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## (54) Hinge.

(57) A vehicle door hinge has a first leaf (1) carrying a fixed hinge pin (4), and a second leaf (5) having a bore (7) for receiving the hinge pin, the hinge pin and the bore being adapted to co-operate to permit assembly and separation of the hinge leaves only at a predetermined relative orientation of the leaves. In a preferred embodiment this is achieved by a flat retaining head (4b) on the hinge pin passing through a slot (8) in the end of the bore (7).

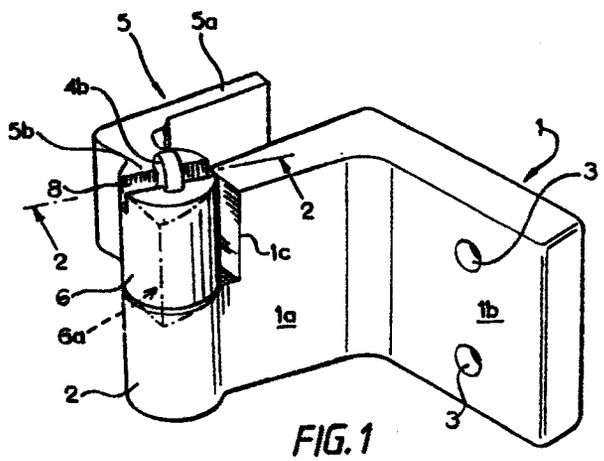


FIG.1

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# HINGE

This invention relates to a hinge suitable, for example, for use in mounting a motor vehicle door.

In the manufacture of motor vehicles, and in particular motor cars, it is desirable to attach the doors to the vehicle body before the body is painted, so that the doors can be painted with the body and are therefore a perfect colour match. However, in the subsequent assembly steps, the presence of the doors limits access to the interior of the vehicle, increases the width of the assembly track required, because the vehicle must move with the doors open, and makes the trimming of the door, i.e. the fitting of windows, window winding mechanisms, door locks and handles, and the internal padding and finishing of the door, more difficult. It is therefore desirable to be able to remove the door after painting for separate trimming, and then to refit the completed door when assembly of the vehicle is otherwise complete. With conventional vehicle door hinges, this is difficult to achieve, because the initial fitting of the door requires accurate positioning, and removal of the door would necessitate a second accurate positioning operation, which would add significantly to the vehicle construction cost.

The present invention provides a hinge comprising a first leaf having a hinge pin secured thereto, and a second leaf having a hinge pin boss including a bore for receiving the hinge pin to enable relative pivoting of the leaves, characterised in that the hinge pin and the hinge pin boss are adapted to co-operate to permit assembly and separation of the hinge leaves only at a predetermined relative orientation of the leaves.

Preferably the bore opens through an end portion of different cross-section from the remainder of the bore, and the hinge pin carries a head portion linked to the remainder of the pin by a neck portion, the head portion being of substantially the same cross-section as the end portion of the bore so as to be able to pass therethrough at said predetermined orientation, and the neck portion being freely rotatable within the end portion of the bore. The neck portion may be cylindrical with a diameter smaller than that of the remainder of the hinge pin, and the head portion then has a width in one plane through the hinge pin axis substantially equal to the hinge pin diameter and a width in a second plane through said axis at right angles to the first plane equal to the diameter of the neck portion.

The hinge of the invention is simple in construction, but ensures accurate repositioning of the door when removed by separation of the hinges. As mentioned above, such separation is primarily intended to occur during assembly of the vehicle after painting has been completed. At this stage the door is not provided with a door check and so it can swing freely. Advantageously therefore, the hinge is provided with a stop to prevent the door opening too far and possibly hitting the surrounding body work. Additionally, the position of the predetermined orientation of the leaves can be chosen to restrain lifting of the door at a position whereat it might hit against the surrounding body during removal. It is therefore possible to carefully control the exact rotational position at which the door may be removed.

In the final stages of assembly of the vehicle, the door is provided with a door check which is arranged to restrain the door from opening sufficiently to reach said predetermined orientation of the leaves so that during the normal sweep of the door the hinge leaves are not separable.

Reference is made to the drawings, in which:

Figure 1 is a perspective view of a hinge according to a preferred embodiment of the invention; and

Figure 2 is a sectional elevation on line A-A in Figure 1.

The hinge has a first leaf 1 which is generally L-shaped in plan and has a cylindrical boss 2 attached to the shorter arm 1a of the leaf. The longer arm 1b of the leaf has two fixing holes 3 therethrough to enable the leaf to be bolted to the vehicle door mounting pillar. The boss 2 extends over approximately half the height of the leaf 1 and has a bore therethrough into which is secured a hinge pin 4 (Figure 2). The hinge pin 4 is secured by interference between a knurled portion 4a and the bore.

The second hinge leaf 5 is also generally L-shaped, the longer arm 5 a of the leaf being welded, in use, to the vehicle door. The shorter arm 5b carries a cylindrical hinge pin boss 6 having a bore 7 therethrough. The bore 7 is initially drilled as a blind bore, which is opened by milling a slot diametrically across the end face of the boss, the slot intersecting the blind bore. The slot 8 has a width less than the diamter of the remainder of the bore. A bush 9, which is suitably formed from a lubricant metallised plastics material, is inserted into the opposite end of the bore 7.

The hinge pin 4 is provided at its free end with a head portion 4b separated by a neck portion 4c from the remainder of the pin. The neck portion 4c has a diameter just less than the width of the slot 8 so as to be a close fit therein. The head portion 4b has a width equal to the diameter of the neck portion, while the dimension in a plane through the

pin axis perpendicular thereto is equal to the diameter of the remainder of the pin 4. Thus, the head portion can pass through the bore 7 and through the slot 8 if correctly aligned therewith.

The slot 8 is milled in a direction relative to the alignment of the longer arm 5a of the second leaf 5 such that the head portion 4b of the hinge pin can only pass through the slot when the hinge leaves are in a predetermined relative orientation which for instance could correspond to the fully-open position of the vehicle door. At any other position, the head portion 4b engages the boss end on either side of the slot 8 and prevents separation of the hinge leaves, the neck portion 4c permitting rotation.

In use, the longer arm 5a of the second leaf 5 of the assembled hinge is welded to the vehicle door, a pair of such hinges being used for each door, in conventional manner. The door is then correctly positioned in the vehicle door frame and the first leaf of each hinge is attached to the door pillar by bolts, which are tightened after final adjustment of the position of the door relative to the frame. After painting of the vehicle body with the doors, the doors can simply be opened to the correct position to align the head portions 4b of the pins with the slots 8, and then lifted off for trimming, and to permit finishing of the vehicle body and interior, the first leaves 1 being left undisturbed on the door pillars. In order to prevent the door opening too far and possibly cause damage by hitting the surrounding vehicle body, it is possible to provide the hinge with a stop. Conveniently the stop may take the form of a lug 6a (shown in dotted lines in Figure 1) formed on hinge pin boss 6 which abuts against shoulder 1c on hinge leaf 1. Finally, the doors are repositioned in the reverse of the operation by which they are removed, and their original precise alignment is resumed without the need for further adjustment. A door check is then fitted to the door to restrain the door opening to its open position whereat it can be lifted off the hinge pins.

## Claims

1. A hinge comprising a first leaf (1) having a hinge pin (4), and a second leaf (5) having a hinge pin boss including a bore (7) for receiving the hinge pin to enable relative pivoting of the leaves, characterised in that the hinge pin and the hinge pin boss are adapted to co-operate to permit assembly and separation of the hinge leaves only at a predetermined relative orientation of the leaves.

2. A hinge according to Claim 1, characterised in that the bore (7) opens through an end portion (8) of different cross-section from the remainder of the bore, and the hinge pin (4) carries a head portion (4b) linked to the remainder of the pin by a neck portion (4c), the head portion being of substantially the same cross-section as the end portion of the bore so as to be able to pass therethrough at said predetermined orientation, and the neck portion being freely rotatable within the end portion of the bore.

3. A hinge according to Claim 2, characterised in that the neck portion (4c) is cylindrical with a diameter smaller than that of the remainder of the hinge pin, and the head portion (4b) has a width in one plane through the hinge pin axis substantially equal to the hinge pin diameter and a width in a second plane through said axis at right angles to the first plane equal to the diameter of the neck portion.

4. A hinge according to Claim 2 or 3, characterised in that the bore (7) is provided in a boss (6) on the second leaf (5) and in that the end portion of the bore comprises a slot (8) cut diametrically across the boss to intersect the blind end of the remainder of the bore.

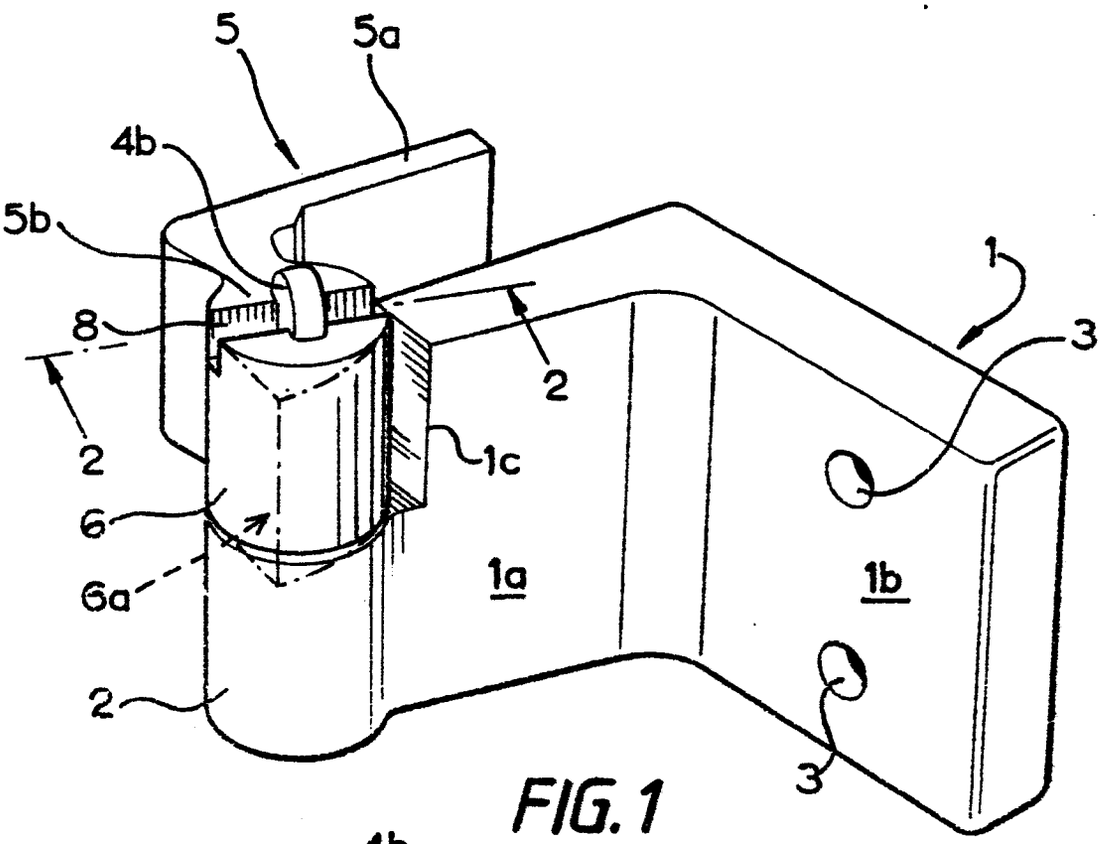


FIG. 1

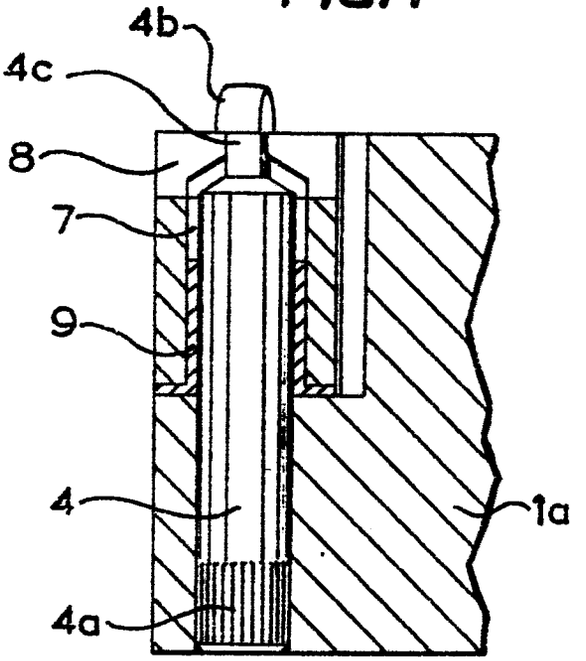


FIG. 2

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# EUROPEAN SEARCH REPORT

Application number

EP 85 30 5112

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
|---|---|---|---|
| X | FR-A-2 463 844 (W. FRANK GmbH)<br>* Figures 1,2; claim 1 * | 1 | E 05 D 7/10 |
| A | | 2 | |
| | --- | | |
| X | DE-C-3 321 558 (ALUMINIUM PRESS- UND WALZWERK)<br>* Figures 1-3,8; claim 1 * | 1 | |
| A | | 2 | |
| | --- | | |
| X | US-A-4 334 338 (J.L. CONN)<br>* Figures; column 1, line 47 - column 2, line 27 * | 1 | |
| | ----- | | TECHNICAL FIELDS SEARCHED (Int. Cl.4) |
| | | | E 05 D |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 06-03-1986 | SCHEIBLING C.D.A. |

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