A. GOTTSCHALK.

DOOR OPERATING MECHANISM.

APPLICATION FILED NOV. 18, 1910.

1,172,519.

Patented Feb. 22, 1916.

2 SHEETS—SHEET 1.

FIG. 1.

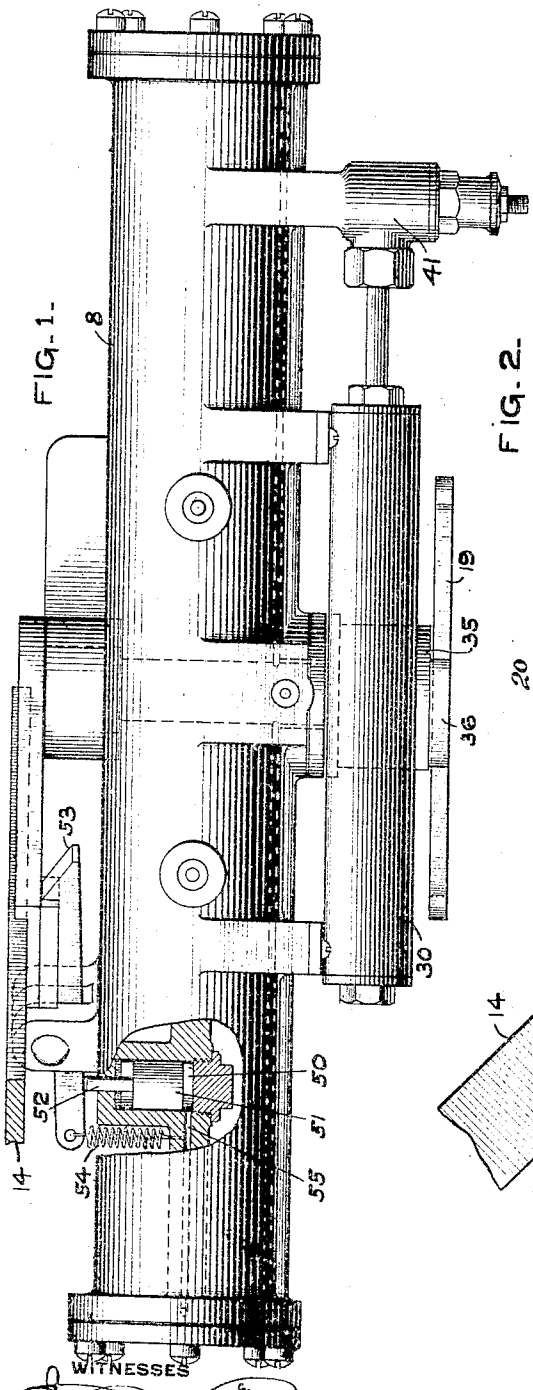
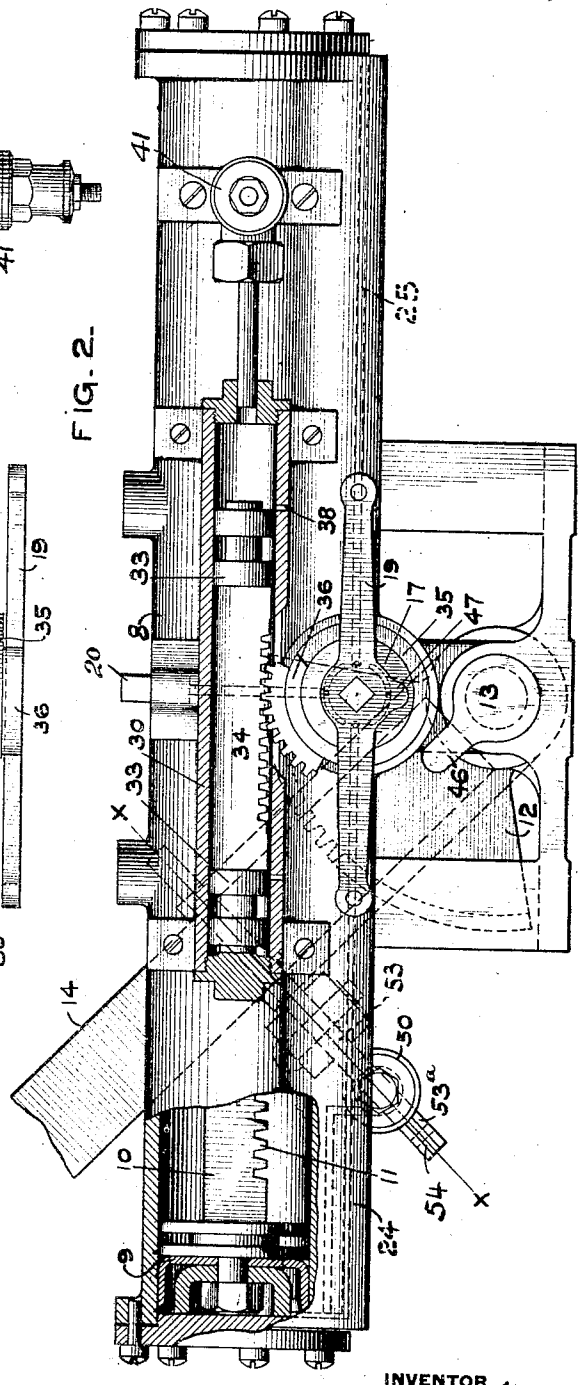


FIG. 2.



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 3.

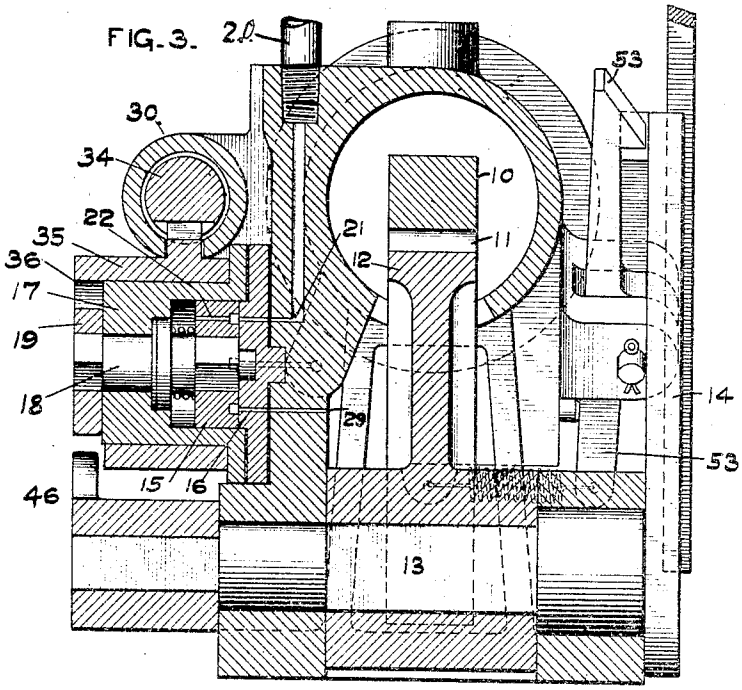


FIG. 4.

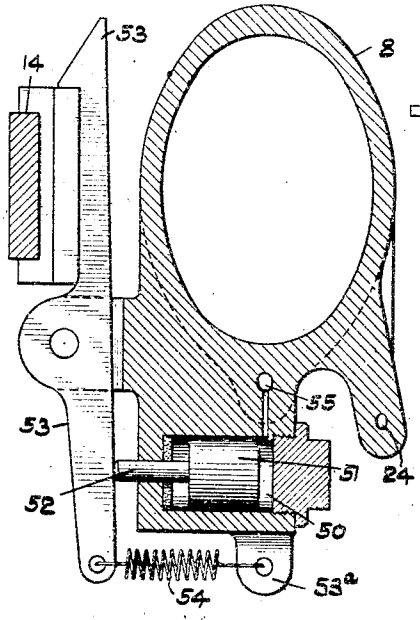
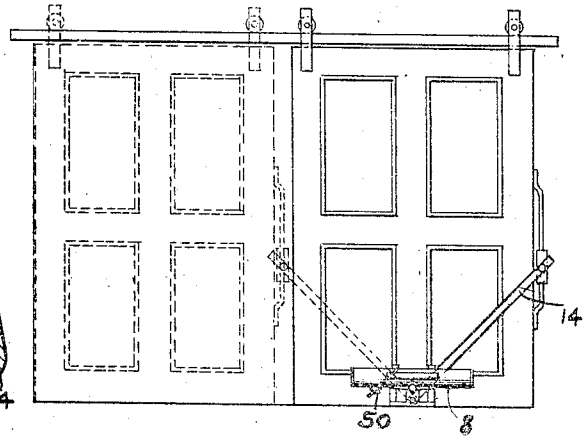


FIG. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

ALBERT GOTTSCHALK, OF NEW YORK, N. Y., ASSIGNOR TO NATIONAL PNEUMATIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

DOOR-OPERATING MECHANISM.

1,172,519. Specification of Letters Patent. Patented Feb. 22, 1916.

Application filed November 18, 1910. Serial No. 593,032.

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 new and useful Improvements in Door-Operating Mechanism, of which the following is a specification.

This invention relates to fluid pressure apparatus, for operating doors, gates and the like, and particularly car doors on elevated railways, subways, local suburban traffic, and electric traction service generally. In this class of service it is desirable that, after the door has been closed by the operator, it should not be opened again except by him, and one of the objects of this invention is to provide an improved means for locking the door or the operating mechanism in the closed position, so that it cannot be opened by passengers or other persons near the door, but so arranged as to be automatically released and permit the opening movement of the apparatus, when the operator actuates the mechanism for that purpose.

Another object of my invention is to so arrange the door operating arm, that when the door reaches a closed or nearly closed position, the arm shall be inclined at such an angle, preferably about forty-five degrees, to the horizontal, that in case a person should be accidentally caught by the door and the power shut off, the door may be readily pushed open to release the person caught.

These and other objects of my invention will more fully appear hereinafter from the following description and claims.

In the accompanying drawings: Figure 1 is a plan of a door operating mechanism showing one form of my improved locking device applied thereto, a portion being broken away to show the locking cylinder in horizontal section; Fig. 2, a side elevation of the same, with portions shown in vertical section; Fig. 3, a central transverse vertical section; Fig. 4, a section taken on an inclined plane indicated by line x x in Fig. 2; and Fig. 5, a diagrammatic view illustrating the position of the motor and operating arm in the open and closed positions of the door.

While my present improvements may be applied to any suitable or preferred construction of door operating mechanism, I have illustrated the same as applied in connection with a fluid pressure door operating mechanism, such as covered in my prior Patent No. 1,065,323, issued June 17, 1913. This mechanism comprises 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.

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 the 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 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 communicating with a groove 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. 2, 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 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 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 means controlled by the movement of the motor piston or door to either end of its stroke for automatically shifting the valve to lap position and thereby cut off the supply of fluid to the cylinder. Various forms of mechanism for this purpose may be devised, that shown herein comprising a valve shifting motor having cylinder 30 communicating by ports 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. In this position the piston head, 33, clears the exhaust port, 38, through which the fluid under pressure may then discharge from the cylinder to the atmosphere. For the purpose of automatically cutting off the supply of fluid to the motor in case the door encounters a person or other obstruction during its closing movement, a valve device, 41, is connected to the motor cylinder near its closing end and is adapted to open under a certain accumulated pressure in said cylinder and admit fluid into the valve shifting cylinder, 30, to shift the valve to its lap position. A cam, 46, on the operating shaft, 13, and a coöperating cam, 47, on the lever, 19, may be employed for automatically shifting the valve when the door is closed manually.

As thus far described, the device corresponds essentially with that of my prior patent above referred to.

According to one of the features of my present improvement, the door operating arm, 14, with its rock shaft, 13, is so arranged as to make substantially the same angle with a horizontal or a vertical line when the door is in its closed position, as when the door is in its open position, as clearly shown in Figs. 2 and 5. This angle is preferably about 45 degrees, so that the actual arc described by the arm in its normal movement would be about 90 degrees, one half of which would be on each side of the vertical position of the arm. This has the great advantage of producing a maximum lineal movement of the door for a given angular movement of the arm, at the same time giving a substantially uniform and rapid movement.

If a person should be accidentally caught by the door, during its closing movement, this arrangement of the operating arm also permits the door to be readily pushed toward its open position, which is not the case where the arm occupies a position nearly, or quite horizontal in the closed position of the door.

When the door is obstructed in its closing movement, by a person or object, the pressure acting upon the piston head, 9, increases sufficiently to open valve device, 41, and admit fluid to the valve shifting cylinder, 30, and thereby move the valve to lap position to cut off the supply of fluid to the main motor cylinder and open the exhaust port, 38, to the atmosphere, as fully set forth in my prior application above referred to. It will be apparent, however, that other means may be employed for this purpose if desired.

In order to lock the door and the operating mechanism, in the closed position, I provide a latch or locking lever, 53, pivoted upon the casing and held in such position by spring 54, as to normally engage the swinging or operating arm, 14, and lock the same in the position shown in Fig. 2. The spring may be attached at one end to the lever, 53, and at the other end to a lug, 53ª, formed upon the casing. This will prevent the door being opened by any person near the door who might endeavor to open it after it had been closed by the operator.

For the purpose of releasing the latch, 53, at the time the operator shifts the lever to admit fluid under pressure to the actuating piston, 9, to open the door, I provide a releasing cylinder, 50, having a piston or plunger, 51, with a port, 55, for connecting the cylinder with admission port, 24, or the end of the main cylinder, 8, so that the pressure will be immediately admitted to piston, 51, which pushes against the lever, 53, and spring, 54, to release the latch and permit the free movement of the operating mechanism and door to the open position.

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

1. In a door operating mechanism, the combination of a vertically swinging arm for actuating the door, a fluid pressure motor for actuating said arm, a spring actuated latch for locking the arm in the closed position of the door, and a piston operated by fluid under pressure to release said latch when fluid is admitted to the main motor to open the door.

2. In a door operating mechanism, the combination of a vertically swinging arm for operating the door, said arm being inclined at an intermediate angle when in its closed position and adapted to swing to substantially the same angle on the other side of the vertical when in its open position, a fluid pressure motor for actuating said arm, a device for locking the arm in its closed position, and fluid pressure means for releasing said locking device.

3. In a door operating mechanism, the

combination of a vertically swinging arm for actuating the door, said arm being inclined at an intermediate angle when in its closed position, and adapted to swing to substantially the same angle when in its open position, a fluid pressure motor for moving said arm, and means operating automatically, when the door is obstructed in its closing movement, to cut off the supply of fluid to the motor.

In testimony whereof I have hereunto set my hand.

ALBERT GOTTSCHALK.

Witnesses:

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