

C. M. MOCK, A. U. GERBER & H. CORDELL.
 PISTON ACTUATED MECHANISM.
 APPLICATION FILED APR. 14, 1911.

1,023,267.

Patented Apr. 16, 1912.

2 SHEETS—SHEET 1.

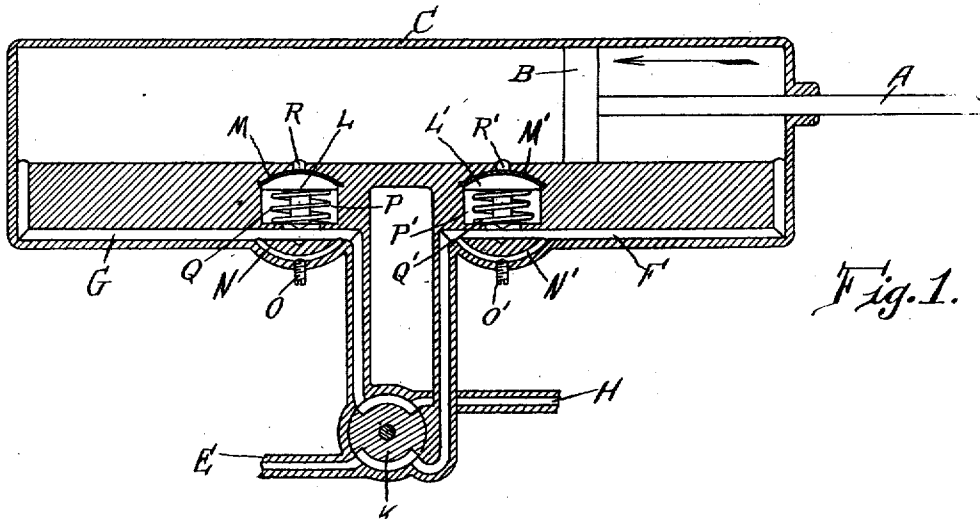


Fig. 1.

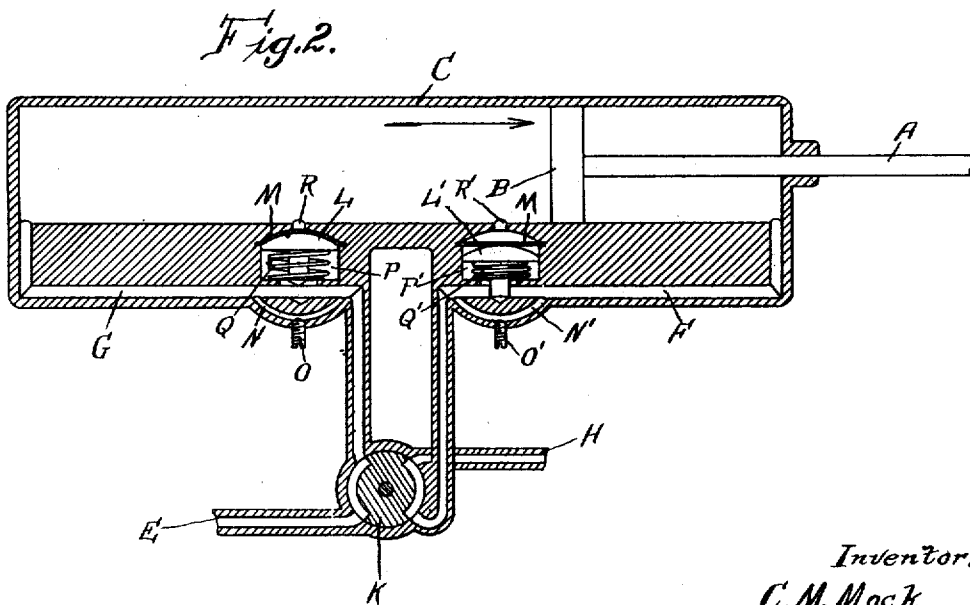


Fig. 2.

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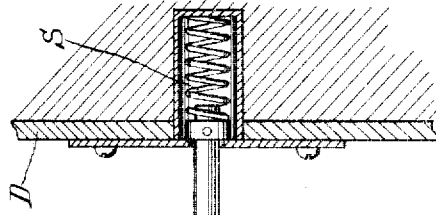


Fig. 5.

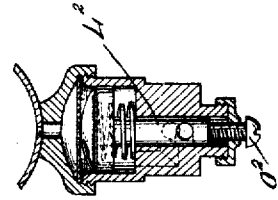


Fig. 4.

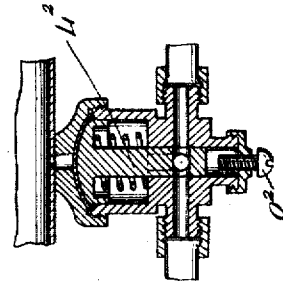
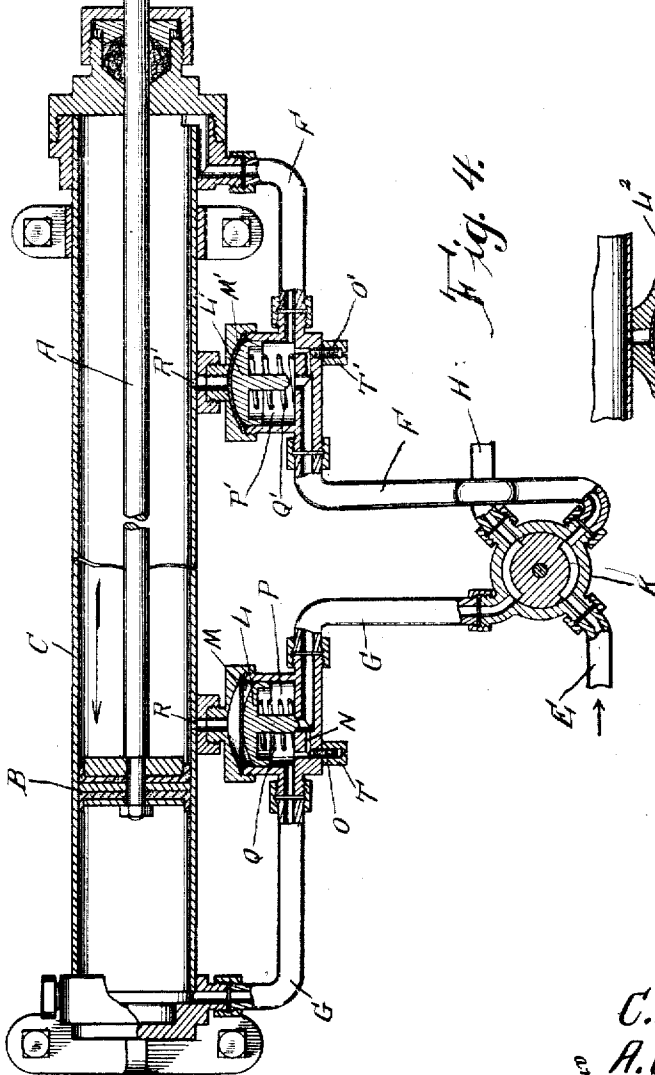


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES M. MOCK, OF KENILWORTH, AND ARTHUR U. GERBER AND HENRY CORDELL,
OF CHICAGO, ILLINOIS.

PISTON-ACTUATED MECHANISM.

1,023,267.

Specification of Letters Patent.

Patented Apr. 16, 1912.

Application filed April 14, 1911. Serial No. 621,172.

To all whom it may concern:

Be it known that we, CHARLES M. MOCK, a citizen of the United States, residing at Kenilworth, in the county of Cook and State of Illinois, and ARTHUR U. GERBER and HENRY CORDELL, citizens of the United States, both residing at the city of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Piston-Actuated Mechanism, of which the following is a specification.

Our invention relates to piston actuated mechanism and is particularly serviceable for opening and closing the sliding doors used on the coaches of elevated railroads. In the devices heretofore used for this purpose, accidents have frequently occurred owing to the sudden slamming of the door against the arm or leg of a passenger; while in other instances great inconvenience has been caused by the catching of clothing between the door and the jamb, which clothing could not be released without opening the door wide and thereby risking further accidents.

It is the object of our invention to provide simple means whereby the door may be quickly and positively opened and closed, but with the final movement in either direction diminished in speed so as to avoid slamming and to allow a passenger to draw back any projecting limb. Also to permit the door to be opened slightly for the withdrawal of any clothing that may have been caught during the closing, without opening the same far enough to endanger those standing close to it.

We will explain our invention more fully by reference to the accompanying drawings, showing the preferred embodiment thereof, in which—

Figure 1 is a simplified diagram showing the principle of our invention as applied to the initial opening of a sliding door. Fig. 2 is a similar diagram showing the arrangement of the operating mechanism during the latter part of the stroke when closing a sliding door. Fig. 3 is a section showing our invention in detail as applied to the moving of a sliding door; Figs. 4 and 5 are sections of another type of the throttling valve which forms a part of our invention.

In the drawings, A is a piston rod connecting the piston B to the object to be

moved, such as a door D, the connection being preferably made through a spring S.

C is a cylinder, preferably of brass, in which the piston is adapted to be moved by the admission of a fluid, preferably compressed air, from a supply pipe E through a passage F connected with one end of the cylinder.

G is a passage through which the exhaust can escape from the other end of the cylinder into an exhaust pipe H.

K is a control valve for alternately connecting the supply and exhaust pipes E and H to the passages F and G, either as indicated by Fig. 1 or in the reverse direction, as indicated by Fig. 2.

L and L' are plungers adapted to close the passages F and G when depressed by flexing diaphragms M and M' against these plungers, these diaphragms being preferably made of leather.

N and N' are auxiliary passages forming by-passes around the parts of the passages F and G which may thus be closed by plungers, which auxiliary passages when considered in connection with the passages to which they are auxiliary, constitute bifurcated passages; O and O' are screws for adjusting the area of these by-passes, these screws being preferably locked in position by locking caps T and T'.

P and P' are valve chambers in which the plungers L and L' are adapted to slide, these plungers being normally held out of the passages F and G by springs Q and Q'. R and R' are openings leading from the cylinder C into the valve chambers P and P'.

When the control valve K is turned as in Fig. 1, the compressed air is admitted to the right hand end of the cylinder, thereby moving the piston rapidly toward the left. The air ahead of the piston is freely pushed out through the passage G, which is bifurcated at N into the exhaust pipe H. As soon as the piston has passed the opening R, compressed air from the cylinder enters through this into the chamber P, flexing the diaphragm M and depressing the plunger L, closing the main exhaust passage G. The exhaust can then continue only through the much smaller area of the by-pass N and as this will not allow the air ahead of the piston to escape as fast as the piston has been moving, this air is compressed, thereby cushion-

ioning the piston and greatly reducing its speed during the remainder of its stroke. On reversing the connections by turning the control valve K as shown in Fig. 2, the compressed air is admitted to the left-hand end of the cylinder and the exhaust escapes freely through the passage E until the piston has passed the opening R' as shown in Fig. 2, when the air from the cylinder enters the valve chamber P' through this opening R', flexing the diaphragm M' against the plunger N' to depress the same and thereby close the main passage E. Being then restricted to the small auxiliary by-pass N' for its escape the air remaining ahead of the piston will be compressed, thereby checking the speed of the piston during the remainder of its stroke.

While we have shown the throttling valves P and P' as operating by having plungers close the main exhaust passages so as to restrict the exhaust to by-passes of smaller area, we do not wish to be limited to this construction, as the throttling of the exhaust passages may be accomplished under our invention by various other arrangements. Thus, Fig. 4 shows a throttling valve for use with an exhaust passage having no by-pass, the plunger L² having a transverse perforation normally forming a full sized portion of the exhaust passage, which perforation is diminished in effective area when the plunger is depressed as shown in Fig. 5 against an adjusting stop O².

In using our invention for operating sliding doors, we preferably insert a spring S between the piston rod A and the door D, the force of this spring being less than that of the air pressure behind the cylinder. Should a garment become squeezed between the door and the jamb when the door is closed by the piston, the door may be slid open as far as the spring can readily be compressed without moving the piston, whereupon the spring will return the door to its closed position.

While we have herein shown and particularly described the preferred embodiment of our invention, we do not wish to be limited to the precise details of construction shown, as changes may readily be made without departing from the spirit of our invention, but,

Having thus described our invention, we claim as new and desire to cover by Letters Patent the following:—

1. Mechanism of the class described including a cylinder having fluid entrance and exhaust passages communicating with opposite ends of the cylinder; a piston adapted to be reciprocated within the cylinder by fluid passing into the cylinder; a throttling plunger working within the exhaust passage; and a flexible diaphragm governing the position of the plunger and operating,

when flexed from normal position, to cause the said plunger to throttle the exhaust passage; there being an opening in the cylinder intermediate of its ends through which the piston-actuating fluid may pass to the diaphragm to flex the same.

2. Mechanism of the class described including a cylinder having fluid entrance and exhaust passages communicating with opposite ends of the cylinder; a piston adapted to be reciprocated within the cylinder by fluid passing into the cylinder; a throttling plunger working within the exhaust passage; and a flexible diaphragm governing the position of the plunger and operating, when flexed from normal position, to cause the said plunger to throttle the exhaust passage; there being an opening in the cylinder intermediate of its ends through which the piston-actuating fluid may pass to the diaphragm to flex the same; and means for adjusting the extent to which the exhaust passage is throttled by the plunger when the plunger is actuated.

3. Mechanism of the class described including a cylinder having bifurcated entrance and exhaust passages communicating with opposite ends of the cylinder for admitting and emitting a fluid; a piston adapted to be reciprocated within the cylinder by fluid passing into the cylinder; a valve adjacent to the aforesaid bifurcated exhaust passage and serving, when actuated, to close one fork of the said bifurcated passage; and a flexible diaphragm governing the position of the plunger and operating, when flexed from normal position, to actuate the said valve; there being an opening in the cylinder intermediate of its ends through which the fluid may pass to the diaphragm to flex the same.

4. Mechanism of the class described including a cylinder having bifurcated entrance and exhaust passages communicating with opposite ends of the cylinder for admitting and emitting a fluid; a piston adapted to be reciprocated within the cylinder by fluid passing into the cylinder; a valve adjacent to the aforesaid bifurcated exhaust passage and serving, when actuated, to close one fork of the said bifurcated passage; there being an opening in the cylinder intermediate of its ends through which the fluid may pass to the diaphragm to flex the same; and means for varying the area of the unclosed fork of the bifurcated exhaust passage.

5. Mechanism of the class described, including a cylinder having fluid entrance and exhaust passages communicating with opposite ends of the cylinder; a piston adapted to be reciprocated within the cylinder by fluid passing into the cylinder; a valve chamber adjacent to the exhaust passage and communicating with the interior of the cylinder

intermediate of its ends; and a valve in said chamber subject to the pressure of the fluid within the cylinder and serving to throttle the exhaust passage when actuated by the fluid.

6. Mechanism of the class described, including a cylinder having fluid entrance and exhaust passages communicating with opposite ends of the cylinder, each of the said passages being bifurcated; a piston adapted to be reciprocated within the cylinder by fluid passing into the cylinder; a valve chamber adjacent to the exhaust passage and communicating with the interior of the cylinder intermediate of its ends; and a valve in said chamber subject to the pressure of the fluid within the cylinder and serving to close one fork of the bifurcated exhaust passage when actuated by the fluid.

7. Mechanism of the class described, including a cylinder having fluid entrance and exhaust passages communicating with opposite ends of the cylinder; a piston adapted to be reciprocated within the cylinder by fluid passing into the cylinder; a valve chamber adjacent to the exhaust passage and communicating with the interior of the cylinder intermediate of its ends; and a valve in said chamber subject to the pressure of the fluid within the cylinder and serving to throttle the exhaust passage when actuated by the fluid; the communication between the valve chamber and the interior of the cylinder being so situated that the valve chamber will be connected to the exhaust portion of the cylinder during the early part of the stroke of the piston, but will be connected to the fluid-pressed end of the cylinder after the piston has passed a predetermined point of its stroke.

stroke of the piston, but will be connected to the fluid-pressed end of the cylinder after the piston has passed a predetermined point of its stroke.

8. Mechanism of the class described, including a cylinder having fluid entrance and exhaust passages communicating with opposite ends of the cylinder, each of the said passages being bifurcated; a piston adapted to be reciprocated within the cylinder by fluid passing into the cylinder; a valve chamber adjacent to the exhaust passage and communicating with the interior of the cylinder intermediate of its ends; and a valve in said chamber subject to the pressure of the fluid within the cylinder and serving to close one fork of the bifurcated exhaust passage when actuated by the fluid, the communication between the valve chamber and the interior of the cylinder being so situated that the valve chamber will be connected to the exhaust portion of the cylinder during the early part of the stroke of the piston, but will be connected to the fluid-pressed end of the cylinder after the piston has passed a predetermined point of its stroke.

In witness whereof, we have hereunto set our hands, this 11th day of April A. D. 1911, in the presence of two subscribing witnesses.

CHARLES M. MOCK.
ARTHUR U. GERBER.
HENRY CORDELL.

Witnesses:

E. B. FLENNER,
J. T. HAYES.