

(No Model.)

D. G. WELLS.
DOOR CHECK AND CLOSER.

No. 577,591.

Patented Feb. 23, 1897.

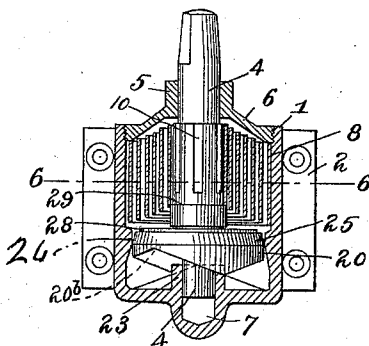
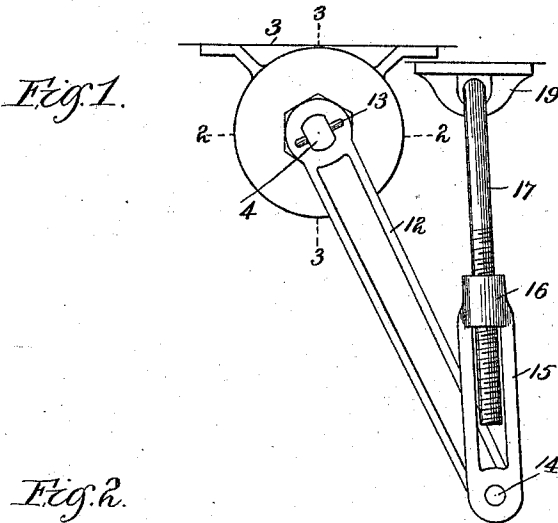


Fig. 3.

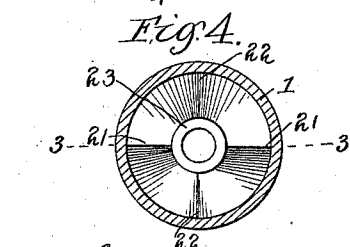
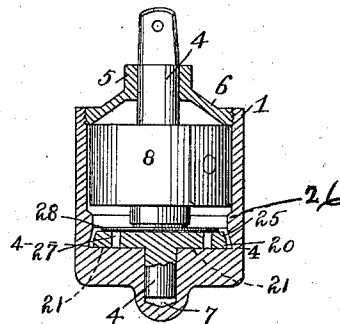


Fig. 5.

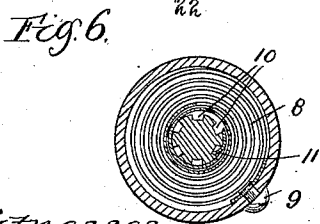
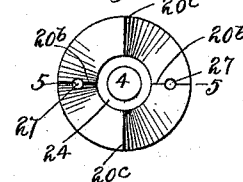


Fig. 7.

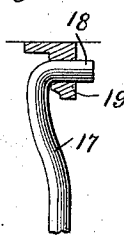
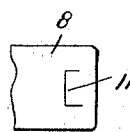


Fig. 8.



Witnesses.

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DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 577,591, dated February 23, 1897.

Application filed October 23, 1895. Serial No. 566,654. (No model.)

To all whom it may concern:

Be it known that I, DAVID GORDON WELLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door Checks and Closers, of which the following is a full, clear, and exact specification.

My invention relates to that class of door checks and closers or devices for closing doors which are also designed for and adapted to prevent the door from slamming and in which is employed a spindle having a coil-spring wound thereon for closing the door and a plunger working in a fluid-chamber for retarding the action of the spring and thereby preventing the same from slamming the door.

One of the objects of my invention is to combine with a door-spring of the described nature an improved and simple device for utilizing the atmospheric pressure in retarding the closing movement of the door, and which shall be incapable of injury or disarrangement and will avoid recoil or rebounding of the door should the door be forced to without waiting for the action of the spring to close it.

Another object of my invention is to provide improved and simple means for readily adjusting the device with relation to the door whereby the check may be caused to operate at the proper time; and a further object of my invention is to simplify the form of the coil-spring and to provide for the ready adjustment of its tension; and a still further object of my invention is to employ an inelastic fluid, such as water or other liquid, in connection with the atmospheric pressure, for checking the closing of the door, whereby the vibratory or rebounding action resulting where air alone is depended upon is avoided.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts whereby the said objects and certain other objects hereinafter described are accomplished, all as fully explained with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a plan view of my improved apparatus as in use. Fig. 2 is an enlarged vertical sectional view of the cas-

ing containing the coil-spring and plunger hereinafter described, taken on the line 2 2, Figs. 1, 3, and 4. Fig. 3 is a similar section taken on the line 3 3, Figs. 1, 2, 4, and 5. Fig. 4 is a plan section of the casing with the plunger and spring removed, taken on the line 4 4, Fig. 3. Fig. 5 is a bottom view of the plunger. Fig. 6 is a horizontal transverse section taken on the line 6 6, Fig. 3. Fig. 7 is an enlarged detail view, partly in section, of the adjustable arm and bracket which connects the same to the door jamb or frame; and Fig. 8 is a detail side elevation of the inner end of the coil-spring hereinafter described.

1 represents a shell or casing provided with wings or flanges 2, by means of which latter the casing may be secured to the door 3 in any suitable way.

Located within the casing 1 is a stem or spindle 4, whose upper end is held and guided by a collar 5, formed on a screw-cap 6, which closes the upper end of the shell or casing 1, while the lower end of such stem or spindle is stepped in and guided by a socket 7, formed in the bottom of the casing 1, as clearly shown in Figs. 2 and 3.

Coiled around the spindle 4 and within the casing or shell 1 is a coil-spring 8, whose outer end is attached by any suitable means, such as a screw 9, to the wall of the shell 1, while its inner end is connected to the spindle 4. This connection is preferably and advantageously effected by providing the spindle 4 with a series of longitudinal or vertical grooves or notches 10, which form upright teeth, as indicated in Fig. 6, and which teeth have salient or undercut edges, as also indicated in said figure, for the engagement of a lug 11, formed on or secured to the inner end of the spring 8. By thus providing the spindle 4 with a number of the teeth for the engagement of the lug 11 it will be seen that the tension of the spring may be readily varied by removing the lug 11 from its notch or tooth and seating it in another one of the notches.

In order that the spring may be utilized for rotating the stem or spindle 4 in either direction, the teeth formed by the notches 10 are undercut on both sides, as shown in the drawings, whereby the lug 11 may be caused to engage with either side, according to the position the spring occupies when placed in the

casing. This lug 11 on the spring 8 may be conveniently and cheaply formed by striking up a tongue on three sides, so as to form a hook, as indicated in Fig. 8, and then forcing such tongue sufficiently away from the body of the spring to cause it to engage with the teeth formed by the grooves 10. The upper end of this spindle 4 is prismatic or flattened, and secured thereon is an arm 12, held in place by means of a pin 13, and being provided at its outer end with a lug or pin 14. The stem 4 is flattened on two sides only, so that the arm 12 must always be applied in the proper position with reference to the inclines on the plunger hereinafter described. The outer end of this arm 12 is connected with the door jamb, casing, or other fixed part of the building by means of an adjustable arm consisting of a link 15, having at one end a perforation into which the pin 14 projects, and at its other end a threaded nut 16, and a threaded rod 17, having one end engaging in said nut, and being provided at the other end with a hook or angular bend 18, which is seated in a bracket 19, suitably secured to the door jamb or casing, the adjustable link or arm thus constituted by the rod 17 and link 15 being held in place on the pin 14 and on the bracket 19 by force of gravity alone, and hence readily removable when it is desired to turn the rod 17 in the nut 16 for adjusting the length of the adjustable arm and causing the door to close sooner or later.

Formed on or securely fixed to the stem or spindle 4 at a point below the spring 8 is an annular or circular plunger or piston 20, whose lower surface is provided with two double inclines, as shown in Fig. 5. That is to say, it is inclined from the point 20^a upwardly when in its proper position, as shown in Fig. 2, to the point 20^b and then downwardly to the point 20^c, these inclines being duplicated on the other half of the surface, so that when viewed as in Fig. 5 or upside down the lower surface of the plunger has two diametrically opposite points of maximum elevation 20^a 20^c and two diametrically opposite points of maximum depression 20^b. The bottom of the shell or casing 1 is provided with complementary inclines, which, when the plunger is in the position indicated in Fig. 3, accurately fit the inclines formed on the bottom of the plunger. The apexes of the inclines on the bottom of the casing are indicated at 21, while the lowest points of depression are indicated at 22.

23 represents the upward extension of the socket 7 for guiding the lower end of the stem 4, which is shown in the drawings as being co-extensive in height with the apexes 21 of the inclines formed on the bottom of the shell, and in order that the plunger 20 may descend to its lowest position and accurately fit and rest upon the inclines on the bottom of the shell 1 the plunger around the stem 4 is cored out or recessed, as indicated at 24, so as to receive the extension 23.

The upper edge of the plunger 20 is beveled or slightly conical, as shown at 25, and the interior of the shell 1 is provided with a circular or annular choke or contraction at 26, against which the conical portion 25 of the plunger fits when the plunger has risen to substantially its maximum elevation. The plunger is provided with a number of perforations or passages 27, which are normally closed by means of a flexible disk 28, resting upon the upper surface of the plunger and constituting a valve. The stem 4 is prevented from slipping through the coil-spring 8, and the coil-spring thereby utilized for assisting gravity in causing the plunger to descend, by means of a shoulder 29, formed on the stem, and upon which the inner convolution of the spring 8 rests.

The space in the shell 1 below the spring is filled with some suitable liquid, in which the plunger works or reciprocates and thus receives its retardation during the closing movement of the door, which closing movement causes the plunger to rise to the position shown in Fig. 2. The advantages of employing this liquid in conjunction with the atmospheric pressure for retarding the closing movement of the door are twofold: First, with the shell thus filled with liquid it is unnecessary to employ any packing-rings or other devices for forming a tight joint around the periphery of the plunger, and, second, the liquid being inelastic unlike air, and its friction on the piston being greater than that of air, it prevents or avoids the recoil or rebounding action of the door so common in pneumatic door-checks when the door is forced to against the pressure of the atmosphere.

Assuming that the parts are in their normal positions, with the shell 1 secured to the door and the bracket 19 secured to the door casing or jamb or other fixed part of the building, and the plunger elevated in the position indicated in Fig. 2, which it assumes when the door is closed, the opening of the door will rotate the spindle or stem 4 through the intermediary of the arm 12 and the parts 15 17, and the inclines on the bottom of the plunger will, by virtue of gravity and the assistance of the spring 8, slide down the inclines on the bottom of the shell 1 until the plunger has reached the position indicated in Fig. 3, with the inclines fitting accurately together and the plunger in its lowest position, and the plunger in thus descending and occupying the space at the bottom of the shell 1 instantly forces the liquid thereunder upward through the perforations 27, the flexible valve 28 automatically rising to permit the passage of the liquid to a point above the plunger. When the opening force on the door is now released, the reaction of the spring 8 will rotate the spindle 4 in the opposite direction and cause the door to close, but in so doing the inclines on the bottom of the plunger 20 and the bottom of the casing 1, coöp-

erating with each other as the plunger rotates in the reverse direction, will raise the plunger in the shell until it reaches the position shown in Fig. 2 and in so doing will create a partial vacuum thereunder, and thus permit the door to close only so fast as the liquid above the plunger can escape downward between the circumference of the plunger and the choke or contraction 26 on the casing, the valve 28 of course automatically closing the openings 26 as the plunger rises. Thus it will be seen that the closing of the door is checked or retarded by the atmospheric pressure above the plunger 20, and the duration and extent of the retardation are dependent upon the freedom with which the liquid above the plunger can be sucked down between the plunger and shell-walls by the partial vacuum created under the plunger when it ascends, and even though sufficient force should be applied to the door to cause it to close without waiting for the liquid above the plunger to escape downward the apparatus would not be damaged nor would any of its parts be deranged. The result would simply be that a vacuum would be created beneath the plunger which would be filled by the liquid after the lapse of sufficient time for the latter to escape between the plunger and the shell.

It will thus be seen that in my improved device the plunger is forced upward in the liquid by positive means during or by the closing movement of the door, and the door cannot close until the plunger has reached the upward limit of its movement, and in doing so the suction created below it causes the liquid to ooze through the gradually-contracting space between the choke 26 and the plunger. Such choke 26 gradually contracting toward the plunger permits the door to close very rapidly throughout the first and greater part of its closing movement and causes it to be arrested in its movement and to close very slowly when it is within but a short distance of the jamb. When the door is opened, the plunger is at liberty to descend in the liquid, but the opening of the door is not dependent upon the descent of the plunger, and hence the door may be opened rapidly without resistance other than that of the spring, while the plunger may be leisurely descending in the liquid under the pressure of the spring only. It is quite evident, therefore, that the passages 27, which are closed by the valve 28, are provided simply for the more fluent escape of the liquid from the lower to the upper side of the plunger, and if such passages were omitted the plunger would nevertheless operate, the difference being that it would take longer to descend.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A device for the purpose described, having in combination a shell provided with a chamber for containing a quantity of liquid

and being hermetically closed at one end and having a contraction or choke located around its wall near its opposite end; a reciprocating plunger located in said shell between said choke and closed end and being of less diameter than the main portion of said chamber between said choke and closed end but of about the same diameter as said chamber at said contraction or choke, whereby the plunger will substantially close the chamber at said contraction or choke; a stem to which said plunger is secured; means for forcing said plunger toward the closed end of said chamber and away from said choke when the door is opened; and means operatively connected with the door for forcing said plunger away from said closed end of the chamber and toward said contraction or choke when the door closes; whereby the opening movement of the door will force the plunger down in the liquid and cause the liquid to escape upwardly past the plunger and occupy a position between the plunger and the choke, and the closing movement of the door will cause said plunger to move away from the closed end of the chamber and rapidly approach said contraction or choke throughout the greater part of the closing movement of the door and thereby cause the liquid to be sucked toward the closed end of the chamber and away from said choke, and the retardation of the door will be increased as the plunger approaches the choke or contraction and the door thus allowed to close rapidly throughout the greater portion of its movement and very slowly through the final portion of its movement, substantially as set forth.

2. A device for the purpose described having in combination a shell having inclines and a choke or contracted portion, a vertically-movable stem in said shell, having a shoulder, a spring coiled around said stem and resting upon said shoulder at one end and being fixed at its other end, a plunger arranged on said stem in said shell below said choke and having bottom inclines complementary in shape to the said inclines in the shell, and means for connecting said shell and stem to the jamb and door, substantially as set forth.

3. A device for the purpose described having in combination a shell having inclines in its bottom and a choke or contraction arranged around the wall of said shell above said inclines, a plunger arranged in said shell and having bottom inclines corresponding to said first inclines and resting thereon, and the upper edge of said plunger being beveled or conical, a stem arranged in said shell and being secured to said plunger, a spring coiled on said stem and secured to said shell, and means for rotatively connecting said stem and shell to the door and jamb, substantially as set forth.

4. A device for the purpose described having in combination a shell provided with in-

clines in its bottom and having the central
socket 7 and extension 23, a plunger arranged
in said shell and having inclines correspond-
ing to said first inclines and being provided
5 with the recess 24 for receiving said exten-
sion 23, a stem projecting through said plun-
ger and recess and having one end fitted in
said socket 7, said shell being provided with
a choke or contraction above said plunger, a
10 spring for rotating said stem and means for
connecting said stem and shell to the jamb
and door, substantially as set forth.

5. A device for the purpose described hav-
ing in combination a shell, a stem located in

said shell and having a series of vertical 15
grooves forming teeth undercut on both sides,
a spring coiled within said shell around said
stem and having a struck-up tongue engag-
ing with said teeth whereby the tension of
the spring may be varied and the spring made 20
to act in either direction, and means for con-
necting said stem and shell with the door and
jamb, substantially as set forth.

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Witnesses:

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