

A. GOTTSCHALK.
MOTOR APPARATUS FOR OPERATING DOORS AND THE LIKE.
APPLICATION FILED AUG. 2, 1912.

1,065,324.

Patented June 17, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

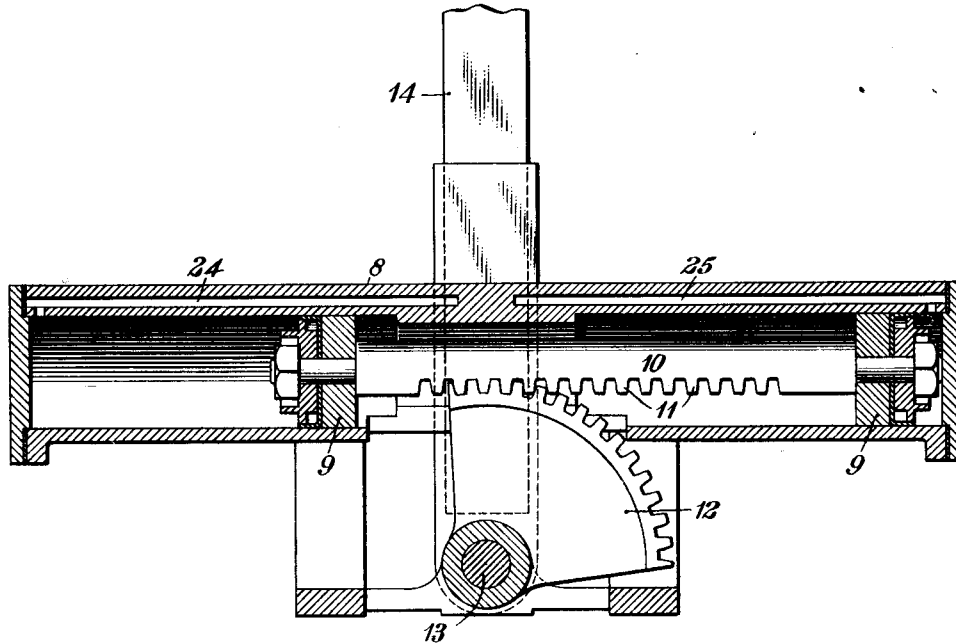
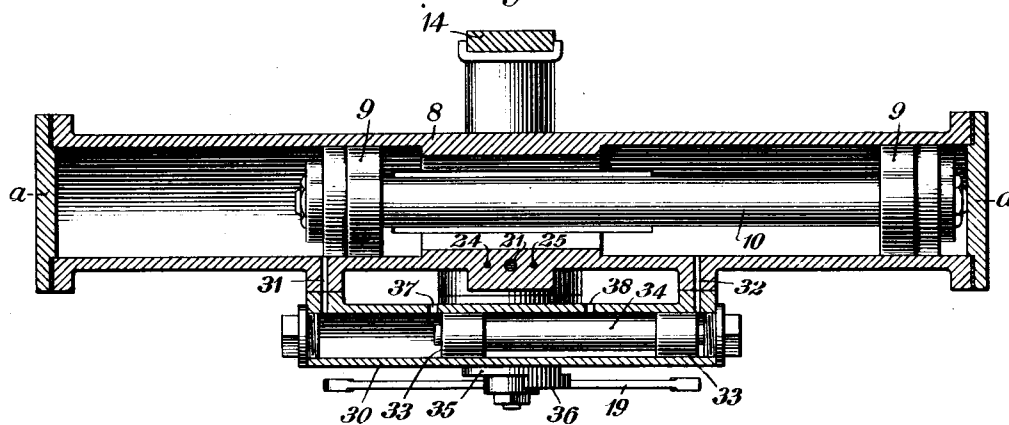


Fig. 2.



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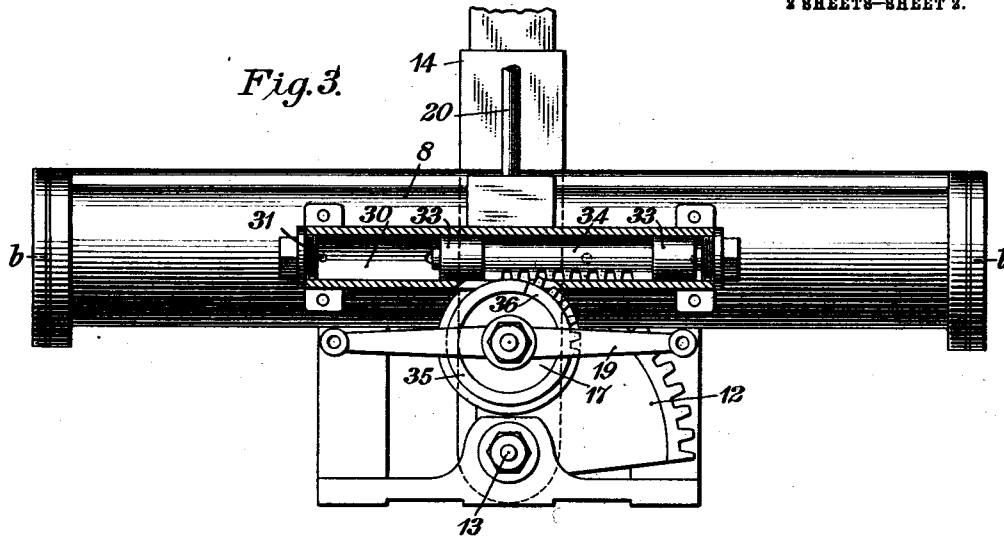


Fig. 5.

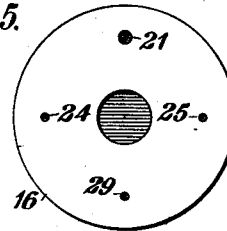


Fig. 4.

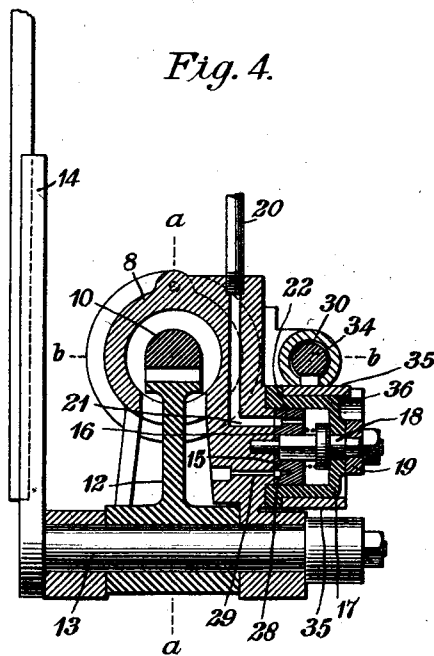


Fig. 6.

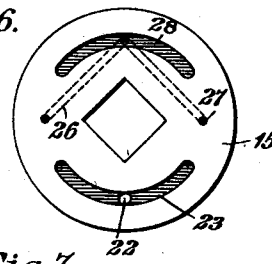
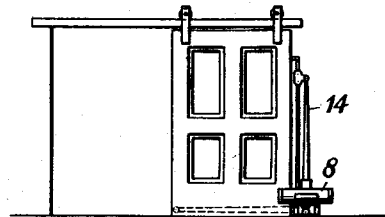


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MOTOR APPARATUS FOR OPERATING DOORS AND THE LIKE.

1,065,324.

Specification of Letters Patent.

Patented June 17, 1913.

Original application filed September 24, 1909, Serial No. 519,432. Divided and this application filed August 2, 1912. Serial No. 712,849.

To all whom it may concern:

Be it known that I, ALBERT GOTTSCHALK, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Motor Apparatus for Operating Doors and the Like, of which improvement the following is a specification.

This invention relates to a fluid pressure device for operating doors, gates, and the like, and particularly car doors such as used in cars of elevated railways, subways, local suburban traffic and electric traction service generally.

One of the objects of my invention is to provide an improved fluid pressure operated device of this character and having means for automatically cutting off all supply of fluid to the motor when the same is moved to either end of its stroke, thereby preventing leakage and waste of fluid during the time that the device stands in either the open or closed position; and another object is to provide improved means for cushioning the movement of the device near the end of its stroke in order to prevent slamming.

This application is a division of my original application Ser. No. 519,432, filed September 24, 1909.

In the accompanying drawing which illustrates a preferred form of construction embodying my improvements, Figure 1 is a vertical section taken on the line *a-a* of Figs. 2 and 4; Fig. 2, a horizontal section taken on the line *b-b* of Figs. 3 and 4; Fig. 3, a side elevation with the valve actuating motor indicated in vertical section; Fig. 4, a central transverse section; Fig. 5, a face view of the valve seat; Fig. 6, a face view of the valve; and Fig. 7, an elevation, on a smaller scale, indicating a preferred location of the motor and its connection to the door.

Various forms of fluid pressure motors may be employed for actuating the door but the construction here illustrated is of a type

having a long cylinder 8 with a double headed piston, the heads 9 being joined by a rod or bar, 10, having rack teeth, 11, adapted to engage the geared segment, 12, on the rock shaft, 13, and operate an arm, 14, which may be connected to move the door in any desired manner, for instance, as indicated in Fig. 7. A valve is employed for controlling the supply of fluid to the respective ends of the cylinder for opening and closing the door, and while any suitable or preferred form of valve may be used in any convenient location, I have illustrated a valve, 15, of the rotary type located on a seat, 16, formed either separate from or integral with the cylinder casing and frame to which a cap section, 17, covering the valve and chamber may be secured. On the valve stem, 18, outside the casing is mounted a lever arm, 19, to the ends of which may be attached pull rods or any suitable form of mechanical or electrical connections extending within reach of the operator who is to control the operation of the door. A supply pipe, 20, leading from a source of fluid pressure such as a reservoir of compressed air, communicates through port, 21, in valve seat and port, 22, in valve, 15, with the valve chamber, the port, 22, having an extension or cavity, 23, in the face of the valve so that the compressed air or other fluid is admitted to the valve chamber in all the positions of the valve. Ports, 24 and 25, lead from the valve seat to the opposite ends of actuating cylinder, 8, for admitting fluid under pressure to open and close the door. The valve is also provided with ports, 26 and 27, communicating with a groove, 28, in the face of the valve and with the exhaust port, 29, in the seat. When the valve is in its normal or lap position, with the handle or lever, 19, horizontal, as indicated in Fig. 3, the supply of fluid to either end of the operating cylinder is cut off, the ports, 24 and 25, being closed. The valve lever is oscillated in one direction for connecting supply port, 22, and groove, 23, with port, 24, and admitting

fluid under pressure to the left end of cylinder, 8, for moving the piston to open the door, and the lever is turned in the opposite direction from its normal or lap position to connect port, 22, and groove, 23, with port, 25, for admitting fluid to the right end of the cylinder for closing the door. In order that the valve may normally occupy its lap position with the supply to either end of the cylinder cut off when the door is in either its open or closed position, and thereby prevent leakage, I provide fluid pressure actuated means for automatically shifting the valve to lap position and thereby cut off the supply of fluid to the motor, when the same has moved to either end of its stroke. Various forms of mechanism for this purpose may be devised, that shown herein comprising a valve shifting motor having cylinder, 30, communicating by ports, 31 and 32, with the door actuating cylinder, and containing a double piston with opposite heads, 33, connected by rack bar, 34, which engages teeth on the oscillating sleeve, 35, mounted on the valve casing and provided with a projection, 36, adapted to engage the valve lever and shift the same to its horizontal position. According to another feature of my improvement means are provided for cushioning the door at either end of its movement by compressing the fluid remaining at atmospheric pressure in the opposite end of the main motor cylinder, and this comprises ports through which the compressed air or other fluid may freely exhaust from the main motor cylinder to the atmosphere, such as ports, 31 and 32, and ports, 37 and 38, in the valve shifting cylinder, and a restricted port, such as exhaust port, 29, in the valve seat, through which the atmospheric air is forced from the cylinder, after piston 9, has cut off ports 31 and 32.

The device then operates as follows: To close the door the operator turns the valve lever to position for connecting ports, 23 and 22, with port, 25, to admit fluid under pressure to right end of cylinder, 8. The piston, 9, then moves toward the left turning segment, 12, shaft, 13, and arm, 14, and thereby moving the door to its closed position. As the piston, 9, passes the port, 31, the air at atmospheric pressure contained in the cylinder, 8, at the left of the piston is forced out through ports, 24, 28 and 29, and as this is a restricted passage the air is compressed sufficiently toward the end of the stroke to retard the movement and form a cushion to prevent slamming of the door. As the piston, 9, reaches the end of its stroke and passes the port, 32, the fluid passes into the right end of the valve shifting cylinder, 30, forcing piston, 33, to the left and thereby turning the sleeve, 35, so that its projection, 36, engages the inclined lever, 19, and

shifts the same with the valve to normal lap position. This cuts off the supply of fluid and opens both ends of the main motor cylinder to the atmosphere through ports, 26, 27 and 29. This prevents any leakage, if there should be any, from accumulating in the cylinder and causing an undesired movement of the door. As the valve shifting piston reaches the end of its stroke it opens port, 38, permitting free exhaust of fluid from the right end of both cylinders. The mechanism then remains in this position until it is desired to open the door, when the operator turns the valve lever to the opposite inclined position in which the ports, 22 and 23, communicate with port, 24, and admit fluid to the left end of cylinder, 8. The action above described is then repeated, the air at the right end being compressed to form a cushion, and the piston, 9, passing port, 31, at the end of its stroke to admit fluid to valve shifting cylinder and actuate piston, 33, to shift the valve back to normal lap position thereby cutting off the supply and opening the outlet port, 37.

The power operating device may preferably be located substantially in position indicated in Fig. 7, in which the operating arm, 14, may be nearly horizontal, as indicated in dotted lines, when the door is in its closed position, and it will then be practically impossible for a person to manually open the door from its closed position, but as the operating arm is nearly vertical in the open position, the door may be readily moved by hand toward its closed position.

While I have described in detail, a preferred construction for obtaining the desired advantages, it is apparent that my invention is not limited to any specific means since various forms of mechanism for performing these functions may readily be devised, all within the spirit and scope of my improvements.

It will be understood that the term "door," as employed herein, includes a gate, switch, or other similar device adapted to be thrown to open and closed positions.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In an apparatus of the character described, the combination with a fluid pressure motor and connecting mechanism, of means governed by the movement of said motor at the end of its stroke for automatically cutting off all supply of fluid to the motor, and opening the exhaust therefrom.

2. In an apparatus of the character described, the combination with a fluid pressure motor and connecting mechanism, of valve means for controlling the supply of fluid to the motor, and means governed by the movement of the motor at the end of its

stroke, but moving independently of the movement of said motor, for positively cutting off all supply of fluid to the motor.

3. In an apparatus of the character described, the combination with a fluid pressure motor and connecting mechanism, of valve means for controlling the supply of fluid to the motor, and means governed by the movement of the motor at the end of its stroke, but moving independently of the movement of said motor, for shifting said valve means to cut off all supply of fluid to the motor.

4. In an apparatus of the character described, the combination with a cylinder, piston and connecting mechanism, of manually operated valve for controlling the supply of fluid to the cylinder, and means governed by the movement of the piston at the end of its stroke for opening an exhaust and for cutting off all supply of fluid to the cylinder.

5. In an apparatus of the character described, the combination with a fluid pressure motor and connecting mechanism, of additional fluid pressure actuated means operating upon movement of said motor to the end of its stroke for automatically cutting off the supply of fluid to the motor.

6. In an apparatus of the character described, the combination with a fluid pressure motor and connecting mechanism, of a valve for controlling the supply of fluid to said motor, and additional fluid pressure actuated means operating upon movement of said motor to the end of its stroke for shifting said valve to closed position.

7. In an apparatus of the character described, the combination with a fluid pressure motor and connecting mechanism, of a valve for controlling the supply of fluid to said motor, and a valve shifting motor actuated by fluid from the main motor to cut off all supply of fluid to the main motor.

8. In an apparatus of the character described, the combination with a fluid pressure motor and connecting mechanism, of a valve for controlling the supply of fluid to said motor, a motor for shifting the valve to its closed or lap position and a port controlled by the piston of the main motor for supplying fluid to said valve shifting motor.

9. In an apparatus of the character described, the combination with a cylinder containing a piston formed with opposite heads connected by a rack bar, a segment and rock shaft operated thereby, and a valve for controlling the supply of fluid to said cylinder, of another cylinder having ports communicating with the main cylinder and containing a piston with opposite heads, a bar connecting said heads, and means operated thereby for shifting said valve to cut off the supply of fluid to the first cylinder.

10. In an apparatus of the character described, the combination with a fluid pressure motor and connecting mechanism, of a valve for controlling the supply of fluid to said motor, a valve casing, a sleeve mounted on the valve casing, and a valve shifting motor for actuating said sleeve to automatically move said valve to lap position.

11. In an apparatus of the character described, the combination with a cylinder, piston, and connecting mechanism, of a valve mechanism for controlling the admission of fluid under pressure to either end of the cylinder, and means governed by the movement of the piston at the end of its stroke, for opening a free exhaust from the admission side, and for automatically cutting off the supply of fluid to the cylinder.

12. In an apparatus of the character described, the combination with a cylinder, piston, and connecting mechanism, of a valve mechanism for controlling the admission of fluid under pressure to either end of the cylinder, means governed by the movement of the piston at the end of its stroke for opening a discharge port, and means actuated by the discharge for shifting said valve to cut off the supply of fluid to the cylinder.

13. In an apparatus of the character described, the combination of a cylinder, piston, and connecting mechanism, a valve for admitting fluid to either end of said cylinder, means for automatically exhausting the fluid from the admission side to the atmosphere at the end of the stroke, and means for compressing the atmospheric air by the movement of the piston in the end of the cylinder opposite the admission and thereby cushion the piston at the end of its stroke.

14. In an apparatus of the character described, the combination of a cylinder, piston, and connecting mechanism, a valve for controlling the admission of fluid to either end of said cylinder, said cylinder having a port for exhausting the fluid from the admission side at the end of the stroke, and a restricted outlet from the end of the cylinder opposite the admission whereby the atmospheric air therein is compressed by the movement of the piston.

15. In an apparatus of the character described, the combination with a cylinder, piston, and connecting mechanism, of a valve for controlling an admission port to either end of the cylinder and a restricted outlet from the opposite end, and means for freely-exhausting the fluid from the admission side to the atmosphere at the end of the stroke of the piston.

16. In an apparatus of the character described, the combination with a cylinder, piston, and connecting mechanism, of a valve for controlling an admission port to either end of the cylinder and a restricted

outlet from the opposite end, and means operated by the pressure of fluid at the end of the stroke for shifting the valve to lap position.

- 5 17. In an apparatus of the character described, the combination with a cylinder, piston, and connecting mechanism, of a valve for controlling an admission port to either end of the cylinder and a restricted

outlet from the opposite end, and a valve 10 shifting motor operated by the pressure of fluid from the main cylinder.

In testimony whereof I have hereunto set my hand.

ALBERT GOTTSCHALK.

Witnesses:

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E. A. WRIGHT.