Aug. 26, 1958 S. F. LORIA 2,848,736

HINGE AND HOLD-OPEN

Filed May 31, 1956 3 Sheets-Sheet 1

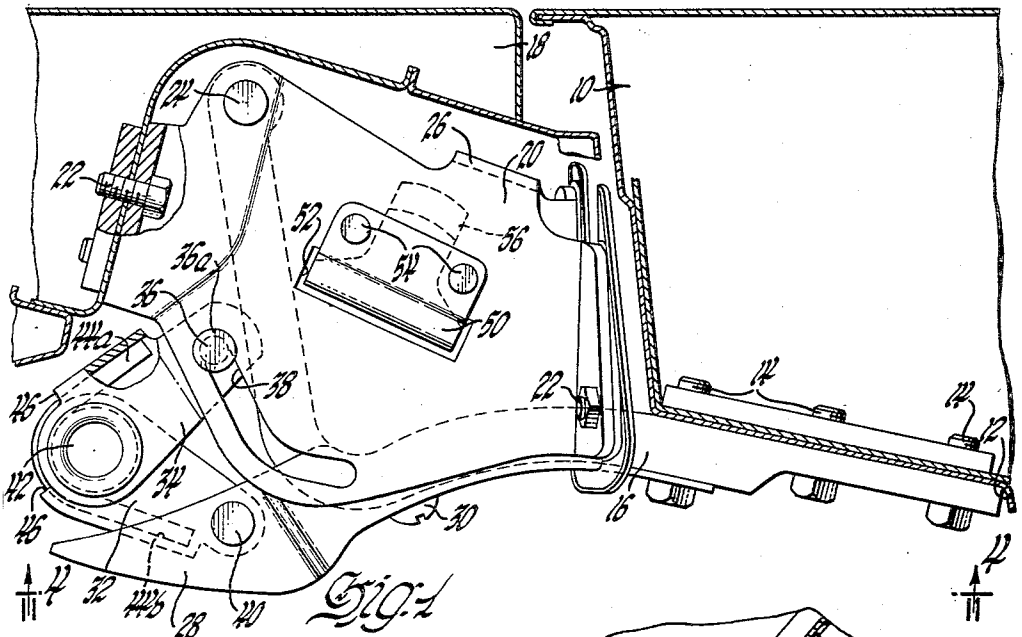


Fig. 1

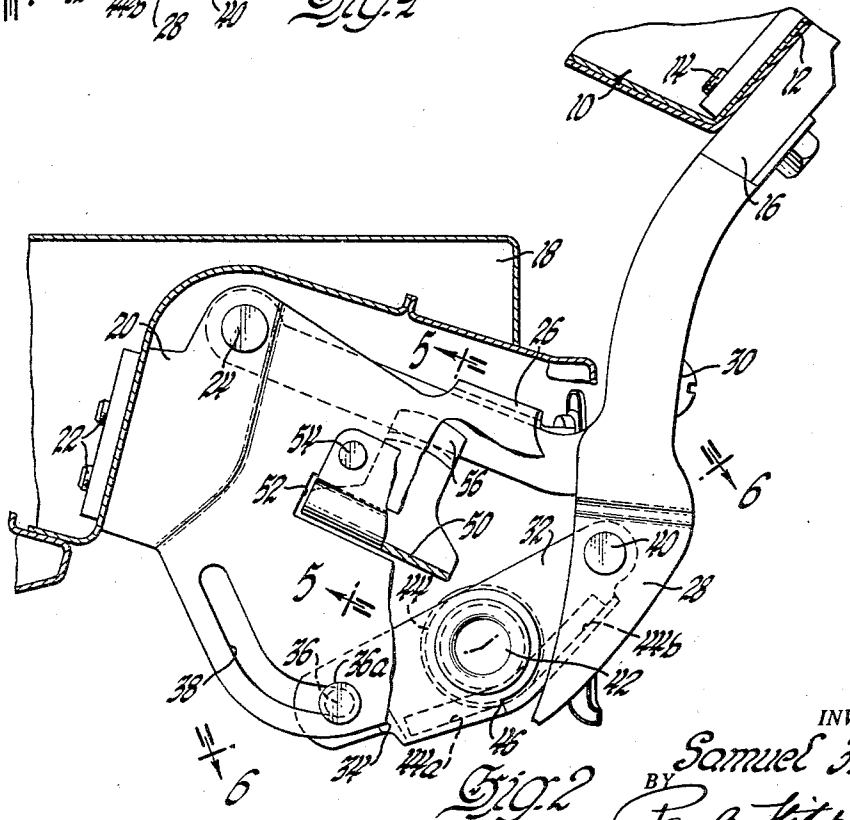


Fig. 2

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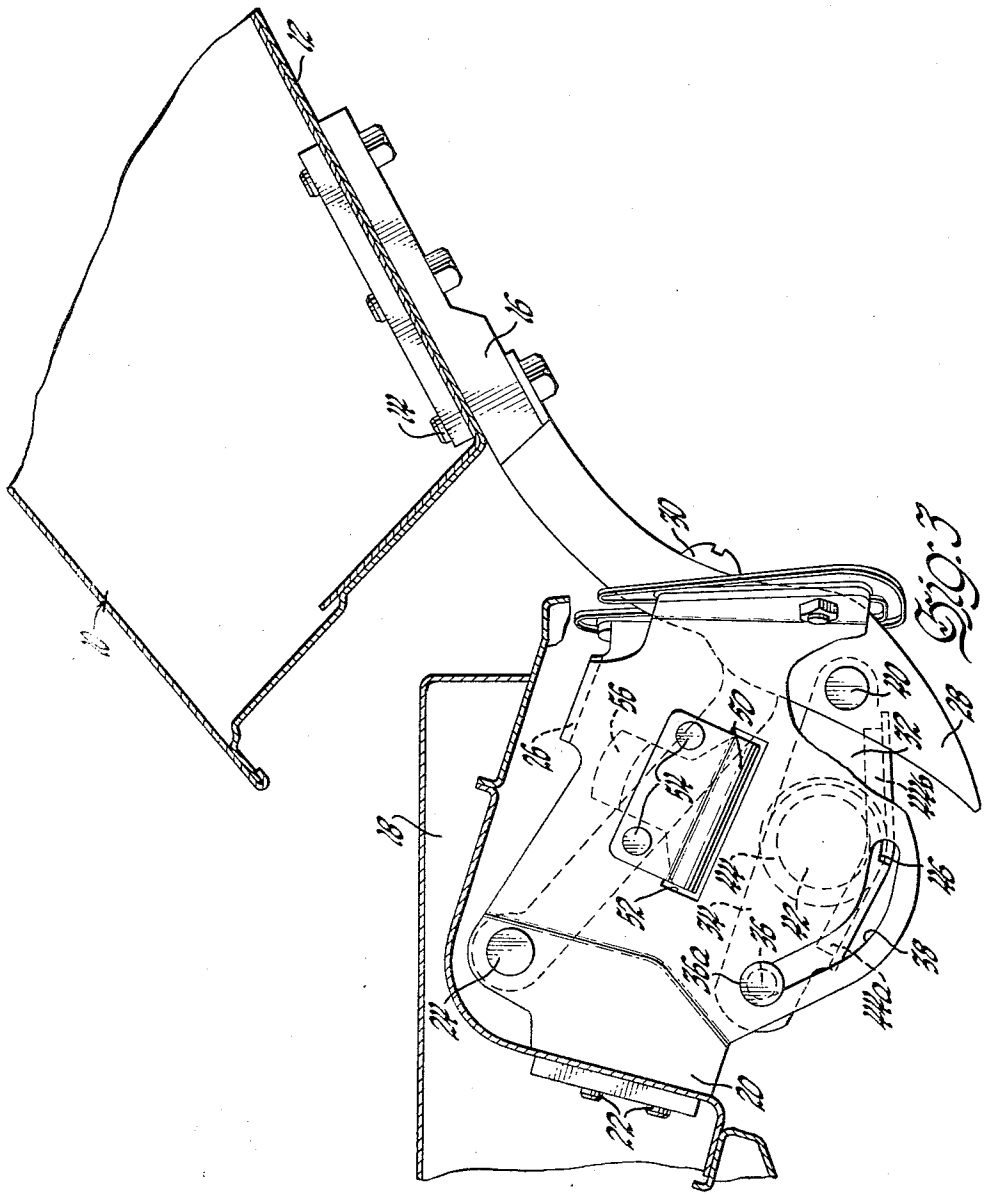


Fig. 3

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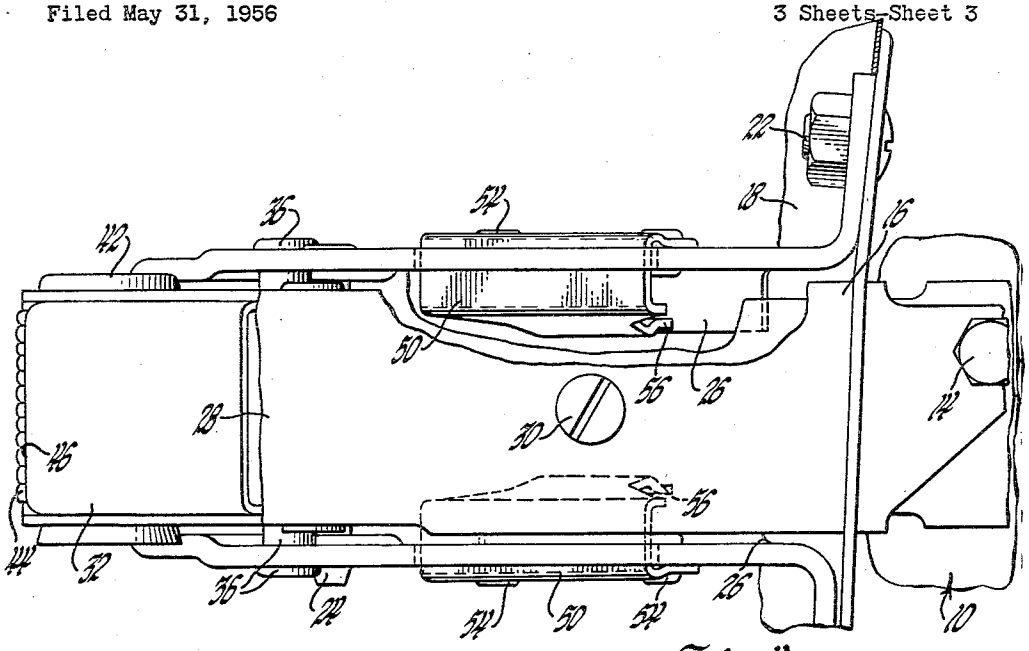


Fig. 4

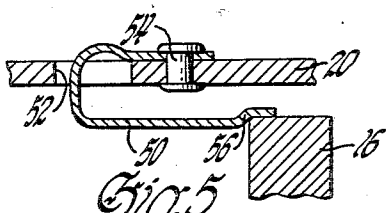


Fig. 5

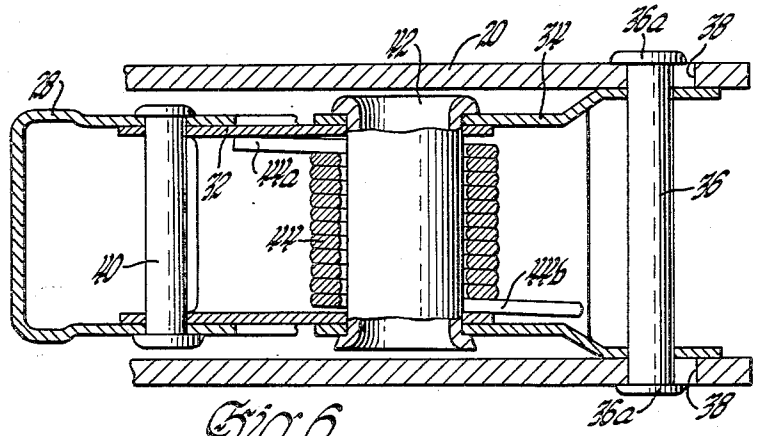


Fig. 6

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2,848,736

HINGE AND HOLD-OPEN

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Application May 31, 1956, Serial No. 588,511

8 Claims. (Cl. 16—142)

This invention relates to a hinge and hold-open, and more particularly to a two-position hinge and hold-open for automobile doors.

One feature of the invention is that it provides an improved hinge and hold-open assembly; another feature of the invention is that it provides a novel two-position unitary hinge and hold-open; a further feature of the invention is that it provides a hinge and hold-open including a toggle linkage for yieldably holding the door in an intermediate open position and a spring detent over which the hinge strap rides when the door swings from intermediate open position to fully open position; an additional feature is that the toggle linkage is mounted on the hinge box on a movable pivot and the toggle linkage moves from closed to extended position when the door is swung from closed to intermediate open position, the pin sliding in the slot when the hinge strap rides over the detent as the door is swung from intermediate open position to fully open position.

Other features and advantages of the invention will be apparent from the following description and from the drawings, in which:

Fig. 1 is a section through a portion of an automobile door and body pillar showing the novel hinge and hold-open with the door closed;

Fig. 2 is a view similar to Fig. 1 showing the door in fully open position;

Fig. 3 is a view similar to Fig. 1 showing the door in intermediate open position;

Fig. 4 is a view taken along the plane 4—4 of Fig. 1, parts being broken away to show underlying structure;

Fig. 5 is an enlarged detail section taken along the line 5—5 of Fig. 2 and showing the spring detent;

Fig. 6 is an enlarged section through the toggle linkage taken along the line 6—6 of Fig. 2.

Automobile doors conventionally are provided with yieldable hold-open devices which may or may not be unitary with the hinge. Since the doors are mounted on inclined hinge axes so that the outer edge of the door rises as the door is opened, it is important to provide a hold-open device at the open position to prevent the door from closing by gravity when a passenger is entering or leaving the car. This invention provides a novel two-position hold-open which is unitary with the hinge. A first hold-open includes a toggle linkage in which the links are extended to provide a yieldable hold-open at an intermediate door open position. A second hold-open includes spring detents on the hinge box, the hinge strap riding over these detents as the door swings from intermediate open position to fully open position. The toggle linkage is mounted on a movable pivot comprising a pin and slot connection on the hinge box and as the door swings to fully open position, the toggle linkage moves along the slot.

Referring now more particularly to the drawings, an automobile front door **10** has a reinforced inner panel **12** to which is secured by bolts **14** a gooseneck type hinge

strap **16** which extends past the jamb edge of the door into a body hinge pillar **18**.

A U-shaped hinge box **20**, which may be regarded as the fixed hinge strap, is secured to the body pillar by bolts **22**. The inner end of the gooseneck hinge strap **16** is pivotally mounted between the walls of the hinge box on a pin **24** so that the door **10** may swing between the closed position of Fig. 1 and the fully open position of Fig. 2. Stop means for limiting swinging movement of the door and defining the fully open position thereof comprise lugs **26** bent from the respective opposite walls of the hinge box and adapted to be engaged by the strap **16** at or just beyond the position shown in Fig. 2.

An extension **28** projects from the stem portion of the gooseneck hinge strap, being secured thereon by a screw **30**. This extension substantially covers the opening in the body pillar through which the hinge strap extends when the door is open as shown in Fig. 2, and the extension provides one abutment for a first hold-open device comprising a spring urged toggle linkage counterbalance, the other abutment of which is the hinge box **20**. This toggle linkage includes two links **32** and **34** of sheet metal channel form, the base of the channels constituting the outer faces of the links as shown in Figs. 1, 2 and 6. Link **34** carries a pin **36** which extends through a curved slot **38** in each wall of the hinge box **20**, opposite ends of the pin being headed at **36***a* to hold the pin in the slot. Link **32** is pivoted on the extension **28** by means of a pin **40**. The links **32**, **34** are pivoted on each other by a tubular pin **42**, the ends of which are flared for retention. A coil spring **44** on the pin **42** has opposite ends **44***a* and **44***b* which project outwardly from pin **42** and respectively engage the links **32** and **34** for biasing the toggle to the extended position shown in Figs. 2 and 3. The limit of extension of the toggle linkage is defined by abutments **46** at the adjacent ends of the base portion of the links **32**, **34**. As shown in Fig. 1, the pin **36** is slightly to the left of the plane containing the axes of pins **24** and **40** when the door is closed so that spring **44** exerts a slight closing force on the door for the first degrees of opening movement of the door. As the door opens further, an opening force is exerted which increases as the force advantage of spring **44** increases. This force may be such, by proper choice of pivot pin locations and spring strength based upon the weight and hinge axis orientation of the particular door, as approximately to balance the door during a portion of the opening movement and then to considerably overbalance the door when the toggle links are extended as shown in Figs. 2 and 6.

As the door is swung from the closed position of Fig. 1 toward the intermediate open position of Fig. 3, pin **40** swings through an arc extending downwardly and to the right in Figs. 1 and 3 to extend the toggle links. When the links reach the extended position of Fig. 3, they exert a yieldable hold-open force in the conventional manner of such linkage. A similar toggle linkage arrangement is shown and described in the application of William F. Kapanka and Barthold F. Meyer, entitled "Door Hinge, Check, and Hold-Open" filed November 30, 1953, as Serial No. 394,936, now Patent No. 2,775,783 dated January 1, 1957 and assigned to the assignee of this application.

As shown in Fig. 3, the toggle links reach their extended position when the door is only in an intermediate open position and a second hold-open device is provided to hold the door in the fully open position of Fig. 2. This second hold-open device comprises a pair of spring detents **50**, one being mounted on each opposite wall of the hinge box as shown best in Figs. 4 and 5. Each detent is U-shaped in transverse section, the base of the

U extending through an opening 52 in the hinge box wall and one arm of the U being secured by rivets 54 to the outside of the hinge box wall. The other arm of the U which lies inside the hinge box wall terminates in a depressed portion 56 (see Fig. 5) forming a yieldable hold-open detent for the hinge strap 16.

As the door is swung from the intermediate open position of Fig. 3 to the fully open position of Fig. 2, the hinge strap 16 rides over the spring detents 50, seating in the recesses 56 just prior to engagement of the hinge strap with the stop lugs 26 which define the fully open position of the door. During this movement from intermediate open position to fully open position, the pin 36 which supports one end of the toggle linkage on the hinge box rides down the curved slot 38 from the position of Figs. 1 and 3 to the position of Fig. 2. This results in a two-stage hold-open. The door may be swung to the intermediate position of Fig. 2 to provide a relatively small access opening into the automobile, or, if desired, the door may be swung to the fully open position of Fig. 2 to provide a larger access opening. When the door is swung closed from the fully open position, the inertia of the moving door is sufficient to break the toggle when the pin 36 strikes the upper end of the slot 38 so that the door may be closed through a single effort despite the use of the two-stage hold-open.

While I have shown and described one embodiment of my invention, it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A two-position hinge and hold-open assembly for body and closure members, comprising in combination, a first hinge strap connected to the closure member, a second hinge strap connected to the body member, means pivotally connecting said straps together to permit swinging said closure between open and closed positions, a first hold-open comprising a toggle linkage including first and second links, pivot means connecting the links together, means pivotally connecting said first link to said first strap and pin and slot means pivotally and bodily movably connecting the second link to the second strap, the toggle links being extended when the closure is in an intermediate open position and being closed when the closure is swung to closed position, and the pin sliding in the slot to move the toggle links bodily with reference to said second strap when the closure swings from intermediate open position to fully open position, and a second hold-open comprising detent means on the second hinge strap over which said first hinge strap rides when the closure is swung from intermediate open position to fully open position.

2. A two-position hinge and hold-open assembly for body and closure members, comprising in combination, a first hinge strap connected to the closure member, a second hinge strap connected to the body member, means pivotally connecting said straps together to permit swinging said closure between open and closed positions, stop means for limiting movement of said closure and for defining the fully open position thereof, a first hold-open comprising a toggle linkage including first and second links, pivot means connecting the links, means pivotally connecting said first link to said first strap and pin and slot means pivotally and bodily movably connecting the second link to the second strap, the toggle links being extended when the closure is in an intermediate open position and being closed when the closure is swung to closed position, and the pin sliding in the slot to move the toggle links bodily with reference to said second strap when the closure swings from intermediate open position to fully open position, and a second hold-open comprising a spring detent on the second strap over which said first hinge strap rides when the closure is swung from intermediate open position to fully open position.

3. Apparatus of the character claimed in claim 2, wherein, when the toggle is closed, the pivot between the second toggle link and the second strap is located closely adjacent a plane containing the pivotal axis of the connection between the first link and the first strap and the pivotal axis of the connection between said straps.

4. Apparatus of the character claimed in claim 2, wherein said first strap is L-shaped, having a base which is pivotally connected to said second strap and a stem which is connected to said closure, the pivotal connection between said first strap and the first link being closely adjacent the bend in said strap.

5. Apparatus of the character claimed in claim 2, wherein said first strap is bent in the form of an L, having a base pivotally connected to said second strap and a stem connected to said closure, and wherein said first strap has an extension projecting from said stem, the pivotal connection between said first strap and first link being on said extension.

6. A two-position hinge and hold-open assembly for body and closure members, comprising in combination, a first hinge strap connected to the closure member, a second hinge strap connected to the body member, means pivotally connecting said straps together to permit swinging said closure between open and closed positions, a first hold-open comprising a toggle linkage including first and second links, pivot means connecting the links and a spring mounted on the pivot means and reacting against both links to bias the linkage toward an extended position, means pivotally connecting said first link to said first strap at a point between the connection of the first strap to the closure member and the means pivotally connecting said straps together, pin and slot means pivotally and bodily movably connecting the second link to the second strap, the toggle links being extended when the closure is in an intermediate open position and being closed against the force of said spring when the closure is swung to closed position, and the pin sliding in the slot to move the toggle links bodily with reference to said second strap when the closure swings from intermediate open position to fully open position, and a second hold-open comprising detent means on one strap over which the other strap rides when the closure is swung from intermediate open position to fully open position.

7. A two-position hinge and hold-open assembly for body and closure members, comprising in combination, a first hinge strap connected to the closure member, a second hinge strap connected to the body member, means pivotally connecting said straps together to permit swinging said closure between open and closed positions, stop means on one strap for abutment by the other strap to limit opening movement of said closure and to define the fully open position thereof, a first hold-open comprising a toggle linkage including first and second links, pivot means connecting the links together at one end and a spring mounted on said pivot means and reacting against both links to bias the linkage toward an extended position, means pivotally connecting the other end of said first link to said first strap at a point on the first strap between the connection of the first strap to the closure member and the means pivotally connecting said straps together, pin and slot means pivotally and bodily movably connecting the other end of the second link to the second strap, the axis of said last-mentioned pivotal connection being spaced from the connection between the second strap and the body member and spaced from the means pivotally connecting said straps together, the toggle links being extended when the closure is in an intermediate open position and being closed against the force of said spring when the closure is swung to closed position, and the pin sliding in the slot when the closure swings from intermediate open position to fully open position, and a second hold-open comprising a spring detent on the second strap so located that the first strap rides over said

detent when the closure is swung from intermediate open position to fully open position.

8. A two-position hinge and hold-open assembly for body and closure members, comprising in combination, a first hinge strap connected to the closure member, a second hinge strap connected to the body member, means pivotally connecting said straps together to permit swinging said closure between open and closed positions, stop means on one strap for abutment by the other strap in the fully open position to limit opening movement of said closure and to define the fully open position thereof, a first hold-open comprising a toggle linkage including first and second links, pivot means connecting the links together at one end and a spring mounted on said pivot means and reacting against both links to bias the linkage toward an extended position, means pivotally connecting the other end of said first link to said strap at a point on the first strap located between the connection of the first strap to the closure member and the means pivotally connecting said straps together, a slot formed in the second strap at a location spaced from the pivotal connection of the first and second straps, a pin connecting the other end of said second link to said second strap in said slot, the toggle links being folded with said pin being located at one end of said slot when the closure member is in closed position and the toggle links being extended when the closure member is in an intermediate open position, and the pin sliding in the slot to the other end thereof when the closure swings from intermediate open position to fully open position, and a second hold-open comprising a spring detent on the second strap so located that the first strap rides over the detent when the closure reaches fully open position.

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