A. S. NOONAN.

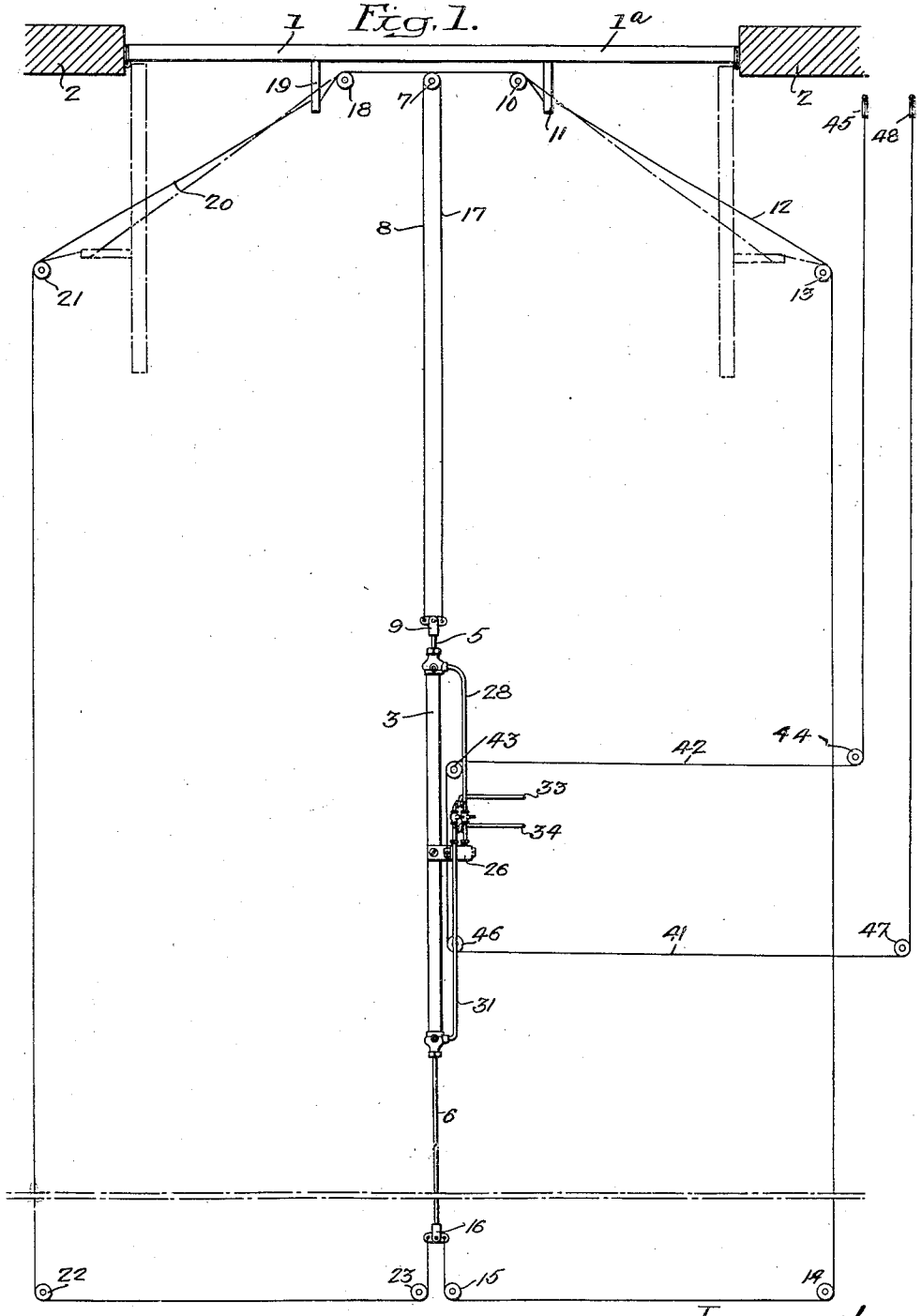
DOOR OPERATING MECHANISM.

APPLICATION FILED JUNE 15, 1918.

1,328,584. Patented Jan. 20, 1920.

2 SHEETS—SHEET 1

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

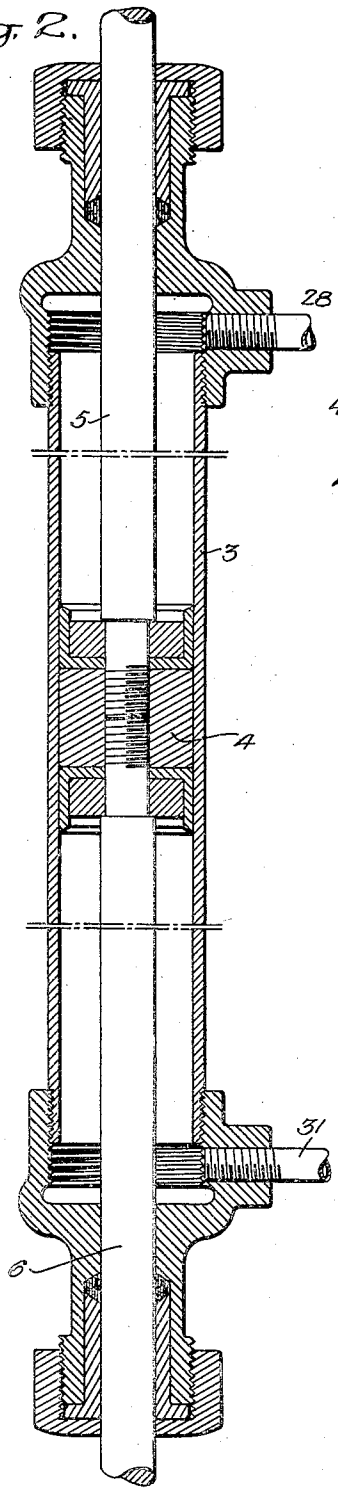


Fig. 3.

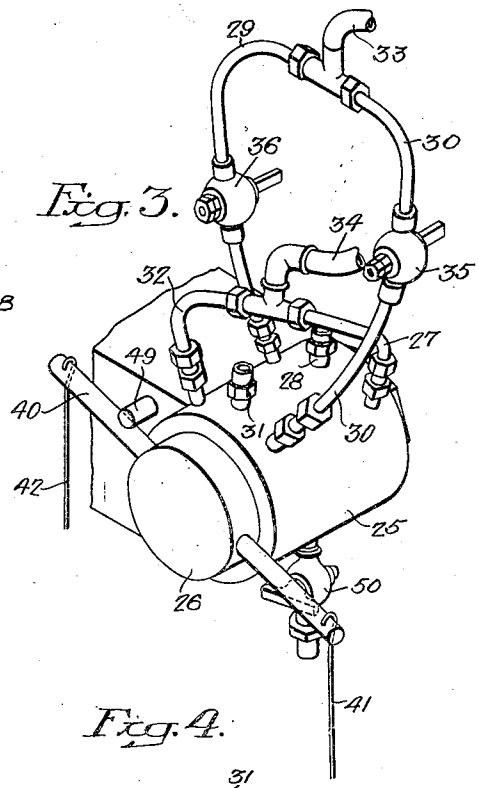


Fig. 4.

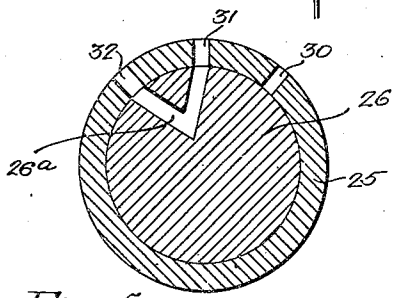
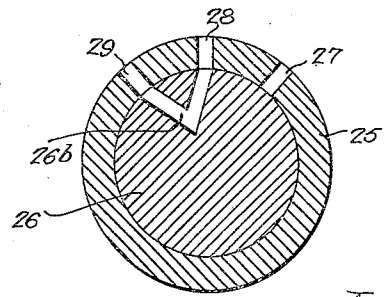


Fig. 5.



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UNITED STATES PATENT OFFICE.

ALBERT S. NOONAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO FOSS-HUGHES COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DOOR-OPERATING MECHANISM.

1,328,584. Specification of Letters Patent. **Patented Jan. 20, 1920.**

Application filed June 15, 1918. Serial No. 240,233.

To all whom it may concern:

Be it known that I, ALBERT S. NOONAN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented Door-Operating Mechanism, of which the following is a specification.

One object of this invention is to provide a relatively simple, inexpensive, substantial and conveniently operated apparatus for mechanically opening and closing relatively heavy swinging doors such as are commonly employed in a garage or factory, the invention contemplating a novel arrangement of fluid actuated motor, controlling means and flexible connections for providing and applying the power necessary to actuate such doors.

These objects and other advantageous ends I attain as hereinafter set forth, reference being had to the accompanying drawings, in which,

Figure 1 is a plan, to some extent diagrammatic and partly in section, illustrating my invention as applied to a pair of swinging doors;

Fig. 2 is a longitudinal vertical section of the preferred form of fluid actuated motor shown in Fig. 1;

Fig. 3 is a perspective view of the preferred form of valve for controlling the operation of the fluid motor; and

Figs. 4 and 5 are transverse sections illustrating the arrangement of the passages in the valve shown in Fig. 3.

In the above drawings, 1—1ª represents a pair of swinging doors hinged to the wall structures 2 in such manner as to be free to turn through angles of substantially 90° from a closed to an open position or vice versa. Supported in any desired manner from the roof or ceiling of the room or building in which the doors operate and preferably immediately adjacent and above a horizontal plane including the upper edges of said doors, is an elongated cylinder 3 having operative within it a piston or plunger 4. Connected to this piston are two oppositely extending rods 5 and 6 passing through the ends of the cylinder respectively, and the latter is provided with stuffing boxes to prevent leakage of fluid under pressure around said rods.

A pair of sheaves or pulleys 7 is suitably supported from the ceiling of the room or building above and immediately adjacent the top of the meeting edges of the doors 1 and a cable or rope 8 passes from a head 9 on the outer end of the piston rod 5, around one of these pulleys and around a second guide pulley 10, to an arm or bracket 11 projecting from the inner surface of the top of the door 1ª. A second rope or cable 12 extends from this same bracket around the guide pulleys 13, 14 and 15 to a head 16 on the outer end of the piston rod 6. A third cable 17 extends from the head 9 around one of the guide pulleys 7 and a pulley 18 to an arm or bracket 19 on the top of the rear face of the door 1, while a fourth cable 20 extends from this same arm around guide pulleys 21, 22 and 23 to the head 16 of the rod 6. The pulleys 13—14 and 21—22 are so placed that tension exerted on the cables 12 and 20 by reason of the movement of the head 16 toward the cylinder 3, causes the doors 1—1ª to turn on their hinges from their closed to their open positions, and similarly, when said doors occupy the latter positions, movement of the head 9 toward the cylinder 3 causes them to be so acted on by the cables 17 and 8 that they move to their closed positions.

For controlling the movement of the plunger or piston 4 and hence of the doors, I provide a valve 24 consisting of a casing 25 having a conical cavity for the reception of a correspondingly formed rotary plug or valve member 26. As shown in Figs. 4 and 5, this latter has in it two passages 26ª and 26ᵇ formed in parallel planes and having their ends opening on its conical surface in positions to coöperate with two sets of ports or passages formed in the casing 25, each of which includes three passages. The passages of one set have respectively connected to them three conduits 27, 28 and 29 and the passages of the other set have likewise connected to them conduits 30, 31 and 32, of which those indicated at 29 and 30 are both connected to an exhaust conduit 33.

Similarly the conduits 27 and 32 are both connected to a conduit 34 leading to a source of supply for fluid under pressure, while the conduit 28 is connected to one end of the cylinder 3 and the conduit 31 is connected to the opposite end thereof. Stop valves 35 and 36 are connected respectively in the conduits 30 and 29 so that either of them may be throttled to any desired extent to cushion the exhaust.

For turning the plug 26 in the casing 25 I provide its externally projecting end with a transverse handle or operating bar 40, which when the valve is placed in an inaccessible position, *e. g.*, immediately adjacent the cylinder 3, may be operated in any desired manner either by power or by hand. In the case illustrated said handle has connected to its opposite ends a pair of wires or cables 41 and 42 guided around pulleys 43—44—45 and 46—47—48 respectively, so that their free ends may be conveniently operated by a person stationed near the doors.

Under conditions of use, if the doors are in their closed positions, movement of the valve member 26 such as will place its passage 26^a in position to connect the conduits 32 and 31 and its passage 26^b in position to connect the conduits 28 and 29, will result in motive fluid, such as compressed air, being delivered from the pipe 34 through the pipe 32 to that end of the cylinder distant from the doors, at the same time that the opposite end of the cylinder is placed in connection with the exhaust pipe 33. The piston 4 is thereupon moved in the cylinder toward the doors and swings them from their closed to their open positions by power transmitted through the rod 6 to the cables 12 and 20;—the movement of the piston being cushioned by adjusting the valve 36 so that the exhaust through the pipe 29 is throttled to any desired extent.

On the other hand, when the movable valve member 26 is so operated as to cause motive fluid to be admitted to the cylinder 3 through the pipe 28 and to place the opposite end of said cylinder in communication with the exhaust pipe 30, the resulting movement of the piston 4 away from the doors causes these to be moved from their open positions, shown in dotted lines, to their closed positions, by power transmitted through the cables 8 and 17. The speed of this movement of the doors is controlled and any objectionable shocks are prevented by adjustment of the valve 35.

A stop 49 is preferably provided to limit the movement of the valve member 26 in one direction and a suitable blow-off cock 50 may be so placed in the casing 25 as to be brought into communication with either of the pipes 28 or 31 through a suitable passage in the member 26 to permit of the escape of water from the system when this is desirable.

I claim:

1. The combination of a pair of doors; a cylinder mounted adjacent said doors and having its longitudinal axis extending at right angles to the plane of the doors when said doors are closed; a piston for the cylinder; a piston rod connected to the piston and extending through both ends of the cylinder; flexible connections between one end of the rod and the doors for closing the latter and other flexible connections between the other end of said rod and the doors for opening the doors; guide pulleys for said connections; and a valve for controlling the admission and exhaust of motive fluid for the cylinder.

2. The combination of a pair of swinging doors; a cylinder adjacent said doors having its longitudinal axis extending at right angles to the plane of the doors when said doors are closed; a piston for the cylinder; two rods connected to the piston and extending through opposite ends of the cylinder; brackets projecting from the upper portions of the doors; flexible connections between one of the rods and the doors for closing the latter and other flexible connections between the other rod and the doors for opening said doors, guide pulleys for said connections; and a valve for controlling the admission and exhaust of active fluid for the cylinder.

In witness whereof I affix my signature.

ALBERT S. NOONAN.