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DOOR CHECKING AND HOLDING DEVICE

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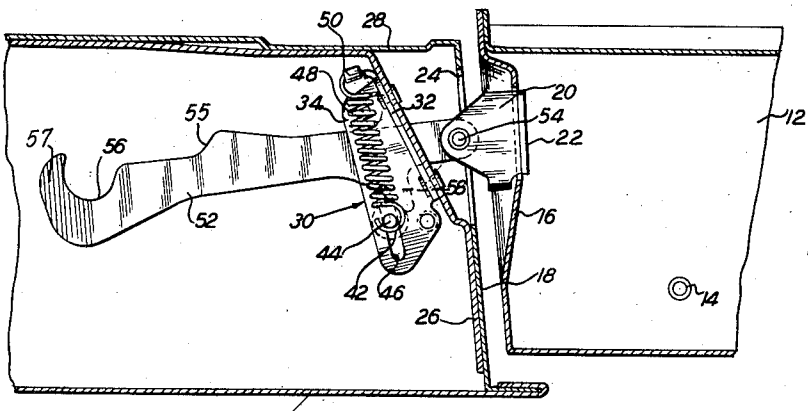


FIG. 1

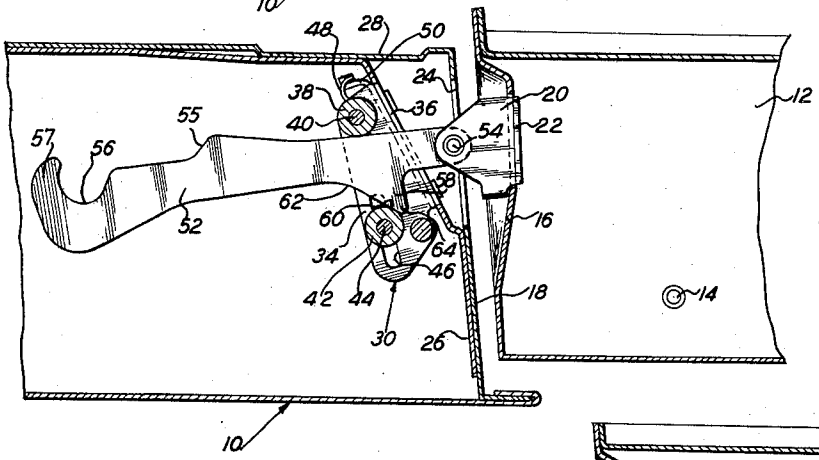


FIG. 2

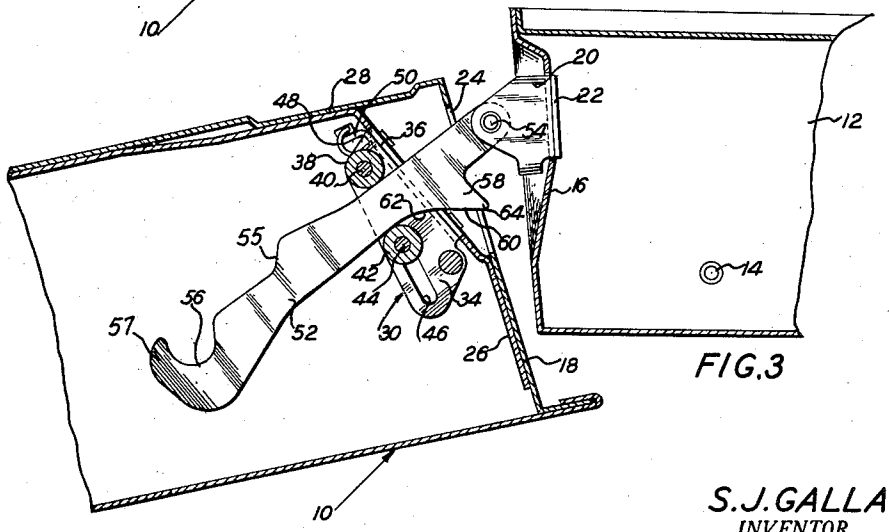


FIG. 3

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DOOR CHECKING AND HOLDING DEVICE

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This invention relates generally to door checking and holding devices for motor vehicle doors, and has particular reference to a device of this type providing an automatic assist to the initial opening movement of the door.

The door checking and holding device of the present invention utilizes a conventional retaining bracket mounted within the door adjacent the jamb face and supporting a fixed anti-friction roller and a moveable anti-friction roller spring urged toward the fixed roller. A check arm pivotally connected to the vehicle body extends between the two rollers and is provided with retaining means adjacent its end for checking the opening movement of the door and for retaining the door in its fully opened position. Adjacent the pivot end of the check arm the latter is provided with an integral inclined ramp portion engageable with one of the rollers and located so that in the closed position of the door the roller is located near the outer upper portion of the ramp. When the door latch is released to permit the door to be opened the spring urged roller cooperates with the inclined ramp to provide an initial and automatic assist to the opening movement of the door.

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

Figure 1 is a horizontal cross sectional view through a portion of the 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 partly broken away and in section.

Figure 3 is a view similar to Figure 2 but showing the door partially open.

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 provided with an opening through which extends a U-shaped bracket **20** having a base **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 Figures 1 and 2.

A reinforcing member **26** is located within the door **10** and is welded to the inner panel **28** of the door and also to the jamb face **18** thereof. Secured to the inner side of the reinforcing member **26** is a supporting bracket assembly indicated generally by the reference character **30**. The supporting bracket assembly **30** is formed of two generally L-shaped members having bases **32** bolted to the reinforcing member **26** and a pair of spaced parallel side flanges **34**. The reinforcing member **26** is formed with an elongated slot **36** between the side flanges **34** of the supporting bracket assembly.

An anti-friction roller **38** is rotatably mounted upon

a pivot pin **40** extending between the opposite side flanges **34** of the supporting bracket assembly. A second anti-friction roller **42** is provided, being mounted upon a pivot pin **44** moveable in slots **46** formed in the opposite side flanges **34** of the supporting bracket assembly **30**. The opposite ends of the pivot pin **44** extend a distance beyond the side flanges **34** and are engaged by coil springs **48** the opposite ends of which are hooked over upstanding flanges **50** formed at the ends of the bases **32** of the bracket. It will thus be seen that the springs **48** urge the moveable roller **42** toward the fixed roller **38**.

A flat one-piece check arm **52** is pivotally connected by means of a pin **54** to the bracket **20** carried by the door pillar **12**. The check arm extends through the opening **24** in the jamb face of the door and through the slot **36** in the reinforcing member **26** and between the side flanges **34** of the supporting bracket assembly **30**. Adjacent its free end check arm **52** is formed with a pair of spaced shoulders **55** and **56** engageable with the anti-friction roller **38** when the door is moved to its partial and fully open positions respectively to releasably hold the door in the position selected. A hook **57** is formed at the end of the check arm **52** to engage the roller **38** and limit the opening movement of the door.

Adjacent the end of the check arm **52** pivotally connected at **54** to the body bracket **20** is an integral flange **58**. The check arm **52** is flat and formed of sheet metal, and the flange **58** is an integral portion of the flat check arm projecting from one edge thereof. The flange **58** has an inclined ramp portion **60** facing toward the free end of the arm and connected to the body portion of the arm **52** by means of an arcuate portion **62**. At its opposite and outer end ramp **60** is formed with a rounded terminal end portion **64**.

In the closed position of the door as shown in Figures 1 and 2, the moveable roller **42** engages the ramp **60** near its outer terminal end **64**. The coil springs **48** are under considerable tension in this position, and when the conventional door lock (not shown) at the opposite edge of the door is released, the coil springs **48** urge the roller **42** down the inclined ramp **60** to provide an initial and automatic assist force tending to open the door. The door is thus automatically moved from the position shown in Figures 1 and 2 to the position shown in Figure 3 in which the roller **42** has moved outwardly along the check arm **52** to a portion of the latter having a uniform width, beyond the ramp **60** and its curved interconnecting portion **62**. Further movement of the door is accomplished manually.

From the foregoing it will be seen that an assist to the opening movement of the door is automatically provided during the initial range only, at which time an assist is most needed. The inclined ramp on the edge of the check arm is so positioned that in the fully closed position of the door the moveable roller engages a high point on the ramp so that the maximum assist is immediately available when the door is unlocked. The outer portion of the ramp **60** is approximately 45 degrees with respect to the longitudinal axis of the check arm, and the inclination of the ramp gradually decreases until it merges into the straight edge of the check arm body and the degree of assist is correspondingly decreased. As a result, the closing movement of the door is facilitated since the ramp is only engaged during the final closing movement at which time the door momentum is such as to enable the resistance to closing movement afforded by the ramp to be readily overcome.

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 having a door structure and a door supporting structure, a pair of spaced abutments mounted upon one of said structures, one of said abutments being movable bodily toward the other abutment, spring means biasing said one abutment toward the other abutment, an arm pivotally connected to the other of said structures and extending between said abutments with its opposite edges engaged by said abutments, said arm having an inclined ramp on one edge thereof, said inclined ramp having a high point with said high point being located between a plane passing through said abutments and the pivotal connection of said arm to said other structure when the door structure is at its fully closed position, said inclined ramp facing the free end of said arm and engaging one of said abutments adjacent said high point to provide an automatic assist to the initial opening movement of the door structure from its fully closed position.

2. In a motor vehicle body having a door structure and a door supporting structure, a bracket mounted upon one of said structures, a pair of spaced rollers mounted upon said bracket, one of said rollers being movable bodily toward the other roller, spring means biasing said one roller toward said other roller, a flat check arm pivotally connected to the other of said structures and extending between said rollers with its opposite edges engaged by said rollers, said arm having an integral inclined ramp on one edge thereof positioned near the pivoted end of said check arm, said inclined ramp having a high point with said high point being located between the plane containing the axes of said rollers and

the pivotal connection of said check arm to said other structure when the door structure is at its fully closed position, said inclined ramp facing the free end of said check arm and engaging one of said rollers adjacent said high point to provide an automatic assist to the initial opening movement of the door structure from its fully closed position, and retaining means on one edge of said check arm adjacent the free end thereof and engageable with one of said rollers to hold said door structure in an open position.

3. The structure defined by claim 2 which is further characterized in that the inclined ramp portion of said check arm comprises a generally triangular shaped integral prolongation at one edge of said check arm with the side of said triangular prolongation facing the free end of the check arm being inclined with respect to the longitudinal axis of the check arm at substantially a 45° angle and interconnected with the edge of the body portion of the check arm by means of an arcuate portion to provide an initial assist to the opening movement of the door from a fully closed position and to gradually and progressively diminish the assist so that a smooth transition is made from the initial assisted portion of the opening movement of the door to the subsequent normal intermediate movement of the door.

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