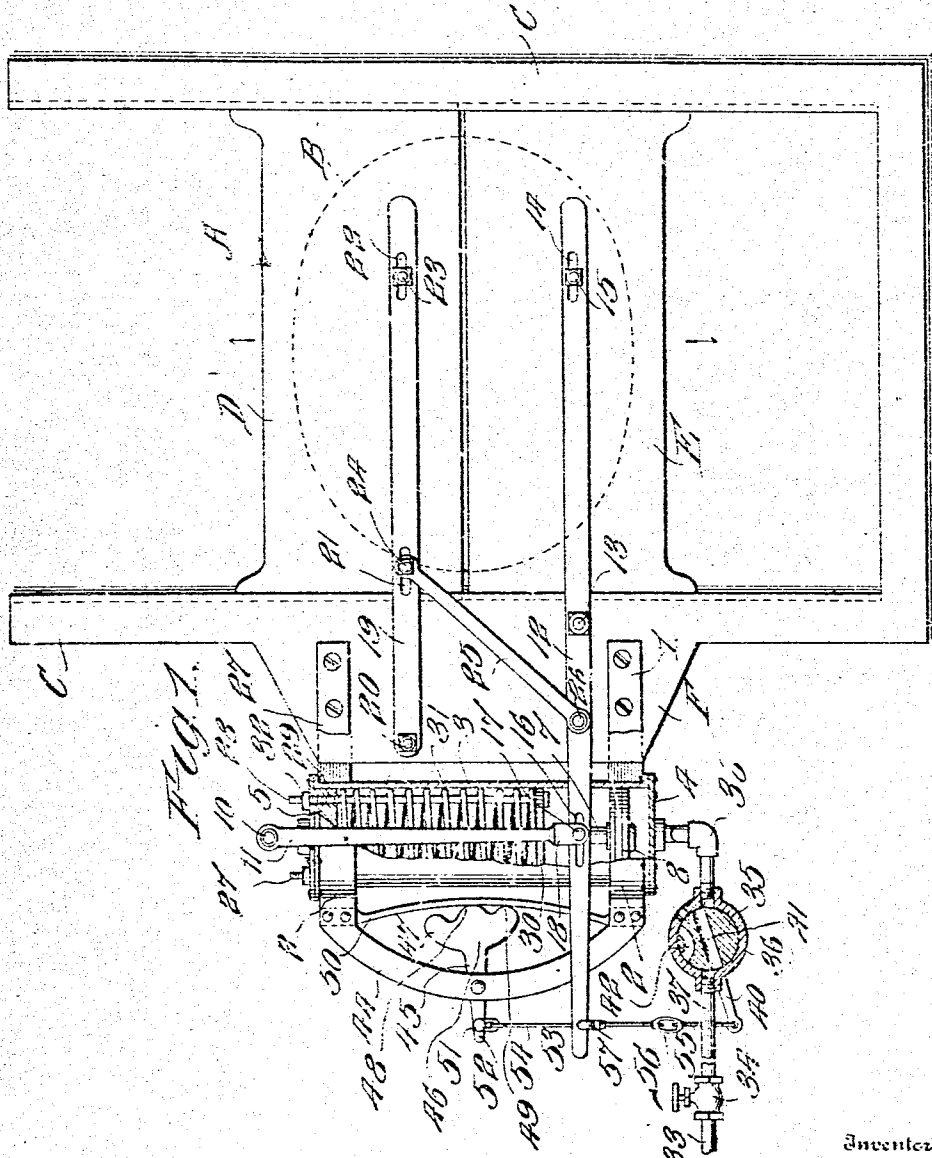


973,051.

Patented Oct. 18, 1910.
 2 SHEETS-SHEET 1.



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Witnesses

Frank Lough

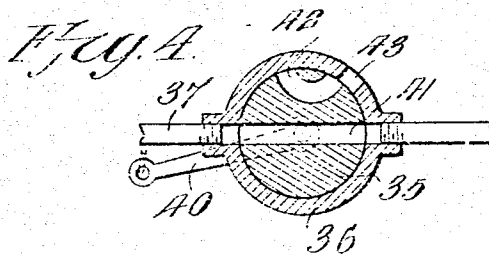
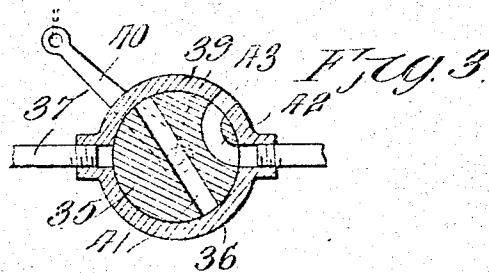
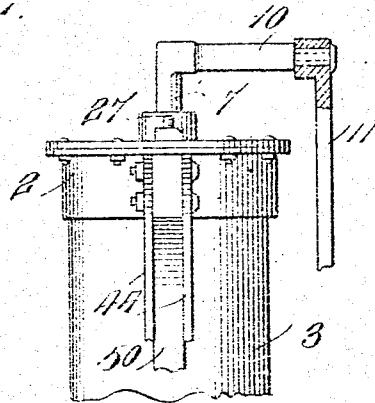
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3 SHEETS-SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

EDWARD C. KING, OF CHARLOTTESVILLE, VIRGINIA.

FIRE-DOOR OPENER.

973,051.

Specification of Letters Patent.

Patented Oct. 18, 1910.

Application filed October 30, 1908. Serial No. 463,279.

To all whom it may concern:

Be it known that I, EDWARD C. KING, a citizen of the United States, residing at Charlottesville, in the county of Albemarle and State of Virginia, have invented new and useful Improvements in Fire-Door Openers, of which the following is a specification.

This invention relates to fire door openers for furnaces and the like, and has for an object to provide means for automatically opening and closing the same, thus enabling a fireman or furnace operator to use both hands in the handling of the shovel.

A further object of this invention is to provide a main air intake valve for controlling air from a suitable reservoir to an automatically operated valve adapted to actuate a sliding piston, which latter is connected with the door operating mechanism.

A further object of the invention is to provide automatically operated means for closing the supplemental inlet valve after the piston has been operated to open the door.

Other objects and advantages will be apparent as the nature of the invention is better set forth, and it will be understood that changes within the scope of the claim may be resorted to without departing from the spirit of the invention.

In the drawings, forming a portion of this specification and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a front view of a furnace door showing the improved opener connected thereto, parts being broken to more clearly illustrate the invention. Fig. 2 is a detail view of the piston cylinder and its rod showing the lever actuating element carried thereby. Fig. 3 is a detail sectional view of the supplemental valve showing the exhaust port in communication with the piston cylinder and its inlet port closed with the intake pipe. Fig. 4 is a view of the valve similar to that of Fig. 3, the valve being in a different position, or full open.

Referring now more particularly to the drawings, there is shown a portion of a furnace wall A having a fire door opening B formed therein, and at each side of the said opening, is a vertical guide member C. It will be seen that the said members C are spaced from each other, and that they receive the ends of door sections D and E. One of the members C has an enlarged portion F formed integral therewith, and se-

cured to the said portion is a pair of horizontally disposed brackets 1. Each bracket is provided with a circular band shaped portion 2, which are disposed directly in a vertical line with each other so that they effectively retain and support a vertical cylinder 3. The said cylinder carries at the lower end thereof a head 4, and at its upper end a head 5 which is somewhat thicker than the former head and is provided with a centrally located passage in which works a piston rod 7 having at its lower end a piston head 8 having its peripheral surface engaged with the walls of the said cylinder. At the upper end, the rod 7 is provided with a stem or pin 10 arranged to lie in parallel relation with respect to the head 5 and the outer end of the said stem or pin pivotally receives the upper end of an element 11. A lever 12 is pivoted midway between its ends to the portion F of one guide member C as shown at 13 and the inner end of the said lever is provided with an elongated slot 14 to receive a bolt or stud 15 extending from the door section E. Outwardly of the pivot point 13, the lever 12 is provided with an elongated slot 16 which receives a pin 17 carried by the lower end 18 of the element 11. A lever 19 is pivoted as shown at 20 adjacent to its outer end to the portion F and is provided with elongated slots 21 and 22, the latter receiving a stud 23 projecting from the door section D and the former receiving the pivot pin 24 at the upper end of a link 25. The said link is disposed normally at an angle as shown in Fig. 1 of the drawings and has its lower end pivoted to the lever 12 as indicated at 26.

Rods 27 and 28 are threaded at their upper ends and are engaged in passages 29 formed in the head 5. The inner portion of the said rods are located within the cylinder 3 and slidably receives a circular head 30 having its peripheral edge engaged with the walls of the cylinder and this head, it may be mentioned, is located normally in spaced parallel relation above the piston head 8. A helical expansion spring 31 is located within the cylinder 3 and has its ends disposed between the heads 5 and 30 and serves normally to hold the latter at the downward limit of its movement. The threaded ends of the rods 27 and 28 receive adjusting nuts 32 adapted for operation to vary the strength or tension of the spring 31.

An air or suitable fluid pipe is shown at

33 and may, as is obvious, be connected to any suitable source of fluid supply, and the said pipe carries a manually operated valve 34. An automatically operated valve is shown at 35 and has a suitable casing 36 in which is secured one end of a pipe 37, the other end being connected to the valve 34, as shown. The casing 36 has also connected therewith a pipe 38 disposed in alignment with the pipe 37 and the said pipe 38 is secured at its opposite end to the lower head 4 of the cylinder 3. The valve 35 is termed a rotary valve and has a stem 39 to which is secured a lever 40, and the said valve is provided with a straight inlet port 41 and an arcuate exhaust port 42, the latter being adapted to register at its ends with the exhaust port 43 in the casing 36 and with the pipe 38 respectively, as shown in Fig. 3. The brackets 1 hereinbefore set forth carry arcuate arms 44 to which a trip element 45 is pivoted having a head 46 provided with projections 47, 48, and 49 adapted to be engaged by a leaf spring 50 secured at its ends to the brackets 1. The element 45 has a pin 51 extending horizontally from its arm 52 and receives the upper end of a rod 53 formed in sections 54 and 55, and as shown, the said sections are connected to each other by a turnbuckle 56 to properly adjust the movement of the lever 40. The section 54 of the rod 53 has mounted thereon a hook 57 to receive the outer end of the lever 12 for a purpose to be hereinafter described.

In operation of the device, it may be stated that the valve 34 is normally closed, and that the port 41 in the valve 35 normally assumes an inclined position as shown in Fig. 1 so that it only slightly registers with the pipes 37 and 38 respectively. In this position of the valves, the lever 12 rests at its outer end in the hook 57 and the piston is at the downward limit of its movement. Assuming the valve 34 to be in an open position, the fluid will be free to travel without restriction until it reaches the valve 35. As this valve initially registers to a slight extent with the piston cylinder and with the fluid pipe 37, fluid beneath the piston will act thereagainst to lift it to a slight extent but sufficient to actuate the lever 12 causing it to be disengaged from the hook 57. Under the tension of the spring 50 the head 46 will then be actuated to operate the valve lever 40 to cause the port of the valve to open in full registration with the piston cylinder and the fluid pipe 37, whereby the increased volume of pressure beneath the piston will act to move the latter rapidly in an upward direction. When the piston comes in contact with the spring pressed head 30 further movement in an upward direction of the piston will be retarded sufficiently to cause the door sections to open

slowly. In upward movement of the piston against the tension of the spring the free end of the lever 12 will be moved into contact with the pin 51, whereby the head 46 will be again actuated to impart the desired rotary movement to the valve 35 to cause its exhaust port 42 to register with the piston cylinder whereby the spent fluid may be conveyed to the atmosphere and the valve 35 and the piston 8 restored to their initial positions. When the lever 12 is in the position shown in Fig. 1 of the drawings its engagement with the hook 57 will be sufficient to hold the head in the position shown but as soon as the said lever is released from the hook the head will be released and the spring will exert its tension to impart the desired movement thereto. As soon as the air is finally exhausted, the lever is thrown downwardly, engaging the hook to the extent that the valve 35 is rotated to cause it to assume a position so that its port 41 lies in its normal inclined position. It will be seen that a novel, simple and inexpensive mechanism is employed that will be automatic in action to open and close the opening B of the wall A. By providing the turn-buckle 56, the sections 54 and 55 can be adjusted or moved toward each other, consequently operating the lever 40 to change the position of the port 41.

I claim:—

In apparatus of the class described, a pair of sliding door sections, a fluid receiving cylinder, a piston in said cylinder, a sliding head located in the cylinder, means for adjusting the head longitudinally of the cylinder toward and away from the piston, spring means for normally holding the head at one limit of its movement, connections between the sliding door sections and the piston, a fluid conveying pipe, a valve casing supported by the pipe and provided with an exhaust port, connections between the valve casing and the cylinder a rotary valve having an exhaust port and provided with a second port, the latter being adapted for registration with the fluid pipe to establish communication between the pipe and the said cylinder, the exhaust port of the valve being adapted to register with the said cylinder and with the port of the valve casing, and an automatically controlled spring actuated trip element operatively connected with the valve to actuate the same and operated in unison with the movements of the door sections.

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

EDWARD C. KING.

Witnesses:

J. H. BUNUSS,
W. W. ROBERTS.