No. 850,394. PATENTED APR. 16, 1907.

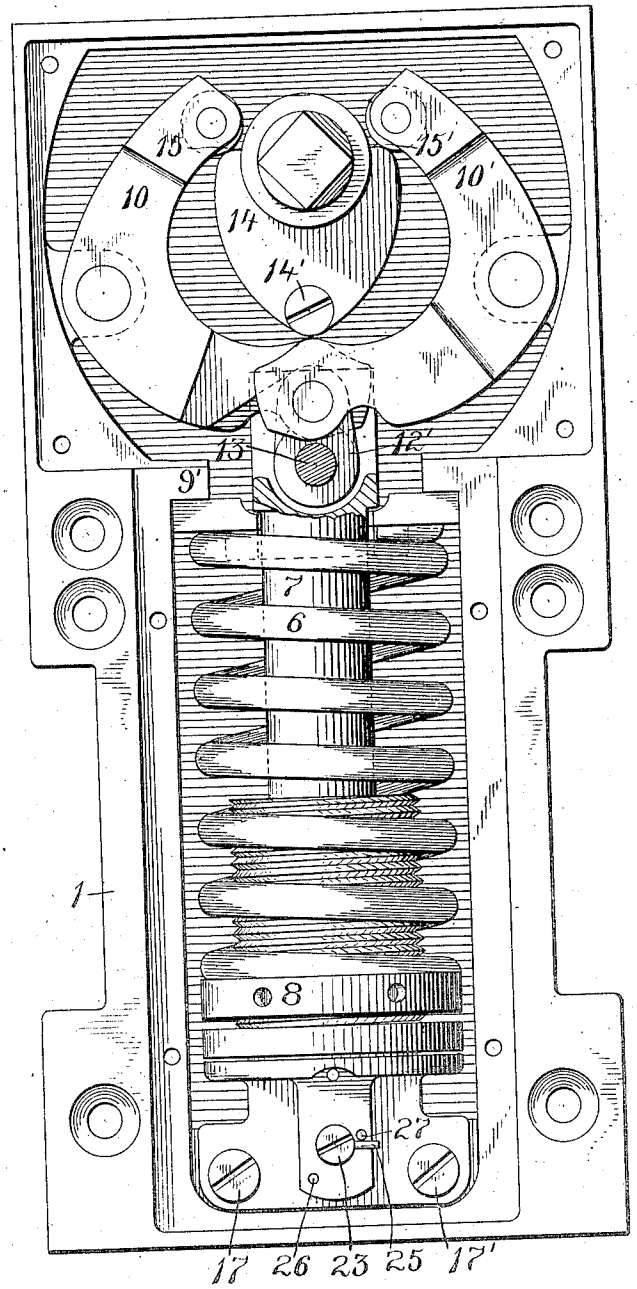
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DOOR CHECK AND CLOSER.

APPLICATION FILED MAR. 22, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



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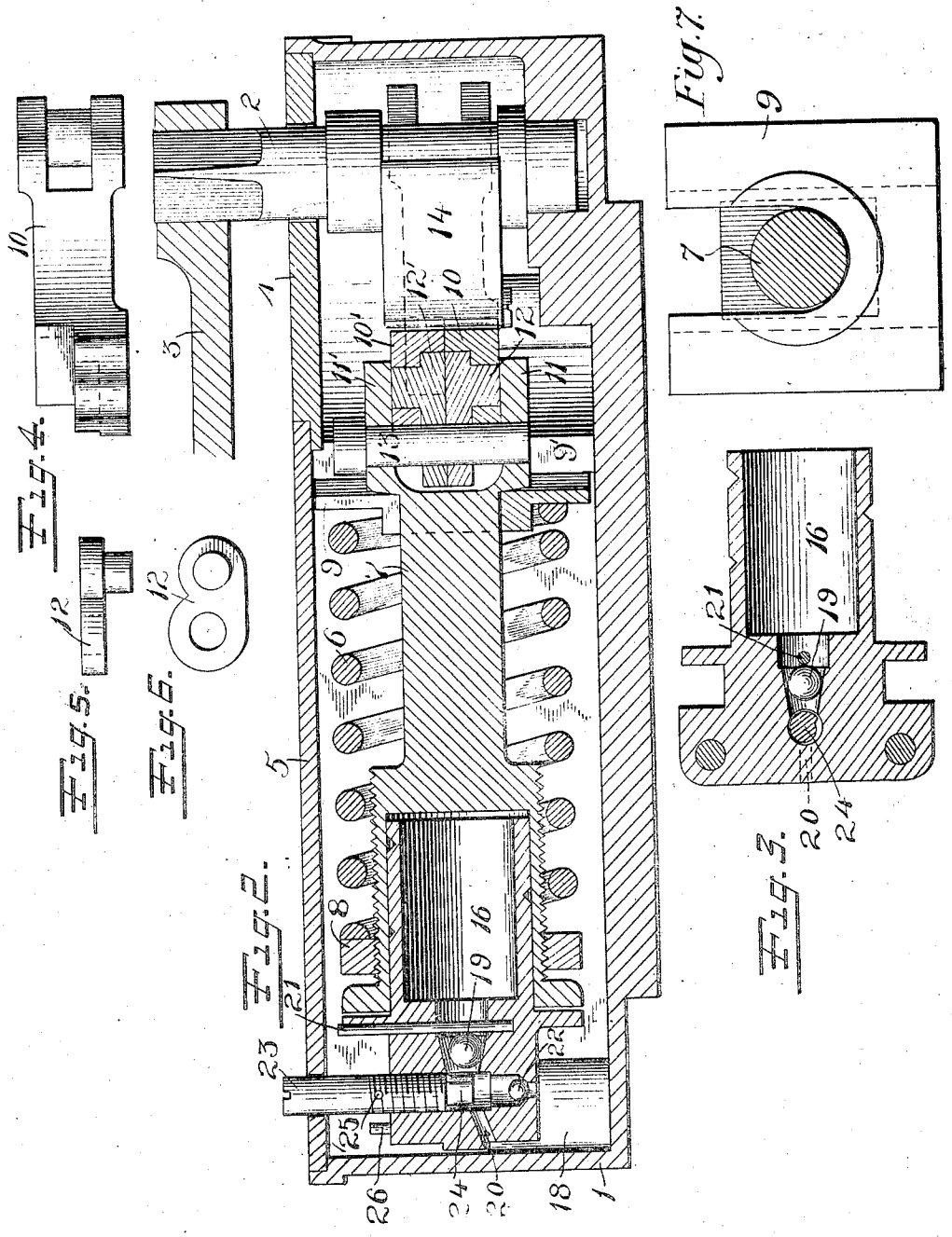
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2 SHEETS—SHEET 2.



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DOOR CHECK AND CLOSER.

No. 850,394. Specification of Letters Patent. Patented April 16, 1907.

Application filed March 22, 1905. Serial No. 251,364.

To all whom it may concern:

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

My invention relates to improvements in door checks and closers, and particularly to such constructions as are to be concealed in the floor beneath the door and are commonly known as "floor-checks."

One of the objects of the invention is to provide a simple and strong construction which will operate on a door swinging in either direction.

Another object is to regulate the action of the checking fluid.

Another object is to construct the parts so that they may be readily assembled and disassembled.

The improvements particularly relate to the mechanical construction, to the connecting mechanism between the operating parts, and to the valve mechanism for governing the passage of the fluid through the check.

The principles of the invention are illustrated in the accompanying two sheets of drawings.

Figure 1 is a plan view of a door check and closer embodying the improvements of my invention, the cover or cover-plates being removed to show the interior. Fig. 2 is a longitudinal vertical sectional view, the cover-plates being in place and the parts being in their normal position. Fig. 3 is a horizontal sectional view of the parts carrying the valve mechanism. Fig. 4 is a side view of one of the connecting-levers of the operating mechanism. Fig. 5 is a detail side elevation of a connecting-link. Fig. 6 is a view of the under side of the same. Fig. 7 is a detail of an abutment, showing one end of the connecting-rod in section.

Numerals are used on the drawings to indicate or refer to the different parts of the mechanism.

1 indicates the casing, which is in the form of a box and provides space for the operating mechanism and the checking fluid.

2 indicates the spindle, which serves as a pivotal support for the door and for transmitting the checking and operating pressure.

3 indicates a fragment of a shoe which it is customary to employ in devices of this character and which may be rigidly secured to the lower edge of the door.

4 indicates a cover for the spindle end of the casing. 5 indicates a cover for the opposite end of the casing. These covers may be suitably secured in place to the casing. The cover 4 also serves to assist in holding the spindle 2 in position.

6 indicates the operating-spring, which is normally under compression and may be of any suitable form.

7 indicates the connecting-rod mounted in suitable bearings in the casing to have longitudinal or reciprocal movement.

8 indicates a collar adjustable on a screw-threaded portion of one end of the rod, serving as an abutment for the spring 6.

9 indicates a U-shaped plate near the center of the casing, serving as a stationary abutment for the other end of the spring. This plate 9 is held in place against the pressure of the spring 6 by the shoulders 9′ 9′ of the casing and permits the connecting-rod to be readily assembled in the device or taken out.

10 indicates a lever suitably pivoted in the casing.

11 and 11′ indicate the lower and upper portions of the head of the connecting-rod 7. The head is larger than the opening in plate 9, so that the head serves as an abutment for the plate and spring 6 in disassembling.

12 indicates a link pivoted to the lever 10.

13 indicates a pivot-pin which passes through the head of the connecting-rod. The lever 10′, corresponding to lever 10, is pivoted in the casing and is connected to the pivot-pin 13 by means of the link 12′, the pin passing through the links 12 and 12′.

14 indicates a cam carried by the spindle 2, and preferably integral therewith and symmetrical on both sides of the longitudinal axis of the casing. When the door swings violently back and forth, the point of the cam tends to strike the levers 10 and 10′.

14′ is a roller mounted at the point of the cam and serving to reduce friction at this point.

15 and 15′ indicate rollers carried, respectively, by the levers 10 and 10′ for coöperating with the opposite surfaces of the cam 14.

Rotation of the spindle on its axis and the consequent swinging of the cam causes the cam to engage one of the rollers 15 or 15′. This swings the lever, carrying the roller on its pivot, so that the opposite end of the lever, which is connected by a link to the cross-head of the rod 7, will move the latter toward the spindle in a substantially straight line against the force of the spring. The movement of the connecting-rod and compression of the spring 6 is therefore the same, irrespective of the direction in which the spindle is vibrated, so that the door may be opened in either direction. The construction may therefore be employed either on a right, left, or double swinging door, without the interchange or readjustment of any of the parts or danger of binding or cramping.

When the door is released, the tendency of the spring 6 is to return the parts to their original position by action directly the reverse of that before described. While the construction is such that in a double-swinging door the yielding resistance is afforded to the parts when they reach the normal position, so that the momentum is taken up by the action of the spring resisting the movement of the door in the opposite direction from that in which it was last swung, it is advisable that the movement be checked to prevent the too rapid closing of the door.

16 indicates a piston which is preferably hollow, as shown, and which serves as a guide for the cylindrical end of the connecting-rod 7, and also in conjunction with it to form a chamber to receive a checking fluid of suitable character, such as oil. This piston may be provided with suitable grooves or other means for lubrication between it and the inner surface of the surrounding cylinder portion of the connecting-rod.

17 17′ indicate screws for securing the piston construction in the casing, it being desirable that the parts be removable.

18 indicates a shoulder in the casing for properly locating and supporting the piston construction.

The outlet from the checking-chamber is preferably through the piston member.

19 indicates a ball constituting a valve member, which operates in a conical passage in the rear of the piston-body.

20 indicates the outlet beyond the valved portion of the passage.

21 is a pin accessible from above when the cover 5 is removed, which serves to prevent the ball 19 from falling back into the interior of the piston.

When the door has been opened and then released, so that the connecting-rod moves to the left, the fluid in the chamber 16, tending to pass through the outlet, causes the valve 19 to move to the left and partially close or restrict the passage, so as to prevent the door from suddenly closing. When the door is opened, the fluid of course must flow back into the checking-chamber. I prefer to provide an auxiliary or inlet passage in which is seated a check-valve 22, so that the fluid may pass into the checking-chamber more freely than it can flow out of the same, the auxiliary passage being closed by the check-valve on said outflow.

23 indicates a screw-threaded post accessible from above. It takes into a tapped hole in the rear of the piston-body and has a cam-shaped portion 24 immediately adjacent to the seat for the valve 19. When the ball is thrown to the left by the pressure of the fluid, the ball, in the position of adjustment shown, will strike against the cam 24, which acts as a stop therefor, thus leaving a passage for the fluid to escape to the outlet 20. The size of this passage may be varied by adjusting the cam 24 so as to permit the ball 19 to approach nearer to its seat and so as to secure the desired or needed checking resistance. To limit the amount of adjustment of the valve, I have provided a projection 25, carried by the post 23, which operates between the two pins 26 and 27.

While the construction is simple, it adapts itself to such adjustments as are necessary in door checks and closers. Advantages other than those set forth will be apparent to those familiar with this art.

What I claim is—

1. In a door check and closer, the combination of a piston and cylinder, a spring, a connecting-rod, an operating-spindle, a cam carried thereby, a pair of pivoted levers for engagement by said cam, and connecting-links from said levers to said rod permitting the spindle to be turned in either direction.

2. In a door check and closer, the combination of a piston and a horizontally-movable cylinder, a connecting-rod, a spring therefor, an operating-spindle, and duplicate pivoted connecting mechanism from each side of said spindle to said rod permitting the spindle to be turned in either direction and intermediate connecting mechanism between said spindle and said pivoted mechanism.

3. In a door-closer, the combination of a rod, a spring for propelling the same in one direction, an operating-cam, a pair of oppositely-arranged pivoted levers engaging said cam, and a pivotal link connection between each of said levers and said rod.

4. In a door-closer, the combination of a longitudinally-movable rod, a spring therefor, said rod having a head with upper and lower arms, a pair of pivoted levers, links connecting said levers and said rod located and held in place between the arms of its

head and an operating-spindle and cam for the purpose specified.

5. In a door-check, a stationary hollow piston having a contracted outlet, a movable rod having a cylindrical end portion adapted to inclose and move on said piston to form therewith a liquid-checking chamber, a ball-valve for said contracted outlet, said ball-valve being normally withdrawn from but adjacent to the narrower end of the contracted portion of said outlet, a rotatable post having a cam portion adjacent to said outlet for varying the permissive movement of said ball for the purpose specified.

6. In a door-check, a stationary hollow piston having a contracted outlet, a movable rod having a cylindrical end portion adapted to inclose and move on said piston to form therewith a liquid-checking chamber, the lower side of said contracted outlet being inclined downwardly from the contracted end of said outlet, a ball-valve supported on said incline and normally standing away from said outlet end, and an adjustable device for varying the permissive operative movement of said ball in said outlet.

7. In a door-check, a stationary hollow piston having a contracted outlet and an auxiliary inlet passage leading to said contracted outlet, a valve in said inlet-passage, a movable rod having a cylindrical end portion adapted to inclose and move on said piston to form therewith a liquid-checking chamber, the lower side of said contracted outlet being inclined downwardly from the contracted end of said outlet, a ball-valve supported on said incline and normally standing away from said outlet end, and an adjustable device for varying the permissive operative movement of said ball in said outlet.

8. In a door-check, a stationary hollow piston having a contracted outlet, a movable rod having a cylindrical end portion adapted to inclose and move on said piston to form therewith a liquid-checking chamber, the lower side of said contracted outlet being inclined downwardly from the contracted end of said outlet, a ball-valve supported on said incline and normally standing away from said outlet end, an adjustable device for varying the permissive operative movement of said ball in said outlet, and a removable stop for holding the ball against accidental displacement.

9. In a door check and closer, a stationary hollow piston having a contracted outlet, a movable rod having a cylindrical end portion adapted to inclose and move on said piston to form therewith a liquid-checking chamber, a ball-valve seated in said contracted outlet, being normally withdrawn from but adjacent to the contracted portion thereof, means for adjusting the extent of closure of said valve, an operating-spindle, oppositely-positioned pivotal means of connection between the operating-spindle and said rod, a spring for bringing the parts to their normal position, and a casing for inclosing said parts.

10. In a door-closer, the combination of a rod, a spring for propelling said rod in one direction, a spindle, an operating-cam carried thereby, a pair of oppositely-arranged pivoted levers engaging said cam, and means of connection between said levers and said rod.

11. In a door-check, the combination of a piston member, a relatively movable cylindrical member forming in conjunction therewith a liquid-checking chamber, one of said members having a contracted outlet-passage leading from said chamber, a normally unseated check-valve in said passage, and adjustable means for varying the permissive closing movement of said valve.

12. In a door-check, a stationary hollow piston, a restricted outlet-passage, an inlet-passage, and an auxiliary inlet-passage in communication with said outlet-passage, a movable rod having a cylindrical end portion fitting on said piston and forming in conjunction therewith a liquid-checking chamber, a normally unseated check-valve in said outlet-passage, a normally seated check-valve in said auxiliary inlet, and a normally unseated check-valve in the pasage between the interior of the hollow piston and the auxiliary inlet.

13. In a door check and closer, a hollow piston member, a relatively movable cylindrical member forming in conjunction therewith a liquid-checking chamber, said piston member having an outlet-passage, a ball-valve therefor, a removable pin for holding said ball in place, and means for adjusting the permissive closing action of said valve.

14. In a door-check, a stationary piston member and a cylindrical member movable relatively thereon, one of said members having a contracted outlet-passage, a valve in said passage normally withdrawn from but adjacent to the contracted portion, and means for adjusting the permissive closure of said valve.

15. In a door-check, a stationary piston member and a cylindrical member movable relatively thereon, one of said members having a contracted outlet-passage and an inlet-passage, a valve in said outlet-passage normally withdrawn from but adjacent to the contracted portion, means for adjusting the permissive closure of said valve, and a valve in said inlet-passage.

16. In a door check and closer, the combination of a casing, a spindle, a normally stationary but removable hollow piston member having an outlet and mounted in said casing, a cylinder mounted to reciprocate on said piston, a rod connected to said cylinder having an enlarged head, operative means of

connection between said head and said spindle, an adjustable abutment-ring screw-threaded on the cylinder, an abutment-plate through which said rod passes, said casing having a stationary abutment against which said plate normally rests, a spring coacting between said abutment-plate and said abutment-ring, said abutment-plate having a passage of less diameter than said enlarged head for the purpose specified.

17. In a door check and closer, the combination of a spindle, a checking-cylinder, a connecting-rod, a spring surrounding said rod and having an abutment at one end thereof, a removable U-shaped abutment-plate for the other end of said spring, an enlarged head beyond said abutment-plate, means of connection between said spindle and said head, and a casing surrounding the operating parts and affording an abutment for said abutment-plate.

18. In a door check and closer, the combination of a piston and cylinder, a connecting-rod, a spring surrounding said rod, a rotary spindle, a cam carried thereby, a pair of pivoted levers for engagement with the opposite sides of said cam, and means of connection between said levers and said rod.

19. In a door-closer, the combination of a longitudinally-movable rod, guides therefor, a spring for moving said rod in one direction, a rotary spindle, a cam mounted to rotate therewith, a pivoted lever disposed on each side of said cam adapted to be operated thereby, and means of connection between each lever and said rod.

20. In a door-closer, the combination of a rod, a spring for moving said rod in one direction, a rotary spindle, a pair of oppositely-disposed pivoted levers one on each side of said spindle, means of connection between said levers and said rod, and means carried by said spindle for coacting with one or the other of said levers according as the spindle is rotated in one direction or the other.

21. In a door check and closer, the combination of a piston member and a cylinder member, a spring for moving one of said members longitudinally with relation to the other, a rotary spindle, a pair of oppositely-disposed pivoted levers, means of connection between each of said levers and said movable member, and means carried by said spindle for coacting with either one of said levers according as said spindle is rotated in one direction or the other.

22. In a door-check, the combination of a cylindrical member and a piston member, one of said members being movable relative to the other to provide in conjunction with the other member a fluid-checking chamber, one of said members having an outlet-passage with a normally unseated valve adapted to be partially seated by the closing action of the mechanism and two branch passages communicating with said outlet-passage, and a normally seated valve in one of said branch passages.

23. In a door-check, a casing, a cylindrical member, a piston member, one of said members being movable relative to the other to provide in conjunction with the other member a fluid-checking chamber, removable means for rigidly securing one of said members in said casing, said removable member having a contracted outlet-passage, a ball-valve in said passage normally unseated, a pin for holding said valve in its normal position, and means for adjusting the permissive closing action of said valve, said pin and said adjusting means being carried by said removable member and removable with it.

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