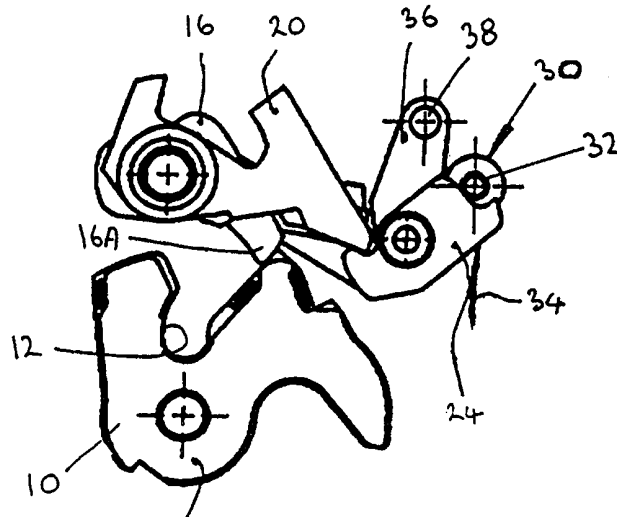




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: VEHICLE DOOR LATCH



## (57) Abstract

A vehicle door latch assembly including a pivotally mounted latch claw (10) having a mouth operatively co-acting with a striker as the door nears its closed position, a latching pawl (16) self-engaging with the claw to hold it in a latched condition retaining the door, and unlatching means selectively operable to disengage the latching pawl for opening the door; characterised in that the unlatching means comprises a pawl lifter (20) movable from a position of rest to carry the latching pawl out of engagement with the claw, a power output member (24) movable to engage and displace the pawl lifter from said position of rest, an input member (30) power actuated between first and second positions, clutch means (28, 32) releasably drive connecting the input member to the output member to cause shifting of the latter as the input member moves to its second position, and an overriding element (36) carrying the clutch means into and out of drive connection, said overriding element being operatively coupled to the pawl to ensure that manual operation of the pawl lifter is not obstructed by failure or malfunction of power actuation of the input member.

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## VEHICLE DOOR LATCH

This invention relates to latches for vehicle doors, particularly for light passenger and goods vehicles.

Powered locking and powered latching of doors is becoming more favoured, both as part of central locking systems, and to enable more effective weathersealing of doors and greater freedom in styling and design. There are also advantages in providing for power actuated unlatching of doors in terms of dispensing with much of the mechanical linkage and components needed for conventional manual inside and outside door handles, and in providing unitary lock and latch modules of standard form which can be speedily installed in doors of a wide range of vehicle models and types without special adaptation.

An example of the provision of power closing is described and claimed in our co-pending patent application GB 9710602.5 dated 23rd May 1997, and the present invention may conveniently be combined with that construction if desired.

The object of the invention is to provide improvements in vehicle door latch assemblies, in particular the provision of latches having a power unlatching facility in an economical, effective and reliable form.

According to the invention there is provided a vehicle door latch assembly including a pivotally mounted latch claw having a mouth operatively co-acting with a striker as the door nears its closed position, a latching pawl self-engaging with the claw to hold it in a latched condition retaining the door, and unlatching means selectively operable to disengage the latching pawl for opening the door: characterised in that the unlatching means comprises a pawl lifter movable from a position of rest to carry the latching pawl out of engagement with the claw, a power output member movable to engage and displace the pawl lifter from said position of rest, an input member power actuated between first and second positions, clutch means releasably drive connecting the input member to the output member to cause shifting of the latter as the input member moves to its second position, and an overriding element carrying the clutch means into and out of drive connection, said overriding element being operatively coupled to the pawl to ensure that manual operation of the pawl lifter is not obstructed by failure or malfunction of power actuation of the input member.

Preferably a cam surface of the claw acts on the pawl when the claw is in the open position to operatively couple the overriding element and pawl.

According to a further aspect of the present invention there is provided a vehicle door latch assembly including a pivotally mounted latch claw having a mouth operatively co-acting with a striker as the door nears its closed position, a latching pawl self-engaging with the claw to hold it in a latched condition retaining the door, and unlatching means selectively operable to disengage the

latching pawl for opening the door: characterised in that the unlatching means comprises a pawl lifter movable from a position of rest to carry the latching pawl out of engagement with the claw, a power output member movable to engage and displace the pawl lifter from said position of rest, an input member power actuated between first and second positions, clutch means releasably drive connecting the input member to the output member to cause shifting of the latter as the input member moves to its second position, and an overriding element carrying the clutch means into and out of drive connection, said overriding element including a surface acting in co-operation with a surface of the claw to ensure that manual operation of the pawl lifter is not obstructed by failure or malfunction of power actuation of the input member.

The output member is conveniently a power release lever having an arm positioned for engagement with the pawl lifter and a second arm provided with a drive formation forming a first element of the clutch means.

The input member may be a crank element coupled to an electric or other power actuator for angular movement and carrying a drive formation forming a second element of the clutch means, the pivot of the crank element being carried on the overriding element which is shifted on manual operation of the release means to move the crank element in a direction disengaging said drive formations of the clutch means.

An example of the invention is now more particularly described with reference to the accompanying drawings in which:

Fig. 1 is a diagram of power unlatching parts of a vehicle door latch assembly in an engaged rest position with some parts not relevant to the invention removed for clarity,

Fig. 2 is a like diagram showing the parts during a power unlatching operation,

Fig. 3 is a like diagram with the parts in a power open position, and

Fig. 4 is a perspective view of the vehicle door latch assembly of figure 1.

Referring firstly to Fig. 1, the latch assembly, which will be operatively secured in a door (not shown) in known manner, includes a conventional rotating latch claw 10 having a mouth 12 for coacting with a striker (not shown) operatively mounted to the associated door post. Claw 10 is biased by a claw spring (not shown) in an anticlockwise direction. A pawl tooth 16A of a latching pawl 16 self engages with the claw in known manner to retain it, and hence the door, releasably at a first safety position at which the door is near closed, and an inner position shown in figure 1 at which the door is fully shut.

The assembly may include powered closing/latching of the door as described in our said co-pending patent application.

Unlatching means includes a pawl lifter 20 in the form of a lever pivoted co-axially with pawl 16 which engages the latter when angularly displaced from its position of rest shown in figure 1, so causing disengagement of pawl 16 from claw 10 to free the door for opening. Manually operable release means (not shown) acts on arm 20A of pawl lifter 20 via a lock link (not shown) to rotate pawl lifter 20 to unlatch the door.

An output member in the form of a power release lever 24, best seen in Figure 4, is fulcrummed on a fixed pivot whose axis is parallel to the claw axis. Its left-hand arm 26 is positioned to engage the lower face of a rightward extension 20B of pawl lifter 20 so that when it is turned clockwise it displaces lifter 20 and so causes disengagement of pawl 16 independently of the manually operable release means. The right hand arm of lever 24 terminates in a drive formation in the form of a shoulder 28.

An input member in the form of a crank 30 extending alongside said righthand arm has a drive pin 32 which, is engagable with shoulder 28 so that clockwise angular movement of crank 30 is transmitted to lever 24 (see figures 1 and 2). An electric actuator motor (not shown) is coupled to crank 30 by a vertical power drive link 34, selectively operable to power crank 30.

Crank 30 is pivoted on the lower end of a swinging overriding element 36, the upper end of which is mounted on a fixed pivot 38 in spaced parallel relationship to the axis of release lever 24. In the angular position shown in Figs.

1, 2 and 4 the pivot axes of crank 30 and lever 24 are substantially co-incident, so maintaining the clutch means constituted by shoulder 28 and pin 32 in drive engagement.

The lower end of element 36 includes a camming formation 40 (Fig. 4) which co-acts with a ramp 42 on the pawl 16. If there should be any malfunction of the power unlatching actuator or associated parts e.g. due to a flat battery or the actuator jamming in an open, closed or intermediate position, which might block the latching/unlatching functions, operation of the manually operable release means will result in anticlockwise rotation of pawl 16, causing ramp 42 to push formation 40 to the right. This displaces crank 30 to the right in relation to release lever 24 so declutching pin 32 from shoulder 28 and freeing the release lever 24 so that it cannot interfere with actuation of pawl lifter 20 by means of the manual operable release means.

A release lever spring (not shown) on release lever 24 provides a force urging anticlockwise rotation of release lever 24 relative to overriding element 36 to return the release lever to the position shown in figure 3.

A spring (not shown) on overriding element 36 provides a restoring force urging re-engagement of pin 32 and shoulder 28 when power actuation is restored or reset.

Power operation of the latch is as follows:-

- 1) Figure 1 shows the latch in a closed position. Movement of the drive link 34 vertically downwards causes clockwise rotation of release lever 24 and anticlockwise rotation of pawl lifter 20 from an engaged position (see fig 1) to a first release position (see fig 2) resulting in the pawl 16 disengaging the claw notch.
  
- 2) The claw spring then rotates the claw 10 anticlockwise to an open position (see fig 3) wherein a cam surface 10A of claw 10 contacts the pawl tooth 16A to rotate the pawl further anticlockwise to a second release position (see fig 3). When the pawl moves from the first release position to the second release position the ramp 42 pushes formation 40 to the right to disengage pin 32 from shoulder 28 wherein release lever 24 returns to its rest position under the action of the release lever spring (not shown). Thus even if the power actuator then malfunctions and remains in its release position as shown in figure 3 the door can still subsequently be correctly latched with full engagement of the pawl tooth 16A with the claw notch and also manually unlatched.

It should be noted that release of the clutch means is effected independently of the manually operable release means.

Also when the claw is moved to its open position (either by manual or power release) the release lever will return to its rest position (see fig 3) independently from the subsequent operation of the manually operable release means or the power actuator.

Thus manual operation of both door latching and unlatching is ensured regardless of any failure or malfunction of the power unlatching eg the power unlatching mechanism remaining in a latched, unlatched or intermediate condition.

## CLAIMS

1. A vehicle door latch assembly including a pivotally mounted latch claw having a mouth operatively co-acting with a striker as the door nears its closed position, a latching pawl self-engaging with the claw to hold it in a latched condition retaining the door, and unlatching means selectively operable to disengage the latching pawl for opening the door: characterised in that the unlatching means comprises a pawl lifter movable from a position of rest to carry the latching pawl out of engagement with the claw, a power output member movable to engage and displace the pawl lifter from said position of rest, an input member power actuated between first and second positions, clutch means releasably drive connecting the input member to the output member to cause shifting of the latter as the input member moves to its second position, and an overriding element carrying the clutch means into and out of drive connection, said overriding element being operatively coupled to the pawl to ensure that manual operation of the pawl lifter is not obstructed by failure or malfunction of power actuation of the input member.
2. A latch assembly as defined in Claim 1 characterised in that the power output member is a power release lever mounted by a first pivot, having a first arm positioned for engagement with the pawl lifter, and a second arm provided with a drive formation forming an element of the clutch means.
3. A latch assembly as defined in Claim 1 or 2 characterised in that the input member is a crank element mounted by a second pivot and having an arm provided with a drive formation forming an element of the clutch means.

4. A latch assembly as defined in Claim 3 so far as dependent on Claim 2 characterised in that the second arm of the release lever and said arm of the crank element are in generally face to face relationship, their distal end parts being provided with the co-acting drive formations of the clutch means.

5. A latch assembly as defined in Claim 4 characterised in that one of said drive formations is a pin and the other of said formations is a notch.

6. A latch assembly as defined in Claim 5 characterised in that the second pivot is displaceable to shift the crank element from a position where the notch and pin are engaged to a position where they are disengaged.

7. A latch assembly as defined in Claim 6 characterised in that the second pivot is mounted on the overriding element.

8. A latch assembly as in Claim 7 characterised in that the overriding element is in the form of a link mounted by a third pivot.

9. A latch assembly as defined in Claim 3 or Claims 4 to 8 when dependent upon Claim 3 in which the overriding element is shifted on manual operation of the unlatching means to move the crank element in a direction disengaging said drive formation of the clutch means.

10. A latch assembly as defined in any preceding claim characterised in that the overriding element is operatively acted on by the pawl

through a camming formation on at least one of the overriding element or that portion of the pawl contacted by the overriding element.

11. A latch assembly as defined in any preceding claim characterised in the overriding element is resiliently biased to the position at which the clutch means is engaged.

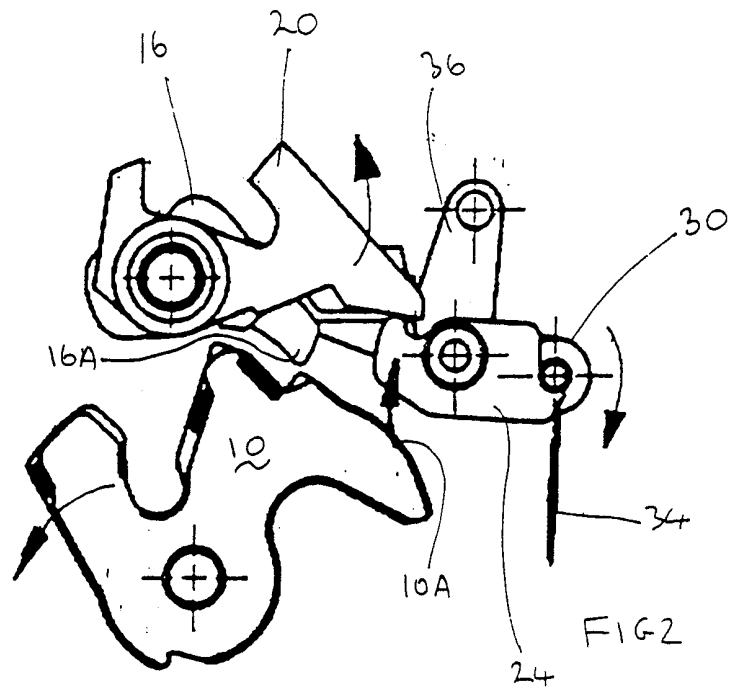
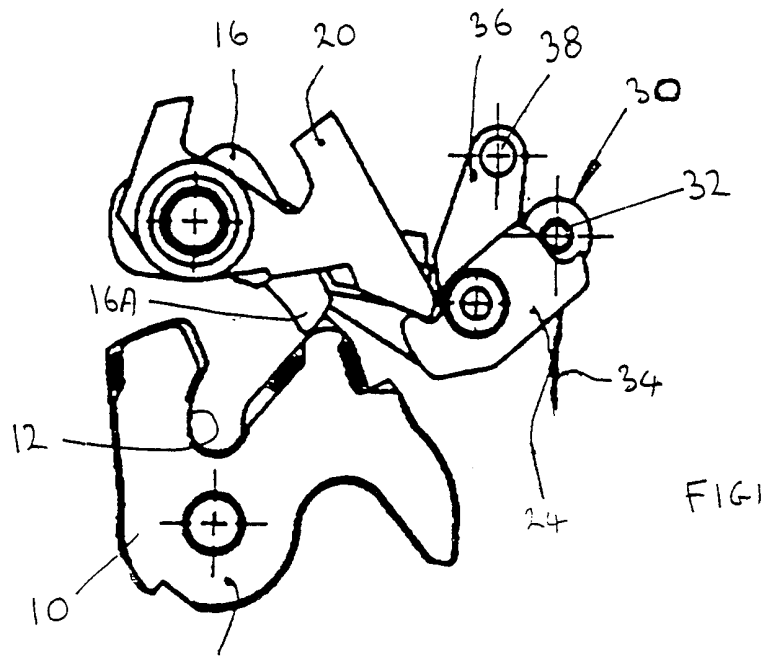
12. A vehicle door latch assembly as defined in any preceding claim in which a cam surface of the claw acts on the pawl when the claw is in the open position to operatively couple the overriding element and pawl.

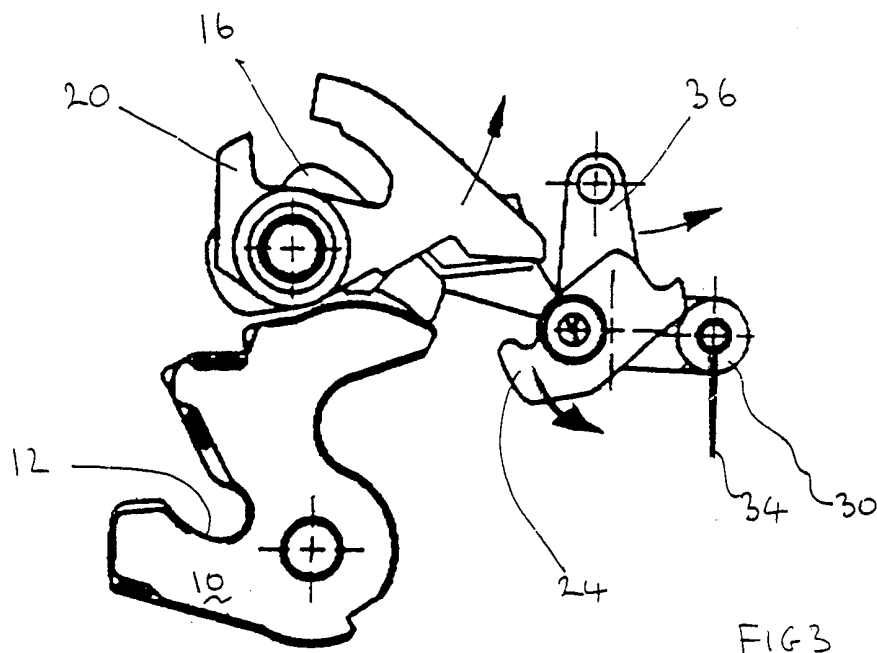
13. A vehicle door latch assembly including a pivotally mounted latch claw having a mouth operatively co-acting with a striker as the door nears its closed position, a latching pawl self-engaging with the claw to hold it in a latched condition retaining the door, and in latching means selectively operable to disengage the latching pawl for opening the door; characterised in that the unlatching means comprises a pawl lifter movable from a position of rest to carry the latching pawl out of engagement with the claw, a power output member movable to engage and displace the pawl lifter from said position of rest, an input member power actuated between first and second positions, clutch means releasably drive connecting the input member to the output member to cause shifting of the latter as the input member moves to its second position, and an overriding element carrying the clutch means into and out of drive connection, said overriding element including a surface acting in co-operation with a surface of the claw to ensure that manual operation of the pawl lifter is not obstructed by failure or malfunction of power actuation of the input member.

14. A vehicle door latch assembly substantially as hereinbefore

described with reference to or as shown in figures 1-3 of the accompanying drawings.

15. A vehicle including a latch assembly as in any preceding claim.





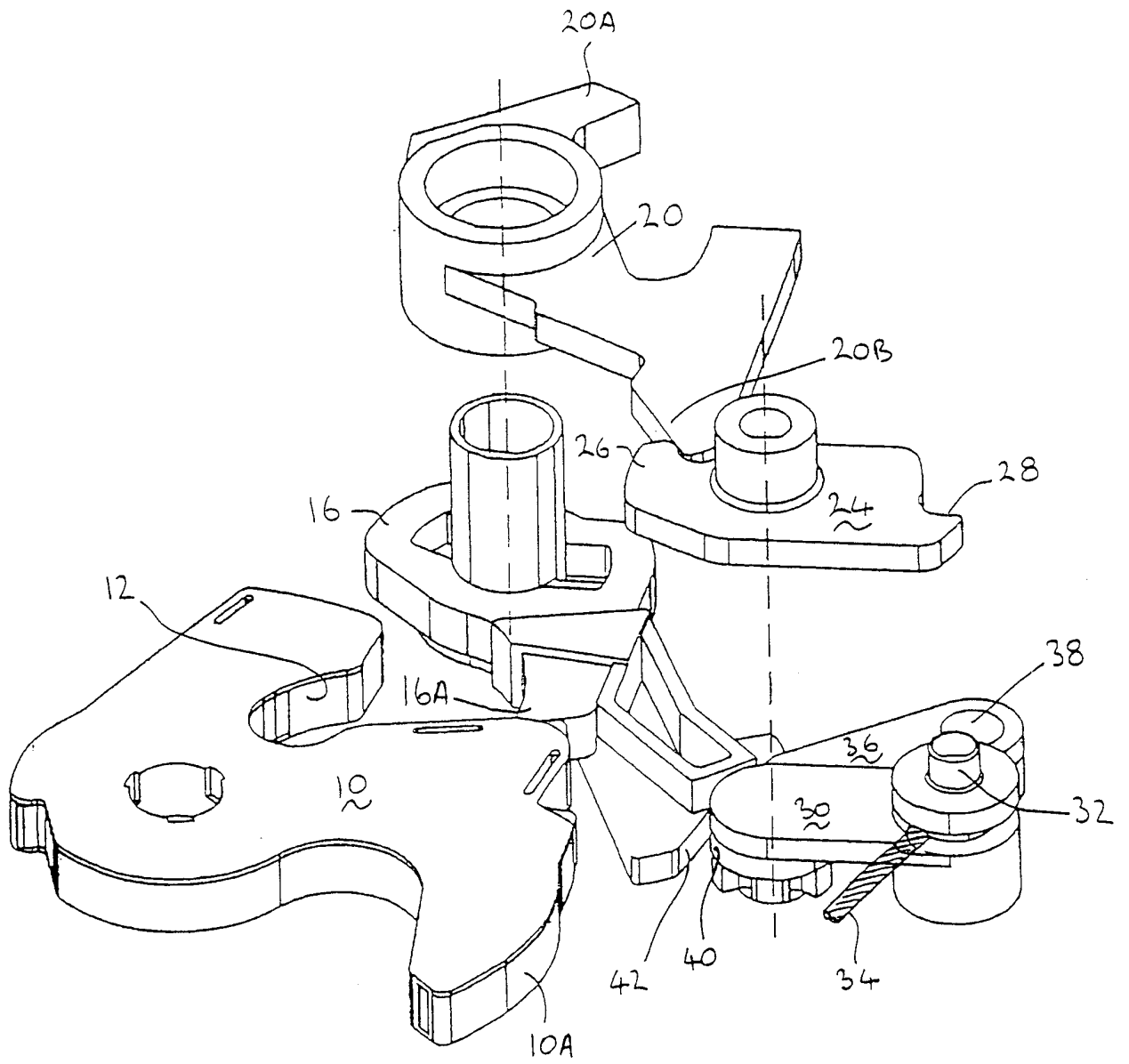


FIG. 4.

# INTERNATIONAL SEARCH REPORT

International Application No

PC./GB 99/02092

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 E05B47/00 E05B65/20

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 195 05 779 A (BOMORO BOCKLENBERG & MOTTE GMBH & CO KG) 29 August 1996 (1996-08-29) the whole document -----	1, 13, 15
A	EP 0 106 725 A (VACHETTE) 25 April 1984 (1984-04-25) page 7, paragraphs 1,2 -----	1, 13, 15
A	EP 0 812 972 A (VALEO SYSTEMES DE FERMETURES) 17 December 1997 (1997-12-17) the whole document -----	1, 13, 15

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Patent family members are listed in annex.

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5 November 1999

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Information on patent family members

International Application No

PCT/GB 99/02092

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