(No Model.) 2 Sheets—Sheet 1.

C. O. CASE.

DOOR CHECK AND CLOSER.

No. 592,236. Patented Oct. 26, 1897.

Fig. 1.

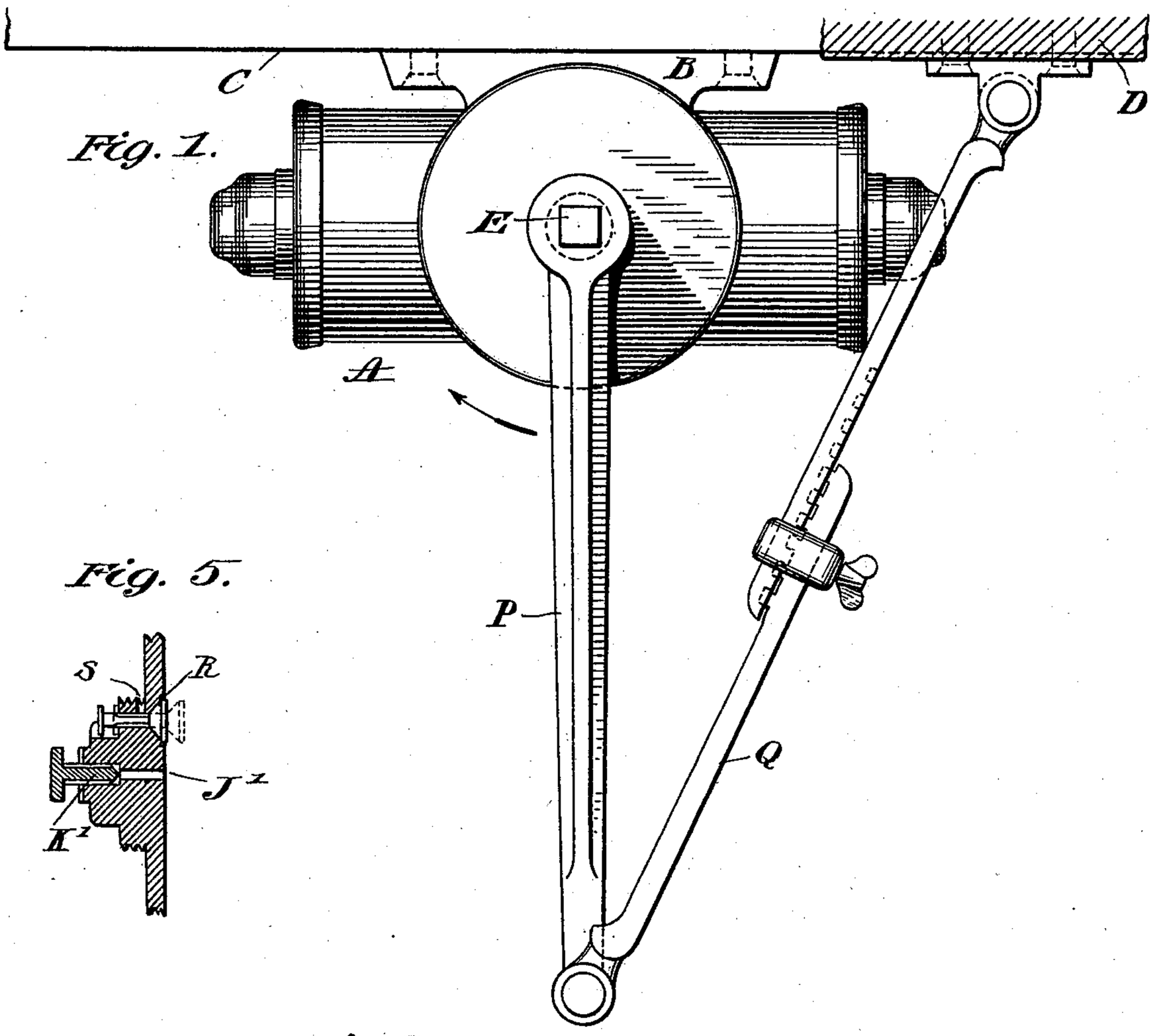
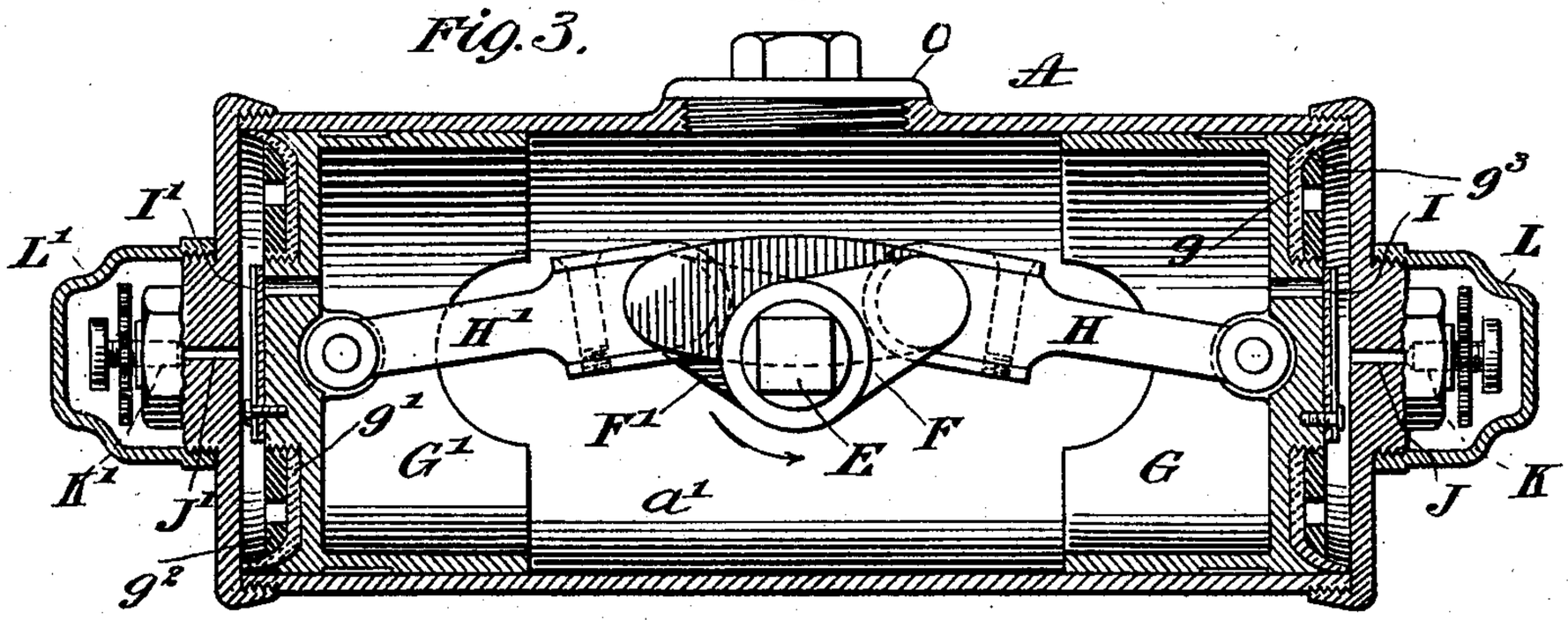


Fig. 5.

Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

C. O. CASE.

DOOR CHECK AND CLOSER.

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Fig. 2.

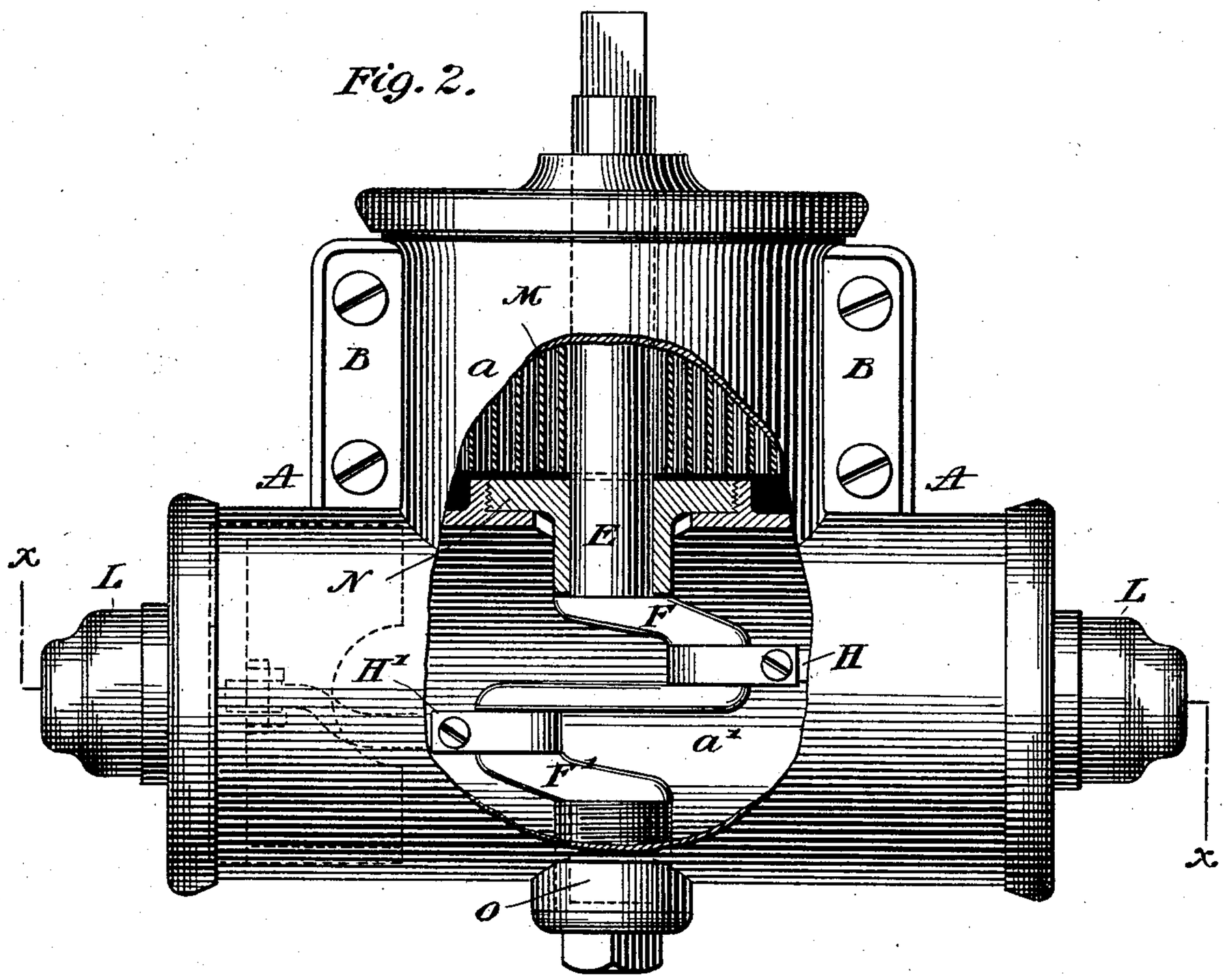
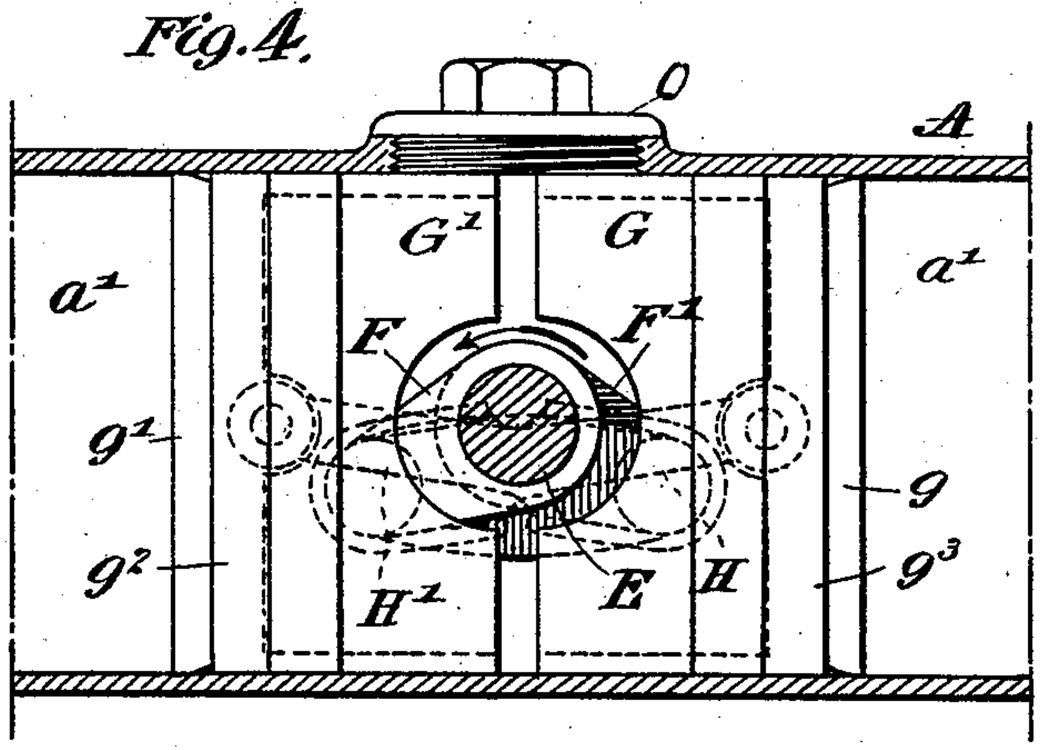


Fig. 4.



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UNITED STATES PATENT OFFICE.

CROMWELL O. CASE, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE P. & F. CORBIN, OF SAME PLACE.

DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 592,236, dated October 26, 1897.

Application filed February 5, 1897. Serial No. 622,119. (No model.)

To all whom it may concern:

Be it known that I, CROMWELL O. CASE, a citizen of the United States, residing at New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Door Checks or Closers, of which the following is a full, clear, and exact specification.

My invention relates particularly to pneumatic door-checks; and it consists in the novel construction and arrangement of parts hereinafter described.

The main objects of my invention are to provide in a door closer and check means for preventing the rebound of the door as it closes against the air-cushion, which is a serious defect in existing air-checks; to overcome the hissing sound of the escaping air as the door is closing, another serious defect in air-checks, and to provide a combined door-spring and air-check of great simplicity, durability, and efficiency.

My invention is illustrated by the accompanying drawings.

Figure 1 is a plan view of my invention shown in one of its operative positions, the door being closed. Fig. 2 is a relatively enlarged side elevation of the check and closer portion shown in Fig. 1, a portion of the casing being broken away, revealing the internal construction. Fig. 3 is a horizontal section on the line $x\,x$, Fig. 2. Fig. 4 is a similar view to that shown in Fig. 3, the extreme ends of the casing being broken away, the internal parts being indicated in the position in which they would appear when the door is open. Fig. 5 is a detail view.

Similar letters refer to similar parts.

A is a casing, the upper portion of the same being the spring-chamber a, while the lower portion is the air-chamber a'. The casing A is provided with a suitable bracket B, whereby the same may be securely held in place, as shown in Fig. 1, in which C is a door, while D represents the casing above the door. The spring-chamber a is provided with the usual means for the receiving, holding, and removal of the spring ratchet-thimble, spindle, common to combined door-springs and liquid-checks, and well known in the art. Through suitable openings passes the spindle E, carrying eccentric journals or crank-arms F F'. These crank-arms are so arranged as to not lie in the same vertical plane or horizontal plane through the spindle-axis.

G G' are pistons moving inside of the air-chamber a', and these pistons are connected to the crank-arms F F', respectively, by the connecting-rods H H'. The pistons G G' are provided with suitable check-valves I I' to permit the air to pass said pistons freely as the latter move toward the center of said air-chamber, but which close when said pistons are moved in an opposite direction—viz., toward the ends of the air-chamber. In the opposite ends of the horizontal casing a' are suitable outlets or vents J J', these vents being respectively provided with adjustable valve mechanism K K' to regulate the outward flow of the air. L L' are caps covering said vent-openings J J', respectively, each providing a secondary chamber about the vent-openings. These caps L L' may be secured to the main air-chamber in any desirable manner, the form illustrated being a loose screw-thread to permit the escape of air, and yet prevent its escaping so that it will be audible.

Within the spring-chamber a is a suitable spring M, one end of which is secured to the casing, the opposite end being secured to the spindle E, the purpose of the spring being to impart rotary movement to said spindle in a direction to effect the closing of the door. The casing A provides the bearings for the rotary spindle E, and, if desirable, a supplemental journal may be provided in an internal screw-cap N, engaging in the partition between the spring-chamber and the air-chamber, as shown. If desirable, an external screw-cap O (see Figs. 3 and 4) may be provided in the side of the air-chamber a', whereby access may be had to the interior of the said chamber to permit oiling or adjustment of the parts. The upper end or top of the vertical spring-casing is by preference removable to afford access to the interior of the spring-chamber a. The extremities of the horizontal cylindrical air-chamber may also, if desirable, be removable, whereby the

packings g g' of the pistons G G′ may be readily accessible. These packings g g' are shown as respectively held in place by a suitable ring-plate g^2 g^3.

The force from the closer-spring is transmitted to the door through the medium of any well-known mechanism, (the form illustrated the well-known compound lever form,) one arm P of the lever having one end fixed upon the spindle E, while its opposite end is pivotally connected to an arm Q, the opposite end of the arm Q being pivotally connected to the door-casing D, the latter lever being ordinarily jointed to permit adjustment.

In operation when the door is closed the parts appear in the position indicated in Figs. 1, 2, and 3, in which position the pistons G G′ are located in the ends of the air-chamber a. As the door is opened the spindle E is turned until when the door is at right angles to the casing the lever-arm P projects in substantially the opposite direction from that indicated in Fig. 1, thus turning the spindle substantially half a revolution, drawing the pistons G G′ toward each other until they lie closely adjacent to the said spindle, as shown in Fig. 4, the bearing ends of the pistons being preferably cut away, as shown, to permit close juxtaposition. As the pistons approach each other the check-valves I I′ permit the air to pass freely from the center into the ends of the horizontal air-chamber. When the motion is reversed, however, (the spring M acting to close the door in the usual manner,) the said check-valves I I′ automatically close, and as the pistons are moved toward the opposite ends of the cylinder the air is compressed, affording a cushion to prevent the door slamming. The vent-openings J J′ being adjustable may be regulated so as to allow the door to move only at a desired speed. By reason of the novel arrangement of the crank-arms F F′, when the door is open, the upper crank-arm F being past the center in the line of its return movement starts the piston G toward the end of the cylinder, compressing the air between the face of the piston and the end of the cylinder, and thus affording sufficient resistance to prevent the door from moving too quickly and coming to a cushion suddenly. At the beginning of the closing movement the crank-arm F′ is required to move a slight distance past the center before it throws the piston G′ into action. Thus it will be seen that as the capacity of the first piston G is gradually being reached toward the end of its movement the second piston G′ is approaching its point of greatest efficiency. Thus the checking power of the second piston takes the place of the first piston, the graduation being regulated to a nicety.

By the above means the spring-closer imparts a stronger pressure against the door at the last end of the stroke to insure the latching of the same, the air-cushion being sufficient to prevent slamming, yet being sufficiently overcome by the advancing of the spring and lower crank-arm to prevent the undesirable rebound common in many pneumatic checks. The spindle with its said cranks or eccentrics, including cams, may be made of a single integral drop-forging, if desirable. The cranks or cams should be located at such an angle to each other and to the axis of the spindle as to insure the dissimultaneous action of the piston, and preferably to so time the advance of the later-acting piston that it will come to its labor at about the time when the earlier-acting piston has compressed the air to its cushioning action. I have found that successful results follow when the said cranks or cams are set at an angle of about twenty-five degrees to the axis of the spindle and on opposite sides thereof.

In Fig. 5 R is a valve located in end pieces of air-cylinder. S is a vent leading to said valve. The function of each of these valves is to permit the air to freely enter the resistance-chamber as the door is being opened.

In carrying out my invention it is apparent that some changes in the construction shown and described may be made without departing from the spirit and scope of my invention.

What I claim is—

1. In a pneumatic door-check, an air-casing, pistons in opposite ends thereof, a rotary spindle between said pistons and carrying eccentrics on substantially opposite sides thereof, yet in different vertical planes in respect to the axis of rotation of said spindle, and connections between said pistons and eccentrics.

2. In a combined pneumatic door check and closer, an air-chamber, pistons therein, check-valves in said pistons, a rotary spindle between said pistons, eccentrics carried by said spindle, said eccentrics being located in different vertical planes in respect to the axis of rotation of said spindle, and connections between said pistons and eccentrics, with means for rotating said spindle in a direction to close the door.

3. In a pneumatic door-check, a spring-actuated rotary spindle, eccentrics carried thereby and located in different vertical planes with respect to the axis of rotation of said spindle, pistons suitably connected to said spindle and moving in a suitable air-chamber, and vent-ports in the casing of said air-chamber.

4. In a closer and check a rotary spindle, a spring connected thereto for rotating said spindle in the direction to close the door, eccentrics carried by said spindle, said eccentrics being in different horizontal and vertical planes with respect to the axis of said spindle, pistons suitably connected to said rotary spindle and moving in a suitable chamber, ports in the casing of said chamber, and valves therefor.

5. In a door closer and check, a spindle, a spring therefor to rotate the spindle in a direction to close the door, a pneumatic resistance-chamber, pistons adapted to move within said resistance-chamber, and means for connecting said spindle and pistons to cause one of the pistons to move in advance of the other, and means for permitting the pistons to move freely in one direction.

6. In a door-check, comprising in its construction an air-chamber, pistons to reciprocate therein, a rotary spindle stepped in said chamber, and carrying eccentrics pitched at an angle with respect to a vertical plane through the axis of said spindle to cause said pistons to move, one in advance of the other.

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