(No Model.)

G. W. WRIGHT.

DOOR CHECK.

No. 456,748. Patented July 28, 1891.

Fig 1

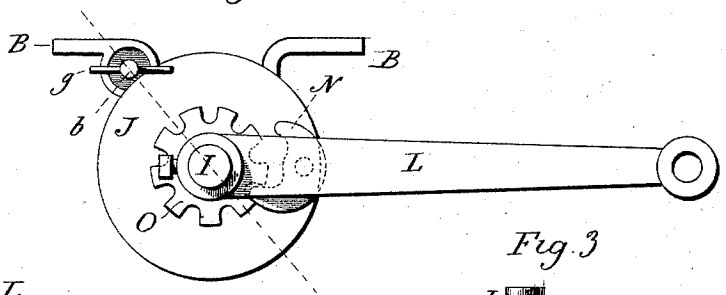


Fig 2

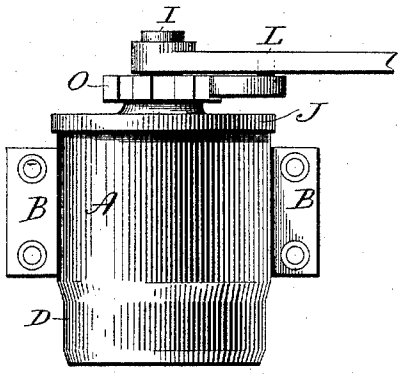


Fig 3

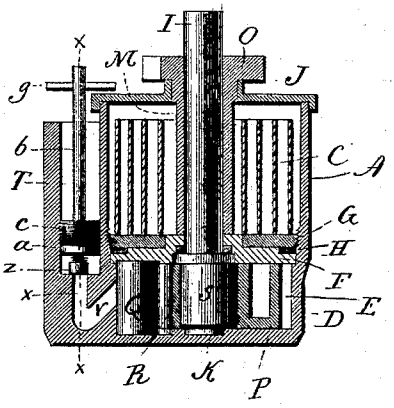


Fig 4

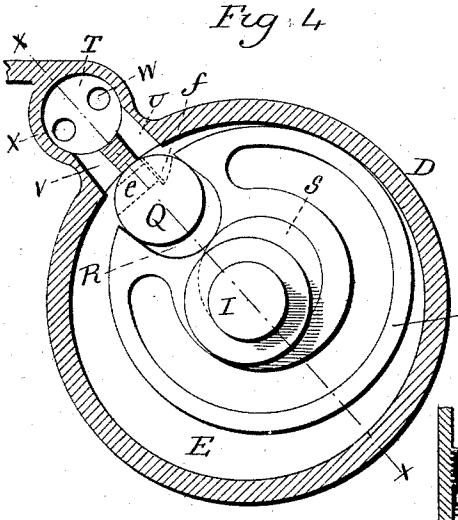


Fig 5

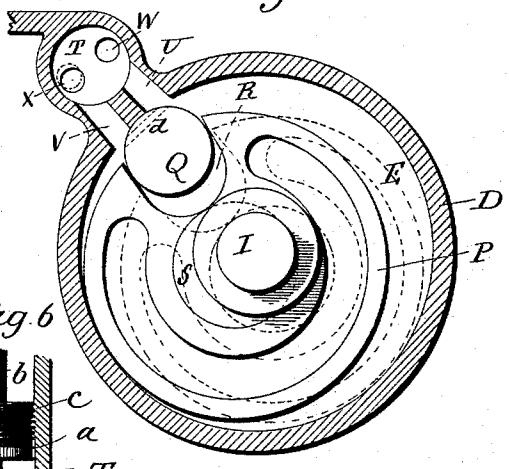
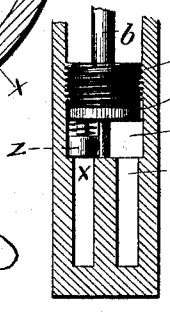


Fig 6



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UNITED STATES PATENT OFFICE.

GRANVILLE W. WRIGHT, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE SARGENT & COMPANY, OF SAME PLACE.

DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 456,748, dated July 28, 1891.

Application filed February 16, 1891. Serial No. 381,665. (No model.)

To all whom it may concern:

Be it known that I, GRANVILLE W. WRIGHT, 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 side view of the same; Fig. 3, a vertical section cutting on line *x x* of Fig. 4, but showing the post Q, the shaft I, and the valve in side view; Fig. 4, a transverse section through the casing cutting on the line of the top of the piston and showing the piston at one extreme point of its movement; Fig. 5, the same as Fig. 4, showing the piston at the other extreme point of movement; and Fig. 6, a vertical section through the valve-chamber on line *x x* of Fig. 3, Figs. 4, 5, and 6 being enlarged.

This invention relates to an improvement in apparatus adapted to be applied to doors to resist the sudden closing of the door and so as to prevent its slamming, particularly applicable to doors in which a spring or other power is employed tending to force the door to its closed position, the invention relating particularly to that class in which a fluid is employed as the medium to resist such sudden closing of the door.

In the construction of this class of door-checks the fluid is inclosed in a chamber within which a piston is arranged, and to which piston movement is given by the swinging of the door, the fluid under the movement of the piston passing from one side of the piston to the other in the chamber. In the opening movement of the door such freedom is given to the passage of the fluid from the then advancing side of the piston to the other side as to offer no substantial resistance to the opening of the door; but on the return or closing movement of the door and as the piston returns less freedom is given for the flow of the fluid, the fluid then offering a resistance to this return or closing movement of the piston and sufficient to prevent the slamming of the door. Broadly considered, this combination of a chamber containing fluid and a piston working therein is well known.

The object of my invention is a simple construction of the fluid-chamber, piston, and its operative mechanism, whereby a small quantity of fluid may be employed, and at the same time the construction of the apparatus be produced by lathe-work—that is, all the parts being substantially circular—so as to be finished by boring or turning, as in a common lathe; and the invention consists in the construction as hereinafter described, and particularly recited in the claims.

In the illustration I show the invention as applied in direct connection with the spring which is to operate to close the door.

A represents the case, which forms the spring-chamber. It is constructed with ears B or other device, by which it may be conveniently attached or secured. The casing is of circular shape and within it a coiled spring C is arranged. The casing is constructed with an extension D, which forms the fluid-chamber E, and, like the spring-chamber, this fluid-chamber is circular in shape, as seen in Figs. 4 and 5, and is substantially concentric with the spring-chamber. The fluid-chamber is separated from the spring-chamber by a disk F, forming a close partition between the two, the joint around the disk F being packed by a second disk G, screwed into the bottom of the spring-chamber upon suitable packing H, as clearly seen in Fig. 3.

Concentrically through the spring and fluid chambers is a shaft I, which projects through the top J of the spring-chamber, and at its lower end it takes a bearing centrally in the bottom of the fluid-chamber, as at K. Its upper or outer end is provided with a lever L, by which connection is made to the door in the usual manner of connecting door-springs of this class with the door.

Around the shaft I and within the spring-chamber is a tubular shaft M. One end of the spring C is made fast to the shaft M, and the other end of the spring is made fast to the casing, and so that as the shaft M rotates in one direction it will wind the spring. Then the reaction of the spring will return the shaft M. Connection is made between the shafts I

and M by means of a pawl N on the lever L and a ratchet-wheel O on the shaft M, (a common arrangement in door-springs,) and so that as the lever L swings under the opening and closing movement of the door it will impart a corresponding oscillating movement to the shaft I, which will be engaged in one direction with the shaft M, so as to wind the spring, and so that as the spring is permitted to react it will return the shaft M and apply the force of the spring to the shaft I and the lever L in a well-known manner.

Within the fluid-chamber E the piston P is arranged. This piston is circular in shape, but of less diameter than the chamber E, and its length corresponds to the distance between the bottom and top of the chamber, so that as the piston moves in the said chamber it will work in close contact with the top and bottom of the chamber. At one point in the chamber and at one side is a stationary post Q, and at a corresponding point in the piston P a recess R is formed, so that the piston may set onto the said post Q, the said post forming an axis, as it were, upon which the piston P may swing, as from the position seen in Fig. 4 to that seen in Fig. 5, and return. The shaft I extends through the piston P, and is constructed with an eccentric S within the piston, the eccentricity of the said eccentric being equal to the difference between the external diameter of the piston and the internal diameter of the chamber in which the piston works, and so that as the shaft I oscillates under the swinging movement of the door, as from the position seen in Fig. 4 to that seen in Fig. 5, it will impart the swinging movement to the piston, before mentioned, and because of the eccentric which forms the connection between the shaft I and the piston the periphery of the piston on the longer radius of the eccentric will work in close contact with the inner surface of the chamber throughout its movement from one extreme to the other, the intermediate position being indicated in broken lines, Fig. 5.

A passage is provided from one side of the piston to the other, so that the fluid placed in the chamber around the piston may pass from one side to the other as the piston forces the fluid before it, the piston moving only as fast as the fluid is displaced. Preferably the passage for the escape of fluid from one side of the piston to the other is made through a valve-chamber T at one side of the casing and substantially in radial line with the post Q. A passage U opens from one side of the post Q into the said valve-chamber T, and a similar passage V opens from the other side of the post Q into the same chamber T. The valve-chamber T is preferably arranged above the plane of the piston-chamber and so that the passages turn upward and open respectively through ports W X into the valve-chamber T, as seen in Figs. 3, 4, and 5. In this valve-chamber a valve Z is arranged, here represented as a vertical spring-valve, which is adapted to rest upon one of the ports, here represented as X, and so as to readily yield to any pressure brought upon it tending to open it, but so as to seat itself upon the opening, and resist a return flow through the port and passage which it closes. The valve-chamber and valve are shown detached and enlarged in Fig. 6. The space around the piston in the piston-chamber, as well as the passages and valve-chamber, is substantially filled with fluid, any suitable fluid being employed, as oil, mercury, glycerine, &c.

The position of the piston represented in Fig. 4 is that as when the door is closed and the fluid fills the space in the chamber around the piston. As the door is opened, the shaft I turns and causes the piston to swing around within the cylinder, pressing upon the fluid on its then advancing side, causing the fluid to flow through the passage V and against the valve Z, seated upon the port X. This pressure causes the valve to rise, so as to allow a free flow of fluid, which passes through the valve-chamber and through the passage U to the then retreating side of the piston and so as to offer no substantial obstruction to the opening movement of the door; but as the door closes the shaft I returns and the piston returns with it, bringing the force upon the fluid on the then advancing side of the piston, which causes that fluid to return through the passage U; but such return of the fluid meets the valve in the closed position, which resists the return of the fluid, and were no escape provided the closing movement of the door would be prevented.

A small aperture is provided at some point to restrict the return of the fluid, so that its escape from the then advancing piston may be so restricted and so gradual that the return movement of the piston will be comparatively slow, and thus retard the return or closing movement of the door. The aperture for the return of the fluid may be made in various ways. As here represented, the valve is attached eccentrically to a disk *a* upon a vertical shaft *b*, extending up from the valve-chamber, the disk *a* closely fitting the valve-chamber and so as to form the top of the chamber, as seen in Fig. 6. The shaft extends through a plug *c*, which is screwed into the valve-chamber or made fast therein, so as to firmly support the shaft, but yet allow the shaft and the disk *a* to rotate. The ports W and X are arranged diametrically opposite each other. The valve Z, being supported upon the disk *a*, will rotate with the disk, so that by rotating the shaft *b* and the disk *a* the position of the valve may be changed with relation to the port it covers or be turned from one port to the other, as and for the purpose presently described. The valve is set so as to not entirely cover the port X, as indicated in broken lines, Fig. 5. This will leave a slight aperture through the port X sufficient to permit the fluid to slowly escape on its return, as before described, and this aperture

may be adjusted to be of a greater or less extent by rotating the disk *a* accordingly, thus making the apparatus adjustable, so as to offer a greater or less resistance to the closing of the door.

As represented in the drawings the apparatus is set for a right-hand swinging door. If the same apparatus be required for a left-hand swinging door, then the valve is swung around from over the port X and so as to cover the port W. This will reverse both the free and restricted flow of the fluid, it being understood that the action of the spring is to be reversed accordingly and in the well-known manner. As here represented this may be done by reversing the engagement of the pawl N with the wheel O. The shaft *b* extends above the valve-chamber, and is provided with a suitable handle *g*, as a means for conveniently rotating the shaft to adjust the valve.

The aperture for the return of the fluid may be arranged in various ways—as, for illustration, it may be through a hole in the post Q, as indicated by broken lines at *d*, Fig. 5.

It is not essential to the invention that the valve for the free escape of the fluid shall be adjustable, as I have described, and it may be differently arranged—as, for illustration, it may be arranged in the post Q, as represented in broken lines, Fig. 4, *e* representing the passage, and *f* the flap-valve, which opens freely in one direction for the escape of the fluid, but resists that return in the opposite direction, a suitable restricting-aperture being made for the return of the fluid. While, therefore, preferring the construction of valve and valve-chamber first described, I do not wish to be understood as limiting the invention to any particular construction of valve for either escape of the fluid or of opening to restrict the return of the fluid. The door-spring or force for closing the door may be applied by any of the known means, it not being essential to the invention that the spring shall be combined as a part of the apparatus. By this construction it will be seen that all the parts are of circular or cylindrical shape, so that the entire work may be produced as lathe-work, thus making the construction extremely cheap, yet durable and effective, and because of the peculiar construction described but a very small amount of fluid is required for operation.

I claim—

1. In a door-check, a circular chamber closed at both its ends and adapted to contain fluid, a vertical post at one side of said chamber, a piston in said chamber of circular shape, but of less diameter than the diameter of the said chamber, the said piston constructed with a recess at one side to embrace and work upon said post as an axis, a vertical shaft concentrically arranged in said chamber, said shaft adapted for connection with the door and extending into the said piston and provided with an eccentric within the piston, but the shaft-eccentric being concentric with the piston, the eccentricity of the said eccentric corresponding to the difference in diameter between the piston and the chamber, and so that the periphery of the piston on the longest radius of the eccentric will always be in contact with the corresponding surface of the chamber, a passage leading from one side of the piston in said chamber to the opposite side of the piston, the said passage provided with a valve opening freely in one direction, but closed in the opposite direction, and a restricting-aperture opening from the chamber on one side of the piston to the same chamber on the opposite side of the piston, but in the opposite direction to the opening of the valve, substantially as described.

2. In a door-check, the combination of a fluid-chamber circular in shape closed at its two ends, a post arranged at one side of said chamber, a piston of circular shape arranged in said chamber, but of less external diameter than the internal diameter of the chamber, the piston constructed with a recess at one side to embrace said post and so as to swing thereon as an axis, a shaft concentrically arranged through said chamber and extending outward, said shaft adapted for connection with the door and extending into the said piston and constructed with an eccentric within the piston, but the shaft-eccentric being concentric with the piston, the eccentricity of said eccentric corresponding to the difference in diameter between the said piston and chamber, a valve-chamber arranged outside said piston-chamber and of circular shape, a passage leading from the chamber on one side of said post through a port into said valve-chamber, a second passage leading from the said chamber on the other side of said post through a port into the same valve-chamber, the said ports being independent of each other, a rotative disk carried by a shaft concentric with said valve-chamber and by which shaft said disk may be rotated, and a valve hung upon said disk in a position corresponding to one of said ports, and so as to substantially close that port in one direction, but open freely in the opposite direction, the said valve by its rotation being adapted for adjustment to either port, substantially as described.

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

GRANVILLE W. WRIGHT.

Witnesses:

HERMAN H. SCHARF,

WM. S. COOKE.