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EUROPEAN PATENT APPLICATION

21 Application number: 83103213.1

51 Int. Cl.³: E 05 D 11/10

22 Date of filing: 31.03.83

30 Priority: 22.04.82 IT 6752982

43 Date of publication of application:
02.11.83 Bulletin 83/44

84 Designated Contracting States:
DE FR GB

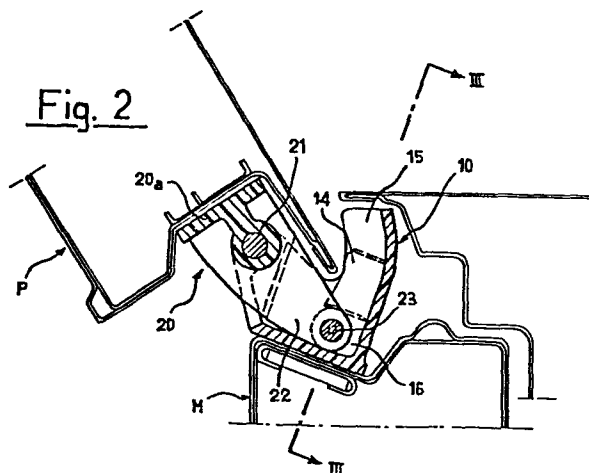
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54 Hinge structure, particularly for automobile vehicle doors, incorporating an open position holdback device.

57 The hinge comprises a stationary part (10) and a movable part (20), and the holding action is accomplished by the elastic engagement of an extension (22) of the movable part, the end whereof slides, under an elastic bias force, along at least one profile track (14) provided on the stationary part (10), or viceversa.



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"HINGE STRUCTURE, PARTICULARLY FOR AUTOMOBILE VEHICLE
DOORS, INCORPORATING AN OPEN POSITION HOLDBACK DEVICE"

This invention relates to a hinge structure, particularly for automobile vehicle doors.

As is known, automobile vehicle doors, in addition to the hinge connection for attachment to the vehicle body, are also provided with open position holdback devices effective to prevent the door from closing spontaneously, such as by its own weight, or due to wind pressure or other similar causes. These devices, generally based upon the action of an elastic means, are located as a rule between the two hinges, and comprise a part which is rigid with the hinge supporting upright and a part which is made rigid with the door. This requires the arrangement of a means of securing said parts to the upright and door, and in general, also the arrangement of a housing in which one of said parts fits out of view when pushed into the closed position of the door. The use of such holdback means complicates, therefore, to a less than indifferent degree the door assembling operations, and above all, creates, both on the door and upright, areas of reduced strength especially where one or both parts of the device are secured by welding, since the welding areas are readily attacked by the oxidation produced by weather exposure, with attendant short time failure of the sheet metal.

Another drawback is the poor reliability of currently available holdback devices, resulting from the fact that the elastic means which actuates the device are apt to wear rapidly owing to the relative

rubbing movements, which would require plenty of lubrication, generally entirely neglected, instead.

A further drawback is the generally high cost of prior devices, a circumstance which -- in combination with the cost of the assembling operations -- makes the installation of the devices uneconomical.

The task of the invention is essentially directed to remove such prior drawbacks. The task is achieved by a structure as defined in the appended claims.

10 In an advantageous embodiment of the invention, the hinge stationary part is shaped substantially as a spread out "U" and the end of one leg of the "U" carries the articulation pin for the movable part, while the other leg, having at least in part
15 the profile of an arc of a circle, receives -- to engage it elastically -- the end of an extension of the movable part which is produced beyond the hinge axis. At least that leg which receives said extension has a preferably channel-like profile
20 and carries, on the inner walls thereof, juxtaposed camming surfaces which have the same profile and have formed thereon, at least at the ends, snap holdback notches for the extension end of the movable hinge part. This end yields elastically,
25 and is also shaped, preferably, according to a yoke configuration, and carries, interposed between the arms of the yoke, a spring or equivalent

elastic means, adapted to force the arms, the ends whereof have a boss-like configuration, into engagement by elastically contacting the juxtaposed cams of the fixed part of the hinge.

5 Advantageously, according to a variation of the invention, the extension of the movable part is provided with an end pawl which engages, either laterally or frontally, a flat spring which is shaped and accommodated within the channel-like profile leg of the stationary part.

10 In a further advantageous embodiment the extension pawl is made elastically yielding and engages, preferably at the front, with a shaped rigid track on the stationary part.

 Further features and advantages will be apparent from the detailed description which follows, with reference to the accompanying drawings, given herein by way of example only, and where:

 Figure 1 is an elevation view of the hinge;

 Figure 2 is a longitudinal centerline section
20 taken through the same along the line II-II of Figure 3;

 Figure 3 is a cross-sectional view taken along the line III-III of Figure 2;

 Figure 4 is a partly sectional front view of the
25 movable part of this hinge;

 Figure 5 is a section view similar to Figure 2 but illustrating another embodiment of the invention;

 Figure 6 is a sectional view taken along the line VI-VI of Figure 5;

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Figure 7 is a sectional view, similar to Figure 6, showing a further embodiment;

Figure 8 is also a cross-sectional view, similar to Figure 6, showing another embodiment of the invention; and

Figure 9 is a longitudinal section view showing yet another embodiment.

With initial reference to Figures 1 to 4, the numerals 10 and 20 designate the two parts of the hinge, articulated to each other and intended, the one for connection to the upright M of the car body, and the other to the door P, such parts being identified hereinafter as the stationary part and movable part, respectively. The stationary part 10 has a substantially U-like shape with a spread out leg, and comprises a body 11 with a channel cross-section and a profile following in part that of an arc of a circle from a mounting base 11a.

At the end of the spread out leg, the body 11 carries a pair of supports 12 for the hinge pin 13. That end is configured as a yoke to receive an eye 21 of the movable part 20, through which eye the pin 13 passes loosely. Formed on the side inner walls of the channel body 11, are camming surfaces 14 which are juxtaposed and formed with the same profile. Received in the channel body 11 is the end of an extension 22 of the movable part 20 of the hinge, also extending from a mounting base 20a.

The extension 22 has preferably a yoke-like configuration, or an M-like cross-section, and the

arms of said yoke carry each a boss 23 which is arranged to slide along the corresponding shaped wall 14 of the body 11 in elastic contact engagement therewith. The engagement of the bosses 23 with the walls 14 may be ensured by the very elasticity of the extension material, but preferably, interposed between the arms of the extension, there would be a spacer 24 on which an elastic means, such as a tube of an elastically yielding material or a coil spring 25 is inserted which, by urging the arm ends biases the bosses 23 into engagement with the walls 14. The latter are shaped as shown in Figure 3, and at least one of them, but preferably both of them, comprises two end notches 15-16 which are snap engaged by the end bosses 23 in the two, open and closed, positions of the door P, respectively.

If desired, there may be provided on the shaped walls 14 an additional intermediate notch, which may occupy any selected position and provide a hold-back function for a corresponding stable ajar position of the door. Moreover, the notch 15 -- which corresponds to the closed position -- is faired into the wall 14 by means of a surface having a large radius of curvature, or of an incline which -- owing to the elastic engagement with the ends of the extension 22 -- produces on said extension a couple directed to assist the door shutting movement.

While the selection of the materials is in no way restrictive, both parts 10 and 20 of the hinge are formed from a polymeric material, or alternatively,

either of said parts is made of metal, e.g. the stationary part 10, and the other from a thermoformable polymeric material or a non-thermoformable one, with the possible addition of reinforcing fillers. If made
5 of a polymeric material, the parts 10 and 20 of the hinge would be provided with stiffening ribs, 17-18 and 26, respectively.

In the embodiment of Figures 5 to 8, the extension 22 of the stationary part 20 carries a cylindrical end
10 pawl 200, which is received in a space 110 of the stationary part 10. That pawl engages elastically with a flat spring 114 supported on a wall of said space; the flat spring being corrugated to define corresponding closed, and partly or fully opened, positions of the
15 door. Of course, instead of being arranged laterally, the flat spring 114 may be located frontally, in which case the axis of the cylindrical pawl 200 would be perpendicular to the axis of the extension 22.

Where allowed by the elasticity of the material
20 selected, the flat spring 114 may be eliminated and the corrugations 115 formed directly on the (side or front) wall of the space 110 (Figure 7). On the corrugated wall may also act, from the outside, a suitably calibrated spring 116. Alternatively, and
25 as shown in Figure 8, the space 110 may be given a profile with lobed slots which would be oppositely located and define corresponding open seats 117-118-119 which are deformable elastically and adapted to accommodate the pawl 200 therein, allowing its
30 movement and transfer from one to the other.

According to the embodiment shown in Figure 9,
the pawl 201 is made elastically yielding. To this aim,
it is held loosely slidable in a seat 202 on the
extension 22 and caused to move axially against the
5 bias force of a spring 203 which urges the pawl into
engagement with a fixed cam 120, provided on
the front wall of the body 11, in elastic contact
relationship therewith.

Of course, based upon the same principle of this
10 invention, the constructional details and embodiments
may be changed within a wide range of possibilities
with respect to what has been described and illustrated
by way of example and not of limitation, without
departing from the true scope of the invention.

CLAIMS

1 1. A hinge structure, particularly for automobile
2 vehicle doors, characterized in that it comprises an
3 open position holdback device, and in that the holding
4 action is provided by the elastic engagement of an
5 extension (22) of the movable part (20) of the hinge,
6 said extension (22) being arranged to slide, in forced
7 contact relationship, along at least one contoured
8 track provided on the stationary hinge part (10), or
9 viceversa.

1 2. A hinge structure according to Claim 1, wherein
2 the stationary hinge part (10) has a substantially
3 U-like shape with spread out legs, and wherein the
4 end of one leg of the "U" carries the pivot pin (13),
5 whilst the other leg, following at least in part a
6 circular arc profile, receives and elastically engages
7 the end of an extension (22) of the movable hinge
8 part (20) produced beyond the hinge axis.

1 3. A hinge structure according to Claims 1 and 2,
2 wherein at least that leg (11) which receives said
3 extension (22) has a channel-like profile and carries
4 on at least one of the sidewalls (14) thereof a
5 camming surface having formed therein, at least at the
6 ends, snap retaining notches (15,16) for the end of
7 the extension (22) of the movable hinge part (20).

1 4. A hinge structure according to the preceding
2 claims, wherein the channel-like profiled leg (11)
3 of the stationary part (10) has opposing cam surfaces
4 (14) engaged by end bosses (23) of the extension (22)
5 of the movable part (20) which is configured as a yoke,

6 elastic means (25) being provided between the arms
7 of said yoke to elastically bias the end bosses (23)
8 towards respective ones of said cam surfaces (14).

1 5. A hinge structure according to Claims 1 and 4,
2 wherein the extension (22) of the hinge movable part
3 (20) has an elastically yielding section, such as an
4 M-like section, to ensure -- by virtue of the material
5 own elasticity -- the elastic engagement of its ends
6 with the cam surfaces (14) on the stationary part (10).

1 6. A hinge structure according to Claims 1 to 3,
2 wherein the end of the extension (22) of the movable
3 part (20) is formed as a rigid cylindrical pawl (200)
4 and engages at least one corrugated flat spring (114)
5 carried either frontally or laterally on the channel-
6 like leg of the stationary part (10).

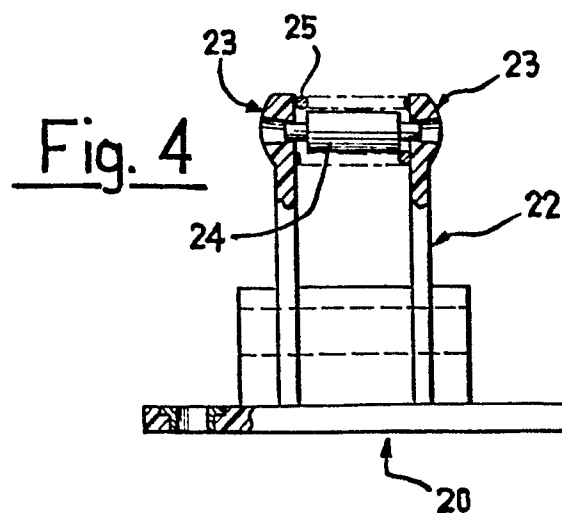
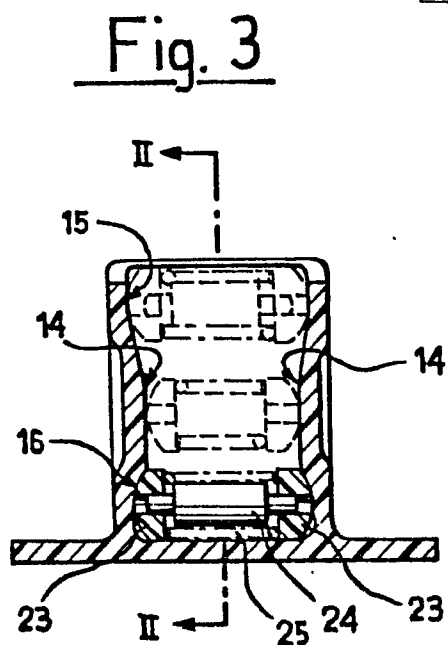
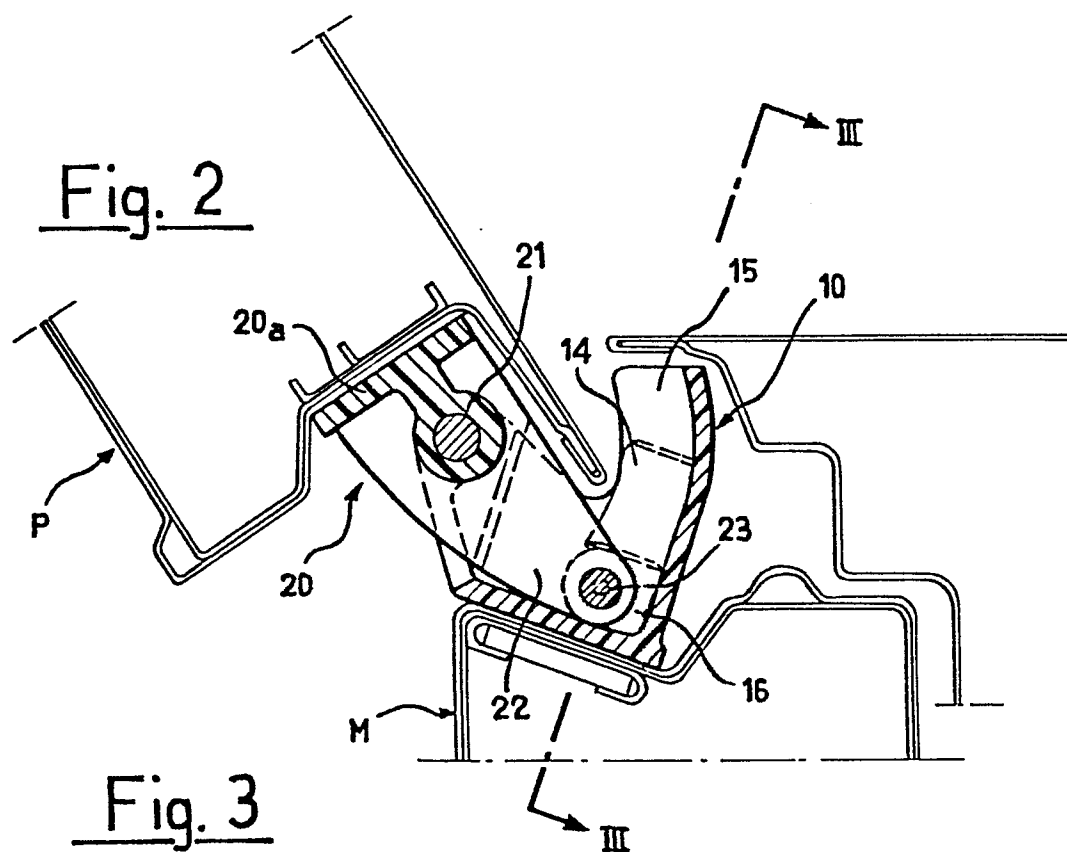
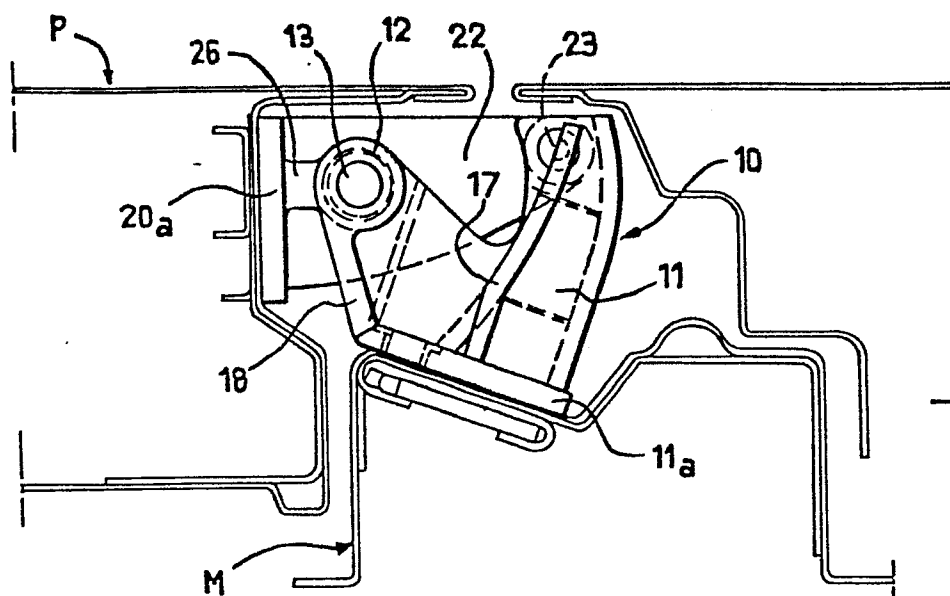
1 7. A hinge structure according to Claim 6,
2 wherein the extension of the hinge movable part (20)
3 is formed as a rigid cylindrical pawl (200) and the
4 stationary part (10) has a space (110) profiled with
5 opposing lobed slots defining corresponding open seats
6 (117, 118, 119) and deformable elastically, being
7 adapted to receive the pawl (200) to allow its movement
8 and snap transfer from one to the other.

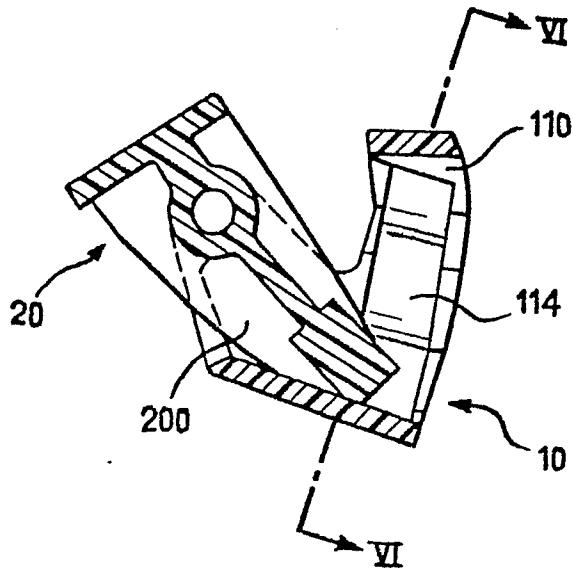
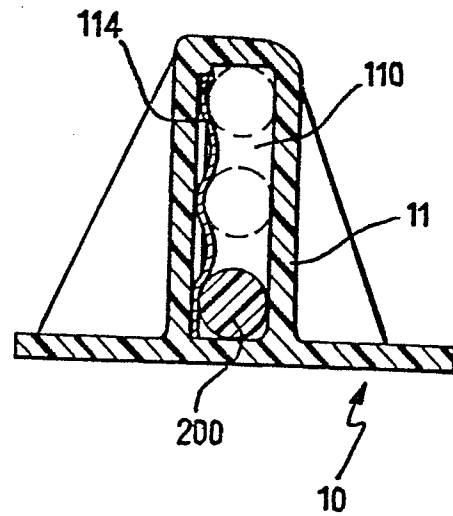
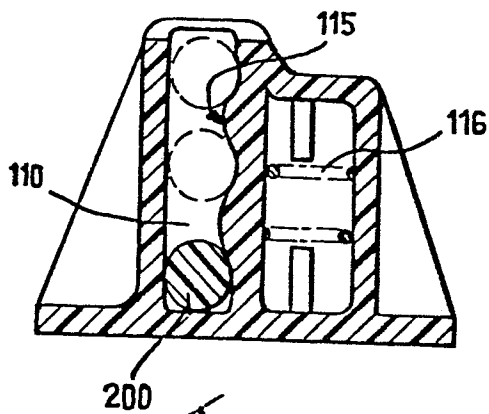
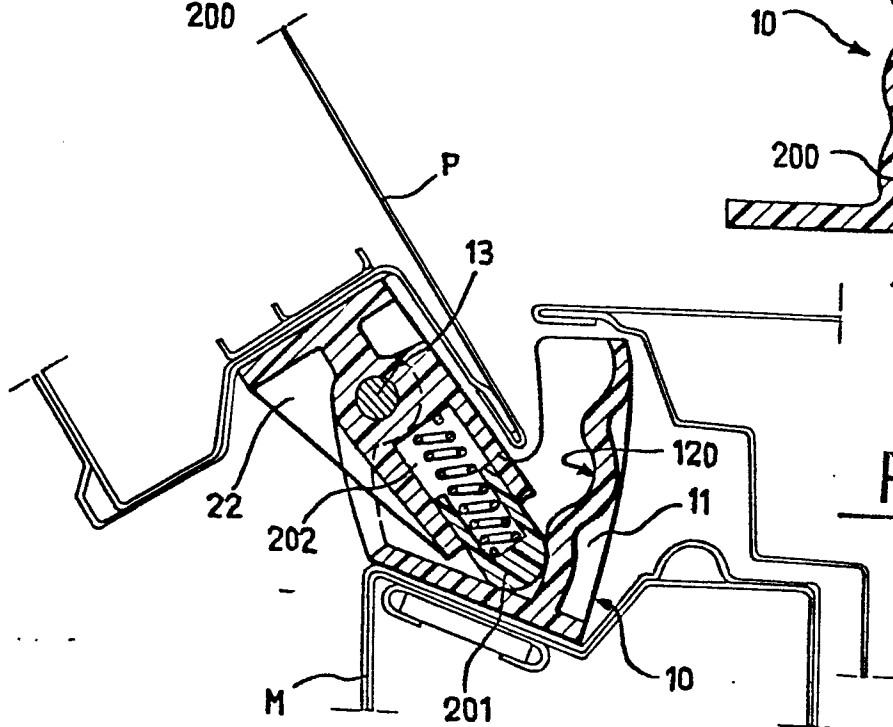
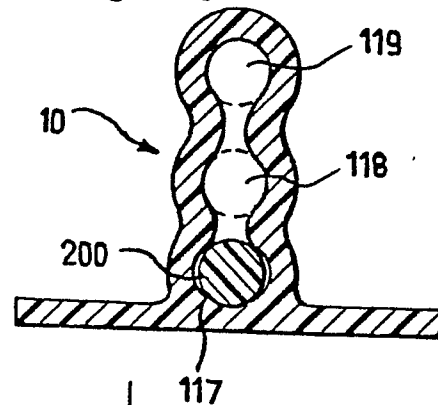
1 8. A hinge structure according to Claims 1 to 3,
2 wherein the extension (22) of the hinge movable part
3 (20) carries an elastically yielding pawl (201) in
4 the direction of the longitudinal axis of said extension
5 (22), and wherein said pawl (201) engages frontally
6 a fixed cam (120) carried on the channel-like leg (11)
7 of the hinge stationary part (10).

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1 9. A hinge structure according to Claim 8,
2 wherein said pawl (201) is supported, to be movable
3 telescopically against the bias of an elastic means
4 (203), in an end seat (202) on said extension (22).

1 10. A hinge structure according to any of Claims
2 1 to 9, wherein at least one part of the hinge is
3 formed from a polymeric material.



Fig. 5Fig. 6Fig. 7Fig. 8Fig. 9