(No Model.) 2 Sheets—Sheet 1.

G. W. WRIGHT.

DOOR CHECK.

No. 491,155. Patented Feb. 7, 1893.

Fig. 1

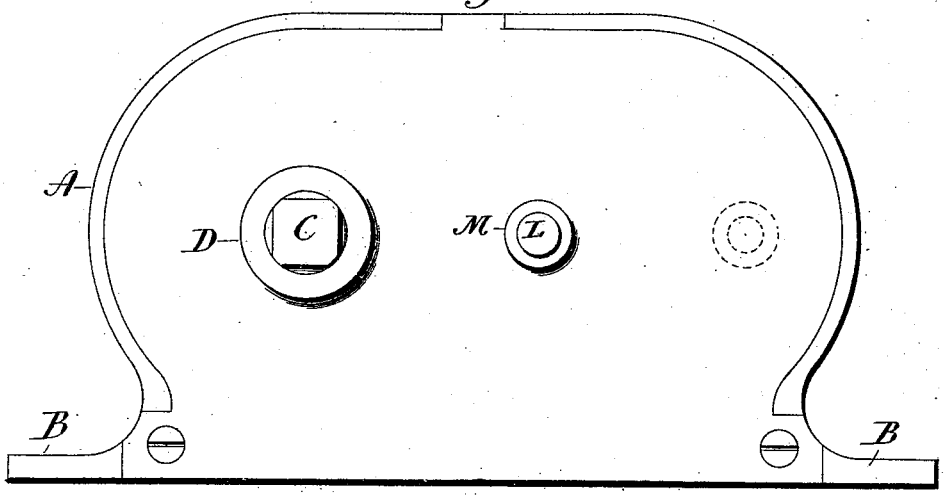


Fig. 2

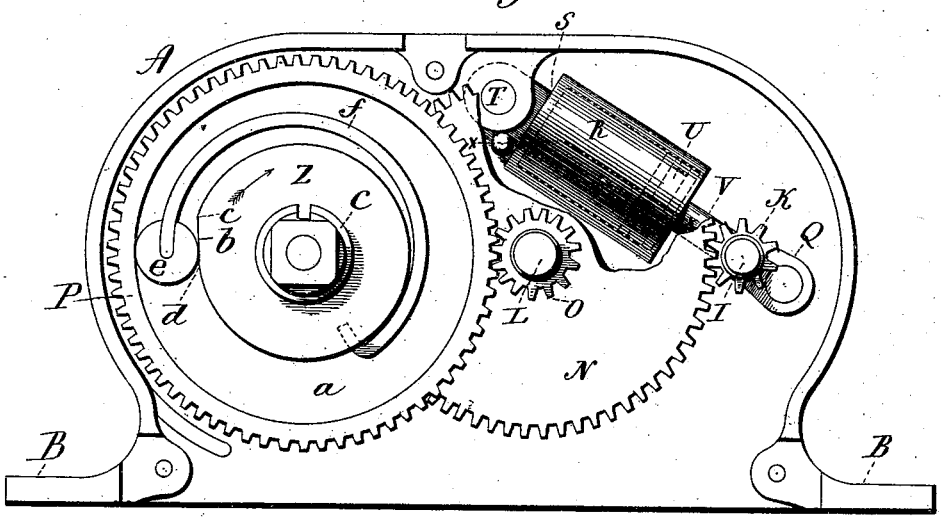
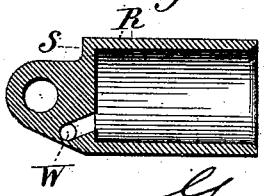


Fig. 3



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Inventor.
By attys Earle & Seymour

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4

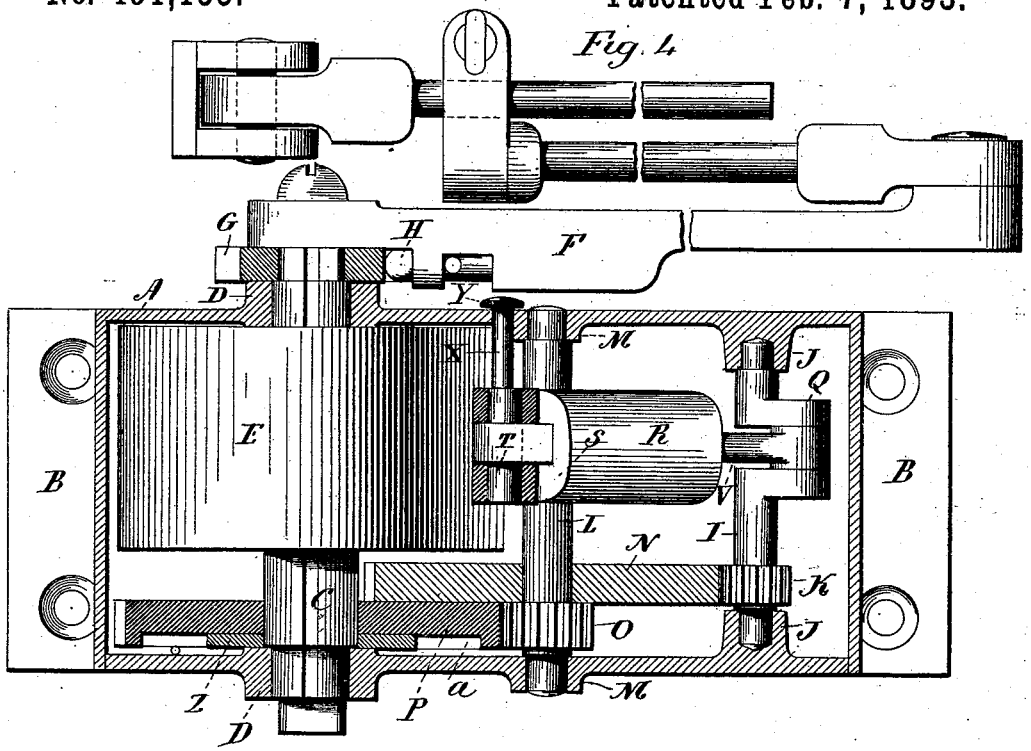
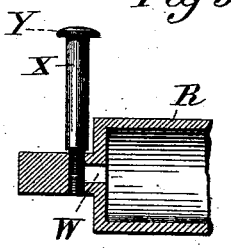


Fig 5



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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. 491,155, dated February 7, 1893.

Application filed February 23, 1892. Serial No. 422,474. (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, (Case C;) and I do hereby declare the following, when taken in connection with 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, an under side view. Fig. 2, an under side view, the bottom of the case removed to show the mechanism. Fig. 3, a horizontal longitudinal central section of the check-cylinders on line *x*—*x* of Fig. 2. Fig. 4, a vertical section through the case showing side view of the mechanism in partial section. Fig. 5, a longitudinal section of the cylinder through the escape aperture illustrating the adjusting screw.

This invention relates to an improvement in that class of door-checks to be used in combination with a door-spring, and so that the closing movement of the door under the action of the spring may be checked to prevent its slamming, and particularly to that class in which a volute spring is employed as the door-spring, the object of the invention being principally to combine a mechanical check with such a volute spring within the same case as the spring, in contradistinction to a fluid check, which has heretofore been combined with such a spring, the check however being adapted for use upon a door in which the force applied for closing the door may be a structure independent of the check, and the invention consists in the combination of mechanism as hereinafter described, and particularly recited in the claims.

A, represents the case, which is provided with suitable lugs or flanges B, by which it may be secured to the lintel, or wherever it may be desired. Within the case a vertical principal shaft C, is arranged, it being supported in the top and bottom of the case in bearings D D, prepared for the purpose, so as to permit the shaft to be rotated. Within the case the steel volute spring E, is arranged, in the usual manner, the outer end being in connection with the case, and the inner end in connection with the shaft. At one end of the shaft, outside the case, a lever F is applied, which is in connection with the door in the usual manner, and so that the opening of the door will turn the shaft in one direction to wind the spring, and so that the reaction of the spring will be communicated through the lever to close the door. As represented the shaft is provided with a ratchet-wheel G, and the lever provided with a suitable pawl or bolt H, by which the lever may be coupled to the shaft, and so that the spring may be wound to the required tension, and then engagement be made between the lever and the shaft, in the usual and well known manner. The connections between the shaft and the door are illustrated, but they are too well known to require particular description, and if preferred other connecting devices may be employed.

Within the same casing which contains the spring E, and at one side, a shaft I, is arranged, supported in suitable bearings J, and so as to revolve freely, the axis of the shaft I, being substantially parallel with the shaft C, of the spring. The shaft I, carries a pinion K, and between the shaft I, and the principal shaft is another shaft L, supported in bearings M, parallel with the shaft I. The shaft L, carries a gear-wheel N, which works into the pinion K on the shaft I, and the shaft L, also, as here represented, carries a pinion O. Loose on the shaft C is a gear-wheel P, which works into the pinion O, of the shaft L. The gear P, is made loose upon the shaft C, but is adapted to engage it in the return movement of the shaft, and so that as the door closes, the gear-wheel P will rotate with the shaft C, and that rotation will be communicated through the pinion O, and the gear P on the shaft L, to the shaft I, through the pinion K, and because of the different diameters of the gears and pinions, a rapid revolution will be imparted to the shaft I. The shaft I, is constructed with a crank Q, and within the case and in a plane parallel with the path of the crank, a cylinder R, is arranged, one end S, closed and that end hung upon a pivot T, so that the cylinder may oscillate in a plane par-

allel with the path of revolution of the crank. The other end of the cylinder is open, as seen in Fig. 3, and in the cylinder a piston U, is arranged from which a rod V, extends to the crank Q, and so that the revolution of the crank will impart reciprocating movement to the piston, the cylinder oscillating upon its axis for such movement of the piston.

The cylinder R and its piston, are constructed in the usual manner of constructing piston door-checks, the piston being adapted to move freely outward from the closed end of the cylinder, and so as to permit the air to flow freely into the cylinder forward of the piston, and so that the air thus admitted will form a cushion to resist the return of the piston. For this free admission of air the piston may be of any of the known constructions, not necessary to be shown in this application.

An aperture W, is provided at the closed end of the cylinder through which the air may slowly escape as the piston moves toward the closed end of the cylinder, so that the cushion may be gradually relieved to permit the piston to so move, and this outlet is regulated by an adjusting-screw X, or other known device, so that the escape aperture may be regulated as occasion requires. As here illustrated, the head Y, of the screw is outside the case where it may be readily reached for adjustment.

To allow the shaft C, to turn in winding the spring, as in opening the door, but without engaging the gear P, and so that that gear with the check mechanism may stand at rest during the opening movement of the door but yet engage the shaft C and gear P as the door closes, and so that the reaction of the spring in closing the door may also impart movement to the checking mechanism, a cam Z is made fast to the lower end of the shaft C, and within a concentric recess *a* in the side of the gear P. The cam is a disk arranged so as to leave a space between its periphery and the outer side of the recess *a*, at one point in the periphery of the disk, a cam-acting surface *b* is formed, which at that point and for a short distance gradually contracts the width of the space *a*, as from *c* to *d*. The direction of rotation of the disk or cam Z under the movement of opening the door, is indicated by the arrow in Fig. 2. Within the space *a* and between the points *c d* in the periphery of the cam a roller *e* is arranged, which is carried by a spring-arm *f*. The roller is of a diameter somewhat less than the width of the space *a*, at the point *d*, where the cam surface *b*, begins, but is greater in diameter than the contracted portion of the space at *c*. The roller is attached to one end of the spring, the spring extends therefrom around the cam, and at its other end is made fast to the cam, so that the spring will travel with the cam, the tendency of the spring, however, is to draw the cam into the contracted space between the points *d*, *c*, and so as to produce substantial contact therewith, but in the opening of the door, the cam turns in the direction indicated by the arrow, and as its cam surface *b* works upon the roller *e*, with a tendency to revolve that roller so that it will travel slower than the cam itself, the result is that the friction between the cam and the roller is less than it is between the roller and the gear P, the resistance to the revolution of the gear P, being greater than the friction produced between the cam and the roller, consequently the cam will travel away from the roller, so that the roller may revolve freely, but without making an engagement between the cam and the wheel P, then as the door spring reacts to turn the cam in the opposite direction, the surface on the periphery of the cam which operates against the roller *e*, serves to draw the roller onto the cam and so as to bind between the cam and the wheel to such an extent that the wheel is practically coupled to the cam and so as to revolve with it, consequently as the door closes, the gear P revolves with the shaft which carries the cam Z, and that revolution is communicated to the crank-shaft, giving to it a rapid revolution, and a constant rapid operation of the piston which produces the check.

The piston and cylinder are very small as compared with the usual piston and cylinder employed as a door-check, but the rapid revolution of the crank and corresponding rapid reciprocation of the piston, produces a quick succession of checks and relief, which serve to so resist the action of the spring upon the door that the door will close easily and lightly under the action of the spring, and without slamming.

The intermediate shaft L, with its pinion and gear may be omitted, the gear on the lever-shaft working directly into the pinion on the crank-shaft, but I prefer the intermediate gear as a more rapid action of the check is produced than could conveniently be had without the introduction of such intermediate gearing, it is therefore only essential to the invention that there shall be a rapid revolution imparted to the check shaft as compared with the rotative movement of the lever shaft.

The arrangement of the check within the case and so near the actuating spring, brings the whole structure into a small space, and makes it most effective, and without other connection with the door than that which is necessary for the operation of the spring. The checking device may be employed without the presence of the spring, the lever and its shaft being operated by the opening and closing door, as described, the spring or closing force of the door being otherwise applied, it is therefore not to be understood that the invention is limited to the necessary presence of the spring, neither is it intended that the invention should be limited to the necessary inclosing of the apparatus in a case, yet it is

desirable that it should be so inclosed, any suitable frame however for carrying the mechanism may be employed.

For the engaging device between the principal or door operated shaft and the gearing, other known engaging devices may be substituted.

It will be evident that the check cylinder and its piston may be permitted to work both in the opening and closing movements of the door, yet it is desirable that it should only operate in the closing movement, and so as to check the door and prevent its slamming, as by such rest of the check a very considerable wear is avoided over what would be the case did the check operate in both the opening and closing movement.

I claim—

1. A door-check consisting of a cylinder hung so as to oscillate in a plane parallel with its axis, a piston within the cylinder, the cylinder and piston adapted for the admission to and escape of air from the cylinder under the movement of the piston, a crank-shaft with which the said piston is connected, and through which it receives reciprocating movement, a principal shaft with connection therefrom to the door, and so that a corresponding rotative movement is imparted to said principal shaft by the opening and closing movements of the door, gearing between said principal shaft and crank-shaft, whereby the movement of the said principal shaft communicates a rapid revolution to said crank-shaft and corresponding reciprocating movement to said piston in the cylinder, substantially as described.

2. A door-check consisting of a cylinder hung so as to oscillate in a plane parallel with its axis, a piston within the cylinder, the cylinder and piston adapted for the admission to and escape of air from the cylinder under the movement of the piston, a crank-shaft with which the said piston is connected and through which it receives reciprocating movement a principal shaft with connection therefrom to the door, and so that a corresponding rotative movement is imparted to said principal shaft by the opening and closing movement of the door, gearing between said principal shaft and crank shaft, whereby the movement of the principal shaft may communicate a rapid rotative movement to said crank-shaft and corresponding reciprocating movement to said piston in the cylinder, and mechanism substantially such as described for disengaging the said principal shaft from the gearing in the opening movement and engaging it in the closing movement of the door, substantially as described.

3. The combination of a case or frame adapted for attachment to the lintel of a door, a vertical principal shaft in said frame, a volute spring around said shaft, the inner end of the spring secured to the shaft and the outer end of the spring secured to the case, a lever extending from said principal shaft and adapted to receive a swinging movement by the opening and closing of the door, and impart a corresponding rotative movement to said principal shaft, a crank-shaft parallel with the principal shaft, a train of gearing between the said principal shaft and the crank-shaft, a cylinder hung in said frame, a piston in said cylinder, its rod hung to said crank, and mechanism substantially such as described to engage the said principal shaft with the gearing in the closing movement of the door, but produce disengagement in the opening movement of the door, substantially as described.

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

GRANVILLE W. WRIGHT.

Witnesses:
FRED. C. EARLE,
LILLIAN D. KELSEY.