(No Model.) 2 Sheets—Sheet 1.

J. M. CONNEL.

COMBINED DOOR SPRING AND CHECK.

No. 368,194. Patented Aug. 16, 1887.

Fig. 1.

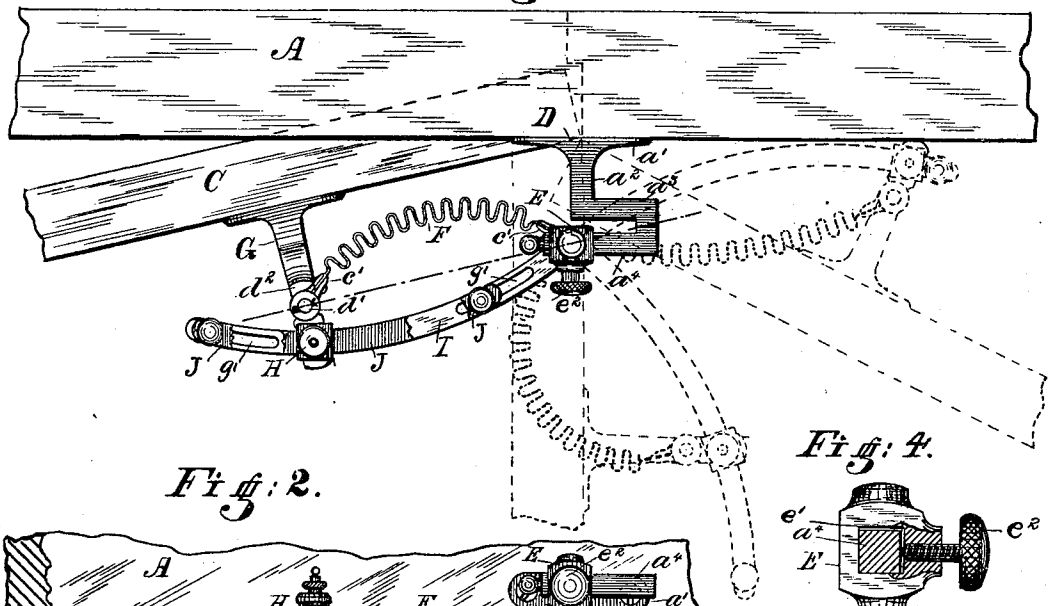


Fig. 2.

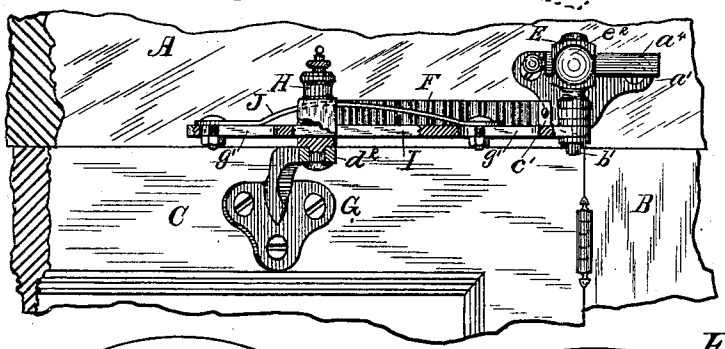


Fig. 4.

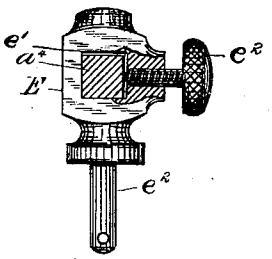
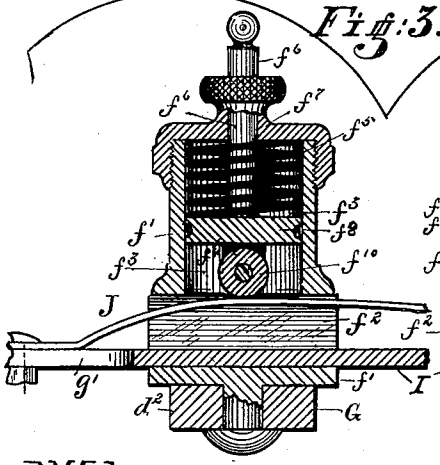


Fig. 3.



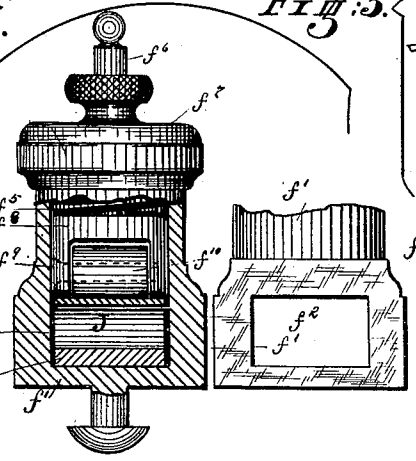
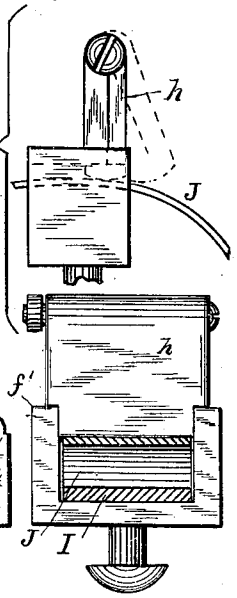


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

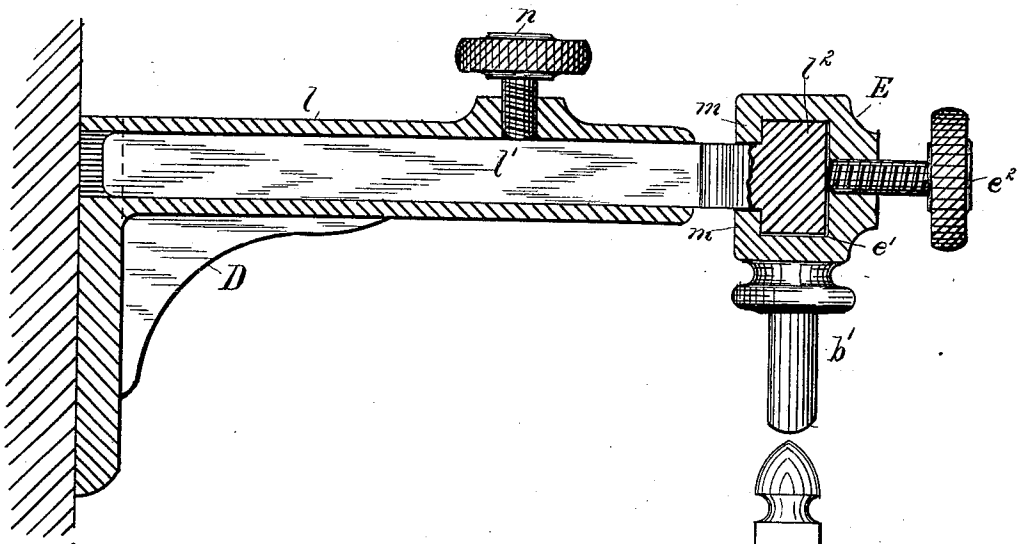
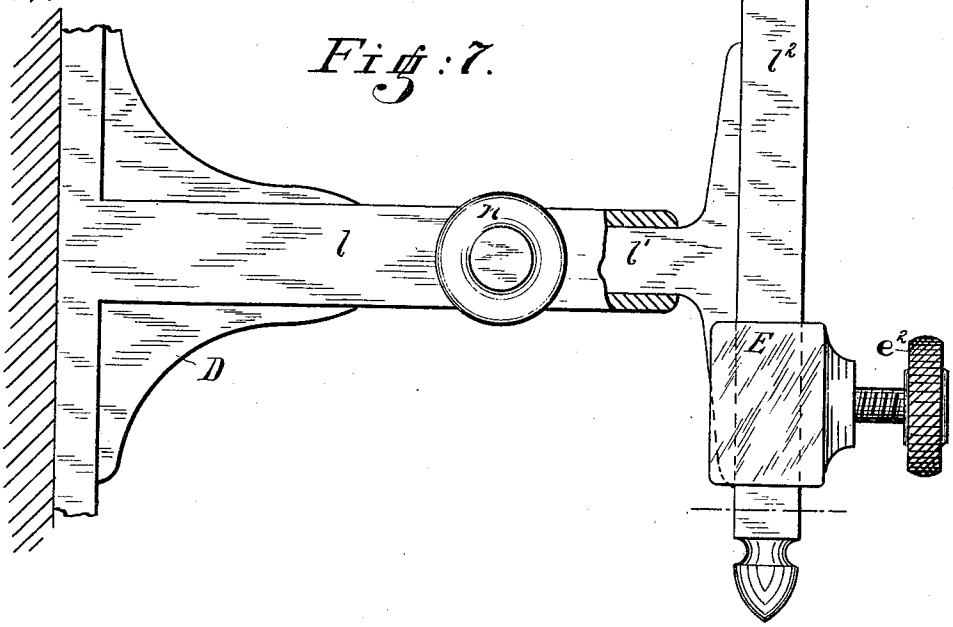


Fig. 7.



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UNITED STATES PATENT OFFICE.

JAMES M. CONNEL, OF NEWARK, ASSIGNOR OF ONE-HALF TO FRANK RIGHTMYER, OF SPRINGFIELD, OHIO.

COMBINED DOOR SPRING AND CHECK.

SPECIFICATION forming part of Letters Patent No. 368,194, dated August 16, 1887.

Application filed March 30, 1887. Serial No. 232,950. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. CONNEL, of the city of Newark, county of Licking, and State of Ohio, have invented certain new and useful Improvements in a Combined Door Spring and Check, of which the following is a specification.

This invention relates to improvements in combined door springs and checks, the objects of my invention being to provide a combined door spring and check which shall be cheap, simple, and durable in construction, perfectly automatic in its operation, and of such construction and arrangement that it will not only insure the automatic closing of the door with which it is connected, but will also act as a "check" to retard the rapidity of the movement of the door in closing at a desired point, thus reducing the force of the blow of the door against the door-frame and rendering the closing of the door noiseless, or substantially so.

Another object of my invention is to so construct and arrange the parts of the door spring and check that the door may be opened to its full extent and retained in place, or may be opened slightly for the purpose of admitting air (and when it is not desired to have the door wide open) and retained in place against slight resistance.

Another object of my invention is to so construct and arrange the parts of the combined door spring and check that the tension of the spring which acts upon the door may be quickly and easily increased or decreased to exert more or less force according to the requirement, and to provide means, substantially as hereinafter set forth, whereby the movement of the door may be checked or retarded at any desired point, and the extent and abruptness of the retardation or checking may be regulated as desired, all of which will be hereinafter fully explained.

My invention consists in certain details of construction and in the combination and arrangement of the elements or component parts of the combined door spring and check, substantially as hereinafter described and claimed.

Figure 1 represents in plan view my improved door spring and check as applied to a door, the full lines representing the door as partially opened and the parts of the device in the position they occupy at the point where the movement of the door is checked or retarded, and the dotted lines showing the door in two other positions, one at right angle to its casing and the other as opened wide, and clearly illustrating the assumed positions of the parts of the door spring and check in the different positions of the door; Fig. 2, a side elevation of the same, partially in section; Fig. 3, enlarged details, partially in section, of the swivel check-head and checking mechanism connected therewith, said figure also showing a portion of the check-spring and its supporting-arm and the devices to regulate the adjustment of the check-spring with relation to its supporting-arm; Fig. 4, an enlarged detail, partially in section, of the sliding head which regulates the tension of the door-operating spring. Fig. 5 illustrates details of a modified form of device for checking the movement of the door. Fig. 6 illustrates in side elevation, partially in section, a modified form of bracket and sliding head, said bracket being shown as extensible and T-shaped; and Fig. 7, a plan view of the same.

Referring to the drawings, A represents the top or transom sill of the door-casing; B, the side sill, and C the door.

Secured to the top or transom sill, A, approximately on a line central with relation to the hinges of the door, is an outwardly-projecting bracket, D, said bracket being constructed with an attaching-plate, a', an outwardly-projecting arm, a^2, and two horizontally-parallel arms, a^3 a^4. These arms, forming a U-shaped terminal to the bracket, are slightly remote from each other and extend parallel with relation to the door-casing.

Removably and adjustably secured to the arm a^4 of the bracket D is a sliding head or device, E, which regulates the tension of the door-operating spring F, which door-spring is pivotally secured to a stud or pintle, b', at the lower end of the sliding head E, through the medium of a jaw or its equivalent, c', which engages the stud or pintle b', as clearly illustrated in Fig. 2 of the drawings.

The door-operating spring F is pivotally secured at its opposite end, through the me-

dium of a jaw or equivalent, to an upwardly-projecting stud or pintle, d', upon an outwardly-projecting arm, d^2, of a bracket, G, secured to the door C near its upper end, and at a point considerably remote from the bracket D, which is secured to the transom-sill.

By reference to the drawings, Figs. 1 and 2, it will be noticed that the pivotal points of the door-operating spring are horizontally aligned with each other, and when the door is closed a line drawn through the axes of the pivotal points will be parallel with the plane of the door.

As shown in the drawings, a serpentine or corrugated flat spring is employed to operate the door, said spring being set up edgewise with its broad face in a vertical plane. By the employment of such a spring I am enabled to secure the maximum amount of elasticity, as the tension of the spring is in the direction of its grain or length, and on account of its peculiar construction its yielding is uniform and substantially from end to end.

I do not desire to limit myself, however, to this exact construction of spring, as it is obvious that a wire spring of spiral form might be employed which would accomplish the same end, but (in my opinion) with results not equally as good, as it is well known that a spiral spring when expanded or contracted has a more or less torsional or twisting movement, and that the greatest elasticity is at the center between its ends, and the end coils yield but little, if any.

The sliding head E, as shown in detail, Fig. 4, is slotted centrally in the direction of its width, as at e', and loosely engages the arm a^4 of the bracket D, which arm enters and extends through the slot e'; and the head E is also provided with a set-screw, e^2, which preferably extends through its front face and contacts at the shank with the arm a^4 to hold the head E in adjusted position upon the bracket. It is obvious, however, that the set-screw may extend through the top instead of the front face of the head E, if desired.

By constructing the bracket D, as shown and described, with the terminal arm a^4 parallel with relation to the door-casing and approximately aligned with the pivotal stud d' of the bracket G, to which one end of the spring F is secured, and by constructing the head E, which slides upon the terminal arm a^4 of the bracket D, and to which the opposite end of the spring F is attached, I am enabled to depress or expand the spring to increase or decrease its tension in a horizontal line with its axes or pivotal points, thus obtaining a uniform tension from end to end.

When it is desired to increase the tension of the door-operating spring F, (the door being normally closed,) the sliding head is moved to the left toward the terminus of the arm a^4 of the bracket D, which decreases the distance between the pivotal points or ends of the spring, contracts its corrugations, and curves the spring inward toward the door, the radius of the curve being greater or less, according to the distance that the sliding head E is moved upon the bracket and the extent of tension imparted to the spring thereby.

Pivotally secured to the forward end of the bracket G, which is secured to the door C, is a door-checking device, H. This checking device consists, essentially, of a casing, f', slotted transversely at its lower end, as shown at f^2, Fig. 3, and is provided centrally with a stud at its lower face, by means of which it is pivotally secured to the end of the door-bracket G, and is cored or bored out centrally at its upper end to form an annular chamber, f^3, communicating with the transverse slot f^2, and forming a seat for a spring-operated plunger, f^4, or friction device, and a spiral spring, f^5, which encircles the shaft f^6 of the plunger and bears at its one end against the upper face of the head of the plunger, and at its other end against the inner face of a screw-cap, f^7, fitted to the upper end of the casing f'. The operation of this device will be hereinafter fully explained, as will be explained a modified construction of checking device to perform the same function.

Extended through the transverse slot f^2 of the casing f', with its end terminating at a point more or less remote from the outer edge of the casing, is a check-spring-supporting arm, I, which arm is pivotally secured at its opposite end to the stud or pintle b' of the sliding head E, which is movably secured to the bracket D, as before described, and as clearly illustrated in Fig. 2 of the drawings, This arm I, preferably curved horizontally in the direction of its width, as shown in Fig. 1, (its radius being more or less, according to the requirements,) will in practice be slotted centrally and vertically in the direction of its length near its ends, as shown at g', Figs. 1, 2, and 3. The upper face of the supporting-arm I will preferably be on a horizontal plane with the lower edge of the door-spring F.

Adjustably secured to the upper face of the arm I by means of screw-bolts or equivalents extended through the slot g' is an upwardly-curved sheet-metal spring or strap, J, which acts, together with the checking mechanism before described, as a check to retard or obstruct the impetuous motion of the door at a desired point, when the door-spring F is operating to close the same, to thereby reduce the force of the blow, which would otherwise be objectionable, and render the closing of the door substantially noiseless, which is a great desideratum.

Pivotally secured between depending ears f^9 upon the head f^8 of the plunger f^4 is a roller, f^{10}, which roller is retained positively in contact with the upper face of the check-spring J, said spring being projected through the transverse slot f^2 in the casing f', as shown clearly in Fig. 3, the frictional pressure of the roller f^{10} upon the check-spring J being determined and regulated by the stress of the spiral spring f^5, exerted upon the head of the

plunger f^4, this pressure being increased or decreased, as required, by simply turning the cap f^7 of the casing f' to lower or raise it, which contracts the spiral spring or allows it to expand, to thereby exert more or less force.

By constructing the checking device as described and providing the plunger-head with a roller to contact with the check-spring I not only secure the desired pressure upon the check-spring, but obviate wearing friction that would ensue if a rigid or fixed device were employed to contact with the check-spring. It will be understood, however, that I do not desire to limit myself to the employment of a revolving bearing for the check-spring; neither do I desire to limit myself to the construction of checking device illustrated in Fig. 3, as, for instance, a casing might be provided having a pivoted gravity pawl or cam, h, to contact with the check-spring J, as illustrated in Fig. 5, (during the operation of closing the door,) and the check-spring might be fixed to its supporting-arm near the pivoted end of the arm, and a set-screw could be extended through the opposite free end of the arm to contact with the under face of the check-spring to elevate or depress it. The construction illustrated in details, Fig. 3, is, however, preferable.

On account of the pivotal connection of the checking device H and the door-bracket G said device will turn on its axis during the movement of the door and conform itself to the different positions that the supporting-arm I and check spring J assume in their movements.

By reference to the drawings it will be noticed that the check-spring J is curved upward in such manner as to form a gradual incline from its rear end, or the end nearest the bracket D, its greatest height or apex being near its forward end, at which point the radius of the curve is greatly decreased to form an abrupt incline from this point forward.

In practice, the greatest elevation of the spring with relation to its supporting-arm I will be at the point it is desired to greatly retard or decrease the movement of the door in closing, as, per example, if it is desired to check the movement of the door at about one foot from a closed position the check-spring will be so arranged or adjusted upon its arm I that its greatest height or apex will be at a point in line with the center of the pivoted checking device when the door is opened about one foot.

The operation of the door spring and check is as follows: Assuming the parts to be in the position they occupy when the door is open at right angles to the door-frame, a slight pressure against the door moves it toward a closed position, the door-spring carrying it rapidly forward, together with the bracket G and checking device H, the checking device moving along the supporting-arm I until the friction-roller begins to ascend the incline of the check-spring J, at which point the impetuous movement of the door is, on account of the pressure exerted upon it by the spiral spring f^5, somewhat decreased and retarded, and gradually becomes lessened as the roller approaches the extreme height or apex of the check-spring in consequence of the increased tension of the spiral spring f^5, caused by the roller and plunger, to which it is attached, being forced upward, at which point the velocity of the movement of the door is sufficiently decreased as to obviate noise in closing, and the checking device, after overriding the apex, abruptly descends the short incline, when the door is closed noiselessly, or substantially so.

The tension of the spiral spring f^5, which operates the plunger and friction-roller, and which keeps said roller positively in contact with the check-spring, will be regulated, as before stated, by raising or lowering the cap f^7, secured to the upper end of the casing f', according to the height or inclination of the check-spring with relation to its supporting-arm, and according to the weight of the door to which the devices are attached and the amount of work to be performed by each of the several parts.

In the modification illustrated in Figs. 6 and 7, I have shown the bracket D, which is secured to the transom-sill of the door, as telescopic in construction—that is, it is constructed in two pieces, $l\,l'$, the one, l', of which slides within the one, l—so that the length of the bracket may be increased or decreased, as may be desired; and instead of providing two parallel arms at the end, as illustrated in Fig. 1, it has a single cross-bar, l^2, at its end, the sides of which project a short distance above and below the upper and lower faces of the arm l' of the bracket D. The sliding head E, as shown in Fig. 6, has a portion of its rear wall cut away, so as to provide an upwardly and downwardly projecting flange, m, to engage the rear face of the bar l^2, said flanges being sufficiently short as to permit the head E to slide along the bar l^2 from end to end without contacting with the arm l' of the bracket D. A set-screw, n, is extended through the arm l of the bracket D, and contacts with the arm l' to hold the same in adjusted position. By this construction I am enabled to increase the distance between the sliding head E, which forms one pivotal point of the door-spring F, and the door-casing, which will tend to stretch the spring somewhat when the door is closed or opened wide; and in another position of the door—as when it is at right angles to the casing—the distance between the pivotal points of the door-spring is considerably decreased, thus giving to the spring the greatest resistance when the door is at right angles, or approximately so, to the casing.

I claim—

1. A combined door spring and check comprising a supporting-bracket fixed to the transom-sill of the door, having two horizontally-parallel arms at its end more or less remote from each other to form a U-shaped terminal

in a line parallel to the door-frame, a sliding head adjustably and removably secured to one of the arms of the said bracket, a bracket fixed to the door and having a projecting stud or pintle, a spring pivotally secured at its ends to the stud of the door-bracket and to a stud upon the sliding head, and a door-checking device pivotally connected with the two brackets, substantially as described.

2. In a combined door spring and check, the combination, with a door-operating spring pivoted at one end to a bracket secured to the door and at its opposite end to a sliding head adjustably secured to a bracket fixed to the transom-sill or door-casing, of a door-checking mechanism consisting of an arm pivoted at one end to the sliding head, a curved spring fixed to the arm, a head or checking device pivoted to the arm of the door-bracket, and means to create friction between the curved spring fixed to the arm and the pivoted checking device, whereby the momentum of the door in closing may be decreased or retarded, substantially as shown and described.

3. In a combined door spring and check, a door-spring, F, pivotally secured at one end to a stud, d', upon a bracket, G, secured to the door, and at the opposite end to a stud, b', upon a head, E, adjustably secured to a bracket, D, fixed to the transom-sill, in combination with a checking mechanism to check the momentum of the door in closing, consisting of the arm I, pivotally secured at one end to the stud of the sliding head E, an upwardly-curved check-spring, J, secured to the arm I, a slotted head or checking device, H, pivoted to the bracket G, through which the arm I and spring J are extended, and a device, substantially as described, to impinge the spring during the movement of the door, as shown and set forth.

4. The combination, in a combined door spring and check having the supporting-brackets D and G, and spring F, pivoted at one end to bracket G, as described, of the check-spring-supporting arm I, the upwardly-curved check-spring J, removably and adjustably secured thereto by means of screw-bolts or equivalents extended through elongated slots in the arm I, and a slotted head or checking device, H, pivoted to the door-bracket G, through which the arm I and spring J extend, and means, substantially as described, connected with said swivel-head or checking device H to impinge the check-spring J and retard or decrease the impetuous movement of the door in closing, all substantially as shown, and for the purpose set forth.

5. In a combined door spring and check having the supporting-brackets D and G, secured to the transom-sill and door, respectively, and pivoted door-operating spring, as described, the combination therewith of the arm I, curved outwardly in a horizontal plane, and having elongated slots g', formed therethrough near its ends, the check-spring J, adjustably secured to the arm by bolts extended through the slots g' in the arm I and through perforations in the spring, and the transversely-slotted checking device or head H, pivoted to the bracket G, and having the spring-operated plunger, a part of which bears upon the check-spring J to check the movement of the door, all substantially as described and shown.

6. In a combined door spring and check, the combination, with the pivoted arm I, its upwardly-curved check-spring J, and the door-bracket G, of the casing f', pivoted to the bracket G, and having the transverse opening f^2, vertical chamber or opening f^3, the plunger f^4, located within the chamber f^3, and having the pivoted roller f^{10} at its lower end to contact with the check-spring J, the spiral spring f^5, located within the chamber f^3, and bearing against the head of the plunger to force it downward, and the screw-cap f^7 at the upper end of the casing to regulate the tension of the spring, substantially as and for the purpose set forth.

7. The combination, in a door spring and check having the bracket G secured to the door, and spring F, pivoted to said bracket, of the bracket D, secured to the transom-sill, and having the outwardly-projecting arm a^2 and the two end arms, a^3 a^4, parallel to each other and with relation to the door-casing, the one, a^4, extending in the direction of the axis of the spring F, and the head E, to which the opposite end of the spring F is pivoted, having the transverse slot c' to override the arm a^4 of the bracket, and having the set-screw e^2 to impinge the arm a^4 and secure the head E in adjusted position thereon, substantially as and for the purpose described.

8. In a combined door spring and check, the bracket D, having the spring-regulating head E adjustably secured thereto, the bracket G, having the pin or stud d' thereon, and the serpentine spring F, pivoted at its ends to the stud d' and to a stud, b', upon the head E, said brackets being of such construction that when the door is closed a line drawn through the axes of the spring will be in a horizontal plane with relation to the door, in combination with the check-spring supporting arm I, curved, as described, the upwardly-curved check-spring J, adjustably secured thereto, the swivel-head or checking device H, pivoted to the bracket G, having the transverse opening f^2, through which the arm I and spring J are extended, the plunger f^4, contained in the casing f' of the swivel-head H, and having the head f^2, stem f^6, and depending ears, between which is pivoted a friction-roller, f^{10}, and a spiral spring, f^5, to keep the roller pressed downward, and means, as described, to regulate the tension of the spring, all substantially as shown and described.

9. In a combined door spring and check, the combination of the bracket G, secured to the door, the spring F, pivoted thereto, the extensible bracket D, secured to the transom-sill, constructed of a series of pieces and made

adjustable in the direction of its length or at right angles to the door-casing, and having an arm at its forward end, as shown, the sliding head E, adjustably secured to said arm, and set-screws to hold the parts of the bracket D and the sliding head E in adjusted positions, substantially as and for the purpose set forth.

10. In a combined door spring and check, the combination, with the spring F, of the telescopic bracket D, consisting of the two arms *l l'*, constructed to slide one within the other, as shown, the one, *l'*, having the cross-bar *l²* at its end, the sides of which project above the upper and lower faces of the arm *l'*, the sliding head E, having the two flanges *m* to engage the rear face of the bar *l²*, and set-screws to engage and hold the parts of the bracket D and the sliding head E in adjusted positions, all substantially as shown, and for the purpose described.

In witness whereof I have hereunto set my hand and seal, at Springfield, Ohio, this 25th day of March, A. D. 1887.

JAMES M. CONNEL. [L. S.]

In presence of—
N. E. C. WHITNEY,
C. L. STEELE.