Nov. 9, 1954 H. F. CROMWELL ET AL 2,693,616

DOOR CHECKING AND HOLDING DEVICE

Filed Nov. 6, 1951

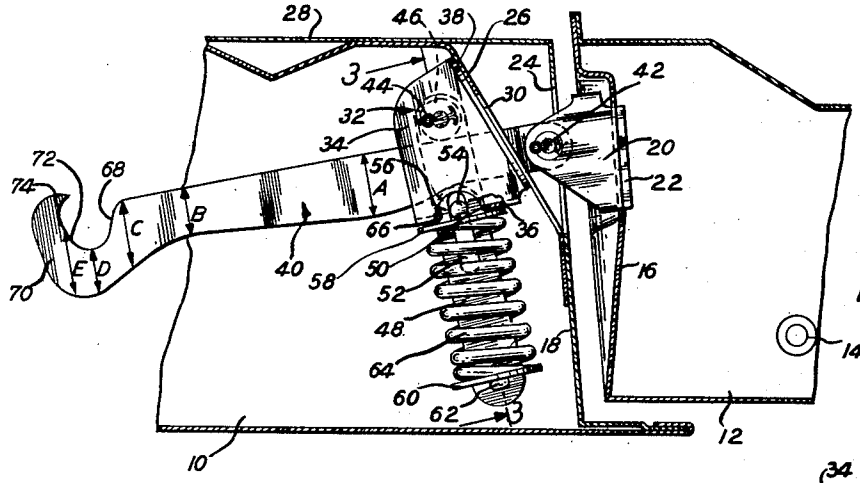


FIG. 1

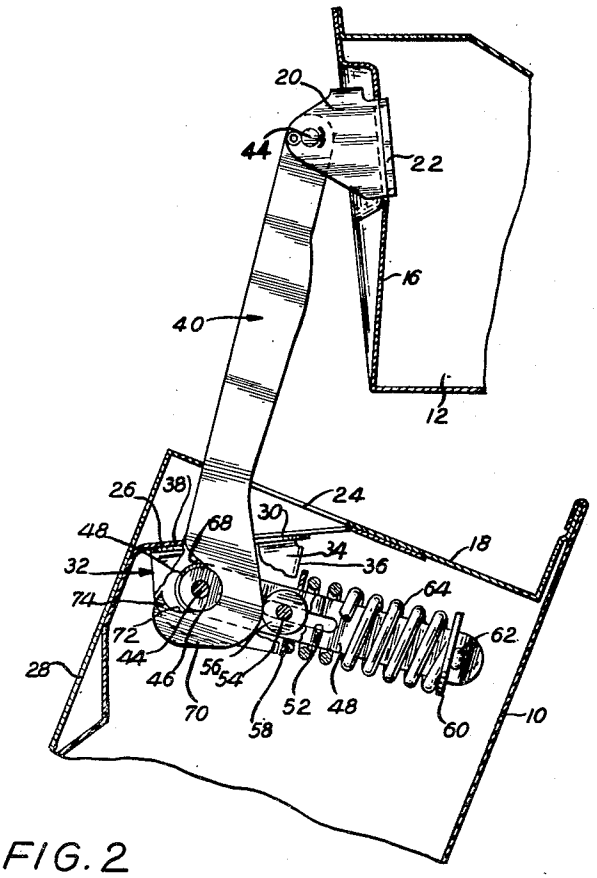


FIG. 2

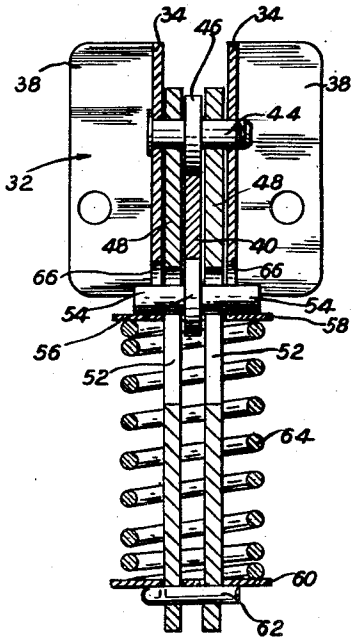


FIG. 3

H. F. CROMWELL
S. J. GALLA
INVENTOR.

BY E. C. McRae
J. P. Faulkner
J. H. Oster

ATTORNEYS

United States Patent Office

2,693,616

Patented Nov. 9, 1954

2,693,616

DOOR CHECKING AND HOLDING DEVICE

Herbert F. Cromwell and Stephen J. Galla, Detroit, Mich., assignors to Ford Motor Company, Dearborn, Mich., a corporation of Delaware

Application November 6, 1951, Serial No. 255,054

3 Claims. (Cl. 16—85)

This invention relates generally to door checking and holding devices for motor vehicle doors.

It is an object of the present invention to provide a door checking and holding device which is positive in operation and inexpensive to manufacture, and which utilizes a one-piece check arm cooperating with rollers mounted within the door to perform the functions of checking and holding the door. Another object of the invention is to obtain a cushioned checking action without the necessity of providing a rubber bumper or other yieldable means on the check arm or the supporting bracket.

The door checking and holding device of the present invention comprises an arm pivotally connected to the door pillar and extending through an opening in the jamb face of the door. The arm is formed in one piece and is provided adjacent its free end with an integral inclined retaining portion and at its extreme end beyond said retaining portion with an integral hook-shaped end portion having an inclined checking ramp. A bracket is mounted within the door and pivotally supports a roller arranged to engage one edge of the arm. A pair of straps are secured to the bracket and slidably and pivotally support a second roller engageable with the opposite edge of the check arm. The straps also support a coil spring arranged to urge the last-mentioned roller toward the check arm. The inclined retaining portion of the check arm engages one of the rollers when the door is open to yieldably retain the door in open position, while the checking ramp serves to cushion the opening movement of the door. The hook portion of the arm forms a positive stop limiting the opening movement of the door.

Other objects and advantages of this invention will be made more apparent as this description proceeds, particularly when considered in connection with the drawing, wherein:

Figure 1 is a horizontal cross-sectional view through a portion of a vehicle door and the adjacent door pillar, showing the door checking and holding mechanism of the present invention.

Figure 2 is a view similar to Figure 1 but showing the door in its open position.

Figure 3 is an enlarged cross-sectional view taken on the plane indicated by the line 3—3 of Figure 1.

The reference character **10** indicates a motor vehicle door hinged to the adjacent body pillar **12** for pivotal movement about a hinge axis **14**. Conventional hinge means can be used and are not shown in this drawing. The wall **16** of the pillar adjacent the jamb face **18** of the door is depressed and is provided with an opening through which extends a U-shaped bracket **20** having legs **22** suitably secured to the pillar wall **16**. The bracket **20** also extends through an opening **24** in the jamb face **18** of the door in the closed position of the latter as shown in Figure 1.

A reinforcing member **26** is located within the door **10** and is secured to the inner panel **28** of the door and also to the jamb face **18**. The reinforcing member is provided with an opening **30** in alignment with the opening **24** in the jamb face. Secured to the inner side of the reinforcing member **26** is a supporting bracket **32**. The supporting bracket **32** is generally U-shaped having opposed side walls **34** and a connecting base **36**. The supporting bracket is also provided with marginal flanges **38** adapted to be secured to the reinforcing member **26** of the door. The two side walls **34** of the supporting bracket, being spaced from each other, form an opening in alignment with the opening **30** in the reinforcing member.

A flat one-piece check arm **40** is pivotally connected by means of a pin **42** to the bracket **20** carried by the pillar **12**. The check arm extends through the opening **30** in the reinforcing member **26** and between the side walls **34** of the supporting bracket **32** carried by the door.

A pin **44** extends between the side walls **34** of the supporting bracket **32** and pivotally supports a roller **46** located between the bracket side walls. The roller **46** is arranged to engage one edge of the check arm **40**. Also supported upon the pin **44** are a pair of flat straps **48** embracing the roller **46** and also the check arm **40**. The straps **48** are located between the side walls **34** of the supporting bracket and project outwardly therefrom through a slot **50** provided in the base **36** of the bracket.

Elongated slots **52** are formed in the straps **48** in alignment with each other and receive stub axles **54** formed integrally with a second roller **56** and projecting from opposite sides thereof. The second roller **56** is arranged to engage the opposite edge of the check arm **40**. It will be apparent that the slots **52** in the straps permit movemeint of the second roller **56** toward and away from the check arm and also rotation of the roller and its integral axles **54**.

A flat washer **58** is slidably mounted upon the straps **48**, being provided with a rectangular opening for receiving the straps. One side of the flat washer forms a bearing surface for the axles **54** of the roller **56**. A second flat washer **60** is slidably mounted upon the straps **48** adjacent their free ends, being retained thereon by means of a cotter pin **62**. Located between the washers **58** and **60** and encircling the straps **48** is a coil spring **64**. The spring is assembled under compression so as to constantly exert a force urging the roller **56** into engagement with the adjacent edge of the check arm **40**.

Although the straps **48** are pivotally connected to the bracket by means of the pin **44**, they are retained against swinging movement by their passage through the slot **50** in the base **36** of the bracket. The arrangement provides an economical means for attachment of the straps to the bracket without the necessity of providing additional parts, and in addition provides the proper lateral support for the straps as well as enabling the straps to embrace and guide the check arm. It will be noted from Figures 1 and 2 that the parts are designed so as to leave a clearance space between the base **36** of the supporting bracket and the adjacent washer **58** at all times. In addition, the side walls **34** of the bracket are provided with semi-spherical cut away portions **66** connecting with the slot **50** in the base **36** to provide clearance for the axles **54** of the roller **56** in their movement toward and away from the check arms.

Reference is now made particularly to Figure 1 and to the construction of the check arm **40**. As previously mentioned, the inner end of the check arm is pivotally connected at **42** to the pillar bracket **20**. The check arm is of uniform width for a short distance immediately adjacent this pivotal connection and then progressively and gradually increases in width to a maximum at an intermediate zone A. Continuing toward the outer end of the check arm, the latter progressively and gradually decreases to a minimum width at zone B, and thereafter more rapidly increases in width to a zone C. The aforesaid variations in the width of the check arm are obtained by providing a contoured edge engageable with the roller **56**, the opposite edge engageable with the roller **46** being straight throughout the above-described portion of the check arm.

Beyond the zone C the edge of the check arm in engagement with the fixed roller **56** is formed with a depressed inclined retaining portion **68** for cooperation with the roller **46** in holding the door in its fully open position. The angle of the retaining portion **68** is predetermined so as to provide the necessary resistance to closing movement of the door to hold the latter open against inadvertent closing yet to permit the door to be readily closed when desired. The retaining portion

of the check arm results in decreasing the overall width of the arm from the zone C to the zone D with the width D corresponding generally to the minimum width B. Beyond the zone D the arm is formed with a hook-shaped end portion **70** having a sharply inclined ramp **72** and a return bent terminal end or stop portion **74**. The check arm increases in width rather sharply from the zone D to the zone E by reason of the ramp **72** to provide a cushioned checking action for the door. In the event the door is opened with such force as to cause the roller **46** to continue past the bottom of the retaining portion **68** (zone D) the sharply inclined ramp **72** causes the rollers to be spread apart against the action of the spring **64**. Overriding movement is thus cushioned with increasing resistance. The return bent hook-shaped terminal end **74** of the check arm **40** forms a stop for the roller **56** and effectively prevents further opening movement of the door should the door be opened with such force as to cause the roller to reach this point.

The portion of the check arm **40** between the zones A and B forms a gradually inclined ramp assisting opening movement of the door and tending to counterbalance the natural tendency of the door to swing closed due to the fact that the hinge axis **14** of the door is inclined with respect to the vertical in an inward and upward direction as is conventional in modern vehicle body construction. The portion of the check arm **40** between the zones B and C increases in width to provide some checking action prior to engagement of the roller **46** with the retaining portion **68** of the arm. The portion of the check arm between the zone A and its pivotal mounting **42** gradually decreases in width so as to assist the final closing movement of the door to partially compensate for the resistance of the weather strip.

It will be understood that the invention is not to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention, as defined in the appended claims.

What is claimed is:

1. In a motor vehicle body having a door structure and a door supporting structure, a check arm pivotally connected to one of said structures and extending into the other of said structures, a supporting bracket within said other structure and fixedly secured thereto, a roller pivotally mounted upon said supporting bracket and engaging one edge of said check arm, a second roller movably mounted upon said supporting bracket and engageable with the opposite edge of said check arm, spring means associated with one of said rollers to maintain said roller in yieldable engagement with the adjacent edge of said check arm, said check arm comprising a flat strap having an integral inclined retaining portion at one edge near the free end of the strap for engagement with one of said rollers to yieldably retain the door structure in open position, and an integral hook-shaped portion at the free end of said check arm beyond said retaining portion to limit the opening movement of said door structure, said hook-shaped end portion having an inclined checking ramp engageable by said last-mentioned roller to cushion the final opening movement of said door structure.

2. In a motor vehicle body having a door structure and a door supporting structure, a check arm pivotally connected to one of said structures and extending into the other of said structures, a supporting bracket within said other structure and fixedly secured thereto, a roller pivotally mounted upon said supporting bracket and engaging one edge of said check arm, a second roller movably mounted upon said supporting bracket and engageable with the opposite edge of said check arm, and spring means associated with one of said rollers to maintain said roller in yieldable engagement with the adjacent edge of said check arm, said check arm comprising a flat strap having one edge relatively straight for the major portion of its length, said last-mentioned edge having a recessed reetaining portion inclined toward the free end of said check arm for engagement with one of said rollers to releasably hold the door structure in open position, said check arm having an integral projecting portion at the free end of said check arm beyond said retaining portion provided with a checking ramp inclined toward the free end of said check arm and engageable with said last mentioned roller to cushion the final opening movement of said door structure, and said integral projecting portion of the check arm terminating in a return bent hook-shaped projection limiting the opening movement of the door structure.

3. The structure defined by claim 1 which is further characterized in that said check arm increases in width from adjacent its pivotal connection to an intermediate zone between said pivotal connection and said retaining portion and then gradually and progressively decreases in width to a minimum at a second intermediate zone between said first intermediate zone and said retaining portion, said check arm progressively increasing in width from said point of minimum width to the adjacent edge of said retaining portion, then progressively and rapidly decreasing in width to form said retaining portion and thereafter progressively and rapidly increasing in width to form said inclined checking ramp.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
346,194	Coultaus	July 27, 1886
2,032,600	Smith	Mar. 3, 1936
2,313,582	Rees	Mar. 9, 1943