

1,301,757.

P. STEFFES.
DOOR OPERATING MECHANISM.
APPLICATION FILED MAR. 16, 1917.

Patented Apr. 22, 1919.

3 SHEETS—SHEET 1.

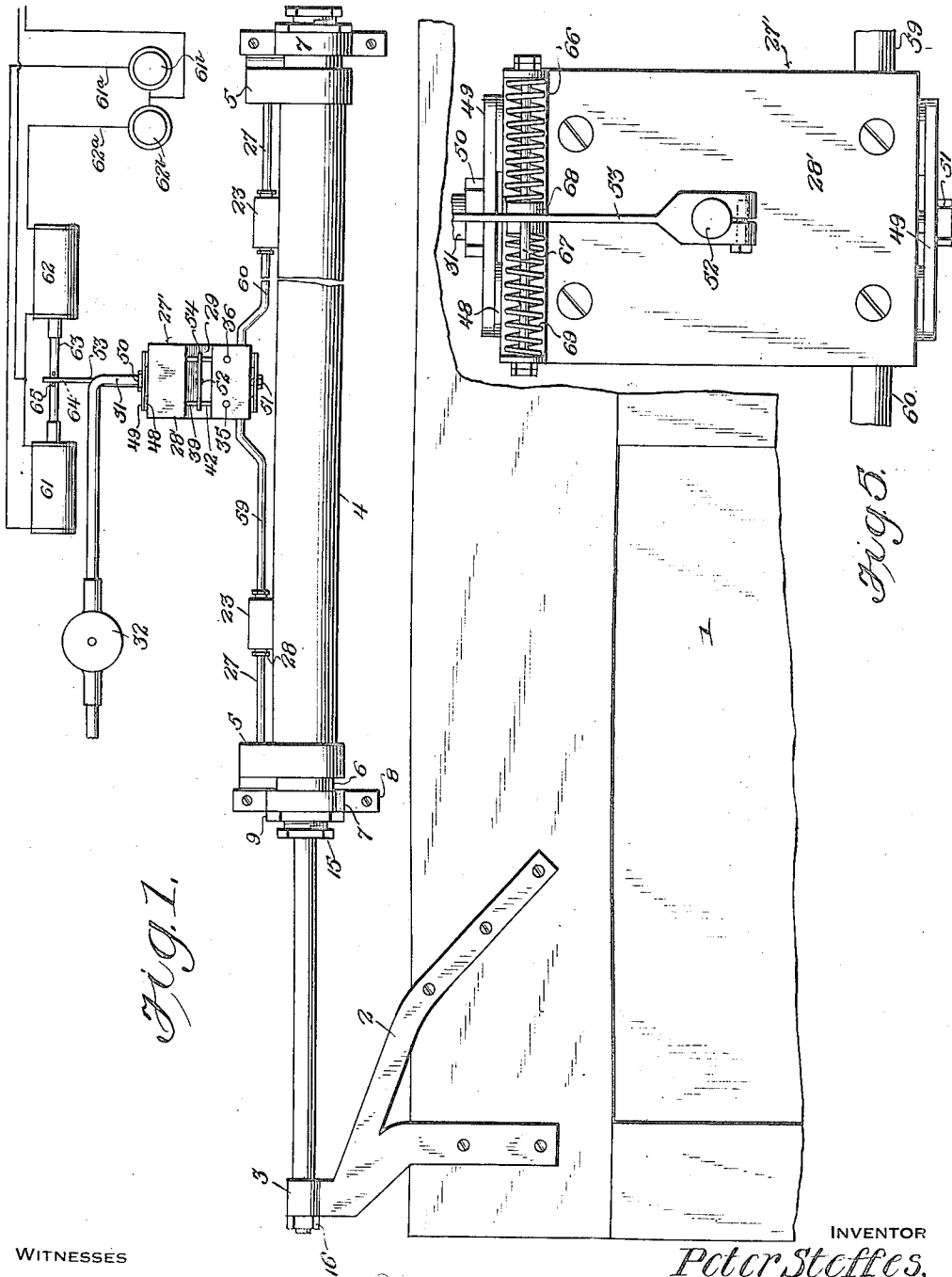


Fig. 1.

Fig. 3.

WITNESSES

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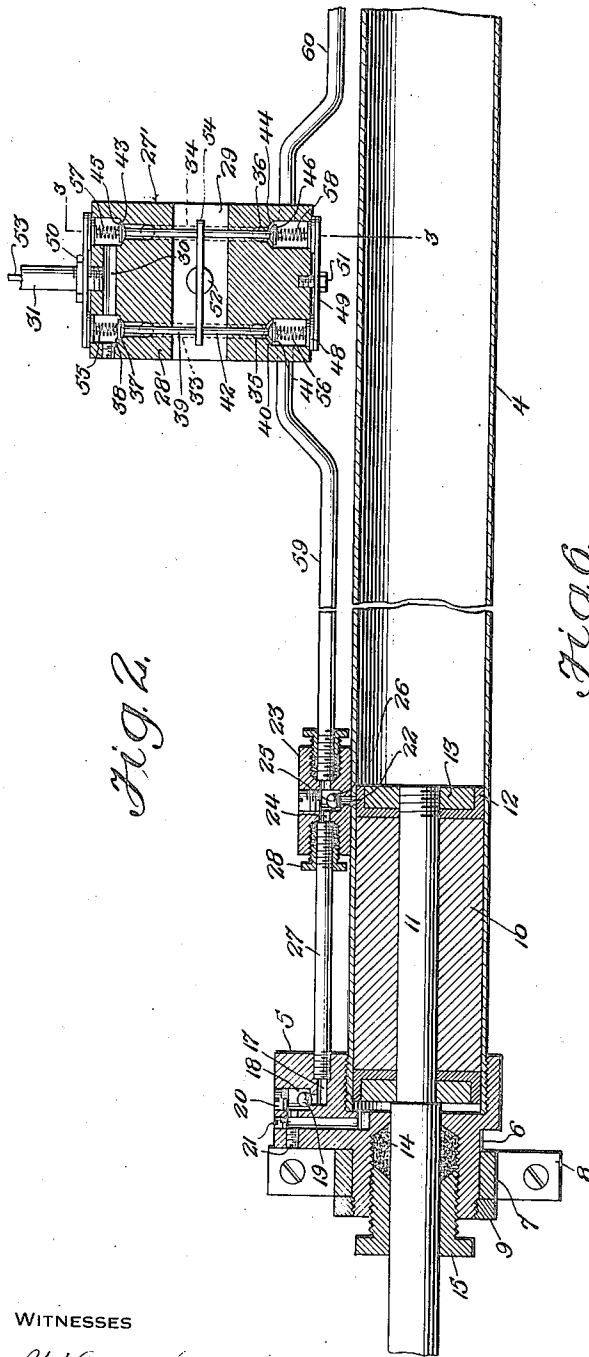
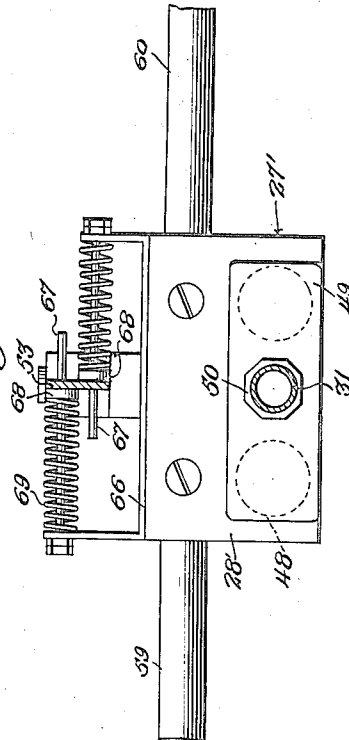


Fig. 2.

Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 4.

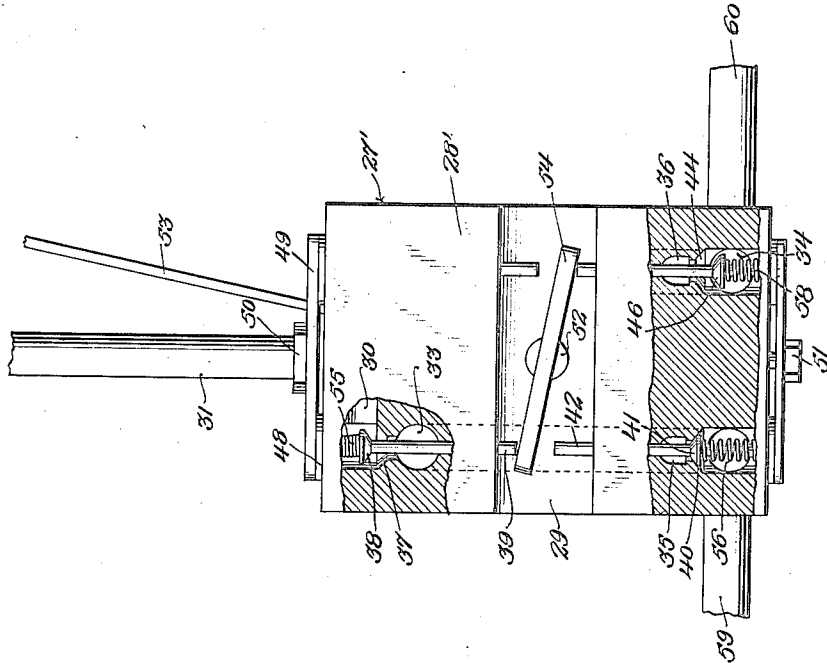
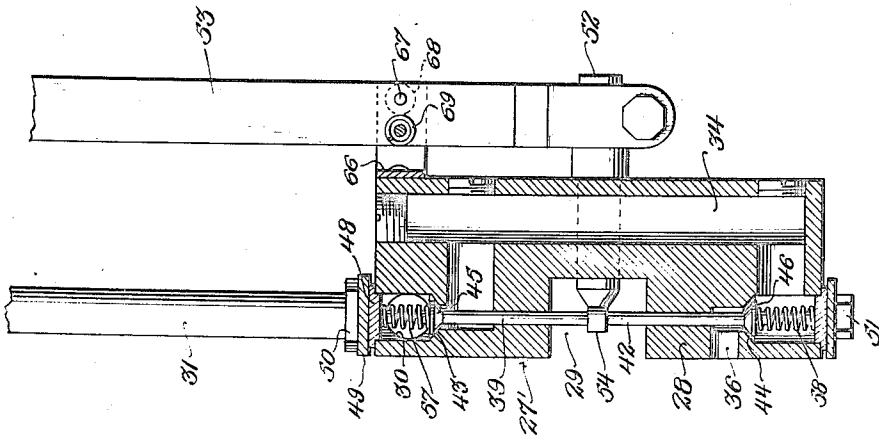


Fig. 3.



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UNITED STATES PATENT OFFICE.

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DOOR-OPERATING MECHANISM.

1,301,757.

Specification of Letters Patent.

Patented Apr. 22, 1919.

Application filed March 16, 1917. Serial No. 155,329.

To all whom it may concern:

Be it known that I, PETER STEFFES, a citizen of the United States, residing at Winona, in the county of Winona and State of Minnesota, have invented new and useful Improvements in Door-Operating Mechanism, of which the following is a specification.

This invention relates to improvements in mechanism for opening and closing heavy sliding doors, gates and the like, one object of the invention being to effect improvements in the construction of the door operating motor to enable the same to automatically check speed of the door as the latter nears the end of an opening or closing movement and prevent the door from striking too hard.

Another object of the invention is to effect improvements in the construction of the operating valve which controls the motor, to enable the door to be manually operated if desired and to prevent the loss of compressed air or other motor fluid by leakage.

Another object of the invention is to provide improved door operating mechanism of this class which is simple in construction, is reliable in operation, and which can be readily installed.

With the above and other objects in view the invention consists in the construction, combination and arrangement of devices hereinafter described and claimed.

In the accompanying drawings:—

Figure 1 is a diagrammatic elevation of a door operating mechanism constructed and arranged in accordance with my invention and showing the same as in use on a door.

Fig. 2 is a vertical longitudinal sectional view of the door operating motor and the controlling valve.

Fig. 3 is a detailed sectional view of the controlling valve on the plane indicated by the line 3—3 of Fig. 2.

Fig. 4 is a detailed elevation of the same, partly in section.

Fig. 5 is a rear elevation of the valve.

Fig. 6 is a plan of the same.

For the purposes of this specification a sliding door, indicated at 1 in Fig. 1 and provided with a bracket 2 which has an upwardly extending arm 3, said arm being provided with an opening. The door operating motor has a cylinder 4 which is arranged horizontally above the door and is attached to the wall. Said cylinder has heads 5 screwed to the ends thereof each head

having a reduced cylindrical portion 6 which passes through an opening in a wall bracket 7. Each wall bracket has a base 8 secured as by means of screws, bolts or the like to the wall above the door. Said brackets securely fasten and hold the cylinder in place as will be understood. Clamping nuts 9 are screwed on the outer ends of the portion 6 of the cylinder heads and bear against the outer sides of the brackets 7. A piston 10 is arranged for reciprocatory movement in the cylinder and is secured to the inner end of a piston rod 11, said rod extending through the piston and cupped piston leathers 12 being provided which are arranged at the ends of the piston and have central openings through which the rod 11 passes. A nut 13 is screwed to the inner end of the piston rod and serves to hold the piston and the cupped piston leathers in place. The piston rod passes through one of the cylinder heads and said cylinder head has a packing chamber 14 and a packing gland 15 threaded therein. The outer end of the piston rod is reduced and passed through the opening of the bracket arm 3 and is provided with a securing nut 16. Each cylinder head has a duct or passage 17 communicating with one end of the cylinder and having an intermediate vertical portion provided with a seat 18 for an inlet check valve 19 which is here shown as a ball valve. A screw plug 20 affords access to the valve and its seat and the outer ends of the bores which form the said duct are permanently closed by suitable plugs 21 which are here shown as screw plugs.

The cylinder is provided at a suitable distance from each end with a port 22. Blocks 23 are secured on the cylinder at points opposite the ports 22, each block having a duct 24 extending longitudinally there-through and also having an exhaust check valve 25 arranged to close downwardly in a seat 26 which establishes communication between said duct and the port 22. Pipes 27 connect the ducts 17 and 24 and are provided at their ends with compression couplings 28 which are screwed in threaded enlargements of said ducts.

When the piston is moved in either direction by compressed air or other motor fluid supplied through one of the inlet ducts 17, to operate the door, the check valve 19 opens to permit the motor fluid to enter the required end of the cylinder during the major

portion of the movement of the piston. The valve 25 near said end of the cylinder remains closed. The corresponding valve near the opposite end of the cylinder opens to
 5 permit exhaust, as will be understood. As the piston nears the end of its stroke it closes the port 22 to cut off further exhaust and hence compresses air in said end of the cylinder, thus checking the movement of the
 10 piston and preventing the door from striking too hard.

I will now describe the controlling valve which controls the operation of the motor. This controlling valve is indicated as an entirety by the numeral 27. A block 28 forms
 15 the body of the controlling valve and has a transverse channel 29 in one side. Near its upper end said block has a transverse duct 30 to which a pipe 31 is connected, said pipe
 20 leading from a suitable compressed air reservoir and being provided with a pressure reducing valve 32. Ducts 33, 34 lead respectively from the duct 30 and respectively terminate in exhaust ports 35, 36. The duct
 25 33 has a seat 37 for an upwardly opening vertically movable inlet valve 38 which has a downwardly projecting stem 39 and said duct also has a seat 40 for an upwardly closing exhaust valve 41 which has an upwardly
 30 extending stem 42. The duct 34 has corresponding seats 43, 44 for similarly constructed and arranged inlet and exhaust valves 45, 46 respectively the stems of which, like the stems of the valves 38, 41 extend into
 35 the channel 33. Plugs 48 close the ports which lead to the valve seats and are firmly secured against leakage of compressed air by bars 49. One of said bars is held in
 40 clamped position on the pipe 31 by a nut 50. The other bar is held in clamped position at the lower end of the plug by a bolt 51.

A rock shaft 52 is mounted in a bearing in the block and is provided at the outer end with a lever 53 and at the inner end,
 45 which extends into the channel 33, is provided with a rock arm 54 the ends of which extend in opposite directions from said rock shafts, said rock arm being arranged in the channel 33 and having one end between the
 50 stems of the valves 38, 41 and the other end between the stems of the valves 45, 46. Springs 55, 56, 57, 58 are respectively provided for the valves 38, 41, 45, 46, said springs serving to normally close the valves.
 55 The lever 53 is normally in vertical position so that the rock arm 54 is normally in horizontal position and the exhaust valves 41, 46 are therefore normally open, thus permitting the door to be manually operated if desired.
 60 A yoke 66 is arranged on the side of the valve block opposite the channel and is provided at its ends with guide openings for a pair of reversely arranged rods 67 each of which passes through an opening in the
 65 valve lever and has a stop 68 which bears

against one side of the valve lever. Counteracting springs 69 are arranged on said rods and serve to normally hold the lever in vertical, neutral position, with the inlet
 70 valves closed and the exhaust valves open.

The ducts 33, 34 of the valve block are connected by pipes 59, 60 respectively with the ducts 24 of the blocks 23 near the opposite ends of the motor cylinder 4. It will be understood that when the lever 53 is turned
 75 in either direction one of the inlet valve members of the controlling valve will be opened and the exhaust valve directly under same will be closed and the exhaust valve on the other side will be opened so that
 80 compressed air will be taken in at one end of the motor cylinder and exhausted from the other end thereof and the door moved in the required direction, according to the direction of movement of the valve lever 53.
 85

To operate the valve lever 53 I provide a pair of solenoids 61, 62 having a common core bar 63 which passes through a notch 64 in the free end of the lever and is provided with stop studs 65 at opposite sides of said
 90 lever so that the lever is connected to the core bar for operation thereby when either of the solenoids is energized. The solenoids are respectively connected in shunts 61^a, 62^a with the terminals of an electric circuit, said
 95 shunts being respectively provided with circuit closing buttons 61^b, 62^b so that either of the solenoids can be energized by pressing the appropriate button, to cause the motor to open or close the door as desired.
 100

While I have herein shown and described a preferred form of my invention, I would have it understood that changes may be made in the form, proportions and construction of the several parts without departing
 105 from the spirit of my invention and within the scope of the appended claims.

Having thus described my invention, what I claim is:—

1. In combination with a cylinder and a
 110 piston arranged for reciprocating movement in the cylinder, a controlling valve having motor fluid connections with the ends of the cylinder, and also having an inlet valve and an exhaust valve for each of
 115 said connections, means to normally close each inlet valve, normally restraining means tending to close each exhaust valve, and means to simultaneously open the inlet valve of either of said connections and permit the closing of the exhaust valve thereof.
 120

2. A cylinder having a duct leading to each end, an exhaust port spaced from each end and leading to one of said ducts, a check valve in each duct and a check valve for
 125 each exhaust port, and a piston arranged for reciprocating movement in the cylinder and of such length as to close one of the exhaust ports when approaching either end of the cylinder, in combination with a con-
 130

trolling valve having motor fluid connection with said cylinder ducts, said controlling valve comprising an inlet valve and an exhaust valve for each of said connections, means to normally close each inlet valve, normally restraining means tending to close each exhaust valve, and means to simultaneously open the inlet valve of either of said connections and permit the closing of the exhaust valve thereof.

3. In a motor of the class described, a cylinder having a duct leading to each end, an exhaust port spaced from each end and leading to one of said ducts, a check valve for each exhaust port, and a piston arranged for reciprocating movement in the cylinder and of such length as to close one of the exhaust ports when approaching either end of the cylinder, in combination with a controlling valve comprising a body having motor fluid connections with said ducts, inlet and exhaust valves in said connections, springs normally closing said inlet valves, springs normally tending to close said exhaust valves and means to simultaneously open the inlet valve of either of said connections

and permit the closing of the exhaust valve thereof.

4. In a motor of the class described, a cylinder having a duct leading to each end, an exhaust port spaced from each end and leading to one of said ducts, a check valve for each exhaust port, and a piston arranged for reciprocating movement in the cylinder and of such length as to close one of the exhaust ports when approaching either end of the cylinder, in combination with a controlling valve comprising a body having motor fluid connections with said ducts, inlet and exhaust valves in said connections, springs normally closing said inlet valves, springs normally tending to close said exhaust valves and means to simultaneously open the inlet valve of either of said connections and permit the closing of the exhaust valve thereof, and means to normally hold said valve operating means in neutral position with the inlet valves closed and the exhaust valves open.

In testimony whereof I affix my signature.

PETER STEFFES.