

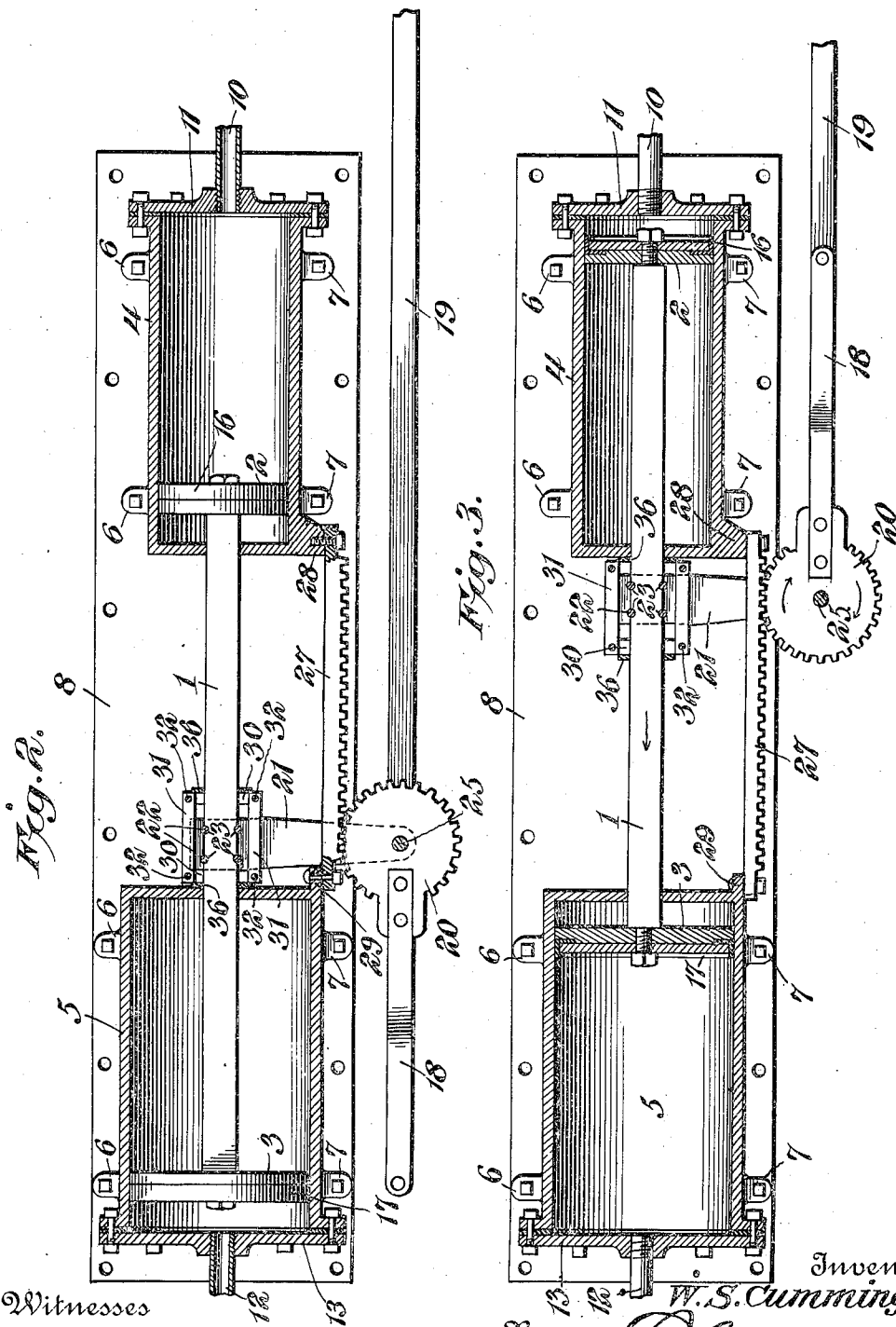


W. S. CUMMING.  
 DOOR OPERATING MECHANISM.  
 APPLICATION FILED MAR. 3, 1910.

1,000,784.

Patented Aug. 15, 1911.

2 SHEETS—SHEET 2.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## DOOR-OPERATING MECHANISM.

1,000,784.

Specification of Letters Patent. Patented Aug. 15, 1911.

Application filed March 3, 1910. Serial No. 547,160.

*To all whom it may concern:*

Be it known that I, WILLIAM S. CUMMING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Door-Operating Mechanism, of which the following is a specification.

The invention relates to a door operating mechanism.

The object of the present invention is to provide simple and comparatively inexpensive mechanism for operating sliding doors, gates and similar closures, and to equip such mechanism with means for automatically checking the closing movement of a gate or door at the end of such movement, whereby injury to persons and the slamming of gates and doors are prevented.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:—Figure 1 is an elevation of a door operating mechanism, constructed in accordance with this invention. Fig. 2 is a longitudinal sectional view of the same, the piston being at the limit of its movement in one direction. Fig. 3 is a similar view, showing the piston and the movable parts in their opposite positions. Fig. 4 is a vertical sectional view, taken substantially on the line 4—4 of Fig. 1. Fig. 5 is an enlarged detail sectional view of the friction device for checking the piston at the end of the stroke thereof.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

In the embodiment of the invention illustrated in the accompanying drawings, 1 designates a reciprocatory piston rod, provided at its ends with piston heads 2 and 3 of different areas operating in cylinders 4 and 5 of different diameters. The cylinders 4 and 5 are provided with upper and lower ears or flanges 6 and 7, which are

bolted or otherwise secured to an attaching plate 8, designed to be secured to a suitable support at one side of a sliding door 9. The piston head 2, which is smaller than the piston head 3, is located at the end of the piston rod nearer the door, and the larger piston head is located at the other end of the piston rod.

The cylinders are arranged in spaced relation, and compressed air or other fluid under pressure is admitted to the outer or pressure end of the smaller cylinder 4 from a feed pipe 10, having a portion piercing the head 11 of the cylinder at the center thereof. The feed pipe is connected by a branch 12 with the outer end of the larger cylinder 5, the branch 12 piercing the center of the outer head 13 of the larger cylinder and being provided at a point intermediate of its ends with a two-way valve 14. The feed pipe 10 maintains a constant pressure in the outer end of the smaller cylinder, and the two-way valve 14, which may be of any preferred construction, is adapted to be operated either to admit pressure to the outer end of the larger cylinder, or to connect the outer end of the cylinder with the atmosphere for exhausting the pressure. The air escapes through a suitable exhaust pipe 15, connected with the two-way valve, and when the latter is arranged for exhausting the air from the large cylinder, the piston is actuated by the pressure exerted against the smaller piston head and the door is moved in one direction. When the valve 14 is operated to close the exhaust pipe and admit pressure to the outer end of the larger cylinder, the piston owing to the increased pressure on the larger piston head is moved in the opposite direction against the constant pressure of the smaller cylinder, and the sliding door is moved in the opposite direction. The piston heads are provided with peripheral packings 16 and 17 of rubber, leather, or other suitable material in order to create a vacuum within one of the cylinders on each stroke of the piston rod. When the smaller piston head moves outward from the inner end of the cylinder 4 from the position illustrated in Fig. 2 of the drawings, a vacuum or partial vacuum will be created within the cylinder at the inner side of the piston head 2, and when the larger piston head moves away from the inner end of the

cylinder 5, a vacuum or partial vacuum will be created in the latter at the vacuum side of the said piston head 3. By creating a vacuum or partial vacuum in this manner, the movement of the piston rod is retarded and a slow positive opening and closing movement of the door is secured in order to avoid injury to persons and to prevent the door from slamming.

The piston rod carries with it in its movement an oscillatory lever 18, connected at its outer end with the door by a link rod 19, and provided at its inner end with a toothed sector-shaped head 20, mounted between a pair of plates or members 21, which are secured to the piston rod at the center thereof. The plates or members 21 are spaced apart by the piston rod and are connected at their inner ends by bolts 22, arranged in pairs and piercing the plates or members at opposite sides of the piston rod, which is provided in its upper and lower edges with grooves 23, receiving the bolts 22, whereby the plates or members 21 are interlocked with the piston rod and positively held against movement independently thereof. The lower or outer ends of the plates 21 are pierced by a suitable pivot 25, on which is mounted a toothed head of the lever 18, and the said toothed head meshes with a fixed rack 27, whereby when the piston rod is reciprocated, the piston will be moved longitudinally of the fixed rack and will be partially rotated to effect an oscillation of the door actuating lever 18. When the piston is moved from right to left from the position illustrated in Fig. 3 of the drawings, the lever will be swung to the left as indicated by the arrows in Fig. 3. The gear element of the lever meshes directly with the fixed rack, so that the lever and the door will move in the same direction as the piston, thereby reducing the length of the lever to the extent of the stroke of the piston. This will enable a shorter lever to be employed for actuating the door. The rack 27 is supported by and extends across the space between the cylinders, and is located at the bottom of the same. It extends between the spaced plates or members 21, and it is secured at one end to the cylinder 4 adjacent to a lug 28 thereof, and its other end is bolted to a supporting lug 29, extending from the inner end of the larger cylinder 5.

The piston is equipped with a friction device composed of spaced friction plates or members 30, arranged in pairs and located at opposite sides of the center of the piston rod and at opposite sides of the plates or members 21. The friction plates are connected to upper and lower bars or pieces 31 by bolts 32, having a head 33 at one end and a thumb nut 34 at the other end. Coiled springs 35 are interposed between the ends of the friction plates and the said heads and nuts 34, and operate to

press the friction plates tightly against the side faces of the piston rod 1. The connecting bars or pieces are of a length greater than the width of the supporting plates or members 21, so that the friction device will come in contact with one of the cylinders on each stroke of the piston rod prior to the completion of such stroke, and the friction device will thereby operate to check the latter portion of the movement of the mechanism. The completion of the movement of the piston carries the supporting plates or members 21 against the pair of friction plates, which are in contact with the contiguous cylinder and spaces them from the other pair of friction plates, so that the friction device will be in position for operation on the next stroke of the piston. The friction device is provided at the abutting edges of the friction plates with cushions 36 of rubber, leather, or other suitable material to prevent noise when the friction device engages the ends of the cylinders. In the accompanying illustration the oscillatory door operating lever is shown beneath the cylinders in a vertical position, but it may be arranged above the cylinders, if desired, and the feed pipes may be located in any convenient position.

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

1. A door operating mechanism comprising a reciprocatory motor actuated rod, spaced supporting plates secured to the rod, a fixed rack extending through the space between the supporting plates, and a door operating lever mounted between and carried by the supporting plates and having a gear element meshing with the rack bar.

2. A door operating mechanism including a motor actuated reciprocatory rod, mechanism for connecting the rod with the door, a friction device carried by the rod and adapted to engage a stop for checking the movement of the rod.

3. A door operating mechanism including a motor actuated reciprocatory rod, mechanism for connecting the rod with the door, and a friction device for checking the movement of the rod having friction members yieldably clamping the rod and movable with respect thereto.

4. A door operating mechanism including a motor actuated reciprocatory rod, mechanism for connecting the rod with the door, and a friction device for checking the movement of the rod having opposite spring actuated plates yieldably clamping the said rod.

5. A door operating mechanism including a motor actuated reciprocatory rod, mechanism for connecting the rod with the door, and a friction device for checking the movement of the rod and having opposite spring

operating plates arranged in pairs and connected together so as to move in unison on the rod.

5 6. A door operating mechanism including  
a motor actuated reciprocatory rod, mechanism for connecting the rod with the door, and a friction device comprising friction plates arranged at opposite sides of the reciprocatory rod and yieldably engaging the  
10 same, said plates being disposed in pairs and connected together and having a limited movement on the rod independently thereof.

15 7. A door operating mechanism including  
a motor actuated reciprocatory rod, a support fixed to the rod at a point intermediate of the ends thereof, door actuating mechanism carried by the support, and a friction

device mounted on the said rod and composed of spaced friction plates arranged in pairs at opposite sides of the support, the members of each pair being located at opposite sides of the rod, bars connecting the pairs of plates, fastening devices piercing the bars and the plates, and springs mounted on the fastening devices and yieldably maintaining the plates in engagement with the motor actuated rod.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM S. CUMMING.

Witnesses:

F. P. COLLIER,  
D. F. HAMLINK.