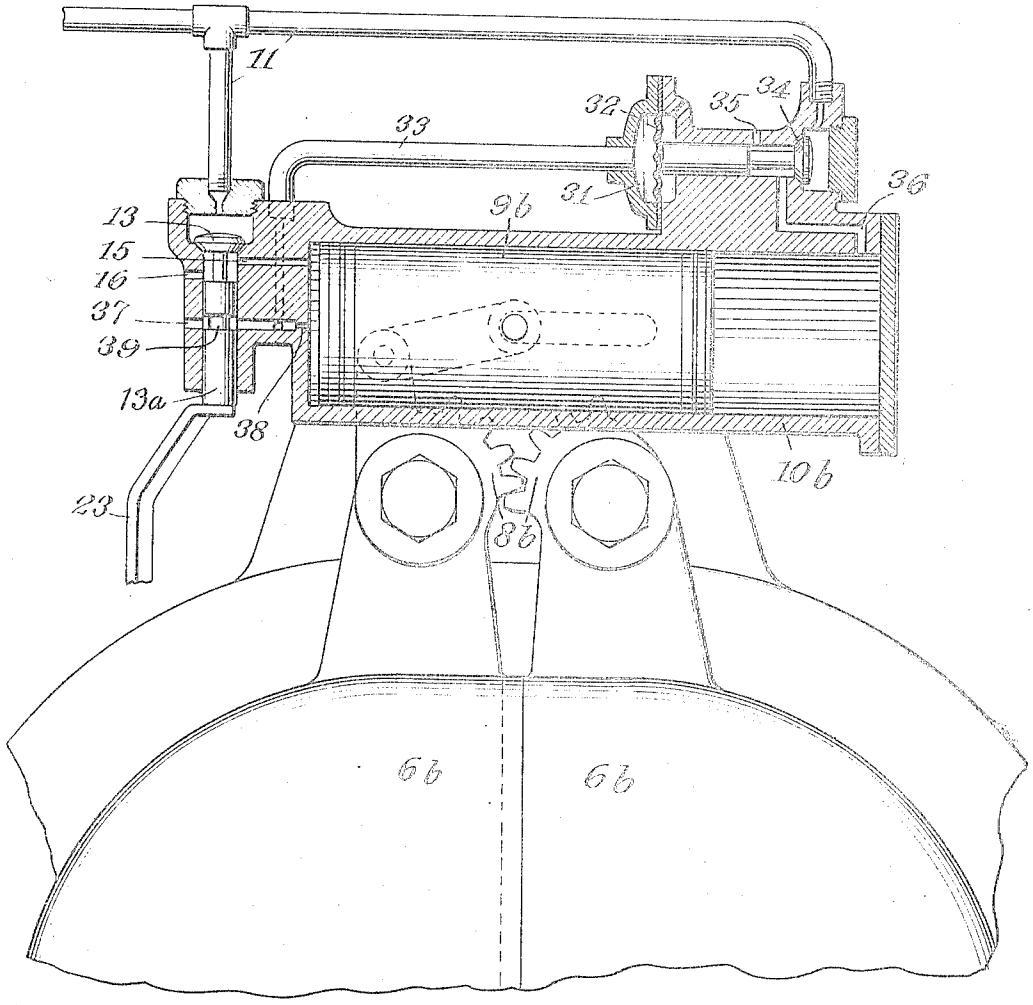
A. G. ELVIN & F. W. MARTIN.

AUTOMATIC CLOSING FIRE DOOR DEVICE.

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1,264,167. Patented Apr. 30, 1918.



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AUTOMATIC-CLOSING FIRE-DOOR DEVICE.

1,264,167. Specification of Letters Patent. Patented Apr. 30, 1918.

Original application filed October 26, 1914, Serial No. 868,611. Divided and this application filed January 22, 1916. Serial No. 73,598.

To all whom it may concern:

Be it known that we, ALBERT G. ELVIN, of Somerville, in the county of Somerset and State of New Jersey, and FREDERICK W. MARTIN, of the borough of Manhattan, in the city, county, and State of New York, have invented a certain new and useful Improvement in Automatic-Closing Fire-Door Devices, of which improvement the following is a specification.

This invention relates to fluid pressure motors for operating certain closures or other devices, and is particularly adapted for use in the opening and closing of fire doors of boiler furnaces, the object being to provide improved means for automatically effecting a positive closing of the fire door within a predetermined interval after the same has been opened, and thereby prevent the fireman from holding the door open for a longer period.

In this fire door apparatus as used on locomotives, the fluid pressure motor for actuating the doors is usually controlled by a valve operated by a pedal device, and it has been the practice of some firemen to hold the foot upon the pedal with the door open a sufficiently long period of time to deliver several shovelfuls of fuel into the furnace. This practice is objectionable, as large drafts of cold air are admitted to the furnace at such times through the wide open door, which tends to cool the fire and chill the water heating surfaces. With our improvement this is positively prevented, as the door will be promptly closed after a predetermined time even though the fireman retains his foot on the pedal.

With this object in view, our improvement comprises, in combination with a fluid pressure motor for actuating the door, an expansion chamber device serving as a timing element in which the pressure increases at a predetermined rate, and upon reaching a certain point, operates to effect a closing of the door at a predetermined time after the opening of the manually operated valve for actuating the motor. This application is a division of our former application Serial No. 868,611, filed October 26, 1914.

In the accompanying drawing, the figure shows, in vertical section, one form of motor and expansion chamber device embodying our improvement, and connected to a pair of fire doors.

Our improvement may be applied to various forms of fluid pressure motors and fire doors, but in the drawing we have illustrated the same in connection with a fluid pressure motor comprising a horizontal cylinder, 10^b, containing a piston, 9^b, having a pin and link connection with one of the doors, 6^b, which doors are provided with intermeshing segmental gears, 8^b, and pivoted to swing laterally and vertically. The doors are opened by admitting fluid under pressure to the working face of the piston, and are normally closed by gravity when said fluid is exhausted to the atmosphere. For this operation a manual valve, such as 13, is provided for controlling the admission of fluid, such as compressed air, from a source of supply, 11, to the inlet port, 15, said valve also controlling the exhaust port, 16.

On locomotive boilers the manual valve is usually operated by a pedal device having an arm, 23, for raising the valve to its open position. According to the usual and proper practice, the fireman steps upon the pedal to raise the valve, and thereby close the exhaust port, and open the admission to supply fluid to the piston to open the doors at the time he delivers a shovelful of coal. He then releases the pedal to close the valve, and open the exhaust port, whereupon the fluid in the cylinder escapes to the atmosphere, and the doors immediately close by gravity. At the time of delivery of the next shovelful, the valve is again raised, and the operation is repeated.

In order to effect an automatic closing of the doors, in case the fireman should retain his foot upon the pedal with the valve in its raised position, we provide a chamber of a given volume, and preferably having a restricted inlet passage through which the fluid flows at the time the manually operated valve is open, and means, such as an auxiliary valve device operated by a given pressure in said expansion chamber for automatically effecting a return movement of the motor, and a closing of the doors at a predetermined time after the opening of the manual valve. As shown in the drawing, the expansion chamber, 31, communicates by pipe, 33, and small port, 38, with the work-

ing end of the cylinder, so that when the manual valve is raised to open the admission port, fluid also flows through port, 38, and pipe, 33, thereby building up pressure in said chamber at a certain rate depending on the capacity of said chamber and the size of said port. The exhaust from said chamber may be controlled by the manual valve, as by exhaust port, 37, and groove, 39, on the valve stem, 13[a].

Various forms of means operated by a given pressure in the expansion chamber may be devised for effecting a return movement of the motor piston and a closing of the doors, that shown in the drawing comprising the diaphragm, 32, subject to the pressure in the expansion chamber, 31, and actuating the valve, 34, for controlling an admission port, 36, for supplying fluid from the pipe, 11, to the opposite end of the cylinder, and an exhaust port, 35.

When the valve, 13, is raised by the pedal device, ports, 16 and 37, are closed and fluid is admitted through port, 15, into the cylinder, where it acts upon the piston, 9[b], moving the same to the opposite end of the cylinder and opening the doors. At the same time fluid begins feeding through the restricted port, 38, and passage, 33, into the expansion chamber, 31. If the pedal device be released at this time, the door will promptly close as the fluid is then instantly exhausted through ports, 16 and 37, and the doors will swing downward by gravity; but if the pedal is retained in its open position with the valve, 13, raised, the fluid pressure in the chamber, 31, acting on the diaphragm, 32, rises, in a short predetermined period of time, to a point sufficient to open the valve, 34, and close exhaust port, 35. Fluid is then admitted through port, 36, to the opposite end of the cylinder, and as the piston is thus balanced as to fluid pressure, the doors descend by gravity to closed position, thereby also returning the piston to its former position from which it will not again be moved until the valve, 13, is first closed and then reopened. Upon closing the valve, 13, the fluid is immediately released from the chamber, 31, through passage, 33, and exhaust port, 37. The valve, 34, then closes, and the exhaust port, 35, opens, so that the fluid is promptly released from both ends of the cylinder, and there will be no movement of the piston.

It is therefore apparent that, with our improvement, the fire doors will be automatically closed within a predetermined short interval of time after the opening of the manual valve even though the fireman retains his pedal device open, thereby insuring what is termed "single shovel firing," or the delivery of but one shovelful of fuel into the furnace at each opening of the door.

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

1. In a fire door apparatus, the combination of a fluid pressure motor, a door, a manually operated valve for controlling admission of fluid to said motor to open the door, and the exhaust therefrom to close the door, an expansion chamber, a conduit having a restricted admission port for supplying fluid to said expansion chamber, and means operated automatically by the pressure in said chamber for providing for a closing movement of the door at a predetermined time after the opening of the manual valve.

2. The combination of a fluid pressure motor, an element operated thereby, a manually operated valve for controlling the admission of fluid to and the exhaust of the same from said motor, an expansion chamber, a conduit having a restricted admission port for supplying fluid to said expansion chamber, and means operated by the pressure in said expansion chamber for providing for a return movement of said motor at a predetermined time after the opening of the manual valve.

3. The combination of a fluid pressure motor, an element operated thereby, a manually operated valve for controlling the admission of fluid to and the exhaust of the same from said motor, an expansion chamber, a conduit having a restricted admission port for supplying fluid to said expansion chamber, and an auxiliary valve operated by the pressure in said chamber for providing for a return movement of said motor at a predetermined time after the opening of the manual valve.

4. The combination of a fluid pressure motor, an element operated thereby, an expansion chamber having a restricted admission port, a manually operated valve for controlling the admission of fluid to said motor and to the expansion chamber, said valve also controlling the exhaust from said motor, and means operated by the pressure in said expansion chamber for providing for a return movement of said motor at a predetermined time after the opening of the manual valve.

5. The combination of a fluid pressure motor, an element operated thereby, an expansion chamber having a restricted admission port, a manually operated valve controlling the admission of fluid to, and the exhaust from, said motor and the expansion chamber, and means operated by the pressure in said expansion chamber for providing for a return movement of the motor at a predetermined time after the opening of the manual valve.

6. The combination of a cylinder and piston, an element operated thereby, a manually operated valve controlling the admission of

fluid to and the exhaust from one side of the piston, an expansion chamber, a conduit having a restricted admission port for said chamber, an auxiliary valve operated by the pressure in said chamber for controlling the admission of fluid to the opposite side of said piston, and means for preventing the escape of fluid from said opposite side of the piston.

7. The combination of a cylinder and piston, an element operated thereby, an expansion chamber, a conduit having a restricted admission port for said chamber, a manually operated valve controlling the admission of fluid to one end of said cylinder and to the expansion chamber, an auxiliary valve operated by the expansion chamber pressure for opening an admission port to the opposite end of the cylinder, and means for preventing the escape of fluid from said opposite side of the piston.

8. The combination of a cylinder and piston, an element operated thereby, an expansion chamber having a restricted admission port, a manually operated valve controlling the admission of fluid to one end of said cylinder and to the expansion chamber, and an auxiliary valve operated by the expansion chamber pressure for controlling the admission of fluid to and the exhaust from the opposite end of the cylinder.

In testimony whereof we have hereunto set our hands.

ALBERT G. ELVIN.
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