Oct. 8, 1963 W. F. KNAPP 3,106,418

MECHANICAL DOOR STOP MEANS

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FIG. 1.

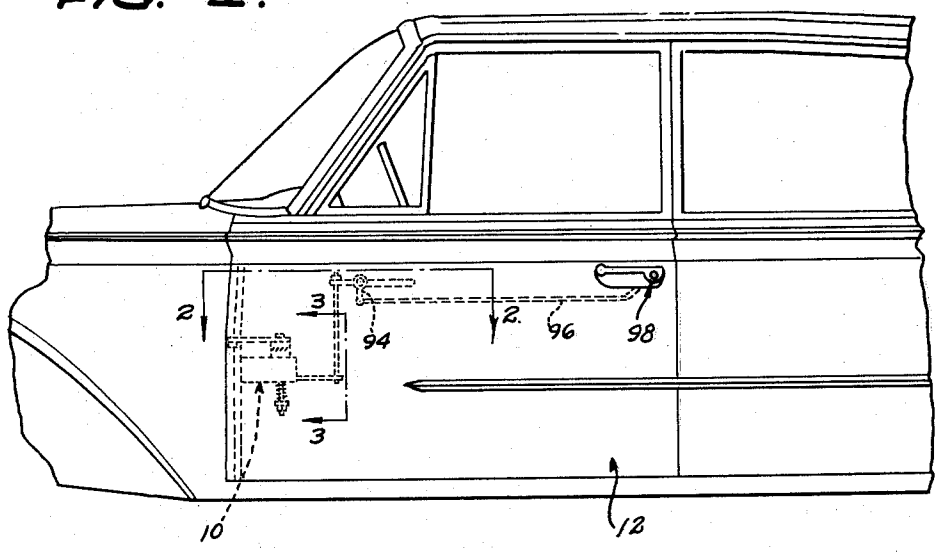
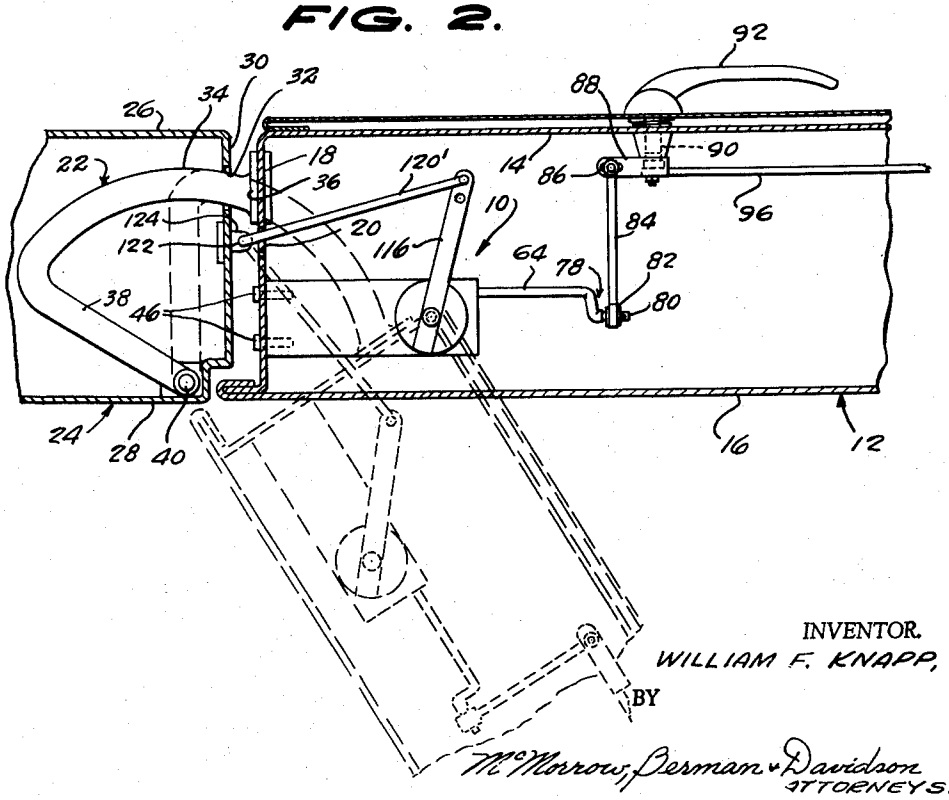


FIG. 2.



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FIG. 3.

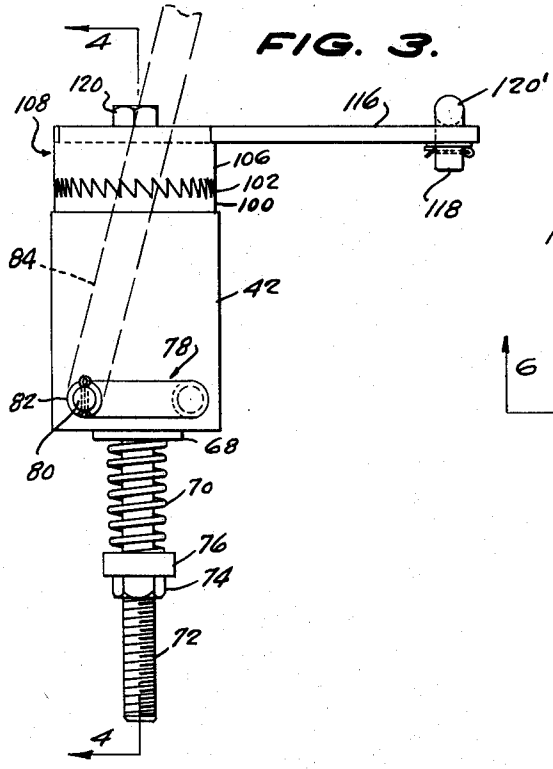
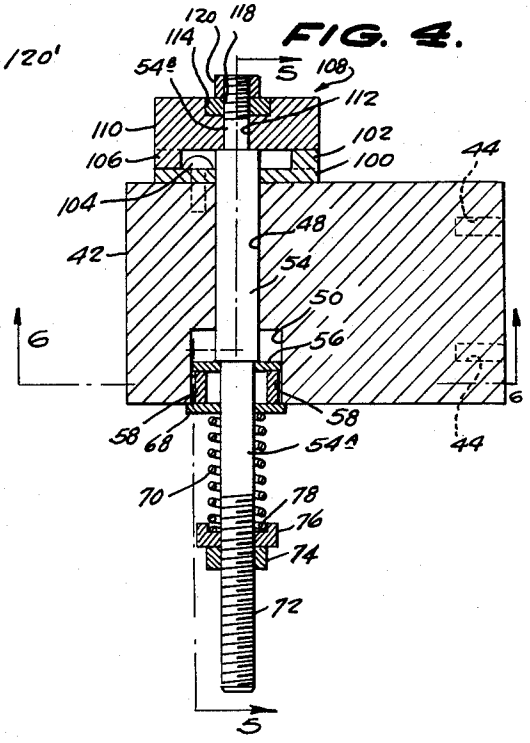


FIG. 4.



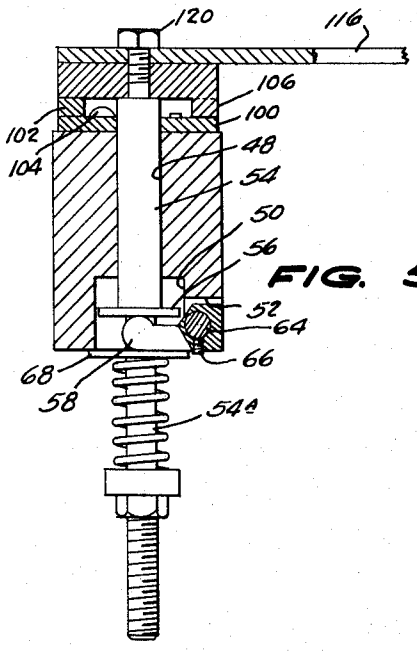


FIG. 5.

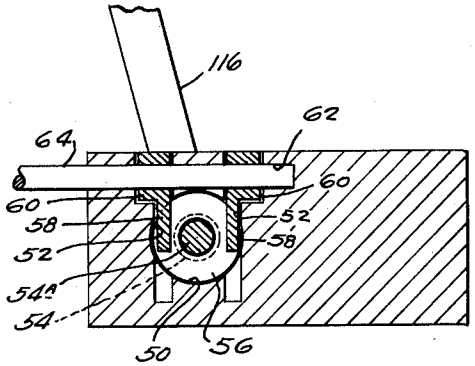


FIG. 6.

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MECHANICAL DOOR STOP MEANS

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4 Claims. (Cl. 292—263)

This invention relates to the general field of the provision of means for limiting the pivotal movement of one element with respect to a fixed or stationary member, and more specifically, the instant invention pertains to the provision of means for securing a door or closure member for an ingress or egress opening against inadvertent or accidental opening.

It is well-known that one of the primary causes of deaths of automobile occupants, when in collision, results from the occupants being thrown from the vehicle through doors which have been sprung open. Hence, one of the primary objects of this invention is to provide means in the nature of automotive door locks which is effective to hold the automobile door securely closed in the event of a vehicle collision and despite any chassis or frame springing.

Another object of this invention is to provide a mechanical door stop device of the type which will resist the inadvertent opening of a vehicle door under impact and which, at the same time, will permit the vehicle door to be easily pivoted to its closed position.

Still another object of this invention is to provide a mechanical door stop which will hold a door or other closure member or means at any desired degree of its pivotal arc of movement.

The invention has, as still another object, the provision of a mechanical door stop or check which may be actuated by the turning of handle members disposed on opposite sides of the door, the operation of the handle automatically releasing the locking mechanism to permit the door or closure member to be pivoted to an open position.

This invention contemplates, as still another object thereof, the provision of a mechanical door stop or door check means of the type referred to supra, wherein the means is non-complex in construction and assembly, in inexpensive to manufacture, and durable in use.

Other and further objects of the instant invention will become more evident from a consideration of the following specification when read in conjunction with the annexed drawings, in which:

FIGURE 1 is a fragmentary side elevational view of a conventional automotive vehicle illustrating, in dotted lines, a mechanical door stop device constructed in accordance with this invention, the vehicle door being shown in closed position;

FIGURE 2 is an enlarged detail cross-sectional view of the mechanical door stop means, FIGURE 2 being taken substantially on the horizontal plane of line 2—2 of FIGURE 1, looking in the direction of the arrows, the door and door stop shown in full lines illustrating the position of several component elements of the stop when the door is in its closed position, and the dotted-line position of the same being illustrated when the door is moved to its open position;

FIGURE 3 is an enlarged detail side elevational view of the door stop means, FIGURE 3 being taken substantially on the vertical plane of line 3—3 of FIGURE 1, looking in the direction of the arrows;

FIGURE 4 is an enlarged detail medial cross-sectional view of the door stop means, FIGURE 4 being taken substantially on the vertical plane of line 4—4 of FIGURE 3, looknig in the direction of the arrows;

FIGURE 5 is a detail cross-sectional view, FIGURE 5 being taken substantially on the line 5—5 of FIGURE 4, looking in the direction of the arrows; and

FIGURE 6 is a detail transverse cross-sectional view, FIGURE 6 being taken substantially on the horizontal plane of line 6—6 of FIGURE 4, looking in the direction of the arrows.

Referring now more specifically to the drawings, reference numeral 10 designates, in general, mechanical door stop means or device constructed in accordance with the teachings of this invention. The means or device 10 is seen to comprise an installation for incorporation with a conventional automotive vehicle door 12, but is not limited thereto. The means or device 10 is disposed between the inner and outer door panels 14, 16, respectively. As is seen in FIGURE 2, the door 12 also includes an upright end wall 18 having an opening 20 formed therein to serve a function and purpose to be described.

In accordance with conventional practice, a plurality of hinge members 22 (only one being shown) pivotally support the door 12 from the body 24 which includes inner and outer body panels 26, 28, respectively, and a door jamb 30 adjacent the upright end wall 18. The jamb 30 is slotted at 32 to permit the butt end 34 of the hinge member 22 to project therethrough for connection at 36 with the upright end wall 18. The hinge arm 38 is pivotally supported at 40 on the body 24 in the conventional manner.

The locking device 10 comprises a main substantially solid elongated block 42 having one of its ends drilled and tapped as at 44 to receive bolts 46 therein for mounting on the upright end wall 18. The other end of the block 42 is bored vertically at 48 and is counterbored at 50 from the underside thereof. The block 42, also from its underside, is formed with a pair of inwardly-extending, longitudinally-spaced slots 52 which also open into an adjacent side thereof.

Mounted for reciprocation in the bore 48 and counterbore 50 is a shaft 54, and the lower end 54A of the shaft is necked down. Mounted on the end 54A is an annular flange 56 disposed within the counterbore 50 and adapted for reciprocation with the shaft 54.

Extending through the slots 52 into the counterbore 50 are one of the ends of a pair of fingers 58 having hubs 60. The block 42 is bored longitudinally at 62 to receive one end of an elongated shaft 64 to which the hubs 60 are fixedly secured. The securing means is accomplished by set screws 66 (see FIGURE 5).

Disposed immediately below the fingers 58 is an annular plate 68 which surrounds the necked down lower end portion 54A of the shaft 54 and which is constantly urged into engagement therewith by means of the upper end of a helocoidal spring 70 surrounding the lower end portion 54A of the shaft 54. The aforementioned lower end portion is threaded, as at 72, to receive a threaded nut 74 that bears against a collar 76 having a spring seat 78 formed therein to receive the lower end of the spring 70 therein. Obviously, the tension or compression of the spring 70 is controlled through the relative positions of the collar 76 and the plate 68.

The outer or exterior end of the shaft 64 develops into a crank 78 to the outer arm 80 of which is pivotally connected at 82 (see FIGURES 2 and 3) one end of a lever 84. The other end of the lever 84 loosely engages within a lost-motion slot 86 formed in one arm of a door-operating bellcrank lever 88. The lever 88 is connected centrally of its ends to one end of a shaft 90, the other end of the latter being connected to an internal door-operating handle 92. The other arm 94 of the bellcrank lever 88 connects through linkage 96 with the ex-

terior door-operating mechanism **98** forming no part of the instant invention. Suffice it to state that the mechanism is such that its operation will effect reciprocable movement of the linkage **96** to cause the bellcrang lever **88** to pivot.

The shaft **54**, at its upper end, extends vertically above the block **42** and through a centrally-apertured discoidal member **100** having an upstanding ratchet flange **102**. The discoidal member **100** is secured to the block **42** as by screws **104**. The flange **102** normally is engaged by the ratchet flange **106** of a cap **108** having a substantially cylindrical upper closure wall **110** centrally apertured at **112** to receive therethrough the upper necked down and threaded portion **54B** of the shaft **54**.

The upper end of the closure wall **110** is formed with a diametrically-extending groove or channel **114** to receive one end of the lever **116** therein. The lever **116** is apertured adjacent one end at **118** to receive the necked down portion **54B** of the shaft **54** and is held locked to the upper closure wall **110** by means of a lock nut **120**. The lever **116** connects through a down-turned arm **118** with one end of an operating bar or lever **120'**, the other end of the latter being pivotally connected at **122** (see FIGURE 2) to a bracket **124** fixedly secured to the door jamb **30**. As is seen, the aforementioned other end of the bar **120'** extends for free swinging movement through the opening **20** formed in the upright wall **18**.

It will be understood from the foregoing specification and a consideration of the drawings that the angularity of the ratchet flanges **102, 106** is such as to lock the door **12** against outward swinging movement unless the handle **92** is pivoted downwardly, or the door-operating mechanism **98** is operated through the turning of the crank **78** to effect disengagement of the two ratchet flanges. Actuation of either of these devices **92** or **98**, respectively, causes the shaft **64** to turn in a clockwise direction, reference being made to FIGURE 5, whereby the fingers **58** lift against the collar **56** and in so acting, lifts the shaft **54** in the same direction. The shaft **54**, when shifted vertically upwardly, causes the disengagement of the ratchet flanges **102, 106** whereby the door **12** may be freely swung to any desired degree of opening, and upon the release of either the handle **92** or the door-operating mechanism, the ratchet flanges **102, 106** re-engage under the influence of the bias of the spring **70**. The door **12** is fixed against further opening, but may be easily closed by pulling or pushing the same toward its normal closed position in the direction of the angularity of the teeth of the ratchet flanges. This angularity of the ratchet teeth on the flanges **102, 106** permits their escape against the tension of the spring **70**.

The desired locking tension between the flanges **102, 106** may be easily adjusted by moving the nut **74** upwardly or downwardly on the threaded shaft portion **72**, and/or heavier or lighter springs **70** may be easily installed through the simple expedient of unthreading the nut **74**, moving the collar **76**, and spring **70**, substituting a new spring and re-installating the collar and nut and subsequently adjusting the same to provide the desired compression or tension on the new spring.

It will be understood that the instant drawings are designed to illustrate the installation of this device in the left-hand front door or driver's door of the conventional automotive vehicle, and that necessarily, the direction of the teeth of the ratchet flanges **102, 106** must be reversed upon installation of the device on the opposite side of the vehicle.

Having described and illustrated one embodiment of this invention in detail, it will be understood that the same is offered merely by way of example, and that the instant invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A mechanical door stop for a door pivotal about an upright axis toward and away from a door jamb, said door stop normally holding said door in its closed position and comprising a substantially solid body fixedly connected to said door and having a first ratchet flange at the upper side thereof fixedly secured thereto, a second ratchet flange superimposed over said first ratchet flange and normally meshing therewith to hold said door in closed position, a lever having a pair of opposed ends with one of said ends fixedly connected to said second ratchet flange and means pivotally connecting the other end of said lever with the jamb of said door, and manually-operable means mounted on said door and connected with said second ratchet flange to effect disconnection of said second ratchet flange from said first ratchet flange whereby said door may be pivoted to its open position.

2. A mechanical door stop device for holding an automobile door in closed position against a door jamb, said door having a pair of opposed side panels and a substantially upright end panel disposed adjacent the door jamb, means pivotally supporting said door for movement from its closed position to an open position away from said jamb, said device comprising an elongated substantially solid member disposed between said panels, means securing one end of said member to said end wall, said end wall having an opening formed therein adjacent said one end of said member, a substantially annular ratchet flange fixedly secured to the upper side of said member, a cylindrical ratchet flange superimposed on said annular ratchet flange and meshing therewith to hold said door in closed position, a first lever having a pair of opposed ends and having one of its ends fixedly connected to said cylindrical ratchet flange, a bracket mounted on said jamb, a second lever having a pair of opposed ends with an end of the latter pivotally connected with the other end of said first lever, the other end of said second lever extending through said opening and being pivotally connected to said bracket, and manually operable means on said door connected with means on said member to effect elevation and disengagement of said cylindrical ratchet flange from said annular ratchet flange whereby said door may be pivoted to its open position.

3. A mechanical door stop device for holding an automobile door in closed position, said door having a pair of oppositely-disposed side panels and a substantially upright end wall disposed adjacent the jamb of said door, means pivotally supporting said door on said automobile with said end wall normally juxtaposed relative to said jamb when said door is in its closed position, an elongated member disposed between said side panels and having an end thereof fixedly secured to said end wall, a shaft mounted for vertical reciprocation through said member adjacent the other end thereof, said shaft having its opposed upper and lower ends extending above and below the upper and lower sides of said member, an annular ratchet flange fixedly secured on said member adjacent said other end thereof, said upper end of said shaft projecting through and beyond said annular flange, a substantially cylindrical cap superimposed on said annular member, an elongated bar projecting radially away from said cylindrical cap, said bar having a pair of opposed ends, means fixedly connecting one end of said bar and said cap with said upper end of said shaft, said end wall having an opening extending transversely therethrough approximate said member, a lever having a pair of opposed ends, means pivotally connecting one end of said lever with the other end of said bar, the other end of said lever extending transversely through said opening, a bracket fixedly secured to said jamb, means pivotally connecting the other end of said lever to said bracket, manually-operable door-handle means connected with said lower end of said shaft to effect vertical movement upwardly of said shaft to disengage said cylindrical ratchet cap from said annular ratchet whereby said door may be moved to its open position, and resilient means connected between said member and said lower end of

said shaft constantly biasing said ratchet cap to move in a direction toward said annular ratchet.

4. A mechanical door stop device for holding an automobile door in closed position, said door having a pair of oppositely-disposed side panels and a substantially upright end wall disposed adjacent the jamb of said door, means pivotally supporting said door on said automobile with said end wall normally juxtaposed relative to said jamb when said door is in its closed position, an elongated substantially rectangular member disposed between said side panels and having an end thereof fixedly secured to said end wall, a shaft mounted for vertical reciprocation through said member adjacent the other end thereof, and having its opposed upper and lower ends extending above and below the upper and lower sides of said member, an annular ratchet flange fixedly secured to said other end of said rectangular member and surrounding the upper end of said shaft, a cylindrical ratchet flange normally engaging and meshing with said annular ratchet flange, an elongated first lever having opposed ends, means fixedly connecting one end of said first lever and said cap with said upper end of said shaft, a second lever, said second lever having one of its ends pivotally connected to the other end of said first lever, said end wall having an aperture extending transversely therethrough, said second lever having the other end thereof extending transversely through said aperture, a bracket mounted on said jamb, means pivotally connecting the other end of said second lever with said bracket, said rectangular member having an opening formed therein extending inwardly from the lower side thereof, said lower end of said shaft reciprocating in said opening, an annular flange mounted on said lower end of said shaft for reciprocation in said bore, said rectangular member having a slot formed therein and extending inwardly from a side of said member, said slot

opening into said bore, an elongated shaft rotatably mounted in said block and having an end thereof projecting laterally from said other end thereof, a pair of fingers having one of their respective ends fixedly secured to said last-named shaft, the other ends of said fingers projecting through said slot and into said opening below said annular flange, an annular plate mounted on said lower end of said first shaft, said plate spanning said bore, a helicoidal spring mounted on said lower end of said first shaft and having one of its respective ends bearing against said annular plate, a spring seat mounted on said lower end of said first shaft and seating the other end of said helicoidal spring therein, means mounted on said lower end of said first shaft for adjusting the position of said seat axially of said shaft to adjust the tension of said spring, said projecting end of said second shaft terminating in a crank arm, and linkage means connecting said crank with the handle of said door whereby actuation of said handle causes said second shaft to rotate forcing said fingers to pivot upwardly to disengage the cylindrical ratchet from said annular ratchet whereby said door may be moved to its open position.

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