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(72) Inventor JEAN CLAUDE PENNEC

(54) HINGE DEVICE

(71) We, REGIE NATIONALE DES USINES RENAULT, a Company incorporated according to the laws of the Republic of France, of: 92109 Boulogne-Billancourt, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a hinge device for a movable panel such as a motor vehicle boot lid or bonnet, which panel is pivotal about a horizontal axis, with the device being disposed entirely within a motor vehicle boot or bonnet.

A hinge device has been proposed which has a member which is in the shape of a swan neck and which is pivotally connected at one of its ends to a link member which is mounted for pivotal movement on a shaft which is fixed with respect to a fixed part of the boot, the swan neck member having an oblong opening which acts as a cam and on which it bears by way of a guide finger which is fixed with respect to the fixed part of the boot, thus providing a suitable guide action for the swan neck member when moving the panel.

With such a proposed device, the panel, i.e. lid, compensation or balancing device is provided on each side by a torsion bar which is supported and guided directly on a roller fixed with respect to the pivotal connection between the link member and the swan neck member.

This means that the action of the torsion bar is exercised at a very precise point, which is fixed with respect to the pivot connection, which determines both the balancing curve in the course of movement of the lid and ensures that it can be held in the opened position.

Now, this proposed construction does not provide the desired balancing curve and moreover, satisfactory retention of the lid in the opened position is governed by the over-strength calibration of the torsion bars, which makes it necessary to provide adjustment in order to modify their initial stress.

There is thus a need for an improved hinge device which can provide a more suitable balancing curve and hold the panel in the completely open position by a positive and straightforward blocking action, in order to omit the over-balancing effect.

Accordingly the present invention provides a hinge device for a movable panel such as vehicle boot lid or bonnet, having a swan neck-shaped member which is subjected to the force of a torsion bar and which is pivotally connected at one of its ends to a link member which is mounted pivotally on a shaft which is fixable with respect to a fixed part to which the panel is to be hinged, the swan neck-shaped member having an elongate opening acting as a cam, by way of which it bears on a guide finger which is fixable with respect to the fixed part, wherein a hook member, which is subjected constantly to a torque applied by the torsion bar is mounted pivotally on the pivot shaft connecting the link member to the swan neck member, and wherein the hook member has a head which locks in a pawl-like manner on the fixed guide finger, at the end of the opening movement of the panel. Thus the torsion bar support and guide roller of the proposed hinge device are replaced by a hook member which is mounted pivotally on the pivotal connection shaft between the link member and the swan neck member. The upper edge of the hook member comprises a groove in which the torsion bar is supported, the torsion bar in the course of the operating movement of the panel following the particular cam-shaped configuration of the groove.

This results in a balancing torque which is transmitted to the panel, e.g. boot lid, by the set of pivotal connections of the device, and a torque tending constantly to pivot the head of the hook member towards the swan neck member, until the hook member locks on to the fixed finger which is fixed with respect to the boot, which also serves to guide the elongate opening in the swan neck member.

This hook efect requires a relatively low force on the part of the torsion bar, which makes it possible to reduce the torsion torque which was previously necessary for holding the boot lid panel in an opened position.

Accordingly, movement of the lid becomes more flexible and makes it possible also to ensure that the lid is held in a more open position which is substantially wider by some degrees than previously.

For a better understanding of the present invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:—

Figure 1 is a side view of a hinge device of the invention, associated with a boot lid panel, in its two limit positions with the open position of the lid shown in broken lines,

Figure 2 is a view in cross-section of a hook member part of the device of Figure 1, and

Figure 3 is a view on an enlarged scale of the area III in Figure 1, showing the locking of a head of the hook member on to a guide finger.

As shown in the accompanying drawings a hinge device of the invention shown in Figure 1 has a swan neck member 4 which is fixed with respect to the panel, e.g. a bonnet or boot lid to be moved (not shown), in this case a boot lid, the movement of which is guided with respect to a fixed carrier 7 which is itself fixed with respect to the boot 3, by means of screws 14.

For this purpose, the swan neck member 4 has an elongate cam-shaped opening 5 through which passes a guide finger 8 which is fixed with respect to the carrier 7.

During the movement of the lid, the swan neck member pivots with respect to the carrier 7 by means of a link member 6 which is pivoted on the one hand about a shaft 9 which is fixed with respect to the boot and on the other hand about a shaft 11 which is fixed with respect to one end of the swan neck member 4.

A hinge assembly formed by two hinge devices identical to that described above is associated with a compensation or balancing device for the lid, which is shown here in the form of a torsion bar 10.

The end of the torsion bar 10 bears on a flat hook-shaped member 15 which is pivotally mounted, substantially at its centre, on the common pivot shaft 11 connecting the link member 6 to the swan neck member 4. The member 15 preferably is made of moulded plastics material.

This hook member 15 has three parts:

—a head 16 intended to the locked in the manner of a pawl on to the guide finger 8 of the carrier (Figure 3), to ensure that the lid is positively held in the position of complete opening (illustrated in broken lines in Figure 1),

—a cam-shaped groove 17 formed in the upper edge of the hook member, acting as a guide and a support for the torsion bar 10, the configuration of which is suited to the desired balancing curve (Figure 2), and

—a deeper recess 18 delimited within the hook member 15 by a rearward extension of the above-mentioned groove 17, to provide a housing and to serve as protection against the aggressive action of the end of the torsion bar 10, when the lid is open (Figure 2).

The hook member is also provided with a projection member 19 which is disposed between the pivot shaft 11 and the head 16 and which engages through a concentric button-hole slot 20 formed in the swan neck member 4, in order to limit the range of angular movement of the hook member about its pivot.

The hinge device of the invention operates in the following manner:

In the solid-line position shown in Figure 1 (the lid closed), the torsion bar 10 applies a force F_1 to the groove in the hook member, which produces a balancing torque which is transmitted by the assembly of the various pivotal connections of the device, and a torque which causes pivotal movement of the hook member 15 about the pivot shaft 11, holding it in an abutment position defined by means of the projection member 19 in the slot 20.

During the opening movement of the lid, the hook member 15 remains in this position until its head 16 comes into contact by way of the engagement ramp surface 21 with the guide finger 8.

When the opening movement of the lid is continued, the head of the hook member comes into locking engagement on the finger 8, being returned against the latter by the torque produced by the support force F_2 of the torsion bar.

In this respect, it should be noted that the hook member 15 tends always to pivot in the same direction, since, in the course of the lid movement, the forces applied by the support of the torsion bar intersect constantly and on the same side, the inter-axis lines 22 of the link member 6.

The locking of the hook member also permits a small clearance to occur between the projection member 19 and the end of the slot 20, which makes it possible for the head 16 of the hook member to be held in contact on the guide finger 8, by the action of the force F_2.

The locking action thus achieved ensures that the lid is completely opened and is positively held in the completely open position.

The provision of the holding hook member makes it possible substantially to reduce the torsional torque forces required for balancing the lid, because the lid is no longer held in the fully open position simply and solely by the torsion bars, which was the case with the previously proposed construction herebefore referred to. Consequently, the lid

opening movement requires a smaller amount of force and is made more flexible.

At the same time, the precise and positive locking of the lid when in an open position makes it possible to avoid a yielding flexing movement of the torsion bar and makes it possible to gain from 3 to 5 degrees on the angle through which the lid is opened, so that the lid can be opened wider.

In order to limit the clearances between the head 16 of the hook member, the guide finger 8 and the opening 5 in the swan neck member, the opening 5 has a small degree of conicity 23 at its end, to ensure firm contact with the finger 8, at the end of the travel movement.

In order to close the lid, it is sufficient to effect a reverse movement in a downward direction. The force transmitted by the swan neck member 4 to the hook member 15 frees the hook member 15, causing it to pivot in the opposite unlocking direction, under the effect of the reaction of the finger 8.

WHAT WE CLAIM IS:—

1. A hinge device for a movable panel, such as a motor vehicle boot lid or bonnet, having a swan neck-shaped member which is subjected to the force of a torsion bar and which is pivotally connected at one of its ends to a link member which is mounted pivotally on a shaft which is fixable with respect to a fixed part to which the panel is to be hinged, the swan neck-shaped member having an elongate opening acting as a cam, by way of which it bears on a guide finger which is fixable with respect to the fixed part, wherein a hook member, which is subjected constantly to a torque applied by the torsion bar is mounted pivotally on the pivot shaft connecting the link member to the swan neck member, and wherein the hook member has a head which locks in a pawl-like manner on the fixed guide finger, at the end of the opening movement of the panel.

2. A device according to claim 1, wherein at its upper edge, the hook member has a cam-shaped groove in which the torsion bar bears, and whose configuration is such that the force (F_1, F_2) applied by the torsion bar to the hook member intersects constantly and on the same side the inter-axis lines of the link member, in the course of the movement of the panel.

3. A device according to claim 2, wherein the rearward extension of the groove defines within the hook member a deeper recess for completely receiving the end of the torsion bar when the panel is open.

4. A device according to any one of claims 1 to 3, wherein the pivotal movement of the hook member is limited by a projection member which is disposed between its pivotal connection and its head, engaging through a button-hole slot in the swan neck member, which is concentric with respect to the pivotal connection.

5. A hinge device according to claim 1, substantially as hereinbefore described with reference to the accompanying drawing.

For the Applicants:
D. YOUNG & CO.,
Chartered Patent Agents,
9 & 10 Staple Inn,
London WC1V 7RD.

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1597020 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

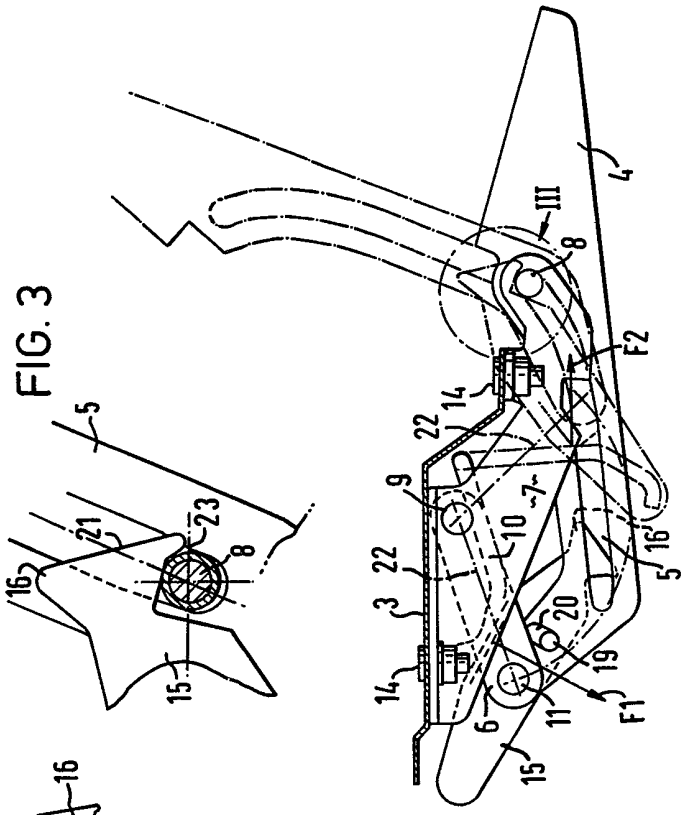

FIG. 1

FIG. 3

FIG. 2