July 5, 1955 W. J. HARMS 2,712,149

DOOR CHECK

Filed Dec. 8, 1951 2 Sheets-Sheet 1

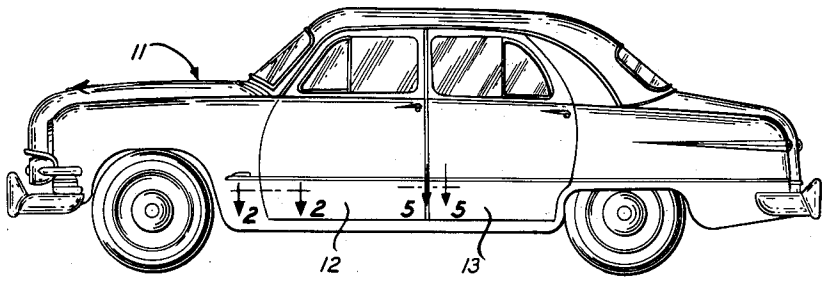


FIG. 1

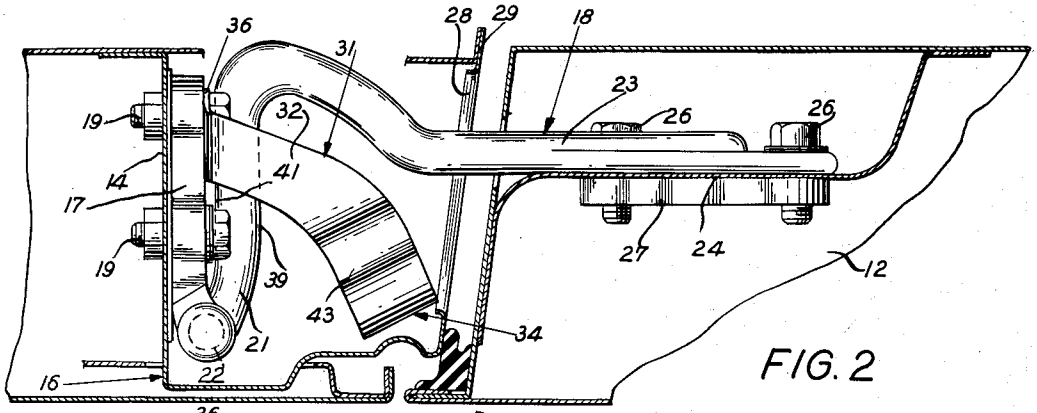


FIG. 2

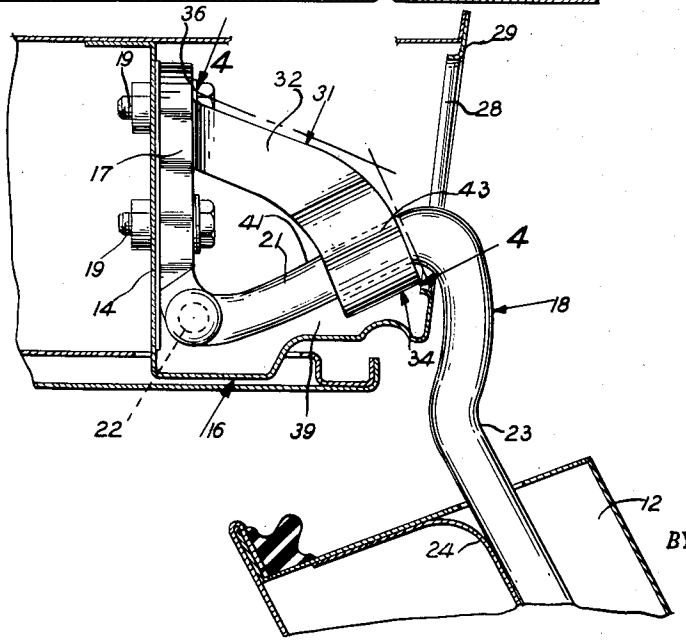


FIG. 3

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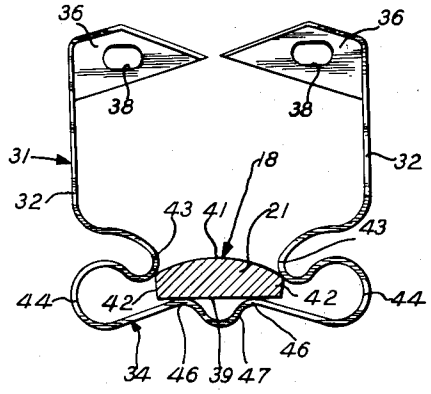


FIG. 4

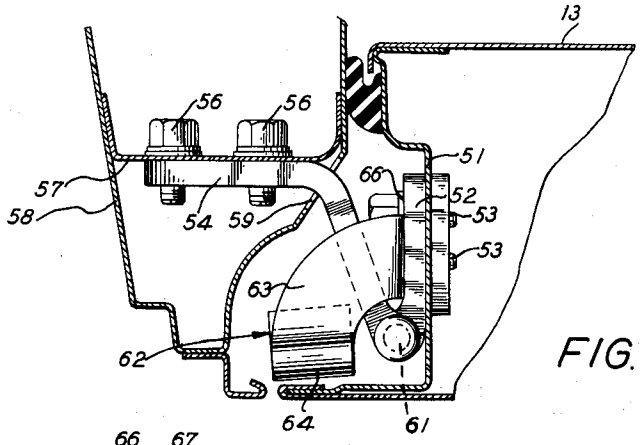


FIG. 5

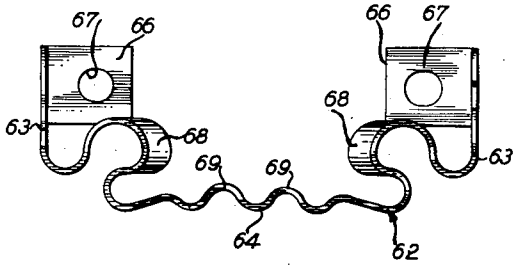


FIG. 6

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DOOR CHECK

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This invention relates generally to door checking and holding devices for motor vehicle doors, and has particular reference to devices of this type adapted to be associated with the hinge structure for the door.

An object of the present invention is to provide an economically manufactured and easily assembled door checking and holding device which may be formed of a single piece of sheet steel and which performs the required functions without the necessity of providing rollable means, rubber bumpers, and other such parts normally used in devices of this type.

A further object of the invention is to provide a door checking and holding device supported wholly upon the hinge structure for the door and requiring no separate attaching or mounting means. The door check of the present invention comprises a single spring steel member, generally U-shaped, and provided with end flanges adapted to be secured to one of the hinge leaves by the fastening means conventionally provided for the hinge leaf. The checking member embraces the other hinge leaf and is provided with inwardly projecting looped retaining portions adapted to engage opposite edges of the other hinge leaf when the door is moved to its fully opened position to releasably retain the door in such position. The base of the one piece checking member is formed with an inwardly dished ribbed portion adapted to be engaged by the other hinge leaf when the door is moved to its fully open position to form a yieldable portion cushioning and limiting movement of the hinge and the door. Another feature of the invention is the provision of means for adjustably mounting the checking member upon the hinge so that the holding action of the retaining portions can be varied to obtain the desired holding action for any particular installation.

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

Figure 1 is a side elevational view of a motor vehicle of the four door type.

Figure 2 is an enlarged horizontal cross-sectional view taken on the line 2—2 of Figure 1, showing the door check for the front door.

Figure 3 is a cross-sectional view similar to Figure 2 but showing the door in its open position.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 3.

Figure 5 is an enlarged horizontal cross-sectional view taken on the line 5—5 of Figure 1, showing the door check for the rear door.

Figure 6 is an elevational view of the door check shown in Figure 5.

Referring now to the drawings, Figure 1 illustrates a motor vehicle 11 having front and rear doors 12 and 13 respectively. Figures 2 to 4 inclusive illustrate the door check of the present invention as applied to the front door 12.

The front door 12 is pivotally mounted upon the forward wall 14 of a fixed pillar 16 by means of a conventional concealed hinge comprising hinge leaves 17 and 18. The hinge leaf 17 is stationary and is mounted upon the wall 14 by means of bolts 19. The other hinge leaf

18 is generally L-shaped and comprises a short leg 21 pivotally connected to the fixed hinge leaf 17 by means of a hinge pin 22, and a long leg 23 secured to the inner reinforcement 24 of the door 12 by means of bolts 26 and a tapped plate 27. The long legs 23 of the hinge leaf 18 extend outwardly from the pillar 16 through an opening 28 formed in the rearward wall 29 of the latter, the opening 28 being large enough to permit the necessary swinging movement of the hinge leaf as the door is opened. The structure thus far described is conventional.

With particular reference now to Figure 4, the door checking member 31 is formed of flat spring steel stock and has integral sides 32, base 34, and mounting flanges 36. The opposite sides 32 are parallel to each other and their free ends are bent inwardly to form the mounting flanges 36, the latter being co-planar. The flanges 36 are provided with elongated slots 38 for receiving the bolts 19 securing the stationary hinge leaf 17 to the pillar. The door checking member 31 is thus mounted upon the rearward face of the fixed leaf 17 without the necessity of providing separate mounting or fastening means therefor. The elongated slots permit adjustment of the mounting flanges 36 either toward or away from each other, for a purpose to be brought out more fully hereinafter. It will be noted from Figures 2 and 3 that the sides 32 of the door checking member extend at an angle to the stationary hinge leaf 17, the mounting flanges 36 being properly bent with respect to the sides to provide for this inclination.

The short leg 21 of the movable hinge leaf 18 is embraced by the checking member 31, and moves from a position adjacent the mounting flanges 36 of the checking member, Figure 2, to a position adjacent the base of the checking member, Figure 3, as the door is moved from its closed to its open position. The cross-sectional configuration of the short leg 21 of the movable hinge leaf 18 is shown in Figure 4, and it will be noted that the forward face 39 of the leaf is flat while the opposite face 41 is convex. In addition, it will be seen that the opposite edges 42 are inclined with respect to each other, converging toward tthe base 34 of the checking member.

As best seen in Figure 4, the sides 32 of the checking member are formed with inwardly extending looped portions 43. The looped portions 43 are generally U-shaped, opening outwardly away from each other, and are located relatively near the base 34 of the checking member. The inner arcuate ends of the looped portions 43 are spaced from each other a distance slightly less than the distance between the opposite edges 42 of the short leg 21 of the movable hinge leaf 18. It will be apparent that as the door is opened and the short leg 21 of the hinge leaf 18 is moved from a position adjacent the mounting flanges 36 toward the base 34 of checking member, the hinge leaf leg will engage the opposed looped portions 43 and spread them apart sufficiently to permit the passage of the hinge leaf leg. This is facilitated by reason of the converging edges 42 of the hinge leaf and the arcuate ends of the looped portions 43 of the checking member. The resilience of the sides 32 of the checking member enables the looped portions 43 to be spread apart by the hinge leaf, after which the looped retaining portions return to retain the hinge leaf between the looped portions and the base 34 of the checking member.

The base 34 of the checking member is integrally connected to the sides 32 by arcuate connecting portions 44 and is inwardly dished to form ribs 46 separated from each other by an outwardly extending bead 47. The ribs 46 are adapted to engage the flat face 39 of the hinge leaf.

In the fully open position of the door, the hinge leaf

occupies the position shown in Figure 4 in which it is yieldably clamped between the ribs 46 of the base 34 and the inwardly looped portions 43 of the sides 32 of the checking member. The door is thus retained in an open position until sufficient inward pressure is exerted upon the door to cause the hinge leaf to spread the looped portions 43 of the checking member apart to permit the hinge leaf to swing inwardly. In this connection it should be noted that the looped portions 43 are inclined toward the base 34 of the checking member to facilitate the passage therethrough of the hinge leaf in its door opening movement and to provide an added resistance to its closing movement in the opposite direction. The distance between the looped retaining portions 43 of the checking member can be varied by adjusting the mounting flanges 36 toward or away from each other on the stationary hinge leaf 17, this adjustment being permitted by the slots 38 in the flanges through which the clamping bolts 19 extend. This adjustment can be made during initial assembly and normally further adjustment is unnecessary since there is very little wear of the parts during use. If necessary, however, further adjustment can be readily made at any time.

The base 34 of the checking member, in addition to cooperating with the looped retaining portions 43 to retain the door in a predetermined open position, forms a yieldable portion cushioning and limiting the opening movement of the hinge leaf and the door carried thereby. Outward flexing movement of the dished portion of the base 34 occurs when the door is opened with considerable force, the resilience of the base thereafter returning the hinge leaf to its normal retained position shown in Figure 4. Contact between the hinge leaf and the base of the checking member being made only at the ribs 46, wear and noise are minimized.

With reference now to Figures 2 and 3, it will be noted that the sides 32 of the checking member are inclined from the stationary hinge leaf 17 in a direction outwardly of the vehicle body, and that this inclination is increased in the zone of the looped retaining portions 43 and base 34 of the checking member so that the retaining portion and base are substantially parallel to the hinge leaf as it approaches its fully open position shown in Figure 3.

It will be apparent that the checking member 31 is unusually economical to manufacture, comprising but a single member, and that it can be readily assembled to the vehicle body with a minimum of labor and without the necessity of providing separate mounting or fastening means. The checking member is fully enclosed within the pillar 16 and is thus concealed from view. It is adapted to be used with hinge leaves of conventional type so that extensive changes therein are not necessary.

Reference is now made to the modified form of the invention shown in Figures 5 and 6, in which the door check is shown in connection with the rear door 13 of the vehicle 11. In this instance the door checking member is carried by the door rather than by the door pillar. The forward face 51 of the door 13 supports a stationary hinge leaf 52 secured thereto by means of bolts 53. A fixed hinge leaf 54 of generally L-shape is secured by means of bolts 56 to the inner reinforcing member 57 of the door pillar 58. The hinge leaf 54 extends outwardly of the door pillar 58 through an opening 59 formed therein, and is pivotally connected to the hinge leaf 52 by means of a hinge pin 61.

The checking member 62 for the rear door has sides 63, a base 64, and mounting flanges 66 extending inwardly from the sides 63 and provided with slotted openings 67 to permit the checking member to be adjustably mounted upon the hinge leaf 52 by means of the bolts 53 securing the latter to the door. The sides 63 are formed with inwardly extending looped retaining portions 68 adapted to be spread apart by the hinge leaf 54 as the door is opened and to spring back to retain the door in its open position. The base 64 is inwardly dished and is provided with spaced ribs 69 engageable with the flat outer face of the hinge leaf 54 to cushion and limit the outward swinging movement of the door. As best seen in Figure 5, the sides 63 of the checking member are generally arcuate in shape to enable the looped retaining portion 68 and the base 64 to be positioned generally parallel to the hinge leaf 54 when the door approaches its fully open position.

It will be undersood 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. A generally rectangular one piece steel checking member for holding a vehicle door in open position and yieldably checking its opening movement, comprising an inwardly dished base portion formed with a pair of spaced inwardly projecting rib portions, generally parallel leg portions extending integrally from opposite ends of said base portion, looped retaining portions extending inwardly from intermediate portions of said parallel leg portions and projecting toward each other and each inclined toward said base portion, and separate co-planar end flanges extending toward each other from the inner ends of said leg portions, said flanges having transversely elongated slots therein to provide an adjustable mounting for said checking member.

2. A generally rectangular one piece steel checking member for holding a vehicle door in open position and yieldably checking its opening movement, comprising an inwardly dished yieldable base portion, generally parallel leg portions extending from opposite sides of said base portion, looped retaining portions extending inwardly from intermediate portions of said leg portions and projecting toward each other and each inclined toward said base portion, and separate co-planar end flanges extending toward each other from the ends of said leg portions, said flanges providing mountings for said checking member.

3. A one piece steel checking member for association with a vehicle door hinge member of rectangular cross section to hold the door in open position and to yieldably check its opening movement, comprising a generally U-shaped spring steel member having a flexible base portion bent inwardly of said U-shaped member and a pair of parallel integral legs extending from opposite sides of said base portion on opposite sides of said hinge member, said legs having inwardly projecting looped retaining portions spaced from each other a distance slightly less than the width of said hinge member, and a mounting flange extending integrally from the end of each leg portion remote from said base portion for attachment to said door.

4. The structure defined by claim 3 which is further characterized in that the looped retaining portions formed on the legs of said checking member are inclined toward the base of said member, and said base has a pair of laterally spaced ribs projecting inwardly toward the looped retaining portions of said legs, said ribs and said inclined looped retaining portions cooperating to engage said rectangular hinge member in the fully open position of the door.

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