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DOOR HINGE HAVING AN INFINITE POSITION HOLD OPEN DETENT

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2 Sheets-Sheet 1

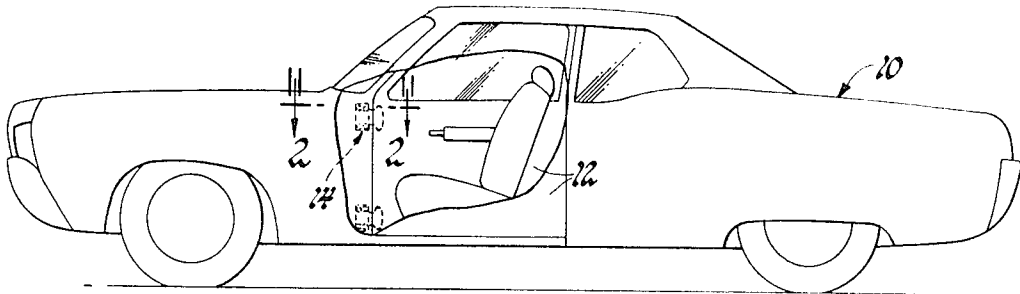


Fig. 1

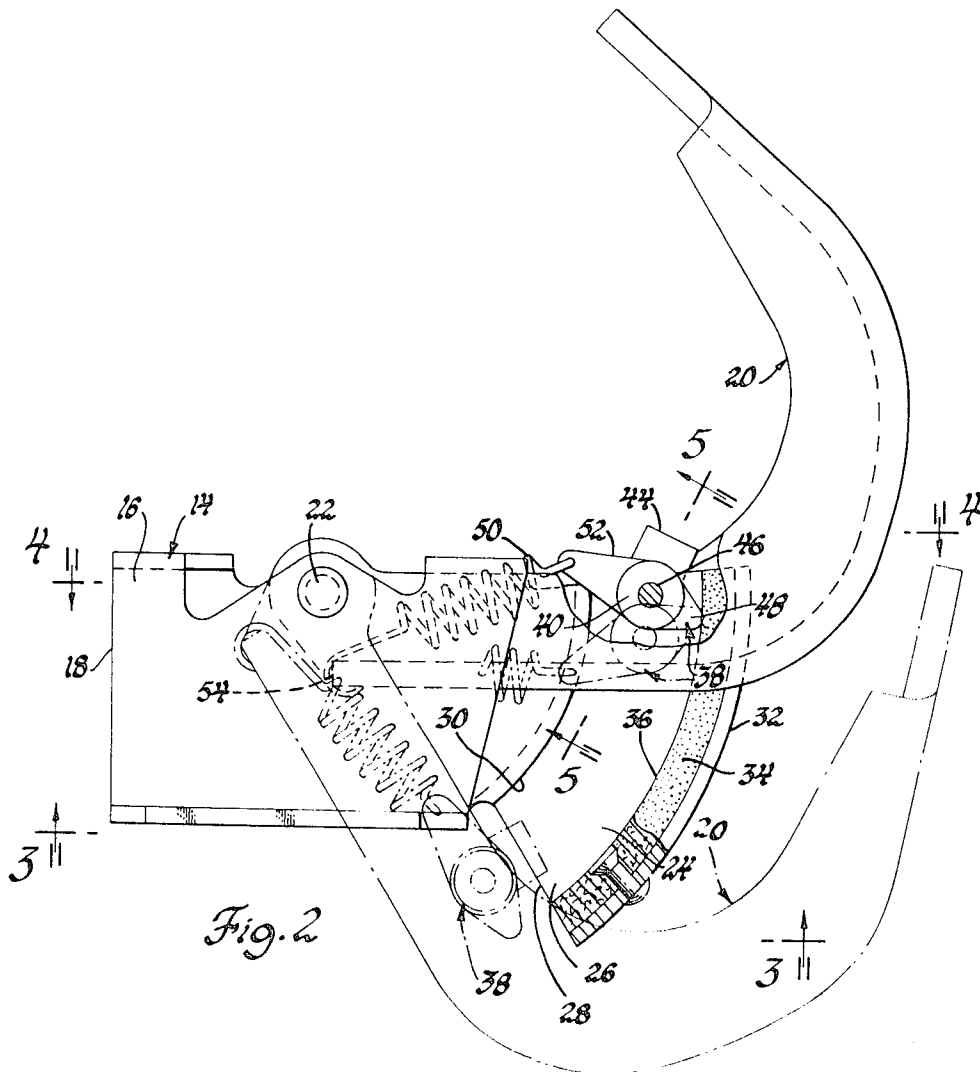


Fig. 2

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DOOR HINGE HAVING AN INFINITE POSITION HOLD OPEN DETENT

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ABSTRACT OF THE DISCLOSURE

A hinge box includes spaced walls pivotally supporting a hinge arm of U-shaped cross section. A cantilevered portion of the lower hinge box wall includes an arcuate channel portion on which is mounted a friction member having an arcuate surface generated about the hinge axis. A detent member has a main portion located between the walls of the hinge arm and an elongated end portion located below the lower wall of the hinge arm and connected to the main portion by an intermediate portion. The detent member is pivotally supported on the hinge arm by a pin extending between the main and end portions of the detent member and through the walls of the hinge arm. A spring extends between the main portion of the detent member and the hinge arm to position a linear contact edge of the elongated end portion for transverse linear contact with the arcuate surface of the friction member to provide a frictional restraint in the direction of swinging movement of the hinge arm. Upon reversal of the direction of swinging movement, the linear contact edge of the detent member digs into the friction member to provide a wedging restraint to hold the door against such reverse swinging movement. This wedging restraint can be overcome by the application of a predetermined force to the hinge arm to dig the linear contact edge further into the friction member and ultimately to swing the detent member on the hinge arm so as to provide a frictional restraint in the reversed direction of swinging movement and a wedging restraint in the initial direction of swinging movement.

This invention relates to vehicle body door hinges and more particularly to a vehicle body door hinge having an infinite position hold open detent mechanism.

Vehicle body door hinges conventionally incorporate a detent mechanism for holding the vehicle door in a limited number of door open positions. Generally, the detent mechanism will hold the door only in an intermediate and a fully open position. Recently, vehicle doors have become substantially wider and thus must swing through a substantially larger arc to provide the same exit and entrance room. Consequently, at times it is necessary to open the vehicle door to a position other than the intermediate or fully open positions. This invention provides a vehicle body door hinge including a detent mechanism that will hold the vehicle door in any desired door open position.

An object of this invention is to provide a vehicle body door hinge having an infinite position hold open detent mechanism including a detent member pivotally mounted on the hinge arm and engageable by linear contact at an infinite number of positions with an arcuate surface of a friction member which is supported on a

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wall of the hinge box laterally of the hinge arm with the arcuate surface thereof facing the hinge axis.

Another object of this invention is to provide a vehicle body door hinge having an infinite position hold open detent mechanism including a detent member having a main portion pivotally mounted between the side walls of a U-shaped hinge arm and an end portion connected to the main portion and located laterally of the hinge arm for engagement by linear contact at an infinite number of positions with an arcuate surface of a friction member which is supported on a wall of the hinge box laterally of the hinge arm with the arcuate surface thereof facing the hinge axis.

Other objects of the invention will become apparent from the following specification and drawings.

In the drawings:

FIG. 1 is a view of a vehicle body including a door hinge having an infinite position hold open detent mechanism according to the invention, with the door shown in closed position;

FIG. 2 is a view taken generally along the plane of line 2—2 of FIG. 1 and showing the hinge and detent mechanism in open position by solid lines and in closed position by dash lines;

FIG. 3 is a view of the hinge taken generally on the plane of line 3—3 of FIG. 2;

FIG. 4 is a view taken generally along line 4—4 of FIG. 2; and

FIG. 5 is a sectional view taken generally on the plane indicated by line 5—5 of FIG. 2.

Referring now to FIG. 1 of the drawings, a vehicle body generally indicated at 10 includes a front door 12 pivotally mounted on the body by a conventional hinge arrangement including a hinge assembly 14 having an infinite position hold open detent mechanism according to the invention. As shown in FIGS. 2 and 3, the hinge assembly 14 includes a hinge box generally indicated at 16 having spaced apertured walls 18. A generally U-shaped apertured hinge arm 20 fits between the walls 18 and is pivotally secured to the hinge box 16 by a hinge pin 22 extending through suitable bushings in the apertures of the walls 18 of the hinge box and the apertures of the hinge arm 20.

The lower wall 18 of the hinge box has an extended cantilever portion 24 which is bent to form an arcuate channel member 26 having a base wall 28, an inner side wall 30 and an outer side wall 32. As can best be seen in FIG. 2, the arcuate channel member 26 is generated about the axis of hinge pin 22. A friction member 34 of friction material engages the inner surface of the outer side wall 32 and is riveted to the wall. The inner surface 36 of the friction member 34 has an axis of curvature coincident with the axis of hinge pin 22.

As best seen in FIG. 5, a detent member generally indicated at 38 has an apertured main portion 40 located between the walls of the hinge arm 20, an elongated end portion 42 located on the lower side of the lower wall of hinge arm 20, and a generally U-shaped intermediate portion 44 connecting the main portion 40 and the elongated end portion 42. A pin 46 extends through the walls of the hinge arm 20 and through the main portion 40 and the elongated end portion 42 to pivotally support the detent member 38 on the hinge arm 20. As best seen in FIG. 2, the elongated end portion 42 of the detent member includes a linear contact edge 48 capable of linear

contact with the inner surface 36 of the friction member 34 as will be described.

As best seen in FIGS. 2 and 4, a tension spring 50 has one end hooked to an apertured arm 52 of the main portion 40 of the detent member 38 and the other end hooked at 54 to the base wall of the hinge arm 20. The tension spring 50 locates the detent member 38 with the linear contact edge 48 positioned for linear contact transverse of inner surface 36 of friction member 34 upon counterclockwise rotation of the hinge arm 20.

The operation of the hinge assembly 14 and the detent mechanism can best be understood by reference to FIG. 2. When the hinge assembly 14 is in the dash line door closed position, the tension spring locates the detent member 38 with the linear contact edge 48 of the elongated end portion 42 coplanar with the axes of hinge pin 22 and pin 46. Upon opening of the door, the hinge arm 20 swings counterclockwise and moves the linear contact edge 48 toward the inner surface 36 of the friction member 34. The distance between the axis of hinge pin 22 and the linear contact edge 48 is slightly greater than the distance between the axis of hinge pin 22 and the inner surface 36 of the friction member 34. Consequently, during counterclockwise rotation of the hinge arm 20 the linear contact edge 48 moves into linear contact with the inner surface 36 of the friction member 34 and rotates the detent member 38 slightly clockwise about pin 46 against the action of the tension spring 50. This clockwise rotation of the detent member 38 will cause the linear contact between the linear contact edge 48 and the inner surface 36 of friction member 34 to be located clockwise of a plane through the axes of hinge pin 22 and pin 46. The clockwise rotation of the detent member 38 will also tension spring 50 to provide a frictional restraint to continued counterclockwise rotation of the hinge arm 20.

The conventional angular positioning of the axis of swinging of the door and gravity will cause the weight of the door to bias the door in a closing direction when the operator releases the door. This biasing force will tend to rotate the hinge arm 20 clockwise and will cause the linear contact edge 48 to dig into the friction member 34 and provide a wedging restraint resisting clockwise rotation of the hinge arm 20 and closing movement of the door. If the operator then desires to open the door further, additional counterclockwise rotation of the hinge arm 20 is possible by merely overcoming the slight frictional restraint between the linear contact edge 48 and the inner surface 36 of the friction member 34. The detent member will then provide a wedging restraint by digging into the friction member 34 at a different location on the inner surface 36. It can thus be seen that the wedging restraint can be provided at any position along the inner surface 36 and consequently at any desired door open position.

When the operator desires to close the door, he applies a force to the door which will tend to rotate the hinge arm 20 clockwise. This force will, of course, be resisted by the linear contact edge 48 digging into the friction member 34 and providing the wedging restraint, as has been described. At a predetermined clockwise force on the hinge arm 20, the linear contact edge will dig into the friction member 34 deep enough to allow counterclockwise swinging movement of the detent member 38 about the pin 46. This will cause the linear contact between the linear contact edge 48 and the inner surface 36 of the friction member 34 to be located counterclockwise of a plane through the axes of hinge pin 22 and pin 46. The door can then be moved to a closed position by overcoming the slight frictional restraint in the clockwise direction of swinging. When the door 12 is almost closed, the linear contact edge 48 moves out of linear contact with the inner surface 36 of the friction member 34 and the tension spring 50 positions the detent member 38 as shown in the door closed position in FIG. 2.

Thus the invention provides a door hinge having an infinite position hold open detent mechanism.

What is claimed is:

1. A vehicle body door hinge comprising, a hinge box having spaced wall members, a hinge arm pivotally supported by said hinge box between said spaced wall members for swinging movement, a detent member pivotally supported by said hinge arm for swinging movement and having an elongated end portion, a friction member mounted on one of the spaced wall members and having an arcuate friction surface generated about an axis coincident with the axis of swinging of said hinge arm, and positioning means positioning said detent for linear contact of the elongated end portion with the friction surface of the friction member, said detent member providing a constant frictional restraint during swinging movement of said hinge arm in either direction and an infinite position wedging restraint only upon reversal of the direction of swinging movement of said hinge arm, said detent member swinging from a position providing the wedging restraint in one direction to a position providing the frictional restraint in the same direction upon application of a predetermined force to the hinge arm.

2. A vehicle body door hinge as recited in claim 1 wherein the arcuate friction surface of the friction member faces radially inward of the axis of swinging of the hinge arm and wherein the linear contact of the elongated end portion of the detent member with the friction surface of the friction member is parallel to the axis of swinging of the hinge arm.

3. A vehicle body door hinge comprising, a hinge box having spaced wall members, a hinge arm pivotally supported by said hinge box between said spaced wall members for swinging movement and having walls generally normal to the axis of swinging of said hinge arm, a detent member pivotally supported between the walls of the hinge arm and having an elongated end portion protruding beyond one wall of the hinge arm, a friction member mounted on one of the wall members of the hinge box and having an arcuate friction surface generated about and facing radially inward of the axis of swinging of said hinge arm, and resilient positioning means positioning said detent for linear contact of the elongated end portion with the friction surface of said friction member, said detent member providing a constant frictional restraint during swinging movement of said hinge arm in either direction and an infinite position wedging restraint only upon reversal of the direction of swinging movement of said hinge arm, said detent member swinging from a position providing the wedging restraint in one direction to a position providing the frictional restraint in the same direction upon application of a predetermined force to the hinge arm.

4. A vehicle body door hinge comprising, a hinge box having spaced wall members, a hinge arm pivotally supported between said spaced wall members for swinging movement and having a U-shaped cross-section including wall portions generally normal to the axis of swinging of said hinge arm, a detent member having a main portion located between the wall portions of the hinge arm and an elongated end portion located on the exterior side of one wall portion and connected to said main portion by an intermediate portion, a hinge pin extending between the main portion and the elongated end portion of said detent member and through the wall portions of the hinge arm for pivotally mounting said detent member on said hinge arm for swinging movement, a friction member mounted on one of the spaced wall members of the hinge box and having an arcuate friction surface generated about an axis coincident with the axis of swinging of said hinge arm, and a spring acting between the main portion of the detent member and the hinge arm for positioning said detent member with the elongated end portion in linear

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contact with the friction surface of the friction member parallel to the axis of swinging of said hinge arm, said detent member providing a constant frictional restraint during swinging movement of said hinge arm in either direction and an infinite position wedging restraint only upon reversal of the direction of swinging movement of said hinge arm, said detent member swinging from a position providing the wedging restraint in one direction to a position providing the frictional restraint in the same

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direction upon application of a predetermined force to the hinge arm.

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