No. 721,302. PATENTED FEB. 24, 1903.

E. O. HENDERSON & J. B. THOMPSON.

FURNACE DOOR OPENER.

APPLICATION FILED FEB. 10, 1902.

NO MODEL.

Fig. 2.

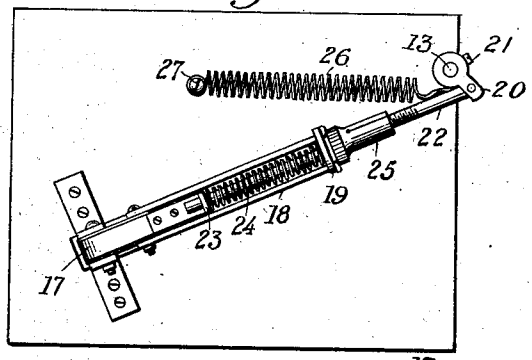


Fig. 1.

Fig. 3.

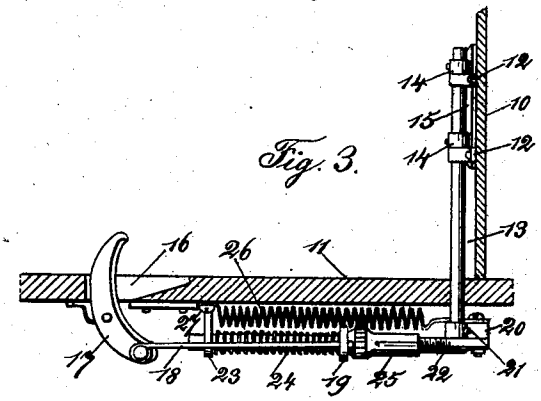
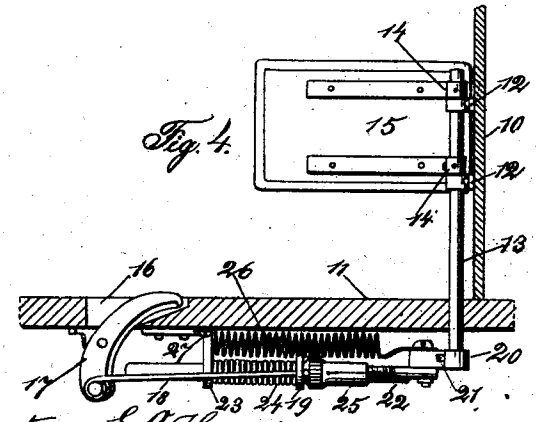


Fig. 4.



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by Orwig & Lane Attys

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UNITED STATES PATENT OFFICE.

ELMER O. HENDERSON AND JACOB B. THOMPSON, OF OKOBOJI, IOWA.

FURNACE-DOOR OPENER.

SPECIFICATION forming part of Letters Patent No. 721,302, dated February 24, 1903.

Application filed February 10, 1902. Serial No. 93,376. (No model.)

To all whom it may concern:

Be it known that we, ELMER O. HENDERSON and JACOB B. THOMPSON, citizens of the United States, residing at Okoboji, in the county of Dickinson and State of Iowa, have invented certain new and useful Improvements in Furnace-Door Openers, of which the following is a specification.

This invention relates to that class of furnace-door openers in which the operator may, by placing his foot upon a lever in the floor in front of the furnace, open the furnace-door, which as soon as the pressure on the lever is released will be closed automatically by a spring.

Our objects are to provide a device of this class in which two springs are provided for the door, one being designed to exert its pressure in a direction tending to open the door and the other in a direction tending to close the door, so that the forces of these springs are opposed to each other; and our object is, further, to provide means for adjusting the tension of the door-closing spring relative to the other one, so that the door-closing spring need only exert that amount of pressure necessary to close the door against the pressure of the door-opening spring, together with the friction of the door and other working parts, to the end that only a minimum of power is required to be applied to the foot-lever for opening the door, and the door will close easily against the furnace-front and without excessive shocks and jars to the door and the furnace-front, and, further, it is our object to provide means by which the door may readily be retained in its opened position.

Our invention consists in certain details in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows in perspective a portion of a furnace-front and a floor with our improvements applied thereto. Fig. 2 shows an inverted plan view of the floor in front of the furnace, showing the door-operating mechanism in position it would assume with the door closed. Fig. 3 shows a vertical sectional view of the furnace-front and floor with our improvements applied thereto and the door shown in its closed position; and Fig. 4 shows a similar view, with a door in its open position.

Referring to the accompanying drawings, we have used the reference-numeral 10 to indicate the furnace-front, and 11 to indicate the floor in front of the furnace. Secured to the furnace-front at one side of the door-opening are the hinge members 12. A shaft 13 is extended through these hinge members, and it extends downwardly through the floor. Fixed to shaft 13 are the hinge members 14, to which the door 15 is attached. The said hinge members 14 rest upon the hinge members 12, and thereby support the door against downward movement.

Mounted in an opening 16 in the floor 11 is a foot-lever 17, which normally projects vertically, and it may be easily moved downwardly by the operator's foot. Attached to the lower end of the foot-lever 17 are the rods 18, a cross-piece 19 connecting the other ends of these rods. A crank 20 is attached, by means of a set-screw 21, to the lower end of the shaft 13, and a screw-threaded rod 22 is pivoted to the outer end of the crank 20, passing through the cross-piece 19, and its other end has bearing in a bracket 23, secured to the under surface of the floor in line between the lever 17 and the crank 20. Mounted upon the rod 22 is an extensile coil-spring 24, one end of which bears upon the bracket 23 and the other end upon the cross-piece 19.

The numeral 25 indicates an internally-screw-threaded sleeve mounted upon the rod 22, with its end engaging the surface of the cross-piece 19 nearest to the crank 20. Obviously by adjusting the sleeve 25 on the rod 22 the tension of the spring 24 may be adjusted.

The reference-numeral 26 indicates a contractile coil-spring attached at one end to the crank 20 and at its other end to a stationary pin 27 on the under surface of the floor 11 in front of the furnace-door.

In practical use and assuming the door to be in its closed position and assuming, further, that it is desired to open the same the operator simply presses his foot upon the lever 17, which at once compresses the exten-

sile spring 24 by drawing the cross-piece 19 toward the spring 24 and away from the sleeve 25. Obviously this may be done by a comparatively light pressure of the operator's foot and without any sudden jar or shock to the operator's foot, such as would be occasioned if the first effect of the pressure of the operator's foot on the lever were to throw the door open at once. Then when the spring 24 is compressed the contractile spring 26 is immediately brought to bear upon the lever 20, with the effect of causing the sleeve 25 to follow the cross-piece 19, thereby opening the door, and that without shock or jar to the door. The downward movement of the lever 17 is limited, and when the lever reaches its limit of movement the door is held in an open position sufficient to permit the operator to fire the furnace through the door. At this point it is obvious that the furnace-door may be placed in a position where it will stand open without the operator bearing upon the foot-lever by simply pushing the door past a dead-center, where it will remain until it is closed, because the crank 20 will have passed a position in line with the rod 22. Assuming, however, that the door had not passed a dead-center, it is obvious that when the operator's foot is removed from the lever 17 the spring 24 will bear against the cross-piece 19 and push the sleeve 25 and will counterbalance the effect of the spring 26, thereby pushing the door shut. This also will be done slowly and without shock or jar to the furnace-door, because after the door closes the strength of the spring 24 diminishes, while that of the spring 26 increases. Obviously the sleeve 25 may be adjusted so that the spring 24 need only have tension enough to slowly close the furnace-door and a comparatively small amount of power is required to depress the lever 17, and my device may be readily, quickly, and easily adapted to a door of any weight or size.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States, is—

1. An improvement in furnace-door openings, comprising a rotatable shaft vertically arranged, a door fixed to the shaft, a crank at the lower end of the shaft, a contractile spring attached to the crank at one end and to a stationary support at its other end in a position to exert its pressure in a direction tending to open the door, a rod attached at one end to the crank and slidingly mounted at its other end, an extensile spring mounted on said rod with one end in engagement with a stationary support, a sliding cross-piece on the rod having the said spring in engagement therewith, an internally-screw-threaded sleeve mounted on said rod to be engaged by said cross-piece for compressing the extensile spring on the said rod.

2. An improved furnace-door opener comprising in combination a rotatable shaft vertically arranged, a furnace-door attached to its upper end, a crank attached to its lower end, a contractile coil-spring attached at one end to the crank and at its other end to a stationary support and exerting its pressure in a direction tending to open the furnace-door, a rod pivoted to the crank, a supporting-bracket for one end of the rod, an adjustable sleeve on the rod, a cross-piece engaged by the adjustable sleeve, an extensile spring between the supporting-bracket and the cross-piece, a foot-lever and rods connecting the foot-lever with the said cross-piece.

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