No. 844,659. PATENTED FEB. 19, 1907.

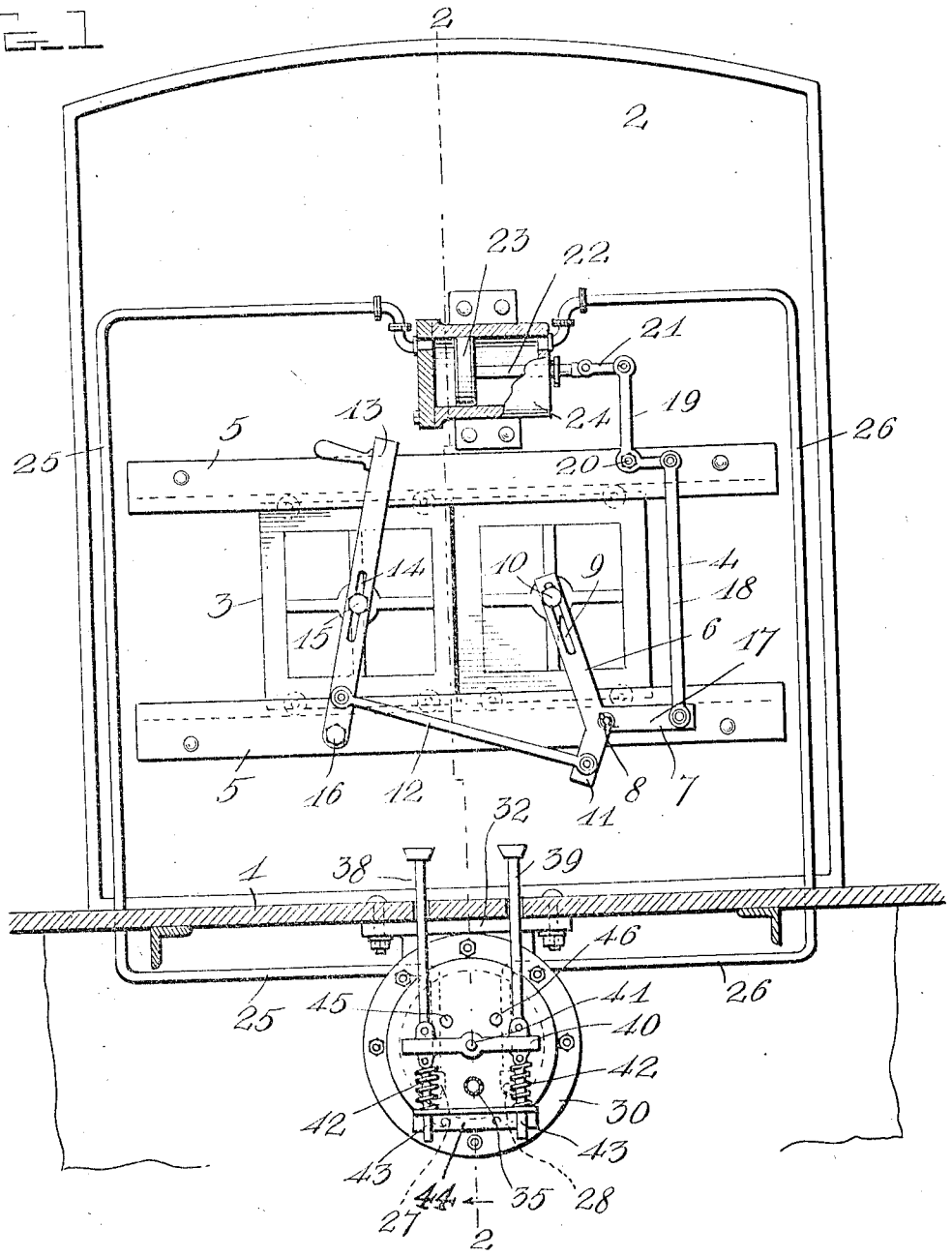
C. W. & H. C. BUTLER.

DOOR OPERATING DEVICE.

APPLICATION FILED MAR. 12, 1906.

2 SHEETS—SHEET 1.

FIG. 1



Witnesses

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2 SHEETS—SHEET 2.

FIG. 2

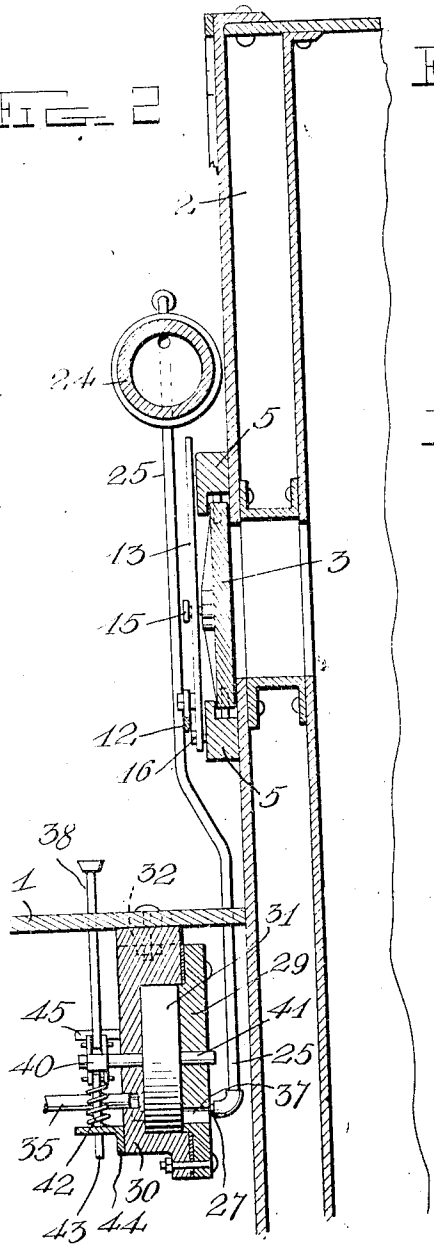


FIG. 3

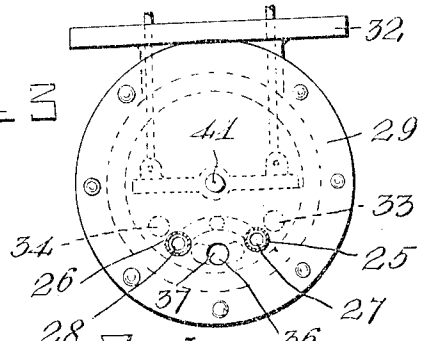


FIG. 4

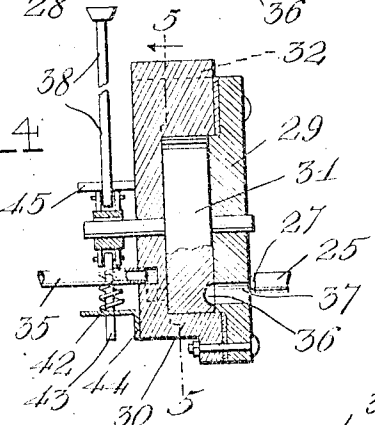


FIG. 5

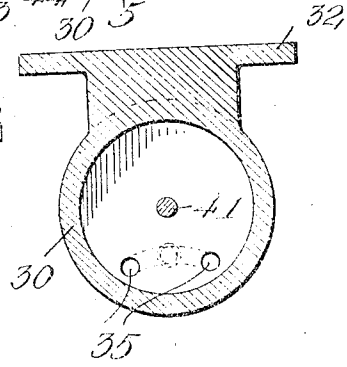
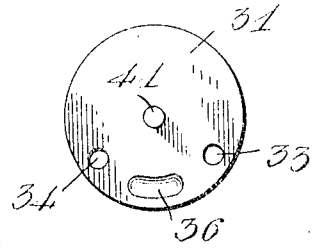


FIG. 6



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES W. BUTLER AND HIRAM C. BUTLER, OF LOUISVILLE, KENTUCKY.

DOOR-OPERATING DEVICE.

No. 844,659. Specification of Letters Patent. Patented Feb. 19, 1907.

Application filed March 12, 1906. Serial No. 305,618.

To all whom it may concern:

Be it known that we, CHARLES W. BUTLER and HIRAM C. BUTLER, citizens of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Door-Operating Devices; and we do 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.

Our invention relates to improvements in door-operating devices, and more particularly to one adapted for use on locomotives for opening and closing the fire-doors by pneumatic or other power.

The object of the invention is to provide a device of this character which will be simple, durable, and comparatively inexpensive in construction and very efficient in operation.

With the above and other objects in view our invention consists of certain novel features of construction, combination, and arrangement of devices, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a detail vertical transverse sectional view through the flooring of a locomotive-cab, showing our improved operating device applied to the furnace-door. Fig. 2 is a detail vertical sectional view taken on the plane indicated by the line 2 2 in Fig. 1. Fig. 3 is a view of the valve-casing. Fig. 4 is a sectional view through the valve and its casing. Fig. 5 is a detail sectional view of the rotary valve, taken on the plane indicated by the line 5 5 in Fig. 4; and Fig. 6 is a detail view of the rotary valve.

Referring to the drawings by numeral, 1 denotes a portion of the deck or flooring of a locomotive-cab, and 2 denotes the head or rear end of the boiler, which usually closes the front of the cab.

Our improved door-operating device may be used upon either swinging or sliding doors; but, as here shown, it is adapted for opening and closing the two sliding doors 3 4, which close the usual fire-door opening in the boiler-head 2. These doors 3 4 slide toward and from each other in upper and lower horizontally-disposed guides 5, arranged upon the boiler-head, as shown. The door 4 is actuated by one arm 6 of a Y-shaped lever 7, which is pivoted, as at 8, upon the boiler-head. The arm 6 of said lever is formed with a longitudinal slot 9 to receive a headed pin or stud 10 upon the outer face of the door 4, so that as the lever 7 is swung the door 4 will slide horizontally in the guides 5. Another arm 11 of the lever 7 is connected by a link 12 to a lever 13, which actuates the other door 3. The lever 13 has a slot-and-pin connection 14 15 with the door 3, similar to the connection just described between the door 4 and the lever 7, and said lever 13 is pivotally mounted, as shown at 16. The third arm 17 of the lever 7 is connected by a link 18 to one arm of a bell-crank 19, which is pivoted at its angle, as at 20, upon the upper portion of the boiler-head 2 and has its other arm connected by a link 21 to a sliding rod 22 of a piston 23, which slides in a cylinder 24. The latter is mounted upon the upper portion of the boiler-head 2 in any suitable manner. The piston 23 is reciprocated in the cylinder 24 to open and close the doors 3 4 by admitting compressed air or other fluid under pressure into the ends of the cylinder upon opposite sides of its piston through pipes or similar connections 25 26. These pipes 25 26 lead to and are connected with nipples 27 28, provided in a removable head or plate 29 on the cylinder-casing 30 of a rotary controlling-valve 31. This valve-casing is disposed beneath the floor or deck 1 of the cab and is formed with an attaching-bracket 32, which is bolted or otherwise secured to said floor, as shown in Fig. 1 of the drawings.

The casing 30 is cylindrical in form, as is also the valve 31, and its open face is closed by the circular plate or head 29, which is bolted or otherwise secured upon an annular flange formed on said casing. The rotary valve 31 is provided with ports or cavities 33 34, which coact with the nipples or casings 27 28 and also with a similar connection 35, provided at the rear of the casing, as shown. The nipple or connection 35 is adapted to have a fluid-supply pipe connected to it, an air-pipe leading from the main reservoir on the engine or locomotive being preferably provided, so that the piston 23 in the cylinder 24 is actuated by compressed air. In the valve 31 is also provided a port or cavity 36, which coacts with the connections 27 28 and also with an exhaust-opening 37, formed in

the cover-plate 29 between the connections or nipples 27 28, as shown.

The arrangement of the ports or cavities 33, 34, and 36 in the valve and the nipples or connections 27, 28, 35, and 37 in the valve-casing is such that when the valve 31 is shifted to one position the compressed air entering through the inlet connection 35 can pass through one of the valve-ports, one of the nipples on the cover-plate, and one of the connecting-pipes between the valve-casing and the cylinder 24, so that its piston 23 will be actuated in one direction to move the doors 3 4 to either an opened or closed position. When the valve is in this position, the air upon the opposite side of the cylinder-piston 23 is permitted to exhaust through the other pipe connecting the valve-casing and cylinder and out of the exhaust-opening 37 in the valve-casing, as will be readily understood. When the valve 31 is shifted to its other position, the compressed air will be admitted into the opposite end of the cylinder, and the doors will be moved in the opposite direction. The valve may be shifted to either of these two positions by depressing either one of two push-rods 38 39, arranged vertically in guide-openings in the floor or deck 1 of the cab. Foot buttons or knobs are provided at the upper ends of these rods, and their lower ends are pivotally connected to a lever 40, which is secured at its center or at a point midway the pivotal connections of said rods, upon the shaft or pivot 41 of the valve 31. This shaft 41 projects through the said valve and the casing 30, as shown. The lever 40 is held in its normal horizontal position by means of coil-springs 42, which surround guide-rods 43 between a plate 44, through which said rods 43 slide, and the under face of the lever 40, to which the upper ends of the rod 43 are pivotally connected. The swinging movement of the lever 40 is limited by two stops 45 46, provided upon the valve-casing, as shown, so that when either of the rods 38 39 is depressed the valve may be shifted to either of its two positions previously mentioned.

The construction, operation, and advantages of the invention will be readily understood from the foregoing description, taken in connection with the accompanying drawings. It will be seen that when one of the push-rods 38 39 is depressed compressed air or other fluid under pressure will pass through the rotary valve, its casing, one of the pipes 25 26, and into one end of the cylinder 24 to actuate the piston 23 in one direction, and thereby shift the doors 3 4 to either their opened or closed position by reason of the lever connections between the piston-rod 22 and said doors. When the other of said push-rods is depressed, the compressed air will be admitted into the opposite end of the cylinder 24, so that the doors 3 4 will be actuated in the reverse direction.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention as defined by the appended claims.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination of doors, means to operate the same, a cylinder, a piston therein having a rod connected to said door-operating means, a valve-casing, pipes leading from said casing to the ends of the cylinder, a rotary valve in said casing to control the admission and exhaust of fluid under pressure through said pipes, a shaft upon said casing, a lever on said shaft, stops to limit the swinging movement of said lever, springs to balance said lever between said stops, and push-rods to actuate said lever in opposite directions.

2. The combination of a valve-casing, pipes leading from said casing, a rotary valve in said casing for controlling the admission and exhaust of fluid under pressure through said pipes, a shaft upon said valve and projecting through said casing, a lever upon said shaft, stops to limit the swinging movement of said lever, springs for balancing said lever between said stops, and push-rods for actuating said lever in opposite directions, substantially as described.

3. The combination of a valve-casing having upon one side a supply connection 35, and upon its opposite sides connections 27, 28, and an exhaust-opening 37, a rotary valve in said casing having ports 33, 34 and 36, a shaft 41 projecting from said valve and through said casing, a lever for actuating said shaft, and stops upon said casing to limit the movement of said lever, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

CHARLES W. BUTLER.
HIRAM C. BUTLER.

Witnesses:
I. M. BUTLER,
THOMAS BRIGGS.