July 22, 1952 H. M. FREDHOLM 2,604,343

CLOSURE CHECK AND RETAINER

Filed Dec. 22, 1950 2 SHEETS—SHEET 1

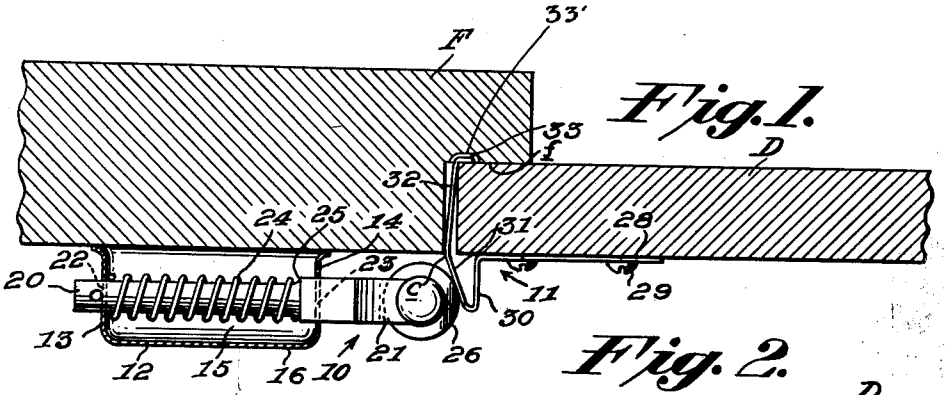
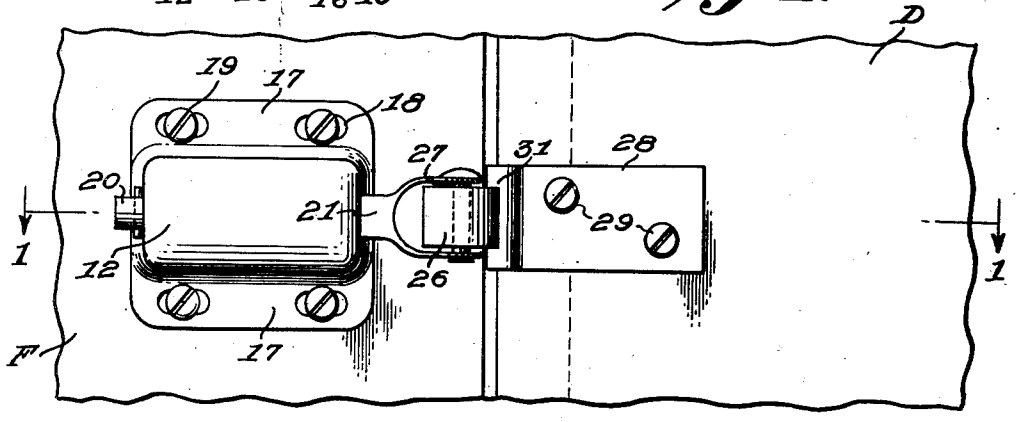


Fig. 1.

Fig. 2.



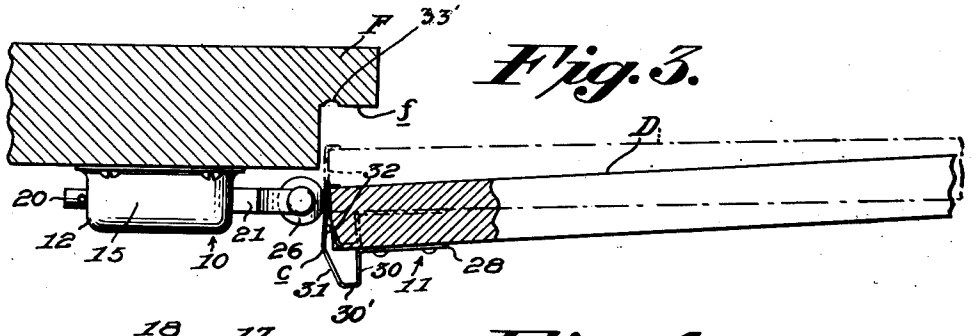


Fig. 3.

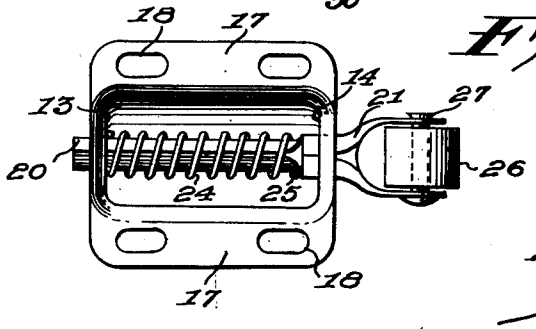


Fig. 4.

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Fig. 5.

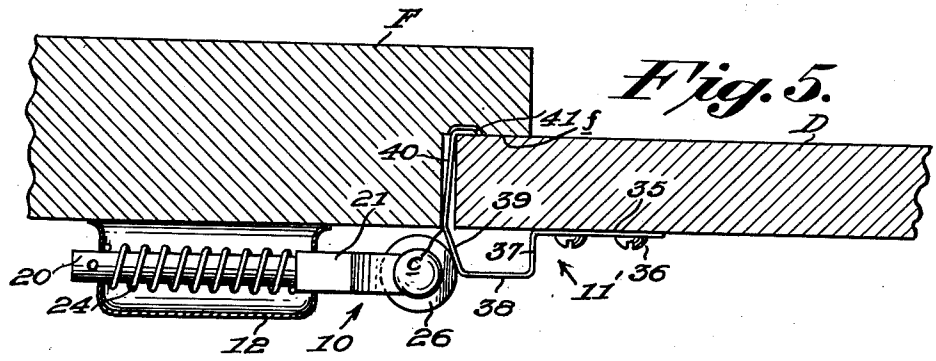


Fig. 6.

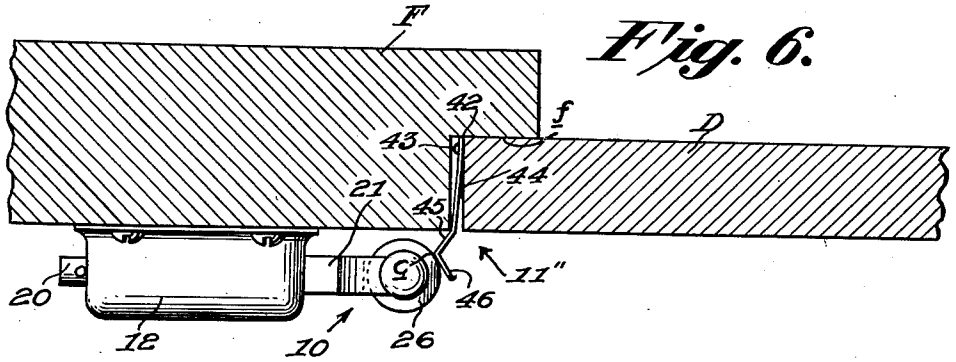


Fig. 7.

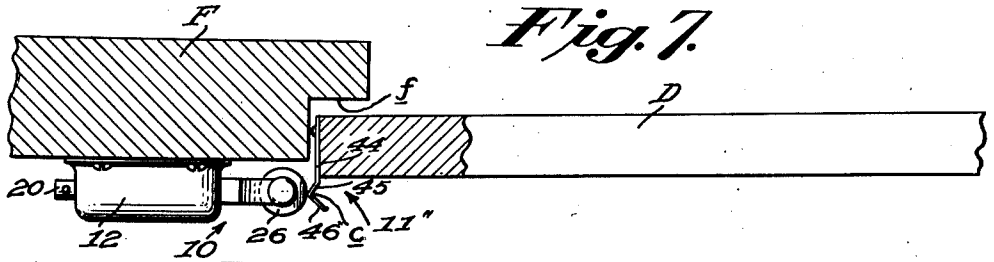
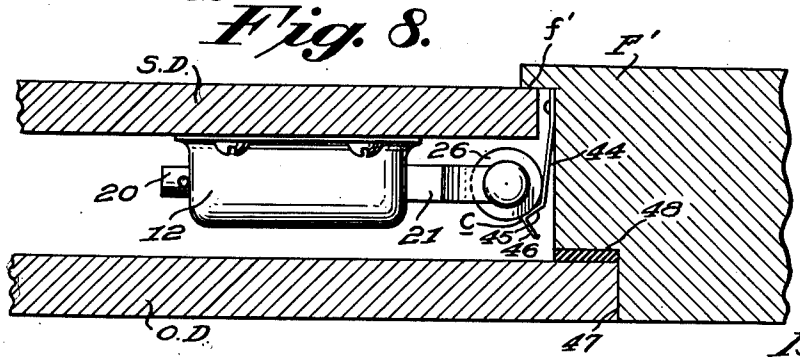


Fig. 8.



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CLOSURE CHECK AND RETAINER

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Application December 22, 1950, Serial No. 202,315

3 Claims. (Cl. 292—75)

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This invention relates to a door check and retainer mechanism including a pair of cooperating elements adapted to be secured to a door and a frame therefor, and which elements function consecutively as a door check or cushion stop, and then as a door retainer upon final closing movement thereof.

This application is a continuation-in-part of my co-pending application Serial No. 52,619, filed October 4, 1948, now abandoned.

It is appreciated that door check and retaining mechanisms of the general character referred to herein, have heretofore been constructed and proposed. However, in such prior constructions, which have comprised a keeper plate secured to either the door or the frame therefor and a bolt carried roller for cooperation therewith and carried by the other, either the plate or the bolt carried roller is yieldable and the other is rigidly supported, with respect thereto.

While such prior constructions no doubt, fulfilled their requirements and were satisfactory with massive or heavy constructions of the relatively movable parts where the yielding stress could be borne entirely by one of the two cooperating elements. It has been found, however, that in the lighter construction of such parts, as are employed today and particularly on trailer doors and frame constructions that new problems are presented. Hence, it has been discovered that two types or degrees of spring checking and retaining actions, occurring successively on bringing such doors to closed positions produces the best result and further serves to prolong the life and usefulness of the checking and retaining device and door parts as well.

It is accordingly a primary object of this invention to provide a door check and retainer structure embodying cooperating elements adapted to be secured to a door and the frame therefor and wherein such elements are each yieldable when brought into cooperative relationship.

A further object of the invention is to provide a door check and retainer structure embodying a resilient keeper plate adapted to be secured to a door or the frame therefor and a cooperating spring projected bolt device adapted to be secured to the door frame or a door embodying such a bolt carried roller for cooperation with the keeper plate, and wherein the keeper plate is more yieldable than the spring means of the bolt so as to be first deflected thereby.

A still further object of the invention is to provide a door check and retainer structure com-

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prising a pair of cooperating devices adapted to be secured to the door and the frame therefor on opposed sides of the juncture between the frame and door, one of said devices including a spring arm normally spaced in part from its support and having a camming end portion adapted to be brought into operative relation after deflection thereof into engagement with its support, and the other device including a bolt carrying a roller engageable with said arm and then the camming portion thereof and having a relatively stronger spring action for first deflecting said arm into engagement with its support and then causing the relatively stronger bolt spring to yield as the roller rides over the same surface of the deflected arm.

Another object of the invention is to provide a relatively thin spring metal keeper plate embodying a yieldably supported arm having a cam portion in angular relation to said arm for cooperation with the support for said arm and a bolt carried roller.

A further object of the invention is to provide a door check and retainer device including a spring projected bolt carrying roller supported by a door frame cooperating with a cam striker plate or keeper supported by a door, and wherein the roller is of cushion material, thereby enhancing the cushioning action of the device upon closing the door, reducing noise, increasing life of the parts etc.

Another object of the invention is to provide in a door check and retainer structure, a one-piece sheet metal casing member adapted to be secured to a door or a frame therefor, a sheet metal member slidably supported in opposed walls of the casing including a tubular bolt member having a bifurcated roller supporting head at one end of the bolt member and unitary therewith, a spring disposed within the casing in encircling relation to the bolt member and a rubber roller rotatably supported within the supporting head.

Other objects and advantages of the invention will become apparent in the course of the following detailed description, taken in connection with the accompanying drawings, wherein:

Fig. 1 is a horizontal sectional view in the plane of line 1—1 on Fig. 2, showing a preferred form of the invention;

Fig. 2 is a broken side elevational view of a door and door frame showing the improved structure attached thereto, and with the parts in closed and retained position;

Fig. 3 is a view similar to Fig. 1, but of a slight-

ly modified form and reduced scale, showing the door in partially closed position and with the cooperating elements of the check and retainer structure in checking contact;

Fig. 4 is a bottom plan view of the roller supporting structure, showing the sheet metal construction of the parts and particularly the roller carrying bolt member;

Fig. 5 is a view similar to Fig. 1, showing a further modified embodiment of the keeper plate, to provide softer checking action for light weight door and frame constructions;

Fig. 6 is also a view similar to Fig. 1, and shows a still further embodiment of the keeper plate for soft checking action;

Fig. 7 is a view corresponding to Fig. 6, and on a reduced scale, showing the door partially closed and wherein the spring backing the roller carrying bolt is in compressed condition as the roller has traveled up to the crest of the cam end portion of the deflected and rigidly backed spring keeper arm retracting the bolt. On further closing movement of the door the bolt will assume its normal extended position with the spring arm of the keeper then retaining the door in closed position, as in Fig. 8; and

Fig. 8 is a fragmental horizontal sectional view showing the improved structure just referred to applied to a screen door within an outer door of a trailer, both doors being in closed positions.

Referring now in detail to the drawings, and first to Figs. 1 to 4 thereof, F designates a portion of a door frame and D designates a portion of a door which is swingably supported within the frame in well known manner. The drawing shows only the free edge of the door and the cooperating portion of the frame which includes a door stop *f*.

It is to be understood that the door with which the improved structure is capable of use may be a screen, storm, or any other form of door and may be of the type yieldably urged to closed position or capable of being closed by manual effort only. The invention is intended to provide both checking and retaining operations with the minimum of equipment and effort, and on such light door and frame structure as are now employed in trailer constructions.

The improved door check and retaining structure comprises essentially two cooperating devices designated in their entireties as 10 and 11, one being secured to the free edge portions of the door frame and the other to the door. More specifically the device 10, comprises a one-piece thin sheet metal casing 12, having opposed end walls 13 and 14, side walls 15 and a top wall 16. The casing further includes base flanges 17 provided with elongated slots 18 for receiving screws 19 by which the casing is secured to the frame F for adjustment longitudinally thereof.

A combined bolt 20 and bifurcated roller supporting head 21 is formed from a single piece of relatively thin sheet metal, the bolt 20 being formed tubular throughout most of its length and projects through a circular aperture 22 in the casing wall 13. The head end portion of this bolt is formed rectangular in cross section as at 21 and extends through a rectangular aperture 23, in the end wall 14.

A relatively heavy coil spring 24 encircles the bolt 20 with one end thereof engaging end wall 13. The other end of this spring engages a shoulder 25 provided at the juncture of the cylindrical portion of the bolt 20 and its squared end 21 inwardly of the wall 14. A rubber roller 26

is journalled on a pin 27 extending through the arms of the bifurcated head 21.

The striker plate or keeper device 11 is formed from a single rectangular sheet of relatively thin spring steel which is adapted to provide an anchoring and supporting arm portion 28 at one end to be secured to the outer face of a door D adjacent the free edge thereof, as by screws 29. This device further includes a central portion 30 bent to extend outwardly from the portion 28, normal thereto and adjoining a further portion 31 in angular relation to portion 30. The portion 31 extends toward but beyond the outer face of the door and away from the free edge thereof to adjoin a still further bent portion 32 which extends across the entire free edge of the door in angular relation thereto, as well as to the portion 31. This latter portion 32 is shown in Fig. 1, as spaced a greater distance from the free edge of the door at its junction with portion 31 than at its inner end where it normally engages the inner corner edge of the door. At this point the portion 32 joins a short rearwardly bent free end extension 33 engaging the inner face of the door and engageable in a recess 33' in the stop face *f*. A cam portion is thus provided by the spring arm portions 31 and 32 having its crest at C.

It will also be seen from Fig. 1, that these keeper plate portions 30, 31 and 32 are readily yieldable and in the closed position of the door with the bolt 20 fully extended, only these portions of the keeper plate are under tension, retaining the door in tightly closed position against the frame F.

Upon opening the door, however, the roller 26 will first ride inwardly upon the portion 31 and since this arm portion of the keeper plate is more yieldable than the coiled spring 24, the portion 31 will be depressed carrying with it the inclined portion 32 until it engages the rigid underlying surface of the door edge after which the roller carrying bolt 20 is forced rearwardly compressing the coiled spring 24 until the roller 26 rides over the crest of the cam surface C, after which the parts will rapidly assume the positions shown in Fig. 3.

As indicated in full lines in Fig. 3 the door has been opened to such extent that the yieldable keeper plate has assumed its normal position. As indicated in dot-and-dash lines in this view the roller is inside the crest of the cam C. The portions 30, 31 and 32 have all yielded inwardly with portion 32 resting on the free edge wall of the door as explained above.

It is to be observed at this point that the plate in Fig. 3 is slightly modified in the inclusion of a short portion 30' spaced from and parallel with portion 28 and which interconnects portions 30 and 31 and provides the desired flexibility of these parts.

As will be seen in Fig. 1 the readily yieldable keeper plate acts to retain the door closed and as seen in Fig. 3 the keeper plate also acts to cushion or check the door in its initial closing movements.

A modified form of keeper plate 11' is shown in Fig. 5. This plate is also constructed from a thin sheet of resilient steel and is bent to provide a straight portion 35 adapted to be secured to the outer face of the door D by screws 36. The plate further includes a straight portion 37 extending outwardly from portion 35 and normal thereto, a third straight portion 38 parallel with portion 35 and a cam striker and re-

taining portion. This latter portion running to the free end of the spring strip includes an angular portion 39 extending from portion 38 toward the outer face of door D and away from the free edge thereof and another angular portion 40 extending inwardly from portion 39 across the free edge of the door. The portion 40 is normally spaced from the edge of the door except at its inner end where it engages the inner free edge corner of the door and terminates in a short rearward retaining extension 41 engaging the rear face of the door.

This form of keeper plate cooperates with the stronger coiled spring pressed bolt carrying roller 26, substantially in the same manner as the member 11 above described. Hence, the portions 37, 39 and 40 provide a yieldable striker or keeper member wherein the portion 40 is forced against the free edge surface of the door upon initial movement of roller inwardly of the inclined cam portion 39. After this initial deflection of the keeper member the roller carrying bolt is caused to retract as it passes the crest of the cam C of the keeper, after which it then returns to normally extended position as the spring keeper arm comes into play to retain the door in closed position.

A further embodiment of keeper plate 11'' is shown in Figs. 6 and 7 wherein the spring plate includes a flat portion 42 secured and retained to the inner free edge corner surface of the door adjacent its inner wall, as by screws 43. Spring arm 44 extends outwardly from this retained portion 42, in angular relation to the free edge surface of the door, as in Fig. 6. This spring arm also includes an outer cam member having its crest at C and provided by angular portions 45 and 46. The cam C is normally engaged by roller 26 in the same manner and for the same purpose above described. Therefore, as shown in Fig. 7, the roller 26 has deflected the spring keeper into engagement with the rigid edge surface of the door and has then rolled up to the crest C of the cam, compressing the coiled spring 24 of the roller carrying bolt.

The structure of Figs. 6 and 7 is shown in Fig. 8 as applied to constructions existing in trailers wherein a screen door S.D. is disposed inwardly of an outer door O.D. In this instance the frame F' is provided with a seat 47 for the outer door and a weather strip 48 is disposed in the bottom of the seat outwardly of the portion 46 of the keeper plate.

The frame F' is further provided with an inner screen door seat or stop *f'* against which the screen door S.D. is adapted to be yieldably yet positively held by the spring arm 44 of the keeper. As in the several forms previously described the stronger spring projected bolt carrying roller 26 is always fully extended when the associated door D or S.D. is in closed position against the frame stop. Hence the inclined cam surface inwardly of the crest C on the spring arm of the keeper will constantly exert a closing pressure on the associated door, through the extended bolt and its mounting on the door.

I claim:

1. In a check and retaining device for a door swingably supported within a frame having a spring pressed roller, the improvement comprising a keeper plate adapted to be attached to a side of the door adjacent the free edge thereof and in its attached position including a plane door attaching portion, a second portion extending away from said plane portion at substantially right angles to the side of the door, a roller engageable retaining cam portion extending from said second portion in inclined relation thereto toward said side of the door at said free edge thereof, and a roller engageable checking portion extending from the cam portion across the free edge of the door and having its free end inturned and terminating in engagement with the opposite side of the door.

2. In a check and retaining device for a door swingably supported within a frame having a spring pressed bolt, the improvement comprising a spring keeper plate adapted to be attached to a side of the door adjacent the free edge thereof and in its attached position including a plane door attaching portion, a second portion extending away from said plane portion at substantially right angles to the side of the door, a third portion extending from said second portion in substantial parallelism with said first portion, a roller engageable retaining cam portion extending from said third portion in inclined relation thereto toward said side of the door and outwardly of said free edge thereof, and a reversely inclined roller engageable check cam portion extending from the first cam portion across the free edge of the door and having its free end inturned and terminating in engagement with the opposite side of the door.

3. A check and retainer structure for a door member hingedly mounted in a frame member having a door stop, comprising cooperating elements mounted on the door and frame members, one of said elements comprising a striker plate secured to one of said members and including a resilient door check arm normally extending in angular and spaced relation to an edge surface of said one member and in outwardly diverging relation thereto in a direction outwardly of the door and frame members, said striker plate further including a cam portion unitary with the arm and disposed outwardly of said one member and converging toward the plane of said edge surface, the other element comprising a bolt, a relatively heavy coil spring projecting said bolt into contact with said cam portion in a closed position of the door and said spring being of a strength to retain said bolt in its fully projected position against the reaction of said resilient arm and to flex same into engagement with said edge surface upon initial opening of the door, whereafter said cam portion has a relatively rigid support from said one member and reacts upon said bolt upon final opening of the door to retract the bolt and compress the spring.

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