(No Model.)

2 Sheets—Sheet 1.

J. A. BOWEN.

PNEUMATIC DOOR CHECK.

No. 592,233. Patented Oct. 26, 1897.

Fig. 1

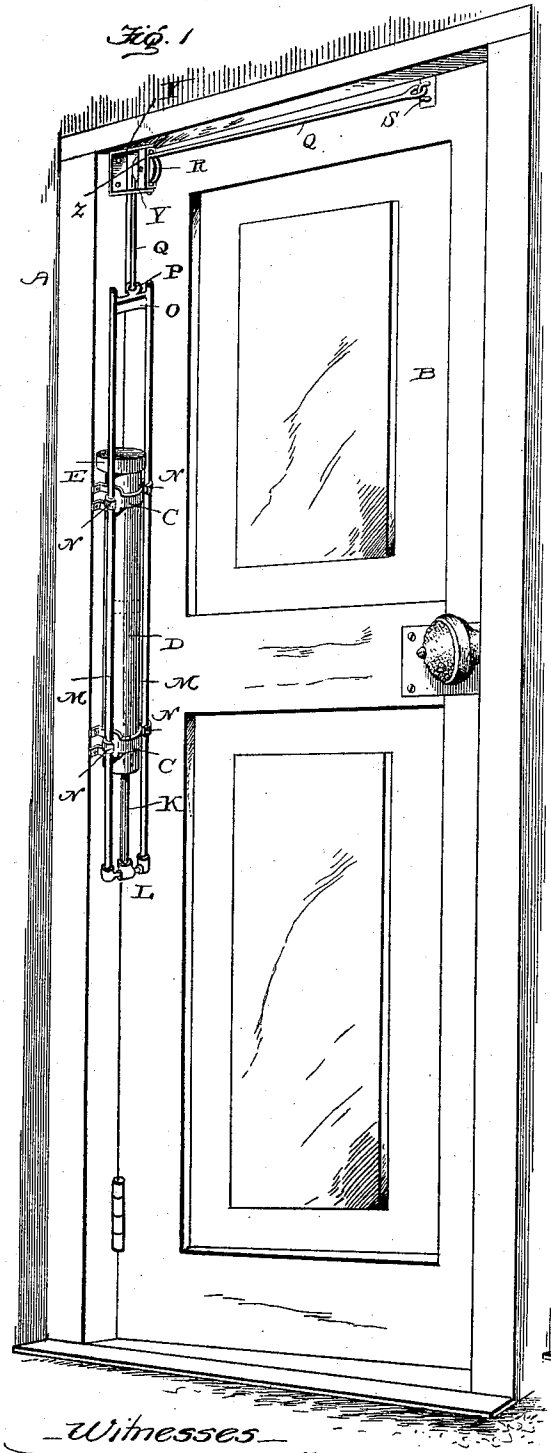
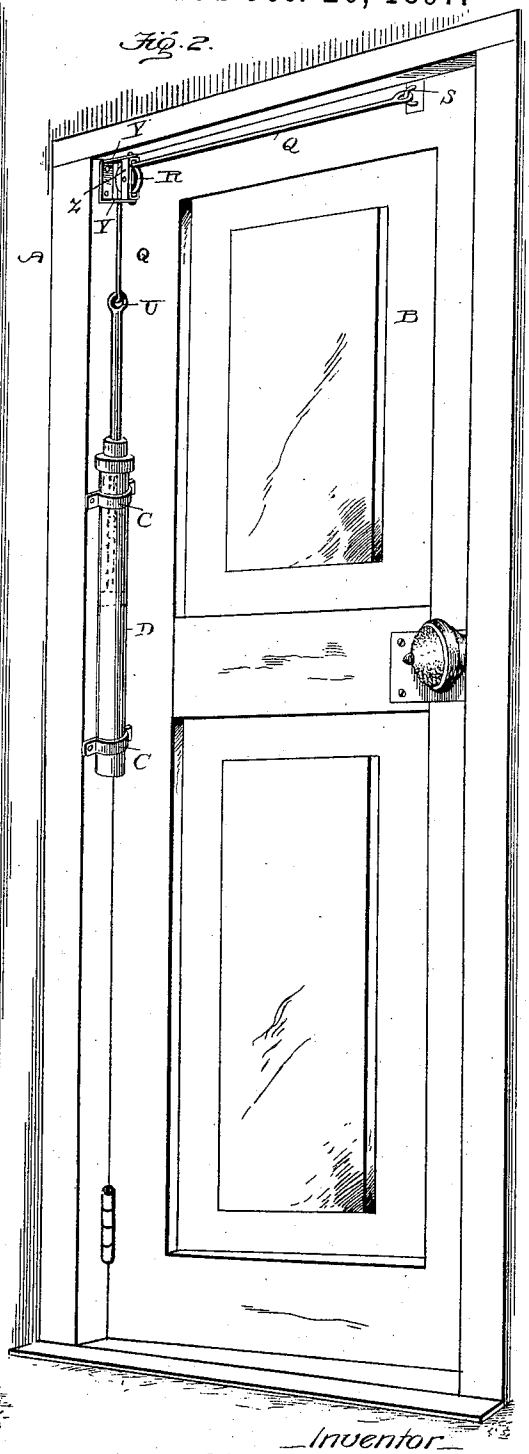


Fig. 2.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3

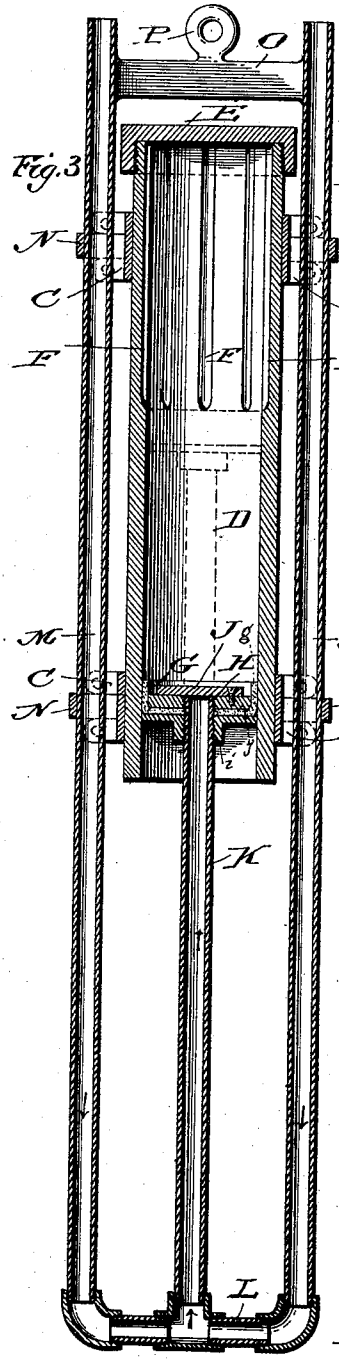


Fig. 4.

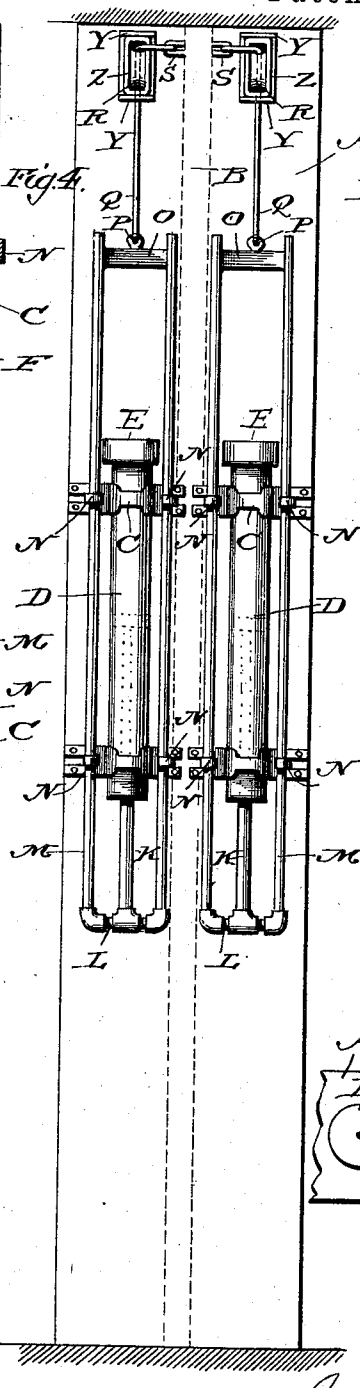


Fig. 5.

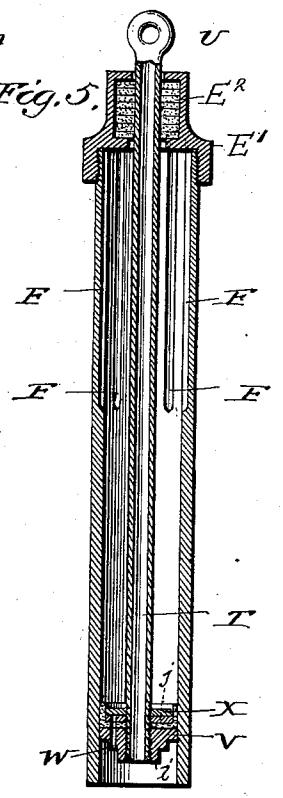
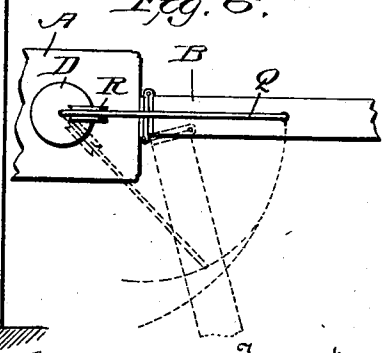


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN A. BOWEN, OF WASHINGTON, DISTRICT OF COLUMBIA.

PNEUMATIC DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 592,233, dated October 26, 1897.

Application filed October 15, 1895. Serial No. 565,728. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. BOWEN, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Pneumatic Door-Checks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in door-checks, and is more especially adapted for application to swinging doors which are pivoted to swing to either side of their closed position and are provided with means, such as a spring, for effecting the closing of the same, although it is capable of use upon doors of various other constructions.

It has for one of its objects to check the momentum of the swinging door when the same is being closed by the spring located thereon for that purpose, so as to prevent the continued swing of the door past the line of closure from the force received from the closing-spring, and to release the checking means when the door has passed the line of closure, so that the door may be easily moved forward to open the same in the opposite direction.

It has further for its object to provide a construction and arrangement of parts whereby when the door is at rest in its closed position it may be readily moved in either direction without resistance from the checking means.

It also has for its object to gradually cushion the action of the closing-spring when the same acts upon the open door to close the same and thus avoid a sudden checking of the door, but exerts a gradually-increasing resistance until the door reaches its closed position, when the resistance is released, so that the continued movement of the door is free from the resistance of the checking means.

It has also for its object to construct the checking means in a simple and economical manner, so as to secure the most effective results with the minimum danger of the parts becoming inoperative through disarrangement or breakage.

The invention consists in the construction and arrangement of a checking device adapted to form a resistance to the pressure of the closing means used to effect the closing movement of a swinging door and to release such resistance when the door is beyond its line of closure.

The invention also consists in the construction and combination of parts hereinafter particularly described, and then sought to be specifically defined by the claims, reference being had to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a perspective of a swinging door provided with checking means upon opposite sides thereof, only one of said means being shown. Fig. 2 is a similar view representing the application of a modified construction of the checking means. Fig. 3 represents a vertical section through one of the cylinders, such as is shown in Fig. 1, the piston being in the position occupied when the door is opened toward the cylinder and shown in dotted lines in its position when the door is closed. Fig. 4 is an edge view of a swinging door, showing the arrangement of the cylinders upon opposite sides thereof with the parts in the position occupied when the door is closed; and Fig. 5 represents a vertical section of the modified form of checking device shown in Fig. 2, which is especially adapted for use when a single cylinder is used to check the closing of the door from either direction. Fig. 6 is a plan view of a modified application of the invention wherein a single cylinder is used to check the door in closing from either direction.

As one form of suitable checking means for accomplishing the objects of this invention I have illustrated in the accompanying drawings a construction of parts in which the letter A designates a door-casing, within which is mounted, upon spring-hinges or otherwise, a swinging door B, adapted to swing in either direction from its closed position. Upon the casing at opposite sides of the door I secure checking-cylinders D by means of suitable brackets or hangers C, secured to the cylinder and attached to the casing. These cylinders are closed at their upper end by a screw-cap E and are provided upon their inner surface with a series of releasing-grooves F, extending from the upper end downwardly toward the center of the cylinder. In the cylinder a suitable reciprocating piston is provided—for instance, as shown at G, where

the piston is composed of two plates *i* and *j*, screw-threaded on the piston-rod K, and between these plates there is clamped a cup-shaped packing *g* of leather or other suitable material. In the downward movement of this piston the free edges of the packing *g* will traverse the walls of the cylinder without material friction, but when the piston rises to compress the air the pressure of the air presses these free edges into tight contact with the walls of the cylinder to form an air-tight joint. Each reciprocating piston G is provided with an inlet-aperture H, controlled by a suitable valve, such as a flap-valve J, and from this aperture depends the tubular or hollow piston-rod K, which at its lower edge communicates with a cross-pipe L, from which extend vertical pipes or tubes M at opposite sides of the cylinder. These vertical pipes are connected at their upper ends by a cross bar or web O, provided with an eye or loop P, to which may be secured one end of a cord, chain, or other suitable connecting means Q, extending from the upper portion of the door upon opposite sides thereof to each of the cylinders.

The cords or connecting means are secured to the door in any well-known manner, as indicated at S, and pass thence to the cylinders over swiveled pulleys R, whereby the cords are held in position to operate the cylinders during the swinging of the door to open and close the same. The means of mounting the pulley R to accommodate the movement of the door and cord to the cylinder consists of a bracket Y, having outwardly-extending arms between which the open frame Z is swiveled to rotate, and within this frame is journaled the pulley R. By this means the changes in the position of the cord Q due to the movement of the door are accommodated and the vertical relation of the cord to the cylinder maintained.

In Figs. 2 and 5 I have shown another suitable form of checking device adapted to accomplish the objects of this invention. In this form the cylinder D is formed with the grooves F, as in Fig. 3, and is closed at its upper end by a cap E′, containing a suitable packing E^2, provided with an aperture therethrough for the passage of a piston-rod T, which carries a reciprocating piston V. The piston is provided with a flap or other suitable valve X, whereby in the downward movement of the piston air will pass through the aperture W and above the piston. Upon the upward movement of the piston the valve X closes and traps or compresses the air in the upper portion of the cylinder until the piston reaches the grooves F, when the air escapes around the piston and releases the checking action. The upper end of the piston-rod is provided with eye U or other suitable means for the attachment of the means connecting the rod with the door. This form of checking-cylinder is very simple, compact in form, and efficient in operation.

In each form of the invention illustrated the weight of the piston-rod and its attached parts is generally sufficient to draw the piston downward by gravity when the connecting means with the door permits the piston to descend in the cylinder, but it is obvious that the piston or rod may be suitably weighted to insure its prompt downward movement when the movement of the door permits the piston to descend in the cylinder.

The operation of the checking means shown in Figs. 1, 3, and 4 is as follows: When the swinging door is in its closed position or at rest, the pistons in the cylinders at the opposite sides of the door lie just below the releasing-grooves in the cylinders, or substantially midway in the cylinder. Now if the door be swung open toward the right (see Fig. 4) the cord or connecting means between the same and the right-hand cylinder will be slacked and the piston in the right-hand cylinder will move downward by gravity and admit air above the same through the valve therein, while at the same time the cord or connection with the left-hand cylinder is tightened and drawn upward from the cylinder so as to raise the piston over the releasing-grooves when the compressed air passes around the piston and escapes. There is consequently no material resistance to the raising of the piston in the cylinder and no extra pressure is required to open the door. When the door is opened into its right-hand position, the piston in the right-hand cylinder lies near the bottom thereof, and the piston in the left-hand cylinder lies over the releasing-grooves therein. In the closing movement of the door from right to left the piston in the right-hand cylinder will be raised and the air above the same gradually compressed until the piston lies just below the releasing-grooves when the door stands in its closed position. During this closing movement the piston in the left-hand cylinder is lowering by gravity and admitting air above the same to be compressed in the upward movement of the piston. When the door is at rest in its closed position, the pistons in both cylinders stand just below the releasing-grooves therein, so that the door may be swung in either direction without material resistance, save from the closing-spring, and the piston in the cylinder toward which the door is swung will lower to admit air above the same, while the opposite cylinder releases its compressed air by means of the grooves over which the piston moves in rising. When the closing-spring effects the closing of the door from either direction, the cylinder from which the door moves exerts a gradually-increasing resistance until the door is at its closed position as the air is being compressed in an increasing degree in the upward movement of the piston.

It is obvious that the results sought might in some degree be accomplished by a single cylinder located at one side of the door. This would check, as above described, when the

door was swung toward the cylinder, and when the door was swung in the opposite direction its spring would cause it to rebound slightly past its closed position and toward the cylinder, which would then act to bring the door at rest in its closed position. I have also found that by placing a single cylinder in the rear of the pivoting-point of the door and in line therewith and connecting the piston-rod thereof with the door, preferably along its upper edge, one cylinder or check will be sufficient to check the door in both directions of its movement. The form of cylinder shown in Fig. 5 is particularly well adapted for this application, as it can be readily inserted in a recess cut in the jamb at the rear of the hinging-point of the door. With this construction when the door is in its closed position the connecting means between the piston and door have lifted the piston to a position below the releasing-grooves and when the door is swung in either direction the connecting means are slacked and the piston dropped in the cylinder to trap air above the same and compress it in the closing movement of the door. In this structure it will be seen that the piston in the single cylinder used will raise and compress the air when the door is closed from either direction, and as the door passes its line of closure the piston again begins to fall, so that the resistance is released. When the cylinder is arranged as just described, the releasing-grooves perform no function, as the body of the air in the cylinder is alternately compressed and allowed to expand in the movement of the piston, so as to form a cushion between the piston and one end of the cylinder. If the pressure of air in the cylinder becomes less than the atmospheric pressure through leakage or other loss, the piston in its downward movement will allow air to pass through it, and thus maintain the desired volume in the cylinder. If the pressure of air within the cylinder be greater than that outside, it is obvious that the valve in the piston will be held closed and no air will pass therethrough in the downward movement of the piston.

The releasing-grooves in the cylinders used may be omitted and any suitable means used to release the compressed air above the piston after the door reaches its closed position. The connecting means between the door and piston-rod of the cylinder may also be varied, as the rod may be actuated in the movement of the door by various constructions of parts, one suitable form of which I have illustrated herein.

It is also obvious that changes may be made in the construction and arrangement of the several parts hereinbefore described and new constructions devised to accomplish the objects sought without departing from the spirit of this invention as defined by the appended claims.

Having described this invention and set forth its merits, what I claim, and desire to secure by Letters Patent, is—

1. In a door-checking device, the combination with the door adapted to swing in opposite directions from its closed position, of a vertically-disposed checking-cylinder located adjacent to said door and having the lower end thereof open, a piston therein positively actuated for the compression of air in said cylinder during the closing movement of the door, means to permit the passage of air through said piston in its movement in the opposite direction, and connections with said door whereby the piston is moved in one direction thereby and permitted to move or be moved automatically in the opposite direction, substantially as described.

2. In a door-checking device, the combination with the door adapted to swing in opposite directions from its closed position, of vertically-disposed checking-cylinders located adjacent to said door on opposite sides thereof and having an opening at one end, pistons therein positively actuated for the compression of air in said cylinders during the closing movement of the door, means to permit the passage of air through said pistons in their movement in the opposite direction, means communicating with the upper ends of the cylinders to permit the passage of air compressed by the pistons from one side thereof to the other in the continued movement of the door past its line of closure, and connections with said door whereby the pistons are moved in one direction thereby and permitted to move or be moved automatically in the opposite direction, substantially as described.

3. In a door-checking device, the combination with a door adapted to swing in opposite directions from its closed position, of a checking-cylinder, a piston therein adapted to compress air above the same in its upward movement, means to relieve the compressed air above said piston, and means connecting said piston with said door, substantially as described.

4. In a door-checking device, the combination with a swinging door, of a checking-cylinder having a releasing-groove formed in its inner surface, a valved piston in said cylinder, means connecting said piston with said door whereby in the upward movement of the piston air will be compressed above the same until the piston lies over said grooves when the compressed air will be released, substantially as described.

5. In a door-checking device, the combination of a cylinder having grooves in its upper portion, the valved piston in said cylinder, the hollow piston-rod depending from said piston, the cross-pipe communicating with said piston-rod, and the vertical pipe leading upward from said cross-pipe, substantially as described.

6. In a door-checking device, the combination with a swinging door, of a checking-cylinder, a valved piston adapted to compress

air in said cylinder, means to release said compressed air, and means connecting said piston and door whereby when the door is moved toward the cylinder the piston will be lowered and in the opposite movement of the door the piston raised, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN A. BOWEN.

Witnesses:
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D. P. MOORE.