(12) UK Patent Application (19) GB (11) 2 147 942 A

(43) Application published 22 May 1985

(21) Application No 8425333

(22) Date of filing 8 Oct 1984

(30) Priority data
(31) 3336802 (32) 10 Oct 1983 (33) DE
3405083 13 Feb 1984

(51) INT CL⁴
E05D 7/10 3/02 11/10

(52) Domestic classification
E2F CQ PD
U1S 1855 E2F

(56) Documents cited
GB A 2128243 GB A 2106587 GB 1560816

(58) Field of search
E2F

(71) Applicant
ED Scharwachter GmbH & Co KG (FR Germany),
Hohenhagenerstrasse 26–28, 5630 Remscheid 1,
Federal Republic of Germany

(72) Inventor
Ernst Brockhaus

(74) Agent and/or Address for Service
Brookes & Martin,
High Holborn House, 52–54 High Holborn, London
WC1V 6SE

(54) A separable hinge

(57) A separable hinge for a motor vehicle door has hinge leaves 1 and 3 articulated together by a pin 2. The pin is fast in a part 3, the part 1 being removable. A projection 16 on part 3 locates between projections on the part 1 to prevent axial movement of the part, in a range corresponding to the normal opening movement of the door. Several embodiments are described.

FIG.1

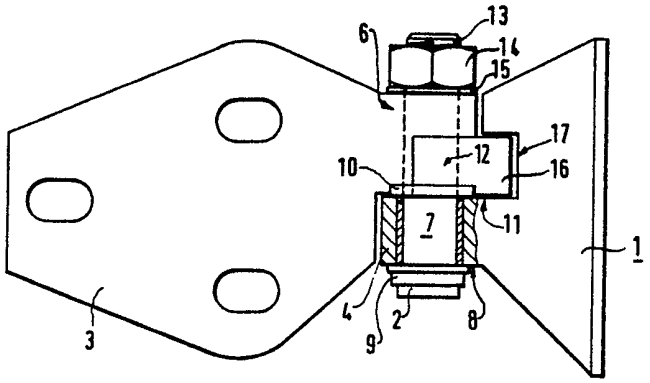
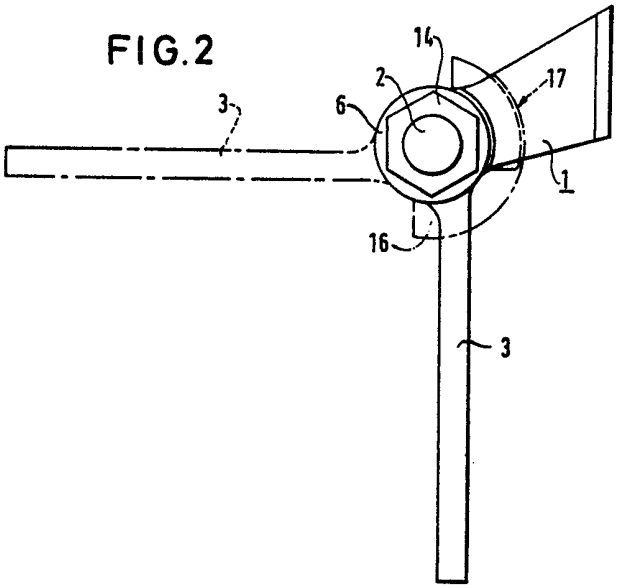


FIG.2



GB 2 147 942 A

2147942

FIG.1

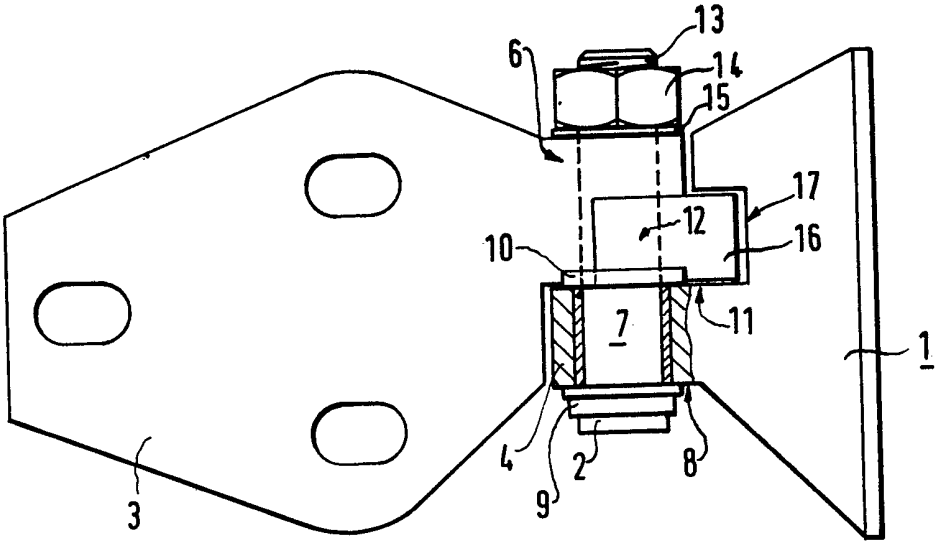


FIG.2

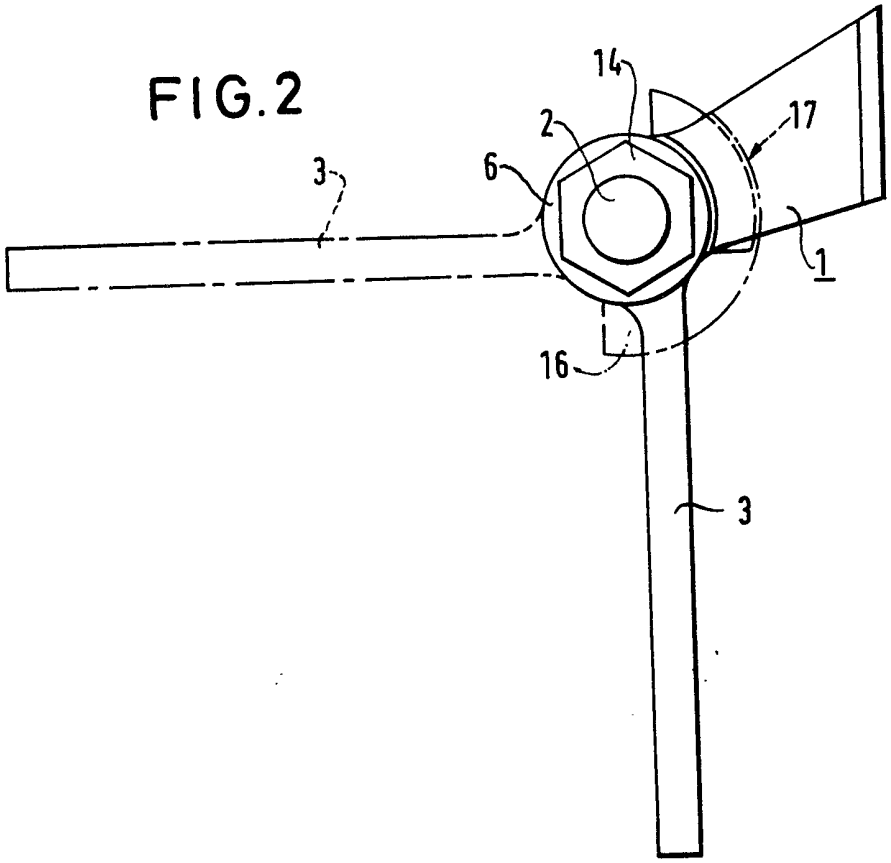


FIG. 3

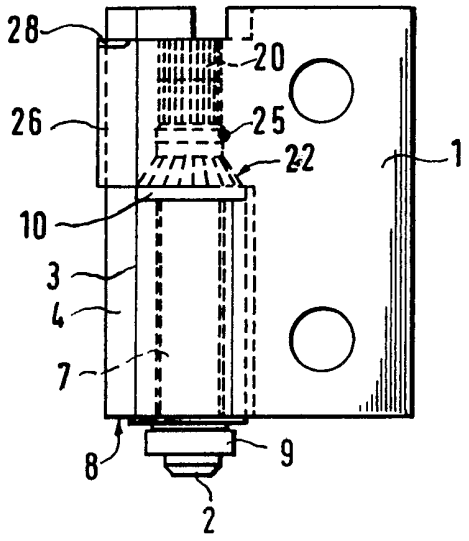


FIG. 4

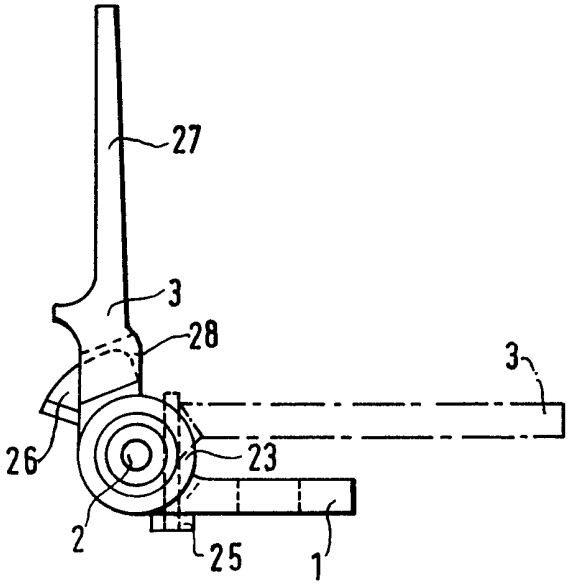


FIG. 5

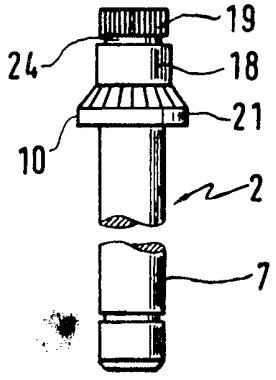


FIG. 6

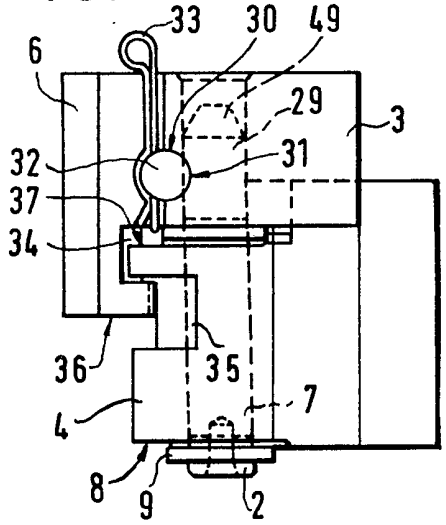


FIG.7

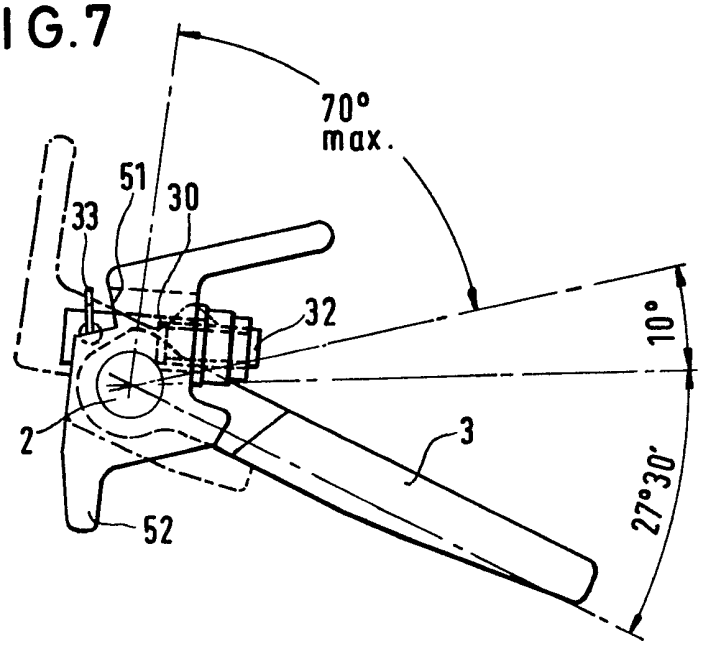
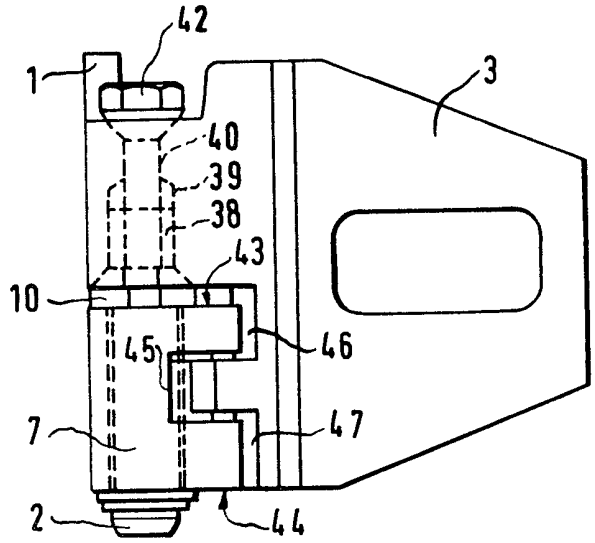


FIG.8



SPECIFICATION

Improvements in hinges

In modern automobile manufacture, separable leaf hinges are increasingly used in order to enable the doors to be fitted and adjusted while the bodywork is still in an unfinished state. Such a hinge may have a first hinge part which may be lifted off the hinge pin which is held fast in the second hinge part. This simplifies and speeds up in the internal fitting out of the automobile, the doors being removed before the fitting out operation commences and being replaced when installation of the internal fittings is completed. A problem peculiar to separable hinges lies in the way in which the relative positions of the two hinge parts are maintained when the automobile door is mounted. The hinge pin may be clamped in the second of the two hinge parts by some form of connection, and if this should become loosened or disengaged, this can lead to the automobile door becoming unhinged and thus to serious accidents.

The hinge described hereinafter by way of example can be manufactured at low cost from continuous hinge profiles. Its two hinge parts can easily be connected together when hanging the door and then be secured against independent complete separation, and wherein furthermore the advantages in assembly of a clamped or form-fitting connection between hinge pin and second hinge part are retained. One aspect of the hinge is that the portion of the hinge pin engaging into the hinge eye of the first, removable hinge part has (apart from a short chamfered or rounded end zone and possibly an indentation or recess transverse to its axial direction) a smooth cylindrical circumferential surface. Another, independent, aspect is that, in addition to the pin being secured in the second hinge part by a force transmitting or form-fitting connection, the hinge parts are secured, through the operating angle range of the hinge, against axially oriented relative movements between hinge pin and second hinge part by means of depressions and projections disposed alternately on the two hinge parts and oriented radially to the hinge axis. A further independent aspect of the present proposal is the use of an emergency lock device to prevent accidental separation of the hinge parts.

These, and various other independent, distinct and separate aspects of the present proposal will appear from the claims which follow.

The connection between hinge pin and second hinge part which holds the hinge in its normal operating position when the automobile door is hung is here secured, under the prescribed assembly and operating conditions, by force-transmitting or form-fitting connecting means between the second hinge part and the hinge pin. Use may be made of a safety device which takes the form of a bayonet connection and consists of projections and recesses disposed alternately on the two hinge parts. This device serves in an emergency to prevent the automobile door falling off in the event that the securing means which normally acts in force-transmitting or form-fitting manner becomes disengaged, for example as a consequence of incorrect installation after a repair to the automobile.

The proposed hinge can have various alternative constructions:

In a first embodiment, the hinge pin is rotatably journalled in the first hinge part by a bearing bushing of maintenance-free bearing material and is secured against movement in an axial direction on the one hand by a safety washer bearing against the lower end face of the hinge eye of the first hinge part and on the other hand by a radially projecting shoulder or flange bearing upon the upper end face of this hinge eye. The hinge pin penetrates through the hinge eye of the second, removable hinge part, which is tightened in the axial direction onto a threaded end of the hinge pin by a threaded nut, and thereby secured against separating of the hinge in the axial direction. In order to prevent the hinge from falling apart if the threaded nut should become loosened, a mutual bayonet lock is provided which is effective through the operating pivot angle range of the hinge. The lock has a radially oriented projection, possible a moulded part adjoined to the hinge eye of the second hinge part and a correspondingly formed recess, U-shaped in plan, in the hinge profile head or leaf zone and which acts, in accordance with its design, as an emergency securing device.

Alternatively, the hinge pin may be journalled and secured in the first hinge part in the same manner as discussed above, and a further portion of the hinge pin engages in the hinge eye bore of the hinge eye of the second hinge part. The hinge pin is connected, in this region, by form-fitting means in the circumferential direction with the hinge eye of the second hinge part. To this end, use may be made of knurling or conical teeth, or both measures may be employed in combination, or a transverse pin may be inserted into the hinge eye transversely to the hinge axis. For example, a screw bolt or the like may be used which extends generally tangentially and touches the hinge pin, engaging into a corresponding peripheral groove of the hinge pin. If a transverse pin is provided, which passes through a transverse bore in the hinge eye of the second half-hinge and engages into a radially oriented recess of the hinge pin having the shape of part of a circle and which is secured in its assembled position, then a bayonet lock of the two hinge parts active through the operating pivot angle range of the

hinge, serves as the emergency locking device, the two hinge parts being manufactured from continuous hinge profiles and being furnished, in the head zone, alternately with projections and depressions, which constitute a bayonet locking of the two hinge parts at least over the operating pivot angle range of the hinge.

Yet again, the hinge pin may engage only over a portion of its height and with a radial clearance in the hinge eye of the second hinge part. For securing the second hinge part in its position corresponding to the hung hinge, a screw bolt is provided, which engages with a threaded portion into a blind bore in the hinge pin and bears with its head on the outer end face of the hinge eye of the second hinge part. The hinge eye of the second hinge part is thereby tightened onto the radially projecting shoulder of the hinge pin. An emergency securing device against unintentional separation of the two hinge parts is formed by a bayonet locking device which is constituted by a recess disposed alternately on the head zones of the hinge profiles of both hinge parts and is disposed in a symmetrical arrangement along the height of the hinge eye of the first hinge part.

To simplify manufacture of the door hinge and bayonet lock of the two hinge parts, both the parts may consist of portions of hinge profiles furnished, in the region of the head portion of the hinge profile, reciprocally with recesses disposed at equal distances from the upper and lower edges of the relevant hinge part and oriented transversely to the profile axis of the head portion of the hinge profile. This has the advantage that the means for mutually locking the two hinge parts over the operating pivot angle range of the door hinge can be manufactured by simply cutting-out from a continuous hinge profile. Here, beading or strip projections oriented radially to the hinge axis may be disposed on the hinge profiles constituting the two parts, one projection constituting an opening limiting stop for the door hinge and the other constituting a part of the bayonet locking of the two hinge parts. The beading projection and the strip projections are each left in place or cut away respectively over equal portions of the total height of the hinge. Furthermore, the hinge profile constituting the one unhingeable hinge part is cut away, in its head portion, from the base of its radially oriented recess as far as the lower edge of the hinge part by a partial amount.

The above explained constructions are each representative for one category of forms of embodiment. The present proposal therefore also contemplates that differently shaped form-fitting or force-transmitting connections of the hinge eye of the second hinge part with thehinge pin may be combined with differently formed and arranged emergency locking devices for the two hinge parts. In particular, the emergency locking device can also be formed by a part which engages over the hinge eye of the second unhingeable hinge part through the operating pivot angle range of the hinge, for example by a projection on the first hinge part or a part to be connected especially with this hinge part.

In the drawings:

Figure 1 is a side view of a separable hinge having an axially acting connection between the second hinge part and the hinge pin and an emergency securing device;

Figure 2 is a plan view of the hinge shown in Fig. 1;

Figure 3 is a side view of a separable hinge having a radially acting connection between th hinge eye of the second hinge part and the hinge pin and an emergency securing device;

Figure 4 is a plan view of the hinge shown in Fig. 3;

Figure 5 is a detailed view of the hinge pin for a separable hinge according to Figs. 3 and 4;

Figure 6 is a side view of another separable hinge having a radially acting connection between the hinge eye of the second hinge part and the hinge pin and an emergency securing device;

Figure 7 is a plan view of the hinge shown in Fig. 6;

Figure 8 is a side view of a separable hinge having an axially acting connection between the second hinge part and the hinge pin and an emergency securing device.

Referring to Figs. 1 and 2, a separable hinge comprises a first hinge part in the form of a leaf 1, capable of being fixed to a door assembly component, not shown in the drawing, and a second hinge part in the form of a leaf 3, capable of being fixed to the other door assembly component, also not shown, and a hinge pin 2 passing through hinge eyes 4 and 5 in the parts 1 and 3, respectively. A cylindrical portion 7 of the pin disposed within the eye 4 is journalled in a bushing of bearing material. The hinge pin is secured against movement in one axial direction by means of a securing device 9 including a washer which bears against the lower, external surface or edge 8 of the hinge eye 4. The hinge pin 2 is likewise secured against movement in the opposite axial direction by means of a shoulder or washer 10, which bears against the other end face or edge 11 of the hinge eye 4. The portion of the pin which penetrates into the hinge eye 5 has a smooth, cylindrical circumferential surface 12. Adjoining the surface 12, the pin has a screw threaded end portion 13, onto which a threaded nut 14 is screwed. The nut 14 bears against the eye 5 by way of an optional spacer washer 15, and tightens the hinge part 3 onto the shoulder 10 of the hinge pin 2, and thus secures the two parts 1 and 3 in

their desired positions when the hinge is hung. To prevent unintentional separation of the hinge parts, an emergency lock device is arranged to act over its operating pivot angle range and is formed in the manner of a bayonet lock. This device consists of a projection 16 which extends radially beyond the hinge eye 6 of the part 3, and received in a cut-out in the head zone of the hinge leaf profile of the first hinge part 1. The projection may be formed either by cutting the hinge part out from a continuous hinge profile equipped with a beading projection or by a separate component fitted onto the hinge eye 6.

The projection is generally segment shaped in plan and the cut-out is generally U-shaped in plan view.

In the embodiment illustrated in Figs. 3, 4 and 5, the hinge pin 2 is journalled in the hinge eye 4 of the first hinge part in the way way as shown in Figs. 1 and 2. The upper portion 18 of the pin which penetrates into the hinge eye 6 of the second hinge part 3 has a circumferential knurling 19 to provide a form-fitting and possibly force-transmitting connection with a corresponding counter profiling 20 in the hinge eye 6 of the second hinge part 3. Instead of or in addition to the knurling 19, the upper portion of the pin may have a set of splines 21 adjoining the radially projecting shoulder 10 of the hinge pin. Alternatively the splines may be disposed at the end zone of the hinge pin. Complementary splines 22 are formed in the hinge eye 6 of the second hinge part 3. In the axial direction, the connection between hinge pin 2 and hinge eye 6 is formed by a screw 25, passing through a transverse bore 23 in the hinge eye 6 of the second hinge part 3 and engaging into a circumfrential groove 24 of the hinge pin 2. An emergency locking device for the two hinge parts 1 and 3, to prevent the hinge from falling apart if the screw 25 becomes loosened, consists of a projection 26 somewhat segment-shaped in plan, projecting radially beyond the hinge eye 6 of the second hinge part 3, in the head zone of the hinge profile of the first hinge part 1 and received in a cut-out 28 in the second hinge part 3, and oriented towards the hinge leaf 27. The device is disposed as a whole in the region of the upper hinge eye 6, associated with the second removable hinge part 3.

In the embodiment according to Figs. 6 and 7, the portion of the pin which penetrates into the hinge eye 5 has a smooth, cylindrical circumferential surface 12. The smooth, cylindrical circumferential surface of the upper portion 29 of the hinge pin is adjoined by a rounded head zone 49, which serves for facilitating the insertion of the hinge pin 2 into the smooth, cylindrical internal surface of the hinge eye 6 of the hinge part 3. The pin is made fast in the part 3 and the hinge pin 2 by means of a tightening pin 32, which engages into a peripheral recess 31 of the hinge pin 2. This connection between the part 3 and the hinge pin 2 can, however, be made in any other appropriate manner.

The two hinge parts 1 and 3 are each formed from a portion of a continuous hinge profile and, for making a bayonet lock between them, are furnished over an operating pivot angle range of the hinge reciprocally with cut-outs 34 and 35 oriented radially to the head portion of the associated hinge profile. Here, the cutout 34 in the removable upper hinge part 3 is at the same distance from the lower edge 36 of the hinge part 3 as the cut-out 35 in the other half-hinge is from the upper edge 37 of the hinge eye 4. The hinge profile constituting the other hinge part 1 has a beading projection 51 extending radially of the hinge axis, while the head portion of hinge profile the part 3 has a strip projection 52. The strip projection 52 constitutes an opening limiting stop for the door hinge and is left in place over a certain part of the height of the hinge eye 5, but elsewhere is cut away from the head portion of the hinge profile of the part 3. Conversely, the beading projection 51, constituting a part of the reciprocal bayonet lock for the two parts, of the hinge profile which forms the other of the unremoved portion of the strip projection 52 of the hinge profile of the removable hinge part. This results in a corresponding increase in the height of the cut-out 35. Furthermore, the head portion of the hinge profile constituting the removable hinge part 3 is cut away from the base of its radially oriented cut-out 34 as far as the lower edge 19 of the part 3 by a partial amount. In the embodiment shown in Fig. 8, the hinge pin 2, journalled and fixed in the manner shown in the hinge eye 4 of the part 1, has a short shank portion 39, engaging with radial clearance into a hinge eye bore 38 of the hinge eye 6 of the second part 3. The hinge eye 6 of the second part 3 is here connected with the hinge pin 3 by a threaded bolt 42, engaging into an axial bore 41 of the hinge pin 2. The threaded bolt 42 presses the hinge eye 6 onto the radially projecting shoulder 10 of the hinge pin 2. The emergency locking of the two separatable parts 1 and 3 through the operating pivot angle range of the hinge is disposed symmetrically to the height of the hinge eye 4 of the first part 1, and consists of a cut-out 45, disposed at equal distances from the upper face 43 and lower face 44 of the hinge eye 4 in the head region of the hinge profile of the part 1, and of two cut-outs 46 and 47, disposed in the head region of the hinge profile of the part 3, of which the one cut-out 46 is open towards the parting plane of the hinge and the other 47 towards the lower side of the hinge. As can be seen especially from the side views of the individual forms of

realization, the form-fitting bayonet lock of the two parts 1 and 3 serves only as emergency locking, and therefore a reciprocal bearing of the components of the bayonet lock upon each other when the hinge is in the normal operating position can be dispensed with, so that the maintenane of close tolerance or special surface qualities is unnecessary. Indeed, the parts of the bayonet lock can mesh with one another with very coarse clearance.

CLAIMS

1. A separable hinge for a vehicle door comprising first and second interarticularted hinge parts having respective hinge eyes through which passes a hinge pin which is journalled in a bushing of bearing material in the hinge eye of the first part but is secured against axial movement relative thereto, the hinge parts having cooperable projections or projections and depressions which interengage to prevent relative axial separation of the hinge parts within a predetermined pivot angle corresponding to the normal opening angle of the hinge, the surface of that portion of the hinge pin which is received non-rotatably within the eye of the second hinge part having a smooth, cylindrical, circumferential surface with the possible exceptions of a tapered or rounded tip and a recess extending transversely to the axis of the pin.

2. A hinge according to claim 1, wherein the hinge parts are secured against relative axial movements between the hinge pin and second hinge part by recesses and projections, disposed in complementary manner, oriented radially to the hinge axis on both hinge parts.

3. A separable hinge for a vehicle door comprising first and second hinge parts articulated together by a hinge pin passing through eyes of both parts, the first part being removable from the pin and the second being fast therewith, the two hinge parts consisting of portions of hinge profiles and being furnished, in the region of the head portion of the hinge profile, in complementary manner with cut-outs oriented transversely to the profile axis of the head portion of the hinge profile and disposed at equal distances from the upper edge and lower edge of the hinge part, the mutually facing surfaces of the cut-outs and projections disposed in complementary manner on the two hinge parts being left unfinished and having large axial clearance.

4. A hinge according to claim 3, wherein each hinge part has a projection extending radially of the hinge axis, one of which projections constitutes a stop for limiting the opening angle of the hinge, and the other of which constitutes part of an arrangement for interlocking the hinge parts.

5. A hinge according to claim 4, wherein the projections are integral with the hinge profile and are left in place and cut away respectively over equal heights.

6. A hinge according to any of claims 3 to 5, wherein the hinge profile of one hinge part is cut away from the base of its cut-out to the lower edge of the hinge by a partial amount.

7. A separable hinge for a vehicle door comprising first and second hinge parts articulated together by a hinge pin passing through eyes of both parts, the first part being removable from the pin and the second being fast therewith, the hinge eye of the second hinge part being held under axial pressure by means of a screw connection at the hinge pin, an emergency lock for the two parts being formed of a radially extending projection of the hinge eye of the second hinge part and of a cut-out in the first hinge part, and being disposed in the vicinity of the level of the hinge eye of the second hinge part.

8. A separable hinge for a vehicle door comprising first and second hinge parts articulated together by a hinge pin passing through eyes of both parts, the first part being removable from the pin and the second being fast therewith, the hinge eye of the second hinge part being connected with the hinge pin by means of an axially extending bolt, an emergency lock being formed by cut-outs disposed in complementary manner in the head region of the hinge profiles of the first and second hinge parts, the cut-outs being disposed symmetrically with respect to the height of the hinge eye of the first hinge part.

9. A separable hinge for a vehicle door comprising first and second hinge parts articulated together by a hinge pin passing through eyes of both parts, the first part being removable from the pin and the second being fast therewith, the hinge eye of the second hinge part being connected with the hinge pin by a radially oriented fixing means, screw or transverse pin, an emergency lock being formed by a cut-out each in the head region of the hinge profiles of the two hinge parts, and disposed as a whole in the upper region of the hinge eye of the first hinge part.

10. A separable hinge for a vehicle door comprising first and second hinge parts articulated together by a hinge pin passing through eyes of both parts, the first part being removable from the pin and the second being fast therewith, the hinge eye of the second hinge part being connected with the hinge pin by a radially oriented or axially acting fixing means or a clamped connection, the emergency lock being formed by a projection, generally segment-shaped in plan, of the hinge profile of the first hinge part in conjunction with a cut-out in the head region of the hinge profile of the second hinge part, and being disposed as a whole in the region of the hinge eye of the unhingeable hinge part.

11. A hinge substantially as hereinbefore described with reference to an as illustrated in the drawings.

12. A separable hinge comprising first and second hinge parts and a pin clamped in an eye of the second part, and an emergency lock device operative to prevent accidental separation of the hinge parts.

Printed in the United Kingdom for
Her Majesty's Stationery Office, Dd 8818935, 1985, 4235.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.