July 20, 1965 A. McNAY ETAL 3,195,173

DOOR HINGE, CHECK AND HOLD-OPEN ASSEMBLY

Filed Dec. 21, 1962 2 Sheets-Sheet 1

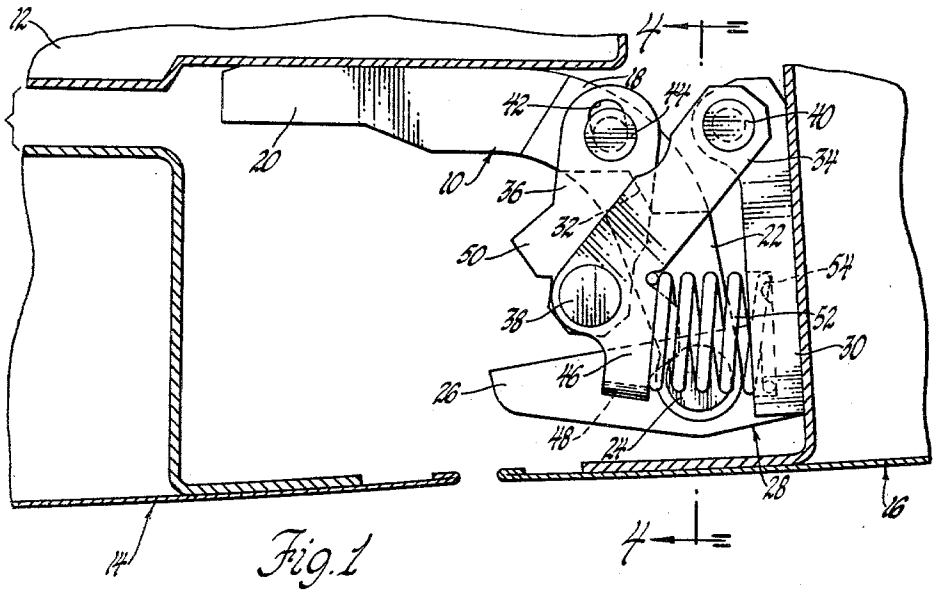


Fig. 1

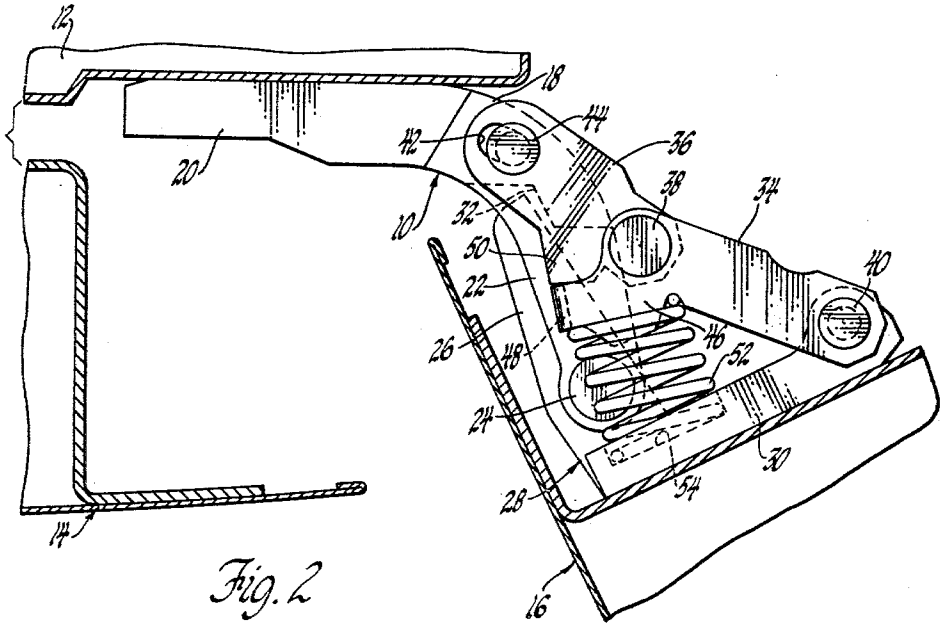


Fig. 2

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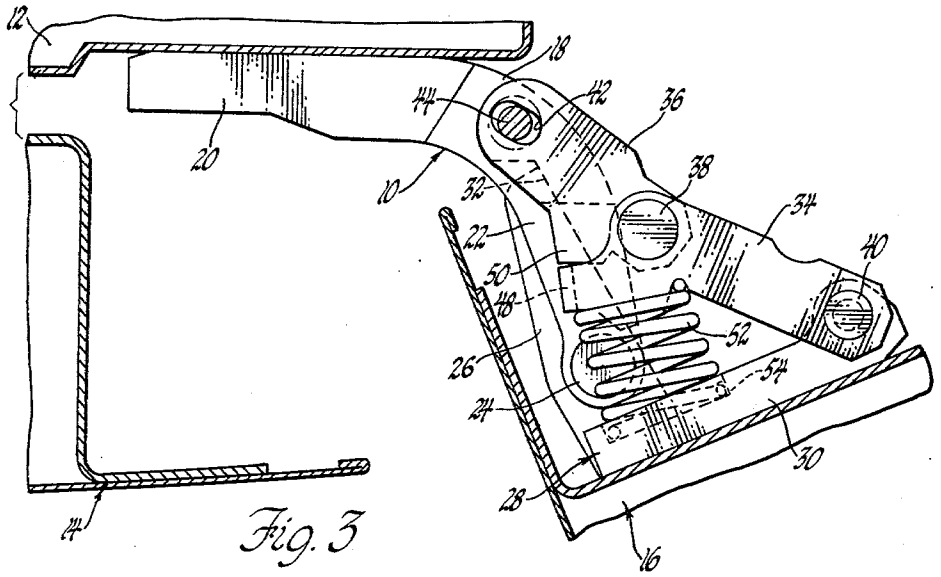


Fig. 3

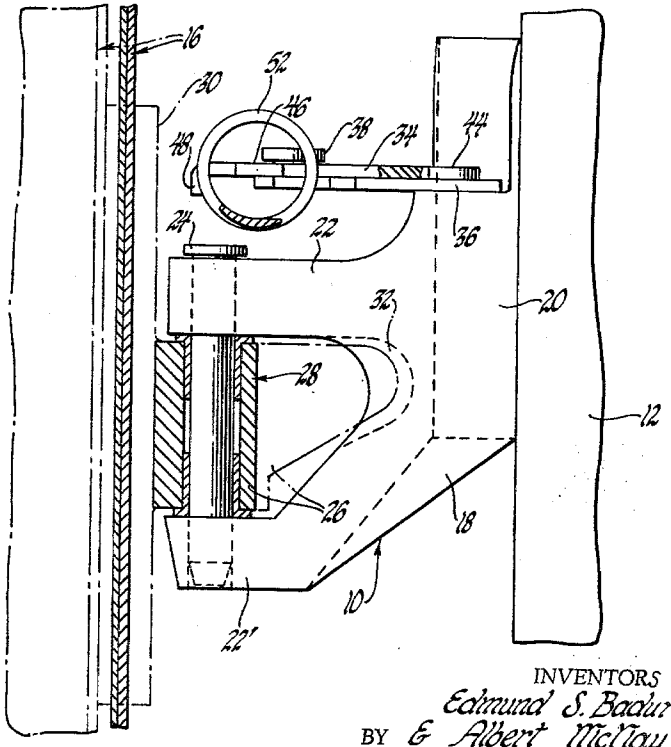


Fig. 4

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DOOR HINGE, CHECK AND HOLD-OPEN ASSEMBLY

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This invention relates to automotive vehicle door hinges and particularly contemplates provision of a relatively simple, inexpensive spring biased hold-open linkage means capable of assisting door opening and closing movement and of cushioning and isolating door checking loads from the pivotal connections of such linkage.

In a preferred illustrative embodiment, a compression spring biased hold-open linkage is operably interposed between two pivotally hinged members having integral door checking means engageable to define a fully opened door position. A limited lost motion pivotal connection provided between the hold-open linkage and one of the hinge members permits spring opposed movement of the hinged members to such check limited fully opened position which is located slightly beyond a partially opened position maintainable by the hold-open linkage. A relatively simple hinge, check and hold-open assembly is thus provided capable of installation as a unit thereby reducing installation problems and costs. Such unit installation also provides improved door opening and holding operation between the several elements. The cushioning of door opening movement to its fully opened checked position and the lost motion isolation of door checking loads from the pivotal connections of the spring biased hold-open linkage further permit the use of inexpensive lightweight hinge members suitably cast or otherwise formed of aluminum and/or magnesium alloys.

The foregoing and other objects, advantages and features of the invention will be apparent from the following description of the illustrative embodiment having reference to the accompanying drawings, in which:

FIGURE 1 is a fragmentary sectional view through portions of an automotive vehicle door and body pillar and shows the hinge, check and hold-open assembly of the invention in plan elevation with the door in its closed position;

FIGURE 2 is a view similar to FIGURE 1 showing the door in an intermediate hold-open maintained position;

FIGURE 3 is a view similar to FIGURES 1 and 2 showing the door in its fully opened checked position; and

FIGURE 4 is a transverse sectional view taken substantially in the plane of the line and in the direction of the arrows indicated at 4—4 in FIGURE 1.

Referring more particularly to the drawings, the combined hinge, check and hold-open assembly is indicated generally by the reference numeral 10. A hinge mounting chamber is defined between a vehicle body pillar 12 forming an intermediate door jamb member and opposing jamb facing edges of front and rear door members 14 and 16. The hinge assembly 10 hinges the rear door 16 and comprises a female hinge strap member 18 having a mounting flange or end portion 20 suitably secured to the pillar 12. The opposite end of the hinge member 18 forms spaced clevis arms 22 and 22' curved outwardly from the strap mounting portion 20. A hinge pin 24 is carried by the clevis arms. This pin extends through and pivotally journals an arm portion 26 of a male hinge strap member 28 immediately adjacent a hinge mounting portion 30. The mounting portion 30 is angled from the arm 26 and suitably secured to the jamb facing edge

of the rear door 16. As best seen in FIGURES 3 and 4, the remote end of the angled hinge arm 26 is engageable with a shoulder 32 formed intermediate the spaced clevis arms of the hinge strap 18 to define means for checking or limiting movement of the rear door to its fully opened position.

A hold-open linkage operably interposed between the hinge members 18 and 28 is adapted to hold the door 16 in an intermediate or partially opened position and permits limited further movement of the door to its check limited fully opened position. This hold-open linkage includes two links 34 and 36 pivotally interconnected at 38. The end of the link 34 distal from the link 36 is pivotally connected to the male hinge member 28 by a pin 40 which is suitably staked to the hinge mounting portion 30 at a point distal from the hinge pivot 24. The distal end of the link 36 has a slot 42 providing a limited lost motion pivotal connection with respect to a pivot pin 44 suitably staked to the female hinge member 18 at a point spaced slightly from its mounting end portion 20. The end of the link 34 pivotally connected to the link 36 is provided with an oblique spring seating extension or arm 46. This arm has a depending flange 48 engageable with a limit boss 50 formed on the link 36. Such flange and boss engagement occurs when the links are in an extended position corresponding to the partially opened hold-open maintainable door position of the hinge members.

A helical spring 52 is compressively interposed between the spring seating arm 46 of the link 34 and a shallow spring seating recess 54 formed in the mounting base portion 30 of the male hinge member and normally biases the linkage against lost motion collapse thereby tending to maintain engagement between the pivot pin 44 and the inner end of the slot 42. When the door is either in or approaches its closed position shown in FIGURE 1, this biasing action of the spring 52 provides clockwise moments with respect to the linkage pivot pins 40 and 44 and tends ot maintain or assist rotation of the door to its closed position. During movement of the door to its hold-open maintainable position shown in FIGURE 2, the biasing action of the spring 52 passes over the center of the lost motion pivot pin 42 and thereafter acts to bias the hold-open linkage to its extended position effecting engagement between the limit flange 48 and boss 50 on the links 34 and 36. Such biasing action serves to assist movement of the door to its partially opened hold-open maintainable position.

As indicated above, the lost motion pivotal connection 42, 44 of the hold-open linkage accommodates door opening movement of the hinge members between their hold-open maintainable position and their fully opened position. This fully opened position is defined by engagement between the door checking shoulder 32 and the hinge arm 26 as shown in full lines in FIGURE 3 and in phantom lines in FIGURE 4. During such hinge movement, the hold-open link is swung as an extended unit about the pivot pin 40 against the opposing action of the spring 52 thereby resiliently cushioning movement of the door to its check limited, fully opened position. The provided lost motion further serves to isolate door checking loads from the links and pivotal connections of the hold-open linkage. This permits the links 34 and 36 to be of relatively simple and substantially lighter construction than would otherwise be the case if the check loads were applied directly to the hold-open linkage. Such check load isolation similarly permits the use of lighter pivot pins 40 and 44 and further permits the hinge members 18 and 28 to be inexpensively manufactured of precision permanent mold castings of suitable lightweight alloys of aluminum and magnesium.

From the foregoing description of the preferred illustrative embodiment, it will be seen that the invention provides a relatively simple, inexpensive hinge assembly capable of providing the several stated objectives and advantages. It will be further apparent that various modifications and changes might be made therein without departing from the spirit and scope of the invention as defined in the following claims.

We claim:

1. In a vehicle having a body member and a closure member hinged thereon for movement between a closed position and an extended check limited fully opened position, hold-open means comprising a pair of pivotally interconnected links, means pivotally connecting one of said links to one of the members, means pivotally connecting the other link to the other of said members for limited lost motion therebetween, abutment means on said links engageable with each other in a normal fully opened position of the closure member, and means for holding said abutment means in engagement in said normal opened position of the closure member, said lost motion means cooperating with said abutment holding means to oppose movement of the closure member between its normal opened position and its extended opened position and isolating the pivotal connections of said hold-open links from the closure checking loads acting between said hinged members when the closure member reaches its extended check limited position.

2. In a vehicle having a body member and a closure member mounted thereon for movement between extended opened and closed positions, hold-open means comprising a pair of pivotally interconnected links, means pivotally mounting one of said links on one of said members, lost motion means pivotally mounting the other of said links on the other of said members, cooperating abutment means on said links engageable with each other in a normal opened position of the closure member, said lost motion means permitting said links to move as a unit relative to said other member as said closure member moves from said normal opened position to its extended opened position, and resilient means mounted on one of said members and biasing the abutment means on said links into engagement with each other in the normal opened position of said closure member, said resilient means resisting movement of said links as a unit relative to said other member to cushion movement of said closure member from its normal opened position to its extended open position.

3. In a vehicle having a body member and a closure member hinged for movement between a closed position and a fully extended opened position, hold-open means comprising a pair of pivotally interconnected links, means pivotally connecting one of said links to one of the members, means pivotally connecting the other link to the other of said members for limited lost motion therebetween, said links being foldable in the closed position of the closure member and each having abutment means thereon engageable in an extended position of said links corresponding to a normal opened position of the closure member, and resilient means interposed between one of said links and one of said members and acting to effect and maintain engagement of said abutment means upon movement of the closure member to said normal opened position, said lost motion means cooperating with said resilient means to permit movement of the abutment engaged links as a unit in their extended position in opposition to movement of the closure member between its normal opened position and its fully extended opened position and isolating the pivotal connections of said hold-open links from the closure checking loads normally acting between the hinged members when the closure member reaches its fully extended opened, check limited position.

4. In a vehicle having a body member and a closure member hinged for movement between a closed position and an extended fully opened position, hold-open means comprising a pair of pivotally interconnected links, means pivotally connecting one of said links to one of the members, means pivotally connecting the other link to the other of said members for limited lost motion therebetween, said links being foldable in the closed position of the closure member and each having abutment means thereon engageable in an extended position of said links corersponding to a normal opened position of the closure member, said lost motion means permitting movement of the abutment engaged links as a unit in their extended position to isolate the pivotal connections of the hold-open links from the closure checking loads normally occurring when the closure member reaches its extended fully opened position, resilient means compressively interposed between said one link and member, the biasing action of said resilient means alternately acting through said links to maintain the closure member in its closed position and passing overcenter of said lost motion pivotal connecting means to effect and maintain engagement of said abutment means upon movement of the closure member to said paritally opened position, and said resilient means cooperating with said lost motion means and the abutment engaged extended links to cushion opening movement of the closure member between its partially opened and fully opened positions.

5. A combined hinge, hold-open and door check assembly comprising a pair of hinge members pivotally interconnected for movement between opened and closed positions, cooperating check means on said hinge members engageable to define an extended opened position therebetween, a pair of pivotally interconnected hold-open links, means pivotally connecting one of said links to one of the members, lost motion means pivotally connecting the other of said links to the other of said members, cooperating abutment means on said links engageable with each other when said members are in a normal opened position, spring means compressively interposed between said one member and the pivotally interconnected ends of said links, the biasing action of said spring means passing over the pivotal axis of said lost motion means and acting through said links to bias and maintain said members alternately to their closed and normal opened positions, and said spring and lost motion means cooperating to isolate the pivotal connections of said hold-open links and their cooperating abutment means from the door checking loads effected upon movement of said members to their extended check limited position.

6. In a combined hinge, hold-open and door-check assembly as defined in claim 5, said lost motion means permitting said links to move as a unit relative to the other member during movement of said members between said normal and extended opened positions and said spring means resisting such movement of the links as a unit and cushioning movement of said members toward their fully opened positions.

7. A combined hinge and hold-open assembly comprising a pair of hinge members pivotally interconnected for movement between a closed position and an opened position, a pair of pivotally interconected hold-open links, means pivotally connecting one of said links to one of the members, lost motion means pivotally connecting the other of said links to the other of said members, said links having a folded position corresponding to the closed position of said hinge members and an extended position corresponding to a normal opened position of said members, cooperating abutment means engageable to limit movement of said links to said extended position when said members reach their normal opened position, spring means acting between one of the links and one of the members to bias said links to effect engagement of said abutment means when said members reach their normal opened position, the biasing action of said spring means passing over the pivotal axis of said lost motion means during movement between said normal opened and closed

positions and acting through said links to bias said members alternately toward their normal opened and closed positions, and said lost motion means isolating the pivotal connections of said hold-open links and their cooperating abutment means from the high checking loads normally occurring between said hinge members upon movement to an extended fully opened check limited position and permitting said links to move as a unit relative to said other member during movement of said members between their normal and extended fully opened positions, and said spring means resisting such movement of the links

as a unit and cushioning movement of said members toward their fully opened position.

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