

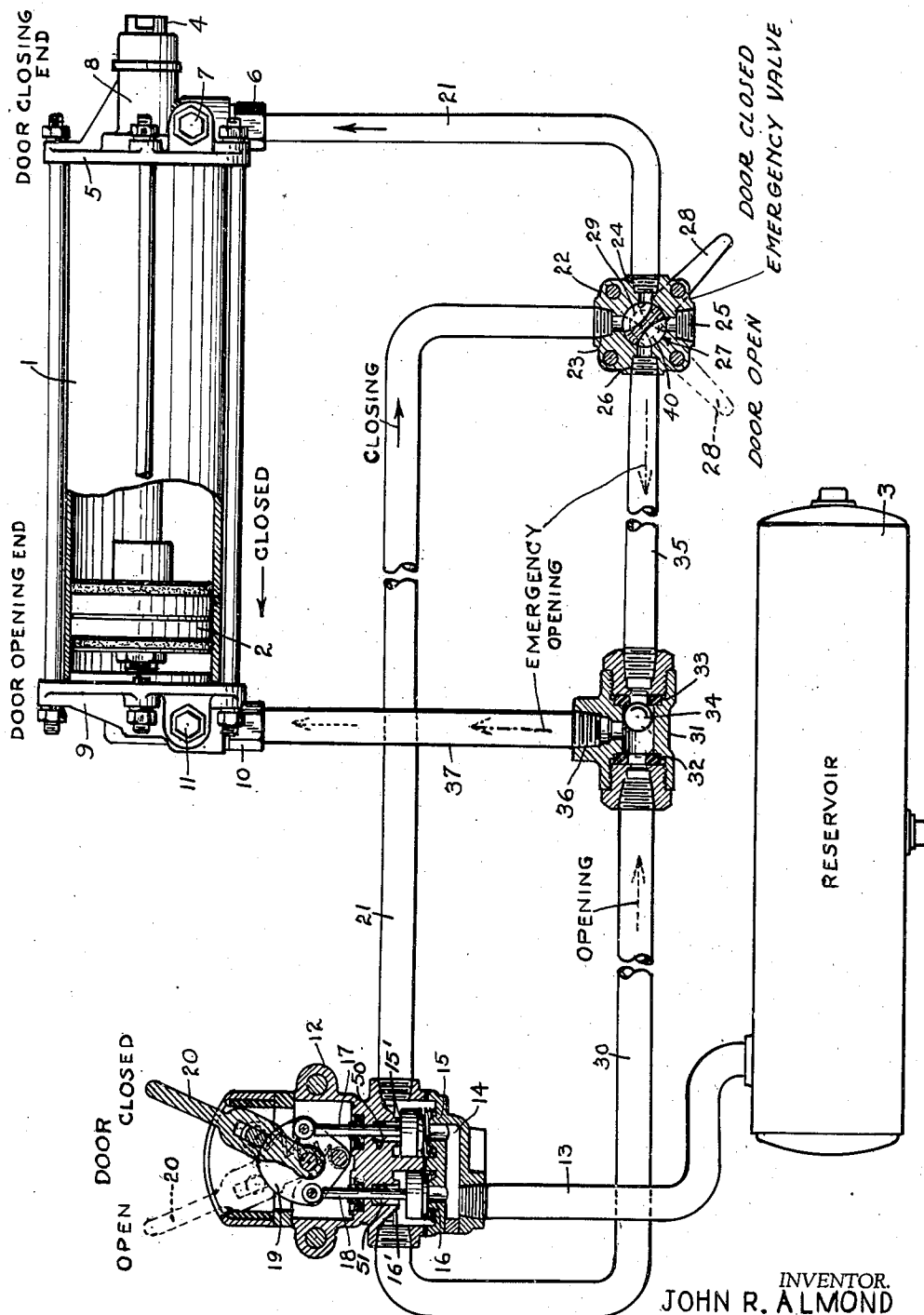
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DOOR OPERATING FLUID MOTOR SYSTEM

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DOOR OPERATING FLUID MOTOR SYSTEM

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This invention relates to door operating fluid motor systems and mechanism, and an important object of the invention is to provide in such a system, an emergency passenger valve whereby a passenger may, in an emergency, operate the system to open the bus doors in a manner that the operator cannot thereafter close the doors from his station until the passenger valve is returned to its normal position which will cause automatic closing of the bus doors and return of the system to the control of the operator at his control station.

In cases of emergencies, as when the bus operator is not in control of the bus and it becomes necessary for passengers to leave or escape from the same, the system provides an emergency valve which the passenger can operate at a point near the doors to open the same independently of any action of the operator; the arrangement being such that the emergency valve must be returned to its normal position before the doors can again be closed or operated from the operator's station, thereby assuring that the bus doors will not be operated until the bus driver walks to a point adjacent the doors and sees that everything is in order before resetting the emergency valve so that the doors can then be closed by the operator and the bus safely moved.

Another object of the invention is to provide a simple double check valve and a three or four-way emergency and manually operated valve which can be readily installed in a standard door operating system with only the addition of a very small amount of piping to the regular system.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawing forming a part of the application and wherein like numerals designate like parts throughout the several views, the single figure represents a more or less diagrammatic showing of the system, with the valves and part of the door engine in section.

Referring now more particularly to this drawing, the numeral 1 designates a door engine cylinder in which a double acting piston 2 is reciprocated at an operator's will by a fluid medium from a reservoir 3 admitted to either end of the door engine cylinder, whenever it is desired to move the piston in the desired direction for opening or closing bus doors of any desired type connected to the piston rod 4 of the double acting piston in any desired manner. The fluid medium in the reservoir 3 may be either higher or

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lower than atmospheric pressure, but in the present illustration of the invention, it will be described as being air under pressure or pressure higher than atmospheric. The right hand end of a cylinder is capped with a closure head 5 having a pipe coupling 6 and the usual pressure regulating valve 7 which controls the inlet and outlet of fluid medium to and from the cylinder to control the speed of movement of the door operating piston, as is well understood in the art. This closure head 5 has an elongated bearing 8 through which the piston rod 4 reciprocates. This end of a door engine will be called the "door closing end" of the cylinder since fluid medium entering the same will cause the piston to move to the left of the Figure to close the bus doors.

The opposite end of the cylinder is closed by closure plate 9 similar to the closure plate 5 and having a pipe coupling 10 and pressure regulating valve 11 associated therewith. This end of the door engine will be called the "door opening end" since admission of the fluid medium under pressure thereto will cause the piston to move toward the right of the Figure to cause opening movement of the bus doors.

In order to direct the fluid medium to either end of the door engine and to exhaust therefrom, a control valve 12 is provided adjacent the driver's seat or control station in the bus. This is a four-way control valve of the snap action type disclosed in my previous Patent No. 2,243,937 granted June 3, 1941. This valve is connected to the reservoir by a pipe 13 which supplies fluid medium under pressure to a common inlet 14, having a pair of valve seats 15 and 16 provided therein. Opposed to and above these seats are a pair of exhaust valve seats 15' and 16'. A double ended door closing valve 17 is adapted to alternately engage the seats 15 and 15' and a corresponding valve 18 for opening the doors is adapted to unseat from the valve seat 16 while being seated upon exhaust seats 16'. These two seats 15' and 16' are ported to the atmosphere through ports 50 and 51 respectively shown behind the valve stems. These two valves are controlled by a spring urged cam 19, operated by a valve handle 20 to alternately open the valve seats 15 and 16 and alternatively close the exhaust seats 15' and 16'.

In order to convey the fluid medium from the control valve 12 to the door closing end of the door engine, door closing pipes 21 extend from the chamber enclosing the control valve seat 15 to the pipe coupling 6 at the door closing end of the door engine. A four-way emergency passen-

ger's valve 22 is interposed between these pipes 21 by connecting two of its ports 23 and 24 therewith. This emergency valve also has two other ports 25 and 26, the former being an exhaust port to the atmosphere. The cock 27 of this valve is provided with an operating handle 28 and two passages 29 and 40, the cock being shown in its full line position communicating the two sections of the door closing pipe 21. Thus, when the control valve 17 is open as shown in full lines in the drawing, the fluid medium passes through the pipes 21 and ports and passages 23, 24 and 29 of the emergency valve and thence into the right hand end of the door engine while the exhaust medium from the left hand end of the cylinder 1 exhausts through either exhaust port 25, or through the open exhaust seat 16' above the closed valve 18.

A door opening pipe 30 is connected to the chamber surrounding the valve seat 16 and to one end of a double acting ball check valve 31 which has a pair of elastic valve seats 32 and 33 in opposite ends thereof. A ball valve 34 is adapted to be moved by the fluid medium to seat on either of the two seats depending upon the pressures existing in the system. The end of the double check valve carrying the seat 33 is connected by an emergency pipe 35 to the port 26 of the emergency valve so that it normally exhausts through the passages 25 and 40 to the atmosphere when the emergency valve is in full line position shown in the drawing. Intermediate the bore of the double check valve housing the ball 34, is a port 36 to which a door opening and emergency pipe 37 is connected, while the other end of this pipe is connected to the coupling 10 of the door opening end of the door engine. The pipes 30 and 37 are jointly considered to be the door opening pipes and thus the double check valve 31 is considered as being in the door opening pipes. The pipes 37 and 35 may be jointly considered the emergency door opening pipes, as when the control valve 20 is in the door closing position and the emergency valve handle 28 is in the dotted line position shown.

The passage of fluid medium through the system is shown by the arrows, the full line arrows designating the path of the medium for closing the bus doors, the dotted line arrows indicating the course of fluid medium for opening the bus doors, while the dot and dash arrows indicate the flow of fluid pressure for an emergency opening of the bus doors. Thus, when the bus is traveling with its doors closed, the pressure of the fluid medium is exercised through the pipe 21 and right hand end of the door engine to move the piston 2 to the left hand end of a door engine, thereby causing the air in the left hand end to exhaust through pipes 37 and 30 into the exhaust port 25 above the valve 16, or these pipes may be of such capacity to house all of the exhaust from the left hand end of the cylinder, or the exhaust may at times be effected through the double acting check valve to the emergency valve for exhausting through the port 25. Should any emergency occur whereby it is desirable for a passenger of the bus to open the doors independently of control by the operator, the passenger has merely to swing the emergency valve handle 28 to dotted line position shown in the drawing which causes passage 30 to communicate the ports 23 and 26 while causing the passage 29 to communicate the ports 24 and 25 to exhaust the right hand end of the door

engine to the atmosphere and cut it off from the pressure of the fluid medium coming from the pipe 21. This switch of the emergency valve causes the fluid medium to then pass from the control valve 12 via the pipe 21 and emergency valve 22 into the emergency pipe 35 in the direction of the dot and dash arrows which causes the ball valve 34 to seat upon the seat 32 thereby directing the fluid medium through pipe 37 in the direction of the dot and dash arrow to pass in to the door opening end of the door engine, thereby moving its piston 2 to the right of the drawing to open the bus doors. Whenever the control valve handle 20 is in the dotted line position shown in the drawing, the valve 18 will be unseated from its seat 16 while valve 17 is seated upon its seat 15 thereby permitting the fluid pressure to pass from the reservoir to the door opening pipe 30, thence moving the ball check 34 to its seat 33 to direct the pressure to the door opening end of the engine through pipe 37, as shown by the dotted line arrows, in which event there is then no occasion for operation of the emergency valve, as the bus doors are already open. As long as the emergency valve is in the position shown in dotted lines in the drawing, no fluid medium can be passed to the door closing end of the door engine by the operation of the control valve as the door closing end of the engine is exhausting through pipe 21 and exhaust port 25. Accordingly, in order for the operator to close the bus doors before moving the bus, it is necessary that he go to the passenger emergency valve adjacent the doors and switch the emergency valve to the full line position before the operator can again manipulate the bus doors from the control station or valve 12.

From the foregoing it is believed that the construction and operation of the system is clear. It will be understood that various changes in the arrangement and relation of parts may be resorted to without departing from the spirit of the invention.

I claim:

1. A bus door operating system comprising a double acting door engine cylinder and piston, a control valve for directing the fluid medium to either end of the door engine cylinder, a door closing conduit connecting the control valve to the door closing end of the engine, an emergency valve in said door closing conduit having passages normally connecting the control valve with the door closing end of the engine, a door opening conduit connecting the control valve to the door opening end of the engine, and a double check valve in said door opening conduit having a connection with said emergency valve which is normally cut off from the double check valve but which automatically opens to said emergency valve in the door opening conduit when the emergency valve is operated to open the doors, irrespective of the position of the control valve.

2. A bus door operating system comprising a double acting door engine cylinder and piston, and a control valve, a door opening conduit and a separate door closing conduit leading from said control valve, an emergency valve connected to both conduits and to the door closing end of said engine, and a double acting check valve in said door opening conduit having a door opening pipe leading to the door opening end of the engine, whereby said double acting check valve automatically connects the door closing conduit with the door opening pipe when the emergency valve switches the flow of medium from the door clos-

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ing conduit to the double acting check valve, said double acting check valve normally permitting the flow of fluid medium to the door opening pipe from said control valve.

3. A bus door operating system comprising a double acting door engine including a cylinder and piston, a door opening pipe and a door closing pipe, a control valve for directing the fluid medium to either the door opening or to the door closing pipe, an emergency valve in said door opening pipe, a double acting check valve in said door opening pipe between the control and emergency valves, the intermediate portion of said double acting check valve being connected to the door opening end of the door engine, and said emergency valve being normally in a position to connect said door closing pipe to the door closing end of said engine and being manually operable to cut off the door closing end of the engine and to switch the fluid medium from the door closing pipe back to said double acting check valve to enter the door opening pipe and end of said door engine, and said emergency valve when in said last named position preventing the fluid medium from entering the door closing pipe and end of the engine.

4. A door operating fluid motor system comprising a double acting door engine cylinder and piston, a four-way two position control valve having a pair of valves each with inlet and exhaust ports adapted to be alternately operated to open or close the doors, a fluid medium reservoir connected to said control valve to supply either of said inlet ports, separate door opening and door closing conduits from said control valve to opposite ends of said cylinder, a double acting check valve included in said door opening conduit, and a two position emergency valve included in said door closing conduit and connected to said check valve to shunt fluid medium from the door closing conduit to said door opening conduit when said emergency valve is shifted to the door open position, the exhaust medium from said door closing end of the cylinder being vented to the atmosphere through said emergency valve.

5. In a door operating fluid motor system, a double acting door engine cylinder and piston, a two position control valve having a pair of valves

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each with inlet and exhaust ports alternately open, a fluid pressure reservoir connected with said inlet ports of the control valve, a double acting check valve, a manually operated two position emergency valve, a door opening conduit connecting said double acting check valve with one of the valves of said control valve and with the door opening end of said engine, a door closing conduit connecting said emergency valve with the other of said valves of the control valve and with the door closing end of said engine, and an emergency conduit connecting said emergency valve with said double acting check valve to shunt fluid medium from the door closing end of said engine to the door opening end of said door engine when said emergency valve is switched to its door opening position from its normal door closed position, and said emergency valve when in its door closed position, admitting fluid medium from the control valve to the door closing end of said engine while exhaust from the door opening end of the engine passes through the door opening conduit to the open exhaust of said control valve.

6. A bus door operating system comprising a cylinder, a double acting piston therein, a control valve, a double acting check valve, an emergency valve, a conduit connecting said control valve through said check valve with the door opening end of the cylinder, a conduit connecting said control valve through said emergency valve with the door closing end of said cylinder and a conduit connecting said emergency valve with said check valve, said last named conduit serving, when the emergency valve is actuated, to divert fluid pressure from said emergency valve into said check valve for opening the door.

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REFERENCES CITED

40 The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
45 1,338,379	Leach	Apr. 27, 1920
1,806,669	Campbell	May 26, 1931
2,243,937	Almond	June 3, 1941