(No Model.)

W. GILFILLAN.

DOOR SPRING AND CHECK.

No. 457,347. Patented Aug. 11, 1891.

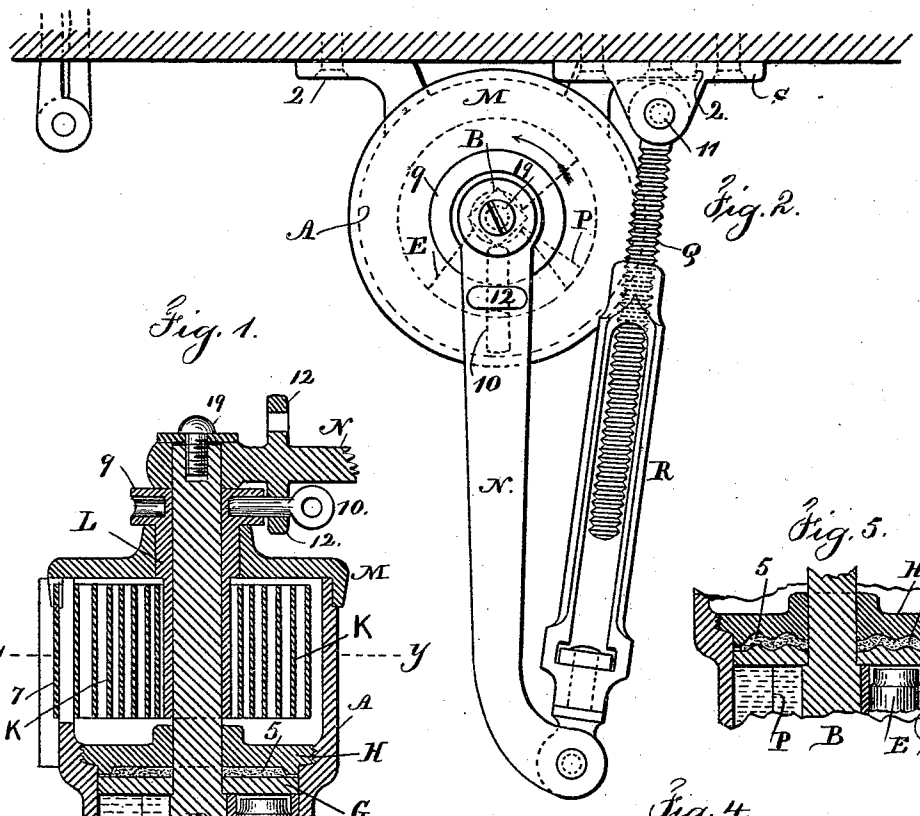


Fig. 2.

Fig. 1.

Fig. 5.

Fig. 4.

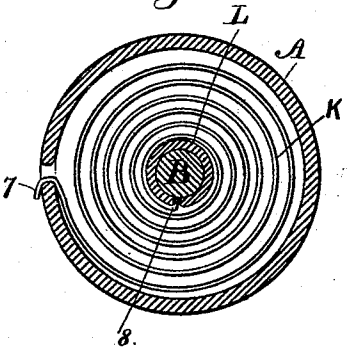
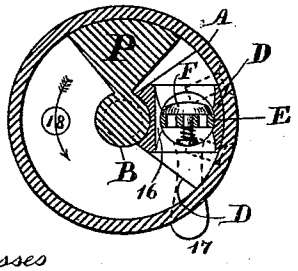


Fig. 3



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM GILFILLAN, OF NEW HAVEN, CONNECTICUT.

DOOR SPRING AND CHECK.

SPECIFICATION forming part of Letters Patent No. 457,347, dated August 11, 1891.

Application filed July 29, 1889. Serial No. 319,017. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GILFILLAN, of New Haven, in the county of New Haven and State of Connecticut, have invented an Improvement in Door Springs and Checks, of which the following is a specification.

Door-springs have heretofore been made of a flat spring coiled as a volute and received within a case and having an arm fastened to the arbor of the spring and connected by a link to the door or case, so that the spring is wound up or its tension increased by opening the door; but such springs are liable to slam the door and sometimes injure the same. Checks have also been applied in connection with springs, so as to arrest the movement of the door when nearly closed, the check being formed of a compressed-air cushion; but in consequence of the air being elastic the closing of the door is unequal and faster at some times than at others, especially when there is a current of air acting upon the door.

The object of the present invention is to adapt the spring to doors opening in different directions and to regulate the closing of the door by a liquid confined within the chamber and having a variable escape, by which the speed of the door in closing can be regulated.

In the drawings, Figure 1 is a vertical section of the improved door spring and check. Fig. 2 is a plan view of the same. Fig. 3 is a sectional plan at the line *x x*, Fig. 1. Fig. 4 is a sectional plan at the line *y y*, Fig. 1; and Fig. 5 is a sectional view showing a modification of the diaphragm, washer, and disk for keeping the piston-cylinder from leaking.

The cylinder A is provided with flanges 2, by which the same may be fastened to the door, or to the door-casing, if more convenient. This cylinder A receives through the center of it an arbor B, the lower end of which passes into a circular socket at the bottom end of the cylinder A, which socket is closed, so as to prevent leakage of the liquid—such as glycerine—that is received into the lower portion of this cylinder A, and upon this arbor B is a piston P, preferably with surfaces that are radial to the axis of the arbor, and this piston can partially revolve within the liquid-chamber of the cylinder A when the arbor B is turned.

The abutment D extends from the arbor B to the interior of the cylinder A and is the same height as the piston P, and this abutment D is secured fast within the cylinder and has through it a vertical hole with parallel or nearly parallel sides for the reception of the plug E, and the stem 3 of this plug passes through the bottom of the cylinder A and it is rendered liquid-tight by a washer at 4. Through the abutment D is a transverse opening, and in the plug E there is an opening covered by a valve F, which valve and its stem are contained within the cylindrical contour of the plug, so as not to interfere with such plug being rotated by a square or handle 17 upon its projecting stem 3, and the sides of the plug E adjacent to the valve F are removed sufficiently to allow for the seat of the valve being flat, or nearly so.

Upon the arbor B and above the piston P is a disk G, that is adapted to fit tightly within the cylinder A, and there is a washer 5, of leather or other suitable material, between the disk G and the removable diaphragm H, which diaphragm H has a central hole for the arbor B, and at its periphery it is screwed tightly into the cylinder A and it confines the washer 5 with more or less pressure, as it may be screwed down upon the same, in order that the liquid within the lower portion of the cylinder A may be confined therein and not escape past the washer 5.

The surfaces of the disk G and of the removable diaphragm H, which are in contact with the washer 5, may be corrugated concentrically, as represented in Fig. 5, to corrugate the washer 5 and lessen the risk of leakage past the same.

The plate or ribbon spring K, which is wound up into a volute, is received into the upper part of the cylinder A, there being a vertical incision in such cylinder A for the hook end 7 of such spring K, and this spring K can be placed within the cylinder A, so that the coil stands in either one direction or the other, and there is through the center of the spring K a tubular axis L, split longitudinally for receiving the hooked inner end 8 of the spring K, and the edges of the tubular axis, where the same is split longitudinally, are of corresponding shape, so as to receive the hook 8 of the spring when such spring K

may occupy the position indicated in Fig. 4 or may be turned upside down. Thereby this door-spring is adapted to being wound up in either one direction or the other, and upon the upper end of the tubular axis L there is a crown 9, perforated or notched radially around its edge for the reception of the pin 10, by which the power is applied for coiling up the spring as the door is opened. There is a movable head M to the cylinder A, with the central hole to the tubular axis L, and the upper end of the arbor B is squared for the reception of the eye on the crank-arm N, and from the end of this crank-arm N extends a link made of two parts, the one portion R slotted like a turn-buckle for the screw Q, to the end of which a joint 11 and attaching plate or bracket S are applied, and this attaching plate or bracket is to be secured to one part and the cylinder A to the other part of the door or casing.

Upon the crank-arm N are flanges 12, projecting both above and below the arm and perforated for the pin 10 to pass through into the crown 9, and it will now be apparent that as the eye upon the crank-arm N has a square hole to fit the squared upper end of the arbor B such crank-arm N can be turned over to place it in either position that may be the most convenient in applying the spring to the door and casing, and the pin 10 will be passed through whichever flange 12 may be adjacent to the crown 9, and the spring K is set up by rotating the tubular axis L and crown 9, so as to obtain the proper amount of power from such spring K, and this is done without changing the position of the arbor B to the crank-arm N, and after the spring has been set up the pin 10 is to be inserted through the flange 12 into the crown 9, in order that the crown and the tubular axis may be partially revolved by the action of the crank-arm N in opening the door, and in so doing the spring K will be still further wound up and its resilient force will tend to close the door.

During the operation of opening and closing the door the piston P will be moved first in one direction and then in the other by the turning of the arbor B by the crank-arm N and link R Q, and in this operation the liquid which is confined in the lower portion of the cylinder A is acted upon by the piston P, and as the door is opened the piston P is moving in the direction of the arrow, Fig. 3, and the liquid forces the valve F open, and such liquid passes freely past the valve and fills the space between the stationary abutment D and the moving piston P. The moment the door is released the spring K, acting through the tubular axis L, crown 9, pin 10, and arm N, moves the door in the opposite direction to shut the same and the piston P is moved in the opposite direction to the arrow, Fig. 3, and the liquid is confined between such piston P and the stationary abutment D because the valve F is closed by the pressure of the liquid and by the spring that moves the valve to its seat, and if the liquid between the piston P and the abutment D were tightly confined the spring would cease to be operative in closing the door. This is prevented by the opening at 16 through the abutment D adjacent to the plug E, and this opening is sufficiently small to only allow the liquid to pass from one side of the abutment to the other at the slowest rate of speed desired. Hence the door opens freely; but it is checked as soon as it commences to close, and can only close at the rate of speed allowed for by the passage of the liquid from one side of the abutment D to the other, and it will be observed that the stem 3 of the plug E passes through the bottom of the cylinder A, so that such plug E may be partially rotated to bring the notched or cut-away portion of the plug adjacent to the valve F contiguous to the slot or notch 16, and thereby increase the space through the plug D for the passage of liquid from one side to the other, and in this manner the rate at which the door is closed by the action of the spring can be regulated with accuracy.

I have represented a handle 17 upon the lower end of the stem 3 as a convenient device for partially rotating the plug E to vary the opening through the abutment D and regulate the time for the closing of the door. It is preferable to put the parts of the spring all together before introducing the liquid into the chamber at the lower part of the cylinder A, and I find it advantageous to provide a removable screw-plug 18 at a hole in the bottom of the cylinder A, so that the glycerine or other liquid can be introduced into the chamber containing the piston C after the other parts of the spring have been put together and are ready for use.

By rotating the turn-buckle R the strength or tension of the spring can be varied as required from time to time, and the pin 10 can be withdrawn and changed from one hole to another for the same purpose. It is usually preferable to provide a washer and screw at 19 to fasten the arm N to the axis B.

In putting the parts together so that the spring will act in the proper direction it is also necessary to turn the plug E in such a manner that the valve F will open when the door opens and close to confine the liquid as the door closes under the action of the spring.

The disk G may be formed with the arbor B and the piston P, or it may be a separate piece fastened firmly in place, and in all cases its edge is turned off true to form a bearing and a joint against the cylinder, which joint is lubricated by the glycerine or other material within the cylinder. This lessens the wear and renders the door-spring durable.

It will be apparent that the arbor B, piston P, and cylinder for containing a liquid and the abutment can be used as a door-check

without the spring, the liquid passing from one side of the abutment to the other during the movement of the parts.

I claim as my invention—

1. The combination, with the arbor B and crank-arm N, of the spring K, the case A, within which the spring is received, the cover M to the cylinder A, the tubular axis L, surrounding the arbor B and passing through the head M, the crown 9, and the pin 10 to connect the crown and the crank-arm, substantially as set forth.

2. The combination, with the spring K and its cylinder A, of the arbor B, tubular axis L, the crown 9, and the reversible crank-arm N, having the two projecting flanges, and the pin 10 for connecting the lower flange with the crown of the tubular axis, substantially as set forth.

3. The combination, with a door-spring, of a receptacle for a liquid, a piston connected to and moved with the spring, an abutment, a valve opening in one direction to allow the liquid to pass freely, there being a small opening to allow the liquid to pass gradually, and a plug carrying the valve and reversible to adapt the valve to open in either direction, substantially as specified.

4. The combination, in a door-check, of a chamber for a fluid, a piston, and a stationary abutment, and a reversible valve and plug adapted to be changed to vary the direction in which the check is made to operate, substantially as specified.

5. The combination, with the door-spring, the arbor B, and piston P, of the cylinder for containing the piston and a liquid, an abutment within the cylinder and a valve for allowing the liquid to pass freely in one direction, a disk moving with the piston and arbor, a washer, and a removable diaphragm within the cylinder for retaining the liquid, substantially as set forth.

6. The combination, in a door-check, of a cylinder to hold a liquid, an abutment in the same, a piston, a central spindle and a disk permanently connected together, the disk filling the cylinder at one end, a movable diaphragm in the cylinder, and a packing between the disk and diaphragm and around the spindle, substantially as set forth.

7. The combination, in a door-check, of a chamber for holding a liquid, a piston moving in such chamber, an abutment, and a plug having an opening through the same and a valve and adapted to regulate the gradual flow of the liquid by turning the plug, substantially as specified.

8. The combination, with the volute spring, of a cylindrical case in one piece, slotted in the upper part thereof and adapted to receive the spring and to hold one end thereof, an arbor and piston within the closed lower portion of the cylinder, a diaphragm for retaining the liquid in such portion of the cylinder, an abutment acting with the piston to regulate the closing of the door by the spring as the liquid within the cylinder is forced from one side to the other of the abutment, a valve, and a reversible plug carrying the valve and adapted to pass the liquid freely in one direction or the other, substantially as set forth.

Signed by me this 27th day of July, 1889.

WILLIAM GILFILLAN.

Witnesses:

GEO. T. PINCKNEY,

HAROLD SERRELL.