

May 10, 1960

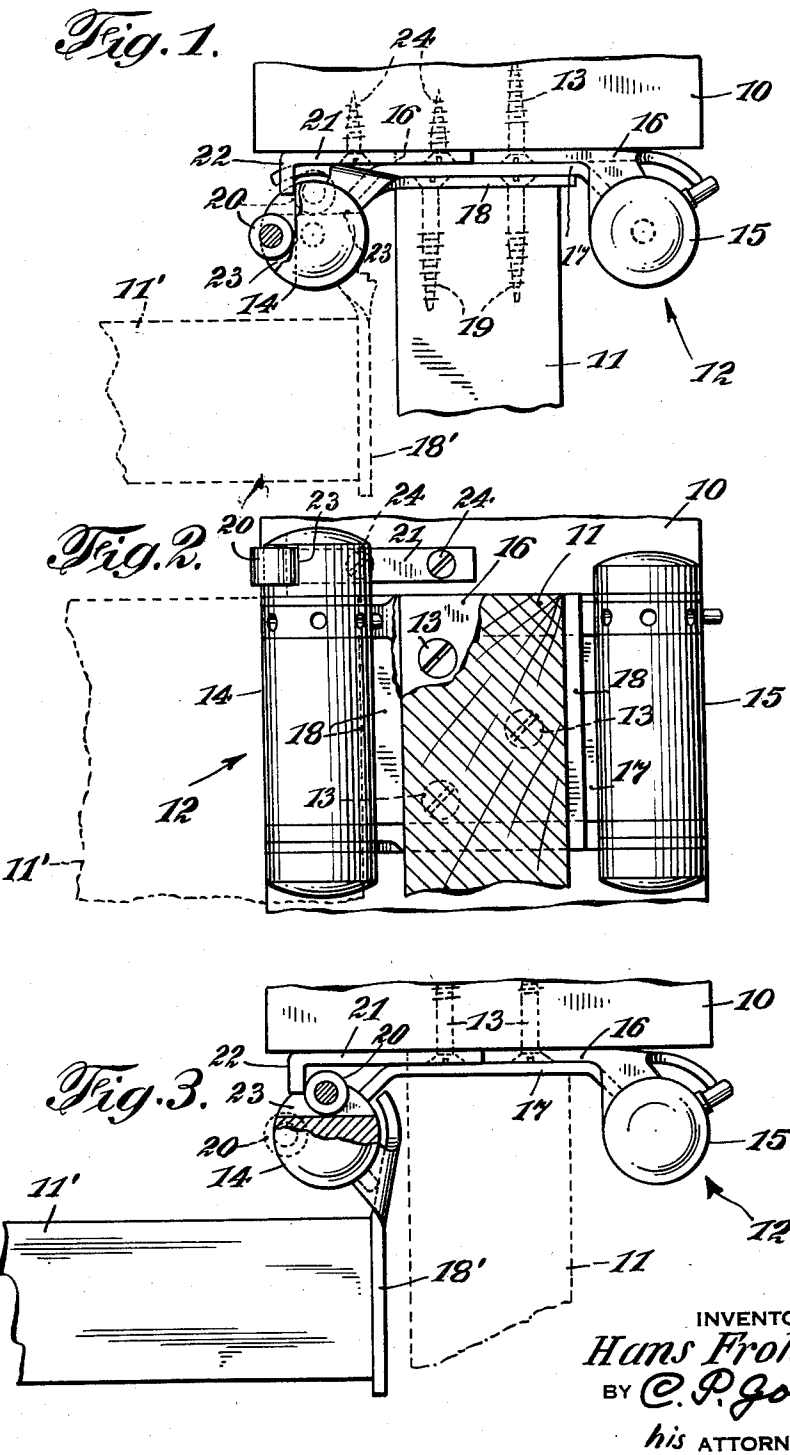
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HOLD OPEN DEVICES FOR SWINGING DOORS AND THE LIKE

Filed Feb. 15, 1956

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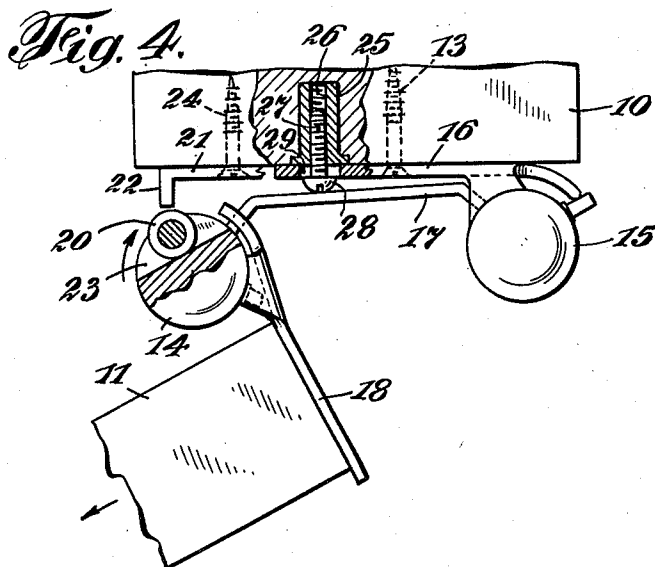
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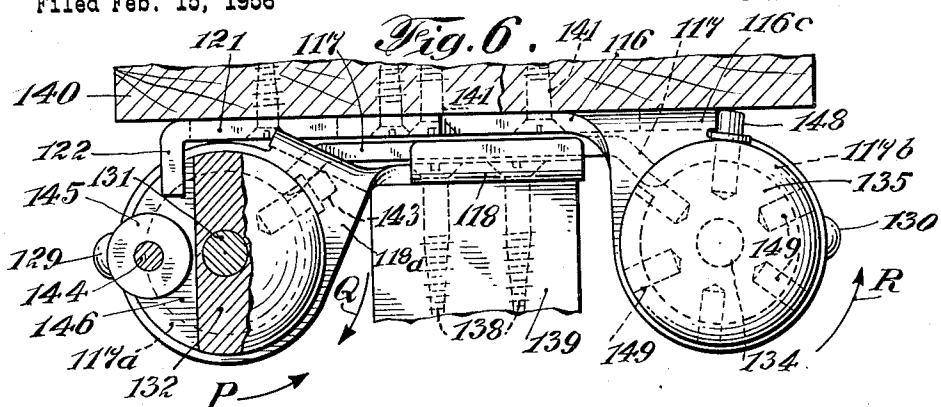
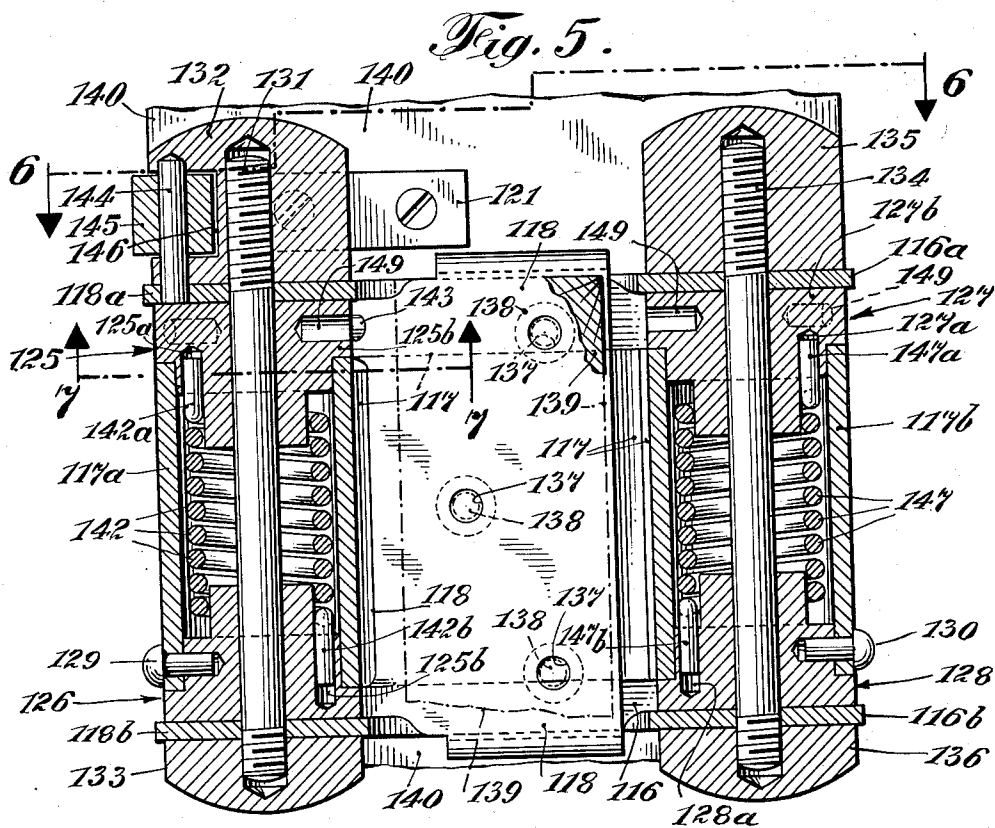
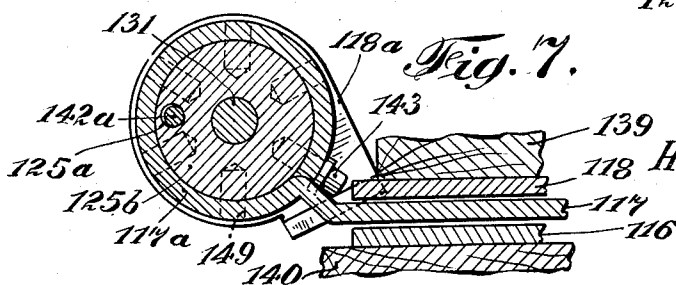
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HOLD OPEN DEVICES FOR SWINGING DOORS AND THE LIKE

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Application February 15, 1956, Serial No. 565,732

6 Claims. (Cl. 16—139)

This invention relates to hold open devices for doors, and more particularly to a device for retaining doors mounted on spring hinges in open or partly open position.

The invention provides a simple and reliable device of this character which will automatically maintain a swinging door open at right angle or at any other angle.

The invention also provides a hold open device which may be released by simply pivoting the door, activated by spring hinges, in either direction from its open or partly open position.

The invention further provides an automatic hold open device which may be attached directly to the spring hinges.

Yet further, the invention provides an automatic hold open device which may be attached to doors mounted on single or double acting spring hinges; in the latter case, a hold open device may be provided for either or both spring loaded tubes, whereby the door may be retained open at any angle within an arc of about 180°.

Still further, the invention provides means for temporarily disconnecting the novel hold open device when it is desired that the door be controlled by the spring hinge or hinges only.

Basically, the invention consists of a follower and a stationary member, both being so positioned with respect to each other that the pivoting door will carry the follower into engagement with the stationary member to maintain the door in a desired position. It is within the scope of the invention to attach the follower and/or the stationary member to a spring hinge, to attach the follower to the swinging door panel and the stationary retaining member to the door frame, or vice versa. The follower is preferably a roller, a plug or a pin, and the stationary member is of a shape to temporarily retain the follower when the swinging door panel is opened to the extent desired.

The novel means for disengaging the hold open device consists preferably of a headed screw which may be moved into a suitable recess to permit the engagement of the pivoting follower by the stationary member; or said screw may be lifted from the recess whereby to prevent the stationary member from engaging the follower, or vice versa. In a modified form, when the follower or the stationary member is yieldably mounted, the screw may be replaced by a pin or the like which maintains the follower at a distance from the retaining arm, or a coil spring may control the yieldability of the follower or the stationary member.

The novel hold open device may be used with particular advantage in warehouses as it is often desirable to maintain the swinging doors open for a specified period of time when merchandise is to be continuously passed therethrough.

Other features and advantages of the invention will become apparent in the course of the following detailed description of some at this time preferred embodiments which are illustrated in the accompanying drawing, and

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the invention will be finally pointed out in the appended claims.

In the drawing, wherein similar characters of reference indicate similar elements,

Fig. 1 is a top plan view of a double acting spring hinge assembly combined with the novel hold open device, with a portion of the closed swinging door panel shown in full lines, and the door retained in open position in dotted lines;

Fig. 2 is a front elevation of the assembly shown in Fig. 1;

Fig. 3 is a view similar to that of Fig. 1, with the swinging door retained in open position shown in full lines;

Fig. 4 shows the door in the process of being opened and the hold open device temporarily disconnected;

Fig. 5 is a vertical section through the tubes of a double acting spring hinge similar to that shown in Fig. 2;

Fig. 6 is a partial section taken on line 6—6 of Fig. 5;

Fig. 7 is a detail sectional view taken on line 7—7 of Fig. 5;

Fig. 8 is a top plan view of a modified embodiment of the hold open device, with the follower member mounted at the top of a swinging door;

Fig. 8a is a view similar to that of Fig. 8, with the swinging door in a position immediately before or after the retaining action takes place; and

Fig. 9 shows a further modification of the hold open device.

Throughout the specification and claims, the term "tube" defines the spring loaded cylinder or cylinders of a single or double acting spring hinge.

Referring now in detail to the illustrated embodiments, and more particularly to Figs. 1 to 3, there is shown a door frame 10 supporting a swinging door panel 11 attached to the frame by a double acting spring hinge generally indicated by numeral 12.

Hinge 12 consists of a pair of spring loaded housings or tubes 14, 15, a flange 16 which is secured to tube 15 and to the door frame 10 by three screws 13, a connecting plate 17 to the left of tube 15 between tubes 14 and 15, and a flange 18 emanating in tube 14 and supporting the door 11, the latter being connected thereto by screws 19. When the swinging door 11 is closed, plate 17 rests against flange 16, the latter being firmly attached to the frame 10, and flange 18 which is attached to the door rests against the plate 17 (see Fig. 1, full lines). The spring in tube 15 thus urges said plate 17 in a clockwise direction and the spring in said tube 14 urges said flange 18 in a counterclockwise direction.

The novel hold open device consists of a follower roller 20 which is rotatably and eccentrically held in a recess 23 in the upper end of tube 14, and a stationary arm 21 terminating in a hook 22, the arm being secured to the door frame 10 by wood screws 24 (see Fig. 2).

When the door 11 is swung to left into the position 11', the flange 18 rotates around tube 14, and when the door is swung to the right around tube 15, flange 18 presses against the connecting plate 17 which rotates and carries with it the tube 14 in a well known manner. The assembly 20, 21, 22 is provided partly on tube 14 and will retain the door anywhere between the two extreme positions 11 (full lines) and 11' (dotted lines) shown in Fig. 1.

The retaining angle depends on the relative position of roller 20 with respect to the hook 22 of arm 21. In the embodiment of Figs. 1 to 3, the hook 22 will engage roller 20 when the door 11 is swung through about 90° around the tube 14. When the swinging door 11 is pivoted back to the right from its position 11', the connecting plate 17 will also pivot slightly around tube 15, and away from flange 16 (see Fig. 4), which movement

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is sufficient to permit roller 20 to slide over the retaining device or hook 22 whereby the door 11 returns into its initial closed position, i.e., at an angle of 90° with respect to the door frame 10. On the other hand, when the door is pivoted toward the left from its position 11' and then suddenly released, the force of the spring in tube 14 will cause slight pivoting of connecting plate 17 away from the flange 16, which is sufficient to permit roller 20 to slide past the hook 22, whereupon the spring in tube 14 returns the door into its initial closed position 11. The roller 20, hook 22, frame 10, plate 17 and tube 14 with the springs in the tubes 15 and 14 cooperate to form a toggle lock, the distance between the center of the tube 15 and the outer edge of the hook 22 being greater than the distance between the center of the tube 15 and the outer face of the roller or follower 20 when the panel 11 is in the open position shown in dotted lines in Fig. 1, whereas the arcuate path of movement from the closed position of the panel 11 in Fig. 1 into the open dotted line position shown in Fig. 1 is at a greater distance from the center of the tube 15 than the distance from the center of the tube 15 to the outer edge of the retaining device 22 necessitating the outward movement of the plate 17 into the position shown in Fig. 4 to enable the follower 20 to clear the retaining device 22 when moving the panel 11 from the closed position into the open position and vice versa when moving the panel 11 from the open position into the closed position.

Fig. 2 shows the stationary retaining arm 21 with its hook 22 as a separate member fastened to the door frame 10 but, obviously, this arm may be made integral with the flange 16, whereby both elements of the hold open assembly are integrated with the double acting spring hinge 12. Also, this arm 21 may be lifted above the upper end of tube 14 and the roller 20 aligned therewith by attaching it in a manner to project above the tube 14, which would render the recess 23 unnecessary.

Instead of having the roller 20 mounted in the tube 14, it may be connected to arm 21 and a projection, for example an L-shaped pin, corresponding to hook 22, provided on the tube 14 or attached to the panel 10, the pivoting pin to engage the roller of the stationary arm in a manner similar to that to be described in connection with Fig. 9.

Fig. 4 illustrates the arrangement which permits temporary inactivation of the hold open assembly 20, 21, 22. As shown, a hollow metallic member 25 is inserted into the door frame 10, the member 25 having a threaded bore 26 for reception of a headed screw 27 whose cap 28 may project above the flange 16 or be retracted into a suitable recess 29 therein. In the position shown, the connecting plate 17 is slightly raised away from substantially faying parallel relationship with the flange 16, which is sufficient to permit roller 20 to bypass the projecting hook 22 of the stationary arm 21, and the door 11 will be closed automatically by the spring in tube 14 upon release. When the head 28 of the screw 27 is driven into the recess 29, the hold open device will be free to operate in the manner described in connection with Figs. 1 to 3.

A hold open device may be provided on both tubes 14, 15 or, for the sake of simplicity and uniformity of manufacture, the mounting of tubes 14, 15 may be reversed when the retaining action is desired in the one or the other direction only. In other words the hold open device shown in Figs. 1 to 3 may be used to retain the door in any of the positions between those indicated as 11 and 11' if the double acting spring hinge assembly is mounted inversely, to wit: tube 14 at the right and tube 15 at the left of the door 11.

In Fig. 8, a metallic plate 41 is fastened to the top surface 11a of the swinging door 11 by a number of screws 43, and a pin 42 projects above the plate 41 to engage the suitably shaped head 45 of the stop 44 whose

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flange 47 is fastened to the door frame 10 by screws 48. Head 45 of the stop 44 is preferably of a tough plastic or any other suitable wear-resistant material and is formed with a notch 46 which receives the pin 42 when the swinging door 11 is to be retained in open or partly open position.

Fig. 8a shows the position of the swinging door panel 11 immediately before the retaining action takes place. Pin 42 bears against the apex 45a of the head 45 while the tube 14 is slightly moved away from the door frame 10 and a narrow slot is formed between the flange 16 and plate 17. Upon a further slight rotation of the door 11 around tube 14, pin 42 enters the notch 46 and is retained therein by the force of torsion spring in tube 14 which urges it against the wall 45b. When the door 11 is pivoted toward left and then suddenly released, the force of spring in tube 14 will cause said tube to pivot around the stationary tube 15 and slightly away from the door frame 10, which movement is sufficient to permit pin 42 to pass the projection 45a of the head 45, whereupon the door 11 returns into its closed position shown in Fig. 8. The identical movement occurs when manual pressure is applied against the door to pivot it toward right from its retained position, i.e., when the pin 42 rests in the notch 46 of member 45.

The system of Figs. 8 and 8a may be applied to swinging doors which are somewhat shorter than their frames, to wit: wherein a horizontal slot is provided between the upper surface 11a of a swinging door and the upper horizontal beam 10a of the frame 10.

Fig. 9 shows a slight modification of the arrangement of Figs. 8 and 8a in that an L-shaped pin 142 extends from the side wall 11b of the swinging door panel 11. The stop member 44 is suitably spaced therefrom and attached to the door frame 10. Otherwise, the operation of this system is identical with those described in connection with Figs. 8 and 8a above. This hold open device may be applied to swinging doors whose upper surfaces 11a are too close to the beam 10a of a frame 10 so that the pin 42 has no room therebetween.

If the door is to be retained while swung in the opposite direction, that is toward the right in Figs. 8 and 8a, or in Fig. 9, the position of tubes 14, 15 is reversed or a yieldably mounted pin 42 is provided, such as shown in Figs. 5 to 7. This system may also be used for single acting spring hinges.

The screw 28 (see Fig. 4) may be applied to either of the embodiments of Fig. 8, 8a and 9 to temporarily disconnect the hold open device in the previously described manner.

A spring hinge similar to that shown in Fig. 2 is illustrated in vertical section in Fig. 5.

Connecting plate 117 is integral with cylindrical members 117a, 117b which correspond to tubes 14, 15 of Fig. 2. The upper end of cylinder 117a is closed by a tension collar 125 and its lower end by a similar collar 126. The upper and lower end of cylinder 117b are closed by tension collars 127, 128, respectively. Collar 126 is rigidly connected to cylinder 117a by a rivet 129, and a similar rivet 130 connects collar 128 with cylinder 117b.

The longitudinal ends of pintle 131, axially traversing collars 125, 126, are externally threaded to receive the upper and lower button tip 132, 133, respectively. A similar pintle 134, axially traversing collars 127, 128, carries a pair of button tips 135, 136. Flange 118, having apertures 137 for the passage of wood screws 138 (see Fig. 6) by means of which it is secured to the vertical end face of a door panel 139, is integral with a pair of annular members 118a, 118b, annulus 118a being received between button tip 132 and collar 125, and the lower annulus 118b between collar 126 and button tip 133. The planes of members 118a, 118b are twisted at right angles to the plane of flange 118.

Flange 116 is fixed to the door frame 140 (see Fig. 6)

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by means of wood screws 141. Annular members 116a, 116b are integral with flange 116 and are received between members 135, 127 and 128, 136, respectively. Thus, flange 116 is rigidly fixed to the door frame and, due to the provision of pintle 134 passing through its annular extensions 116a, 116b, prevents any other but angular displacement of cylinder 117b about the pintle 134.

A coil spring 142 in cylinder 117a has its ends 142a, 142b received in respective bores 125a, 126a in collars 125, 126 and thus permanently tends to move collar 126 with cylinder 117a (the latter being connected with collar 126 by rivet 129) in the direction of arrow P (see Fig. 6); however, such movement of flange 117 and cylinder 117a is prevented by the rigid connection of flange 116 to the door frame 140. The rotation of collar 125 with respect to flange 118 is prevented by a removable pin 143 (see Fig. 7) received in one of radially disposed bores provided in the annular portion 125b of collar 125 which extends above the upper end of cylinder 117a. Thus, when the door panel 139 with flange 118 is pivoted in the direction of arrow Q (see Fig. 6), collar 125 rotates about the pintle 131. Shaft 144 of follower roller 145 is received in aligned bores in bottom tip 132 and annulus 118a and thus rotates with flange 118 and door panel 139 to bring the roller 145 into engagement with and past hook 122 which latter is integral with a plate 121 fixed to the door frame 140 (see Fig. 6). Roller 145 is mounted in a recess 146 in the button tip 132. When the panel 139, flange 118 with annuli 118a, 118b and follower roller 145 are so rotated about spindle 131 and the roller 145 engages with hook 122, connecting member 117 pivots slightly about pintle 134 against the force of coil spring 147 in cylinder 117b to assume the position which is analogous to that of member 17 in Fig. 4. Upon further rotation of panel 139 in the direction of arrow Q, roller 145 slides along the right-hand face of hook 122 and, upon release of the door panel, retains the latter in open position. Such position of panel 139 corresponds to the phantom-line position 11' of the door panel shown in Fig. 1.

Spring 147 has its upper end 147a received in a bore 127a in collar 127, its lower end 147b being fitted into a similar bore 128a in the lower collar 128. This spring acts in such manner as to permanently urge collar 127 in the direction of arrow R (see Fig. 6). However, the rotation of collar 127 with respect to flange 116 is prevented by a removable pin 148 whose projecting head rests against a suitable shaped stop 116c forming part of the flange 116. Pin 148 is received in one of radially disposed openings 149 provided in the upper portion 127b of collar 127 which extends above the upper end of cylinder 117b. Thus, when the door panel 139 is rotated in the direction of arrow R about spindle 134, its flange 118 is parallel with and abuts against connecting member 117 causing the latter also to rotate about pintle 134 and to entrain the entire left half of the assembly shown in Fig. 10, i.e. cylinder 117a, pintle 131, collars 125, 126, tips 132, 133 and roller 145. Upon release of door panel 139, coil spring 147 immediately returns the entire assembly back into the position of Figs. 5-7.

While I have shown and described some forms and uses of the novel hold open device, it will be understood that various changes and modifications may occur to persons skilled in the art within the spirit of this invention, and I therefore do not desire to be limited to the exact details shown and described, but only by the scope of the appended claims.

I claim:

1. In a swinging door including a frame and a door panel having two sides, a combined spring hinge and hold open device comprising, in combination: a first housing connected to said frame at one side of said panel; a plate extending from the left of, carried by, and swingable about, said first housing on an axis parallel to said frame;

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a first spring in said first housing for urging said plate in a clockwise direction into engagement with the frame; a second housing having an axis parallel to the axis of said first housing and carried by said plate at the other side of said panel; a flange carried by said second housing, rigidly connected to said panel, and swingable with said panel about said second housing; a second spring in said second housing for urging said flange in a counterclockwise direction into engagement with said plate whereby said panel is held in closed position with respect to said frame when said flange engages said plate and said plate engages said frame, the panel being swingable into an open position when swung with the flange about said second housing against the force of said second spring, a follower fixed to move with said second housing in an arcuate path of movement, and a retaining device non-yieldably mounted on said frame in the path of movement of said follower when said panel is swung into said open position, the distance from the axis of said first housing to the outer face of said follower being less than the distance from the axis of said first housing to said retaining device when said panel is in open position but greater during the path of movement of said follower when said panel with said follower is swung from said open position into said closed position and in turn from said closed position into said open position.

2. The structure as set forth in claim 1, wherein said follower is a roller and said retaining device is an arm rigidly attached to said frame.

3. The structure as set forth in claim 2, wherein said second housing is a tube, and said roller is eccentrically connected to said second housing.

4. The structure as set forth in claim 1, further comprising means for holding said plate in a position spaced from the frame sufficiently to change the path of said follower when the panel is swung about said second housing to prevent engagement of the follower by said retaining device in the second open position of said panel.

5. The structure as set forth in claim 4, wherein said means comprises a screw threaded into said frame and having an end extendable from the latter for holding the plate at a distance from the frame when the panel is swung between its closed and second open positions.

6. In a swinging door including a frame and a door panel having two sides, a combined spring hinge and hold open device comprising, in combination: a first housing connected to said frame at one side of said panel; a plate extending from the left of, carried by, and swingable about, said first housing on an axis parallel to said frame; a first spring in said first housing for urging said plate in a clockwise direction into engagement with the frame; a second housing having an axis parallel to the axis of said first housing and carried by said plate at the other side of said panel; a flange carried by said second housing, rigidly connected to said panel, and swingable with said panel about said second housing; a second spring in said second housing for urging said flange in a counterclockwise direction into engagement with said plate whereby said panel is held in closed position with respect to said frame when said flange engages said plate and said plate engages said frame, the panel being swingable into a first open position when swung with said plate, with said second housing, and with said flange about said first housing in a direction to move said plate away from said frame, and into a second open position when swung with the flange about said second housing against the force of said second spring, a follower fixed to move with said second housing in an arcuate path of movement, and a retaining device non-yieldably mounted on said frame in the path of movement of said follower when said panel is swung into said open position, the distance from the axis of said first housing to the outer face of said follower being less than the distance from the axis of said first housing to said retaining device when said panel is in open position but greater

during the path of movement of said follower when said panel with said follower is swung from said open position into said closed position and in turn from said closed position into said open position.

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