(No Model.)

A. A. PAGE.

DOOR CHECK.

No. 456,707. Patented July 28, 1891.

Fig 1

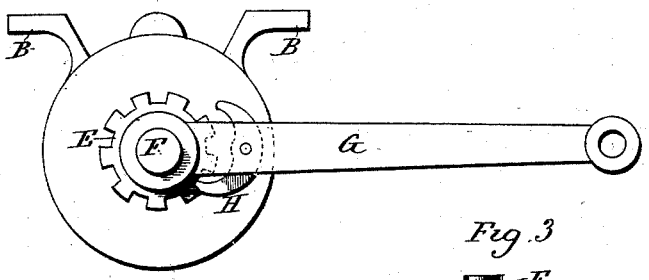

Fig. 2

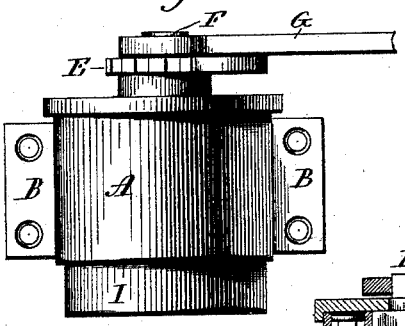

Fig. 3

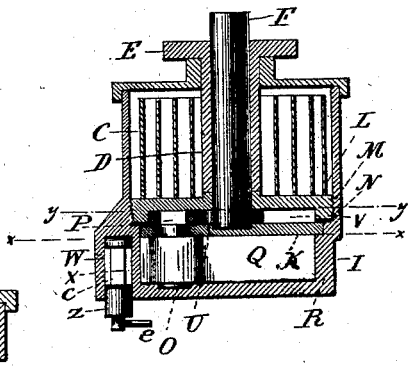

Fig 9

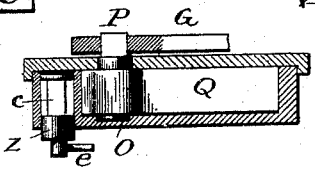

Fig. 4

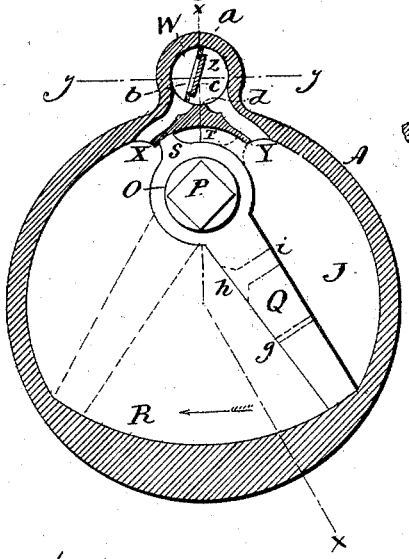

Fig. 7

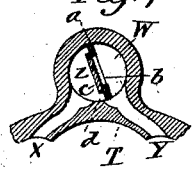

Fig. 5

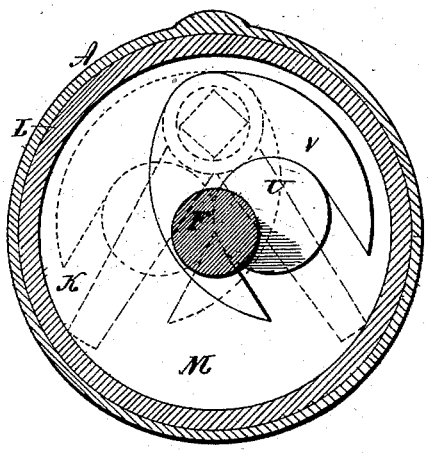

Fig. 6

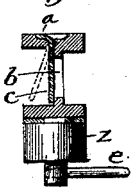

Fig. 8

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UNITED STATES PATENT OFFICE.

ALBERT A. PAGE, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE SARGENT & COMPANY, OF SAME PLACE.

DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 456,707, dated July 28, 1891.

Application filed February 16, 1891. Serial No. 381,673. (No model.)

To all whom it may concern:

Be it known that I, ALBERT A. PAGE, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Door-Checks; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a top or plan view of the check complete; Fig. 2, a front view of the same; Fig. 3, a vertical section cutting on line *x x* of Fig. 4, but showing the shaft F and piston in side view; Fig. 4, a horizontal section on line *x x* of Fig. 3, showing the piston in top view; Fig. 5, a section cutting on line *y y* of Fig. 3; Fig. 6, a vertical section through the valve-chamber, cutting on line *y y* of Fig. 4; Fig. 7, a transverse section of the valve-chamber, illustrating the reversal of the valve from the position in Fig. 4; Figs. 8 and 9, modifications.

This invention relates to an improvement in checks employed to prevent the slamming of doors, and particularly to that class in which the resistance to the closing of the door is a fluid operated upon by a piston, and so that as the piston is forced against the fluid in the opening direction of the door the fluid may readily pass to the reverse side of the piston; but on the return or closing of the door the return of the fluid is hindered, so as to make its escape slowly, that the closing of the door may be so easy as to prevent slamming, the object of the invention being a construction which will permit the use of a small quantity of fluid, fully protect that fluid against escape, and generally to make a simple and cheap construction, but yet effective and durable; and the invention consists in the construction as hereinafter described, and particularly recited in the claims.

A represents the casing, which is provided with ears B or other means by which it may be attached. The casing is of cylindrical shape and contains a coiled spring C, arranged around a vertical tubular shaft D, one end of the spring being made fast to the casing and the other to the tubular shaft, so that the rotation of the shaft will wind the spring in the usual manner for this class of springs for doors. Upon its outer end the tubular shaft D carries a toothed wheel E.

Vertically through the tubular shaft D is a shaft F, which projects outward beyond the wheel E and carries at its outer end a lever G, by which the shaft F may be given a rotative movement, as in the opening and closing of a door, the lever being connected to the door in the usual manner, while the casing A is made fast to the lintel or jamb, as the case may be, and as usual for door-springs.

The lever G carries a pawl H, pivoted to it, and which is adapted to engage the teeth of the wheel E, so that the vibration or swinging movement imparted to the lever G may be communicated to the tubular shaft D and wind the spring or the reaction of the spring be communicated through the shaft D to the lever G.

The casing A is constructed with a downward projection I, forming a chamber J. This chamber is separated from the spring-chamber by a disk K, the disk being held in place by means of a disk L, screwed into the casing above the disk K, the disk L being recessed upon its under side, so as to form a chamber M. Between the two disks L K a packing N is introduced at the joint between the disk L and the chamber below, so as to make a fluid-tight joint between the two chambers. The chamber J contains the fluid to resist the closing of the door. Vertically through the chamber J, but eccentric thereto, is a shaft O, which takes a bearing in the bottom of the chamber J, and also in the disk K, as seen in Fig. 3. The upper end P of the shaft extends into the chamber M, and that end P is preferably made of angular shape, as seen in Figs. 4 and 5. The shaft O carries a piston Q, of a height corresponding to the distance between the top and bottom of the fluid-chamber J, so that the edges of the piston run in close contact with the said two surfaces, as seen in Figs. 3 and 4, the projection of the piston on one side of the shaft being greater than that upon the opposite side, corresponding to the eccentricity of the shaft with relation to the chamber within which the piston works. The piston is adapted to swing in its chamber by

the oscillation of the shaft O, as from the position seen in full lines, Fig. 4, to the position seen in broken lines, same figure, and return. That portion R of the chamber through which the end of the piston passes is made concentric with the axis on which the piston swings, as clearly seen in Fig. 4. On the reverse side of the shaft the piston is constructed with a projection S, which in like manner works in close contact with a corresponding concentric surface T on that side of the chamber, as also seen in Fig. 4, and so that as the piston works backward and forward, as indicated in broken lines, Fig. 4, it forms a close movable partition through the chamber. The vibratory movement is imparted to the piston by means of an eccentric U, made fast to the shaft F between the two disks L K. The eccentric works between the arms of a fork V, which is made fast to the end P of the shaft O and so as to vibrate between the disks L K, the vibration being imparted by the rotation of the shaft F, carrying the eccentric with it, the eccentric working between the arms of the fork and so as to throw the fork from right to left and return, as indicated by broken lines, Fig. 5. The piston partakes of the vibratory movement thus imparted to the fork, the rotative or oscillatory movement being imparted to the shaft F, as before described, by the opening of the door in one direction and in the other direction by the return or closing movement of the door. In rear of the shaft O, which carries the piston, the case is constructed with a chamber W outside the casing, and into this casing a passage X leads from one side of the piston, and a second like passage Y leads from the other side of the piston into the same chamber, as clearly seen in Fig. 4.

The chamber W is made cylindrical, as seen in Fig. 4, and is open from the bottom upward, as seen in Fig. 3. A plug Z is introduced into this chamber, which fills its lower end so tightly as to prevent possible escape of fluid. The plug extends up into the chamber and is flat, forming a diametrical partition *a* across the chamber, as seen in Fig. 4. The plug is represented detached in Fig. 6 in vertical section. Through the partition *a* in the chamber is an opening *b*, and on one side of this opening is a flap or other suitable valve *c*, as seen in Fig. 6, the valve being adapted to close the opening from one direction, but to swing away to open the passage from the opposite direction. The partition *a* being set so as to make the valve to open toward one of the passages, as Y, Fig. 4, and from the passage X of the same figure, it follows that the fluid under pressure from the side of the piston from which the passage X opens will flow through that passage X and freely through the opening in the partition, and thence through the passage Y to the reverse side of the partition, and then, if force be applied to return the piston, the fluid will be accordingly forced through the passage Y, but will be resisted by the valve, which will close under such pressure, and unless some escape for the fluid was permitted the piston would be stopped. To permit the fluid to pass from one chamber to the other on its return, but more slowly than when it entered that chamber through the valve, an aperture is provided independent of the valve-opening. As here represented, this aperture is produced by setting the partition *a* so that it will stand over the opening from the passage X into the chamber W, thus making that passage to open principally on the valve-face side of the partition, but yet so as to leave a slight escape *d* around the partition from the reverse side of the valve. This aperture *d* has no substantial effect upon the free movement of the fluid when the valve is open; but when the valve is closed and the fluid is returning from the back side of the valve it enters the valve-chamber and escapes slowly through the aperture *d* back onto the first side of the piston, and the rapidity with which the fluid may thus escape through the aperture *d* limits the return movement of the piston. If the aperture be greater, the return movement of the piston will be quicker. If the aperture be smaller, then the return movement of the piston will be slower. The aperture or escape may be varied by the rotation of the plug Z. Turning it in one direction will make the aperture wider and in the other direction will reduce the aperture. The plug is constructed of cylindrical shape, so as to readily rotate, and is provided with a handle *e* for its convenient adjustment. The rotative plug Z also permits the valve to be reversed with relation to the two chambers, as seen in Fig. 7, where the arrangement is for the inlet through the passage Y and the return through the passage X; and this reversal of the direction of the free and interrupted passage of the fluid is desirable, so as to adapt the apparatus to a right or left hand swinging door, yet is not essential to the invention. This completes the construction.

The operation of the check is as follows: The casing being secured to the lintel or jamb, as the case may be, and connection made with the door, the opening of the door will impart swinging movement to the lever G, and also to the piston Q. Suppose the position of the piston Q in Fig. 4 be that of the door closed and the chamber J is filled with fluid, the fluid flowing through the respective passages X Y into the chamber W, so that the whole space exposed to the fluid is substantially full. As the door is opened the piston Q travels in the direction indicated by the arrow until it reaches the position indicated in broken lines, Fig. 4, which is the wide-open position of the door. In this movement of the piston the space on the advancing side of the piston has been contracted to the extent of the movement of the piston, while that on the reverse side has been enlarged. In the opening movement of the piston the surplus fluid in ad-

vance of it has passed freely through the passage X and through the valve to the other or retreating side of the piston, the valve opening for such passage of the fluid. The opening movement has contracted the spring, which when the door is free will react to force the door toward its closed position. In the closing movement of the door the piston Q returns and the fluid then in advance of it is forced through the passage Y into the chamber W; but such force closes the valve, and the fluid must pass through the aperture *d* in order to escape to the retreating side of the piston, which it will do slowly and according to the extent of the aperture *d*. The restricted flow of the fluid thus produced retards the closing movement of the piston and correspondingly resists the closing action of the door-spring, the door closing only so fast as the fluid escapes from the advancing piston, and thus the closing of the door must be easy and so as to prevent slamming.

The operation which I have thus described is for a right-hand swinging door. If the door be a left-hand swinging door, then when the door is closed the piston will stand in the position indicated in broken lines and in the opening of the door will move to the position indicated in solid lines and return as the door is closed; but in such case the valve is reversed, as indicated in Fig. 7, and so as to reverse the opening of the valve and the restricted aperture.

If at any time it is desired to make the closing of the door quicker, the partition carrying the valve is turned, so as to increase the size of the restricting-opening *d*, or vice versa. This arrangement of the partition permits the ready adjustment of the aperture and is a desirable construction. It may, however, be omitted and the aperture be of a fixed size—as, for illustration, a simple aperture *f* through the valve, as indicated in Fig. 8, or it may be an aperture directly through the piston, as indicated in broken lines at *g*, Fig. 4. Instead of making the valve in an independent chamber, as described, the valve may be applied directly to the piston, as represented in broken lines, Fig. 4, *h* representing the passage, and *i* representing the valve. If it be desired to remove the resistance entirely, then the valve will be turned as indicated in Fig. 7, which will leave free passage from one side of the piston to the other, so that the fluid may readily escape from one side to the other without offering resistance to the opening or closing movement of the door.

While I prefer to combine the piston-chamber and the spring-chamber in one case, it will be readily seen that they may be made independent, or some other style of spring or force may be employed to close the door. In case of making the piston-chamber separate and independent of the spring, the operating-lever G may be attached directly to the shaft which carries the piston, as represented in Fig. 9. I do not therefore wish to be understood as limiting the invention to the necessary combination of the spring and piston chambers in one structure.

It will be understood that the piston and its shaft may be made integral in one and the same piece instead of employing an independent shaft and attaching the piston thereto, as illustrated.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A door-check consisting of a casing forming a fluid-chamber, a shaft through said chamber, but eccentric thereto, a piston on said shaft and adapted to swing backward and forward in said chamber under an oscillating movement imparted to said shaft, the projection of the piston on one side of the shaft being greater than the projection upon the opposite side, corresponding to the eccentricity of the shaft with relation to its chamber, and mechanism, substantially such as described, to connect the piston with the door, whereby the swinging movement of the door will be imparted to said piston, a passage leading from the said piston-chamber from one side of the piston and through a valve to the opposite side of the piston, and an aperture operating independent of the valve for the restricted escape of the fluid from one side of the piston to the other, substantially as described.

2. A door-check consisting of a casing forming a fluid-chamber, a shaft through said chamber, but eccentric thereto, a piston on said shaft, the projection of the piston on one side of the shaft being greater than the projection upon the opposite side, corresponding to the eccentricity of the shaft with relation to its chamber and adapted to swing backward and forward in said chamber under an oscillating movement imparted to said shaft, and mechanism, substantially such as described, to connect the said piston with the door, whereby the swinging movement of the door will be imparted to said piston, a valve-chamber W, a passage X, opening from one side of the piston to said valve-chamber, and a similar passage Y, opening from the other side of the piston to said valve-chamber, a rotative valve arranged in the said valve-chamber and adapted to open from one of said passages toward the other, but to close in the reverse direction, the said valve under rotation being adapted to reverse its opening and closing directions, with a restricting-aperture *d* between the two sides of the piston and operating independent of said valve, substantially as described.

3. The combination of the casing A, forming a spring-chamber to contain a coiled spring C and a piston-chamber, the said piston-chamber separated from the spring-chamber by a disk K, a piston arranged in the said piston-chamber upon a shaft eccentric to the chamber, the projection of the piston on one side of the shaft being greater than the projection upon the opposite side, corresponding

to the eccentricity of the shaft with relation to the chamber within which the piston works, a passage leading from one side of the piston-chamber on one side of the piston to the same chamber on the other side of the piston, with a valve in said passage opening freely in one direction, but closing in the opposite direction, and provided with a restricting-aperture operating independent of said valve, a central shaft F through said spring-chamber, and mechanism, substantially as described, between said shaft F and the said piston, whereby the oscillatory movement of the said shaft F imparts vibratory movement to said piston, a tubular shaft D upon said central shaft F, one end of the said spring being made fast to the tubular shaft D and the other end made fast to the case, with mechanism, substantially such as described, between the two shafts and the door to engage the said two shafts to produce an oscillatory movement of the same upon the opening and closing of the door, substantially as described.

4. The combination of the piston-chamber J, piston Q, arranged therein upon a shaft eccentric to said chamber, the projection of the piston on one side of the shaft being greater than that upon the opposite side, corresponding to the eccentricity of the shaft with relation to the chamber within which the piston works, the axis of the said piston extending through one side of the piston-chamber, a fork V, made fast to the axis of the said piston, a shaft F, adapted for connection with the door, the said shaft F constructed with an eccentric working in said fork and whereby the oscillatory movement of said shaft F will impart corresponding vibratory movement to said piston Q, the piston-chamber constructed with a passage leading from one side of the piston to the opposite side, and a valve in said passage opening freely in one direction, but closed in the opposite direction, with a restricting-aperture operating independent of said valve between the two sides of the piston, substantially as described.

5. The casing A, forming a spring-chamber, and constructed with an extension I to form the piston-chamber J, a disk K between the said two chambers and forming one side of the piston-chamber, a disk L, recessed upon its under side and set upon said disk K, so as to form a chamber M between the two, a piston Q, hung upon a shaft vertically through said piston-chamber, but eccentric to said chamber, the projection of the piston on one side of the shaft being greater than the projection upon the opposite side, corresponding to the eccentricity of the shaft with relation to the chamber within which the piston works, the axis of the piston extending through the said disk K and into the chamber M, a fork V, made fast to the said axis of the piston, a shaft F, concentrically through the spring-chamber and into said chamber M, the shaft constructed with an eccentric U in said chamber and so as to operate in the fork V, the piston-chamber provided with a passage from one side of the piston to the other, with a valve in said passage opening in one direction and a restricting-aperture opening from one side of the piston to the other side and operating independently of the said valve, a tubular shaft D in the spring-chamber around the shaft F, a coiled spring C in said chamber, one end of the spring attached to the tubular shaft D and the other end to the casing, and mechanism, substantially such as described, between the said shaft F to engage it with the shaft D and with the door, substantially as and for the purpose described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ALBERT A. PAGE.

Witnesses:
WM. S. COOKE,
WM. E. HUSTED, Jr.