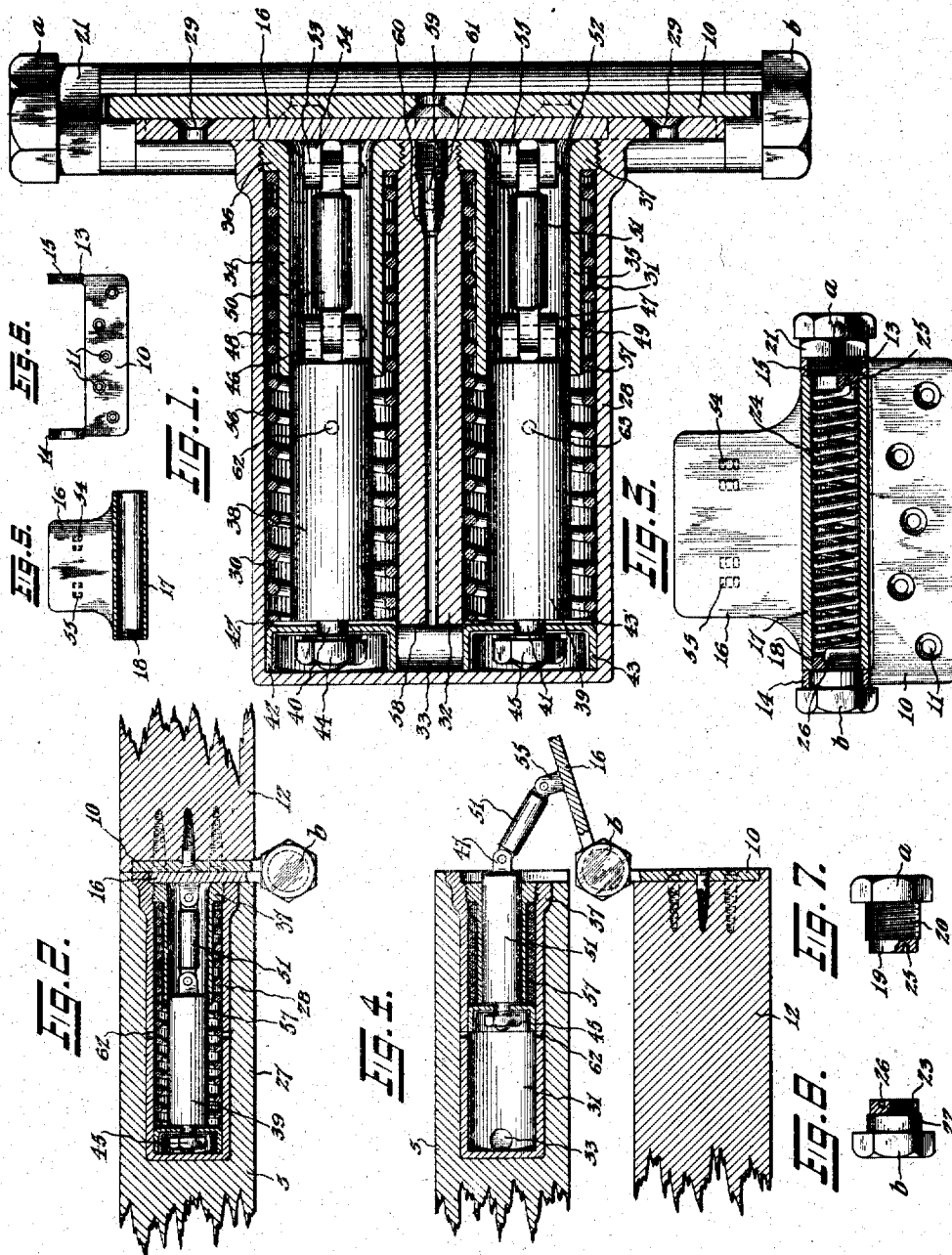


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DOOR CHECK.
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DOOR-CHECK.

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To all whom it may concern:

Be it known that I, WILLIAM W. HAWKINS, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Door-Checks, of which the following is a specification.

My invention relates to improvements in door checks, the primary object of which is to construct such a device, operating under the action of springs and air cushioning, which will permit the door to be opened easily, close automatically and rapidly but prevented from slamming, being throughout its entire amplitude of movement under absolute and predetermined or adjustable control.

To this end my invention is comprised of two co-related units connected in a positive and mechanical manner one unit being so adjusted that it controls the inertia of movement of the door in one direction, the other unit being so adjusted that it controls the inertia of movement of the door in the complement of its motion.

In spring controlled devices of this kind it has heretofore been impossible to synchronize the amplitude of door movement with the actuating force, the member actuated upon closing being adjustable, but the member actuated by opening, ordinarily comprising compression or extension springs is not capable of adjustment, the range of movement required exceeding the scope of action of springs, the dimensions of space available for the proper mounting of a device of this nature having fixed limitations, the heretofore method of having springs operating in one plane, made it impossible to meet conditions imposed by variations in relative positioning of doors and their supporting casings. The sizes and positioning of hinges not being fixed by rule or reason necessitates means of adjustment between the coacting members of a device of this nature, as well as motion of parts without the movement of the whole, it being necessary to insure the maximum movement of one position with but a limited action of the whole.

Another object of the present improvement is to devise a spring closure member for a door comprising a cushioning device, and two spring closure elements operatively associated therewith, one acting against the cushioning device when the door is partly

opened, and the other operating against the said cushioning device when the door is opened wide.

Other objects and advantages of the present improvement will be set forth in the following description and drawings in which,

Figure 1 is a vertical sectional view of the air cushioning elements of the door check.

Fig. 2 is a horizontal sectional view through a door and door jamb equipped with the improved check and showing the door closed.

Fig. 3 is a top plan view partly in section of the spring closure member of the check.

Fig. 4 is a horizontal sectional view similar to Fig. 2 and showing the door open.

Figs. 5 and 6 are reduced side elevations of the hinge leaves of the door check.

Figs. 7 and 8 are enlarged side elevations of the pintle screws for uniting the hinge leaves of the door check.

The check hereafter to be described is applied between the door and door jamb but does not serve as a hinge and does not carry the weight of the door, the check being applied in addition to the usual hinges.

Referring now to the drawings in which like reference numerals designate similar parts throughout the several figures,

10 represents a hinge leaf having screw receiving openings 11 providing means for securing it to a door 12 or other swinging member and provided with parallel collars 13 and 14 projecting from the outer edge thereof, the collar 13 being provided with internal screw threads 15. A second hinge leaf 16 has a tube 17 formed on one edge fitted between the collars 13 and 14 of the leaf 10, the end of the tube adjacent the collar 14 being provided with internal screw threads 18. A pintle *a* is fitted within the collar 13 and adjacent end of the tube 17, and is provided with a bearing collar 19 fitting within the tube and a screw threaded portion 20 meshing with the internal screw threads of the collar. The screw threaded portion 20 is made of sufficient length to receive a lock nut 21. A second pintle *b* is fitted within the collar 14 and the adjacent end of the tube 17, and is provided with a bearing collar 22 within the collar and a screw threaded portion 23 meshing with the internal screw

threads 18 in the tube. A coil spring 24 is mounted within the tube 17, having one end resting within a recess 25 made in the end of the collar 19 of one pintle and its other end 5 resting within a recess 26 made in the end of the screw threaded portion 23 of the other pintle. By screwing the pintle α in and out of the collar 13 the spring 24 is twisted and put under greater or less tension and may be 10 locked at any desired point by the lock nut 21, so that a desired resilient tension may be maintained between the pivoted hinge leaves 10 and 16.

An elongated recess is made in the door 15 jamb 27 to receive a plunger receiving casing 28 which is fastened to the jamb by screws 29. The casing 28 is provided with two parallel cylindrical openings 30 and 31 separated by a webbing 32 provided with a transverse pas- 20 sage 33 adjacent its junction with the bottom of the casing 28 and providing a communication between the two cylinders 30 and 31. Sleeve guides 34 and 35 are provided with spacing collars 36 and 37 respectively, 25 screwed within the upper ends of the cylinders 30 and 31. The guides 34 and 35 extend parallel with the cylinders and are of a length approximately half the depth thereof.

Reciprocally mounted within the guides 30 34 and 35 are pistons 38 and 39 respectively, provided on their lower ends with studs 40 and 41 to receive cup shaped leather pump washers 42 and 43, secured against metallic washers 42' and 43' by means of nuts 44 and 35 45. The upper ends of the pistons are provided with pairs of parallel ears 46 and 47 to receive wrist pins 48 and 49 to which are pivoted one end of connecting rods 50 and 51, the other ends of which are pivoted on wrist 40 pins 52 and 53 mounted between pairs of parallel ears 54 and 55 carried by the hinge leaf 16.

Coil springs 56 and 57 are fitted between the spacing collars 36 and 37 and the upper 45 face of the washers 42' and 43' and are of a diameter to lie against the inner walls of the cylinders.

An elongated passage 58 is drilled through the web 32 and establishes communication 50 between the passage 33 and an opening 59 made through the walls of the casing 28. The passage 58 adjacent the opening 59 is provided with a needle valve seat 60 to receive a screw adjusted needle valve 61. Registering 55 pairs of openings 62 and 63 are made through the walls of the cylinders 30 and 31 respectively.

The operation of the device is as follows:—

60 All of the parts of the mechanism are in their normal positions when the door 12 is closed, as is shown in Figs. 1 and 2, in which the hinge leaves 10 and 16 are together, the coil spring 24 connecting them being under 65 its adjusted tension; the pistons 38 and 39

being at the limit of their inward movement in their respective cylinders; and the coil springs 56 and 57 expanded.

When the door 12 is swung open on its hinges, the hinge leaves 10 and 16 of the check 70 remain substantially together due to the adjusted tension of the spring 24 and the pistons 38 and 39 are moved outwardly in their respective cylinders due to the link connections 50 and 51 between them and the hinge 75 leaf 16. The spring 24 is adjusted to have a tension sufficient to prevent movement between the leaves 10 and 16 until the pistons 38 and 39 reach the limit of their outward 80 movement, which movement is limited by the adjustable guide sleeves 34 and 35. In moving outwardly the suction of the pistons fill the cylinders, below the ends of the pistons, with air drawn in through the open- 85 ings 59 and openings 62 and 63 when these openings have been uncovered by the pistons as is shown in Fig. 4. In normal operation, the door 12 is seldom swung past the position in which it is at right angles to the jamb 90 and the spring 24 is so set that up to this point there is no movement between the leaves 16 and 10 but they remain adjacent each other and move as one, the springs 56 95 and 57, however, will be compressed to their limit as is shown in Fig. 4. Should the door be swung farther and pass its right angle position with the jamb, as for instance 100 swung back parallel with the jamb as is shown in Fig. 4, leaves 10 and 16 will separate putting the spring 24 under additional tension.

Should the door be in the position shown in Fig. 4 when it is released for closing, the leaves 10 and 16 are drawn together 105 under the tension of the spring 24 until they contact after which they will move together under the tension of the springs 56 and 57, which expand between the collars 36 and 37 and the washers 42' and 43' carried by the pistons 38 and 39. The expansion of the 110 springs 56 and 57 forces the pistons 38 and 39 inwardly, which in their inward movement compress the air within the cylinders 30 and 31 which provides an air cushion for the pistons. The compressed air is, during 115 the initial movement of the piston, exhausted through the openings 62 and 63, but the further inward movement of the pistons closes these openings and thereafter the air is exhausted through the passages 33, 58 and 120 opening 59, permitting the pistons to gradually move inwardly to the limit of their movement as is shown in Figs. 1 and 2.

Should the door be in a position at right 125 angles to the jamb when it is released for closing, there will be no action of the spring 24 but the leaves 10 and 16 move together under action of the springs 56 and 57.

It is to be understood that the tension of the spring 24 may be adjusted so that the 130

leaves 10 and 16 will separate at any desired time other than that herein described but to accomplish the best result the spring 24 should always be under a tension greater than the tension of the springs 56 and 57 when they are completely compressed.

The rapidity of the exhaustion of the air cushions in the cylinders may also be adjusted by the needle valve 61 controlling the air fed through the passage 58 into the exhaust opening 61.

It is to be understood that should the door be jerked open, the leaves 10 and 16 will separate until the inertia of the springs 56 and 57 and pistons 38 and 39 have been overcome. This will insure an easy opening of the door since the inertia of the checking elements is overcome gradually.

From the above description it is apparent that a door check is provided incorporating two spring closing elements both of which operate in conjunction with the checking air cushion, yet exert their closing action on the door independently of each other, one operated by a partial opening of the door and the other operated by a greater opening thereof.

I claim:

1. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming the closure and its other leaf freely movable, resilient means for normally keeping the said leaves together, and connecting means between the said freely movable leaf of the hinge and the spring closure element.

2. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming the closure and its other leaf freely movable, resilient means for normally keeping the said leaves together, and connecting means between the said freely movable leaf of the hinge and the spring closure element, the leaves of the said hinge adapted to lie adjacent each other and between the door and the door jamb when the door is closed.

3. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming the closure and its other leaf freely movable, resilient means for normally keeping the said leaves together, the leaves adapted to lie adjacent each other and between the door and the door jamb when the door is closed, and connecting means between the spring closure element and the adjacent face of the freely movable leaf.

4. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming

the closure and its other leaf freely movable, resilient means for normally keeping the said leaves together, the leaves adapted to lie adjacent each other and between the door and the door jamb when the door is closed, and connecting means between the spring closure element and the adjacent face of the freely movable leaf, the said resilient means having a greater tension than the spring closure element.

5. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming the closure, and its other leaf freely movable, resilient means for normally keeping the said leaves together, the leaves adapted to lie adjacent each other and between the door and the door jamb when the door is closed and connecting means between the spring closure element and the adjacent face of the freely movable leaf, the said resilient means having a greater tension than the spring closure element whereby the said leaves will remain together while putting the spring closure element under tension.

6. A door check consisting of a cushion element comprising a compression cylinder, a piston reciprocatably mounted therein, a spring within the cylinder and acting against the said piston, controllable means for exhausting air compressed in the cylinder by the piston, and a hinge member, one leaf of the hinge connected to one of the members forming the closure, the other leaf freely movable, a link pivotally connected to the freely movable leaf and to the piston, and resilient means for normally keeping the said leaves together.

7. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming the closure and its other leaf freely movable, a tubular member formed at the pivotal point of said leaves, resilient means for normally keeping said leaves together concealed in said tubular member, and connecting means between the said freely movable leaf of the hinge and the spring closure element.

8. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming the closure and its other leaf freely movable and disposed to lie against and conceal the spring closure element, resilient means for normally keeping said leaves together, and connecting means between the said freely movable leaf of the hinge and the spring closure element.

9. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming the

closure and its other leaf freely movable and disposed to lie against and conceal the mouth of the spring closure element, a tubular member formed at the pivotal point of said leaves, resilient means for normally keeping said leaves together concealed in said tubular member, and connecting means between the said freely movable leaf of the hinge and the spring closure element.

10 10. A door check comprising a spring closure element carried by one of the members forming the closure, a hinge having one leaf attached to the other member forming the closure and its other leaf freely movable and disposed to lie against and conceal the mouth of the spring closure element, a tubular member formed at the pivotal point of said leaves, resilient means for normally keeping said leaves together concealed in said tubular member, and connecting means between the said freely movable leaf of the hinge and the spring closure element, the said resilient means having a greater tension than the spring closure element whereby the said leaves will remain together while putting the spring closure element under tension.

11. A door check consisting of a cushion element carried by one of the members forming the closure, said element comprising a compression cylinder, a piston reciprocatably mounted therein, a spring within the cylinder and acting against the said piston, a hinge having one leaf attached to the other member forming the closure and its other leaf freely movable, resilient means for normally keeping the leaves together, the leaves adapted to lie adjacent each other and between the door and the door jamb when the door is closed, a link connecting the piston and the adjacent face of the freely movable leaf, said link adapted to enter the cylinder and the freely movable leaf to lie against the open end of the cylinder when the door is closed.

12. A door check comprising a cushion element, a spring closure element operatively associated therewith and put under tension when the door is opened, a hinge member having one leaf thereof attached to one of the members forming the closure and its other leaf freely movable, connecting means between the freely movable leaf and the cushion element, resilient means for normally keeping the said leaves together, said resilient means having a set tension when the door is closed which is greater than the

tension put on the other spring closure element when the door is opened.

13. A door check consisting of a cushion element comprising a pneumatic dash pot carried by one of the members forming the closure, a spring actuated against the piston thereof, and a hinge member having one leaf connected to one of the members forming the closure and its other leaf freely movable, connecting means between the freely movable leaf and the piston, and resilient means for normally keeping the leaves of the hinge member together.

14. A door check consisting of a cushion element comprising a pneumatic dash pot carried by one of the members forming the closure, a spring actuated against the piston thereof, and a hinge member having one leaf connected to one of the members forming the closure and its other leaf freely movable, a connecting means between the freely movable leaf and the piston, and a spring for normally keeping the leaves of the hinge member together, the tensioning of the said spring being greater than the tension of the spring acting against the piston.

15. A door check consisting of a cushion element comprising a cylinder, a piston reciprocatably mounted in said cylinder, a spring within the cylinder acting against the said piston, a spring closure element comprising two leaves pivotally connected to each other, a spring carried by the said leaves, a swinging of the leaves apart putting the last named spring under tension, one leaf connected to one of the members forming the closure and the other leaf freely movable, and connecting means between the freely movable leaf and the piston.

16. A door check consisting of a cushion element comprising a compression cylinder, a piston reciprocatably mounted therein, a spring within the cylinder and acting against the said piston, means for exhausting air compressed in the cylinder by the piston, and a hinge member, one leaf of the hinge connected to one of the members forming the closure and the other leaf freely movable, a link pivotally connected to the freely movable leaf and to the piston, and resilient means for normally keeping the leaves of the said hinge member together.

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Witnesses:

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