(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 309 239**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **88308786.8**

(22) Date of filing: **22.09.88**

(51) Int. Cl.[4]: **E 05 B 65/08**
E 05 B 65/20

(30) Priority: **25.09.87 GB 8722550**

(43) Date of publication of application:
29.03.89 Bulletin 89/13

(84) Designated Contracting States:
AT BE CH DE ES FR GR IT LI LU NL SE

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(54) Door mechanisms.

(57) A door mounted to slide across an opening in a structure (for example, a vehicle body) has a handle(11) pivotally, or slidably, mounted on the door and biassed to a central position by springs (18, 19) acting on an arm (14). Movement of the handle in one direction (to open the door) causes release of the door latch by the arm (14) pulling a rod(20) and operating a pivoted lever (24) and an operating rod (25). Simultaneously, a connecting rod (29) is pushed, rotating a lever (28) to open a second latch (27) for securing the door in an open position. Continued applioation of force to the handle (11) in the same sense draws the door across the opening to latch it in an open position.

Pivoting of the handle (11) in the opposite direction causes the arm (14) to push the rod (20) and lever (24) pulling the connecting rod (29) and rotating the lever (28) to release the second latch (27). The operating rod (25) does not move because of a lost motion connection (26) with the lever(24). Continued application of force to the handle 11 draws the door back across the opening to latch it in the closed position. The latches may also be operated by a handle (31) of the second latch (27) inside the vehicle.

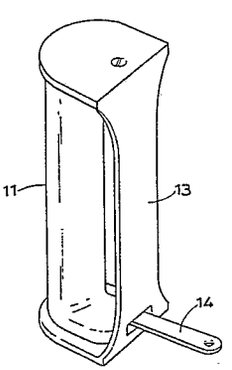

FIG 3.

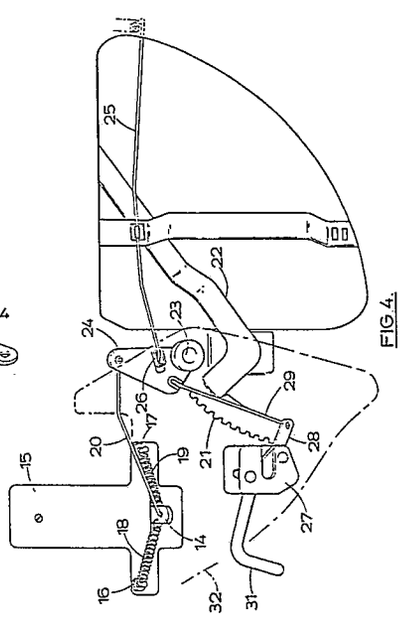

FIG 4.

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Description

DOOR MECHANISMS

This invention relates to a handle and mechanism for the release of a latch retaining a closure member in a position in which it closes an opening in a structure, wherein the closure member is movable to and fro across the opening and may, additionally, be movable into and out of the opening. Such a closure member is hereinafter referred to as "a closure member of the type described".

An example of a closure member of the type described, a corresponding structure and an opening therein is provided by a vehicle having a door opening and a door slidable to and fro across the opening. The door may be movable into and out of the opening as well as across it. The door and the vehicle at the opening are provided with co-operating latch components for retaining the door in its closed position across, or across and in, the opening. Interior and exterior handles are provided whereby the latch may be released from inside or outside the vehicle to enable the door to be opened.

According to a first aspect of the present invention there is provided a closure member which in use closes an opening in a structure and is movable to and fro across the opening, and may also be movable into and out of the opening, has a latch releasably engageable with a latch member on or adapted to be mounted on, the structure to retain the closure member in one position relative to the opening, a handle movable between first and second positions connected to the latch by connecting means for operating the latch, and is characterised in that biassing means acts on the handle to bias it to the first position and the connecting means is operated to release the latch by movement of the handle to the second position against the bias of the biassing means whereby the closure member is free in use to be drawn across the opening and to be so drawn by the continued application of force in the same sense on the handle.

The handle may be pivotally mounted on the closure member or may be slidably mounted relative thereto.

On release of the handle the biassing means causes it to return to its first position.

The handle may be mounted so as to be movable between first, second and third positions such that force applied to the handle to move it to the third position against the bias causes release of the latch, or release of a further latch carried by the closure member and operatively connected to the handle, which latch or further latch is adapted to co-operate with a further latch member on the structure to retain the closure member in another position relative to the opening, whereby the closure member can be drawn across the opening and, in use, is so drawn by the continued application of force in the same sense to the handle.

According to a second aspect of the present invention there is provided a vehicle comprising a structure having an opening, a latch member fixed on the structure, a door for closing the opening, means supporting the door on the structure and guiding the door for sliding movement across the opening between first and second positions in which the door respectively covers and uncovers the opening, the door having a latch releasably engageable with the latch member to retain the door in one of its first and second positions and a handle movable between first and second positions connected to the latch by connecting means for operating the latch, and characterised in that biassing means acts on the handle to bias it to its first position and the connecting means is operated to release the latch by movement of the latch to its second position against the bias of the biassing means whereby the door is free to be drawn across the opening and to be so drawn by the continued application of force in the same sense on the handle.

An embodiment of the invention will now be described by way of example only and with reference to the accompanying drawings in which:

Figure 1 is a scrap side view of a vehicle having a door which is shown in the closed position;

Figure 2 is similar to Figure 1 but shows the door in the open position;

Figure 3 is a perspective view of one form of handle;

Figure 4 is a view of a latch operating mechanism mounted inside the vehicle door;

Figure 5 is a view showing latch members for retaining the door in open and closed position respectively; and

Figure 6 is a schematic view of an alternative latch operating mechanism.

Referring to Figures 1 and 2 of the drawings, there is shown parts of one side of a van which has been made with a standard door having a window and housing the usual window winding gear. The usual upper and lower hinges by which the door is secured to the vehicle, adjacent the front edge of the door, have been substituted by a sliding door gear. The sliding door gear comprises an upper guide 1, a lower guide, not shown, located below the sill, and an intermediate guide 2. These guides are secured in parallel spaced relationship on the vehicle body. A bracket 3 at the top of the door carries a roller 3' which is engaged in the upper guide 1. A bracket 4 and arm 5 carry a roller, not shown, which is engaged in the lower guide. The upper and lower guides have inwardly curved front end portions to guide the front edge of the door 6 into the door opening in the vehicle body.

A lock plate 7 at the rear edge of the door 6 is pivotally connected to an arm 8 which is pivotally connected to a guide member 9 slidable along the intermediate guide 2.

A door handle 11, see Figure 3, is pivotally mounted so as to be movable through a small arc forwardly and rearwardly as will be described in further detail with reference to Figure 4. A rearwards force (i.e. a force directed towards the rear of the

vehicle) applied to the handle 11 causes release of a door latch, not shown, of standard type and a continued force in the same direction causes the door to be moved out of the opening, through the hinging action of the plate 7 and arm 8 and the movement of the rollers along the curved portions of the upper guide 1 and lower guide. Conversely, when the door is latched in the open position, a forwards force applied to the handle 11 releases the latch and a continued force in the same direction causes the door to be moved forwards and into the door opening in which it is then latched. An interlock, for example between the arm 8 and the guide member 9, ensures the rear of the door is out of the opening before the guide member 9 moves rearwards along the intermediate guide 2. Similarly, a further interlock ensures that the door 6 is correctly positioned longitudinally of the vehicle before the arm 8 pivots forwardly to carry the rear of the door into the opening, wherein it is latched. Figure 2 shows the door 6 in the opening position. A handhold 12 is provided at the rear of the door 6 for use in moving the door 6 towards the closed position. The pivoted handle 11 may also be used on a conventional vehicle sliding door which is externally mounted and moves to and fro across a door opening without entering into the opening, or on any other closure member which is slidable across an opening and is latched in a position relative thereto.

Referring to Figures 3 and 4, the handle 11 is pivotally carried in a mounting 13 which is secured on the outside of the door 6. An arm 14 fixed to the handle 11 extends through a slot in a plate 15 secured to the inside of the door 6. Helical tension springs 18, 19 at opposite sides of the free end of the arm 14 are connected respectively between pegs 16, 17 on the plate 15 and the arm 14 and bias the handle 11 to a first position from which it is pivotable rearwardly (of the vehicle) to a second position and forwardly to a third position. A rod 20 is connected at one end to the free end of the arm.

The window winding gear comprises, as shown in Figure 4, a toothed quadrant 21, an arm 22 and a stud shaft 23 for a winding handle, not shown. A lever 24 is pivotally mounted on the stub shaft 23 and has the opposite end of the rod 20 connected to it. An operating rod 25 for the door latch has its forward end connected to the lever 24 through a lost motion connection at 26.

A second latch 27, for latching the door 6 in an open position, is mounted inside the door and has an operating lever 28 which is connected to the lever 24 by a connecting rod 29. This latch also has an operating handle 31. A plate 32, indicated in broken lines, retains the lever 24 on the stub shaft 23 and provides a mounting for the latch 27.

Referring now to Figure 5, the 'B' post 33 of the vehicle body at the rear edge of the door opening has secured to it a standard latch pin 34 with which the door latch engages (ie, the door latch which is operated by the operating rod 25). A similar latch pin 35 is secured to the vehicle body in front of the intermediate guide 2.

Considering the door 6 in the closed position in the opening and latched in that position by co-operation of the door latch and latch pin 34, as illustrated in Figure 1, application of a rearward force to the handle 11 causes the handle to pivot rearwardly and consequently the arm 14 to pivot forwardly. The rod 20 connected to the arm causes the lever 24 to pivot forwardly (i.e. anti-clockwise as seen in Figure 4) and this pulls the operating rod 25 which releases the door latch. At the same time the pivoting lever 24 pushes the connecting rod 29, which causes the lever 28 to be rotated to open the second latch 27. As already explained, a continued force applied in the same direction to the handle 11 causes the door to open. The opening movement of the door is terminated when the latch pin 35 enters the second latch 27 which then closes to retain the door 6 in the open position. Alternatively, operation of handle 31 from inside the vehicle will cause the second latch 27 to open and at the same time release the door latch by way of the lever 28, the connecting rod 29, the lever 24 and the operating rod 25. The handle 31 may then be used to push the door rearwards until the second latch 27 and the latch pin 35 engage.

From the latched open position, a forward pull on the handle 11 will cause a rearward pivoting of the arm 14 which through the rod 20 pivots the lever 24 in a clockwise direction. This has no effect on the operating rod 25 because of the lost motion connection at 26 between it and the lever 24, the door latch already being in the released or open position. The lever 28 is pulled by the connecting rod 29 and the lever 24, causing the second latch 27 to open. Alternatively the handle 31 may be operated to open the second latch 27. When the door has been moved forwards across and into the opening the door latch engages with the latch pin 34. Co-operating docking members, not shown, for example a tapered head pin at the front of the door which enters a tube at the front of the door opening as the door approaches the fully closed position, may be provided to assist location, or location and retention, of the door in the opening.

In the embodiment of the invention which has been described, which was devised for a particular vehicle application, it was necessary to locate the intermediate guide 2 at a level below that of the latch pin 34 and it was considered desirable to align that guide and the latch pin 35 as both extend from the side of the vehicle. This necessitated the fitting of the second latch 27 inside the door. However, if desired, the door latch could be utilised to latch the door in both open and closed positions, dispensing with the need for the second latch 27. In this event an additional latch pin, similar to the latch pin 34 is fitted in longitudinal alignment with latch pin 34, and oriented the same way in the region of the rear end of the intermediate guide 2 so as to be engaged by the door latch when the door is open. Docking means, not shown, may be provided to assist stability of the door in the open position. An example of such a docking means might be a tube with a conical opening mounted inside the door so that as the door approaches the fully open position the latch pin 34 enters the tube, so helping to locate the front end of the door.

Referring now to Figure 6, a modified mechanism

is illustrated schematically for operation of the door latch where this is used for latching the door in both closed and open positions. The arm 14 is shown between upper ends of a member 36 of generally inverted T-shape and a lever 37. The T-shaped member 36 has a stem 38 to which the forward end of the operating rod 25 is pivotally connected, and a cross-piece 39 which is engaged between rollers 41 mounted on the door so that the T-shaped member 36 is slidable to and fro. The lever 37 is pivotally mounted at 42 and its lower end is forked to fit over the operating rod 25 and rounded to engage a collar 43 on that rod. Rearward pivoting of the handle 11 to release the door latch causes the arm 14 to pivot forwardly so that it engages the stem 38 of the T-shaped member 36 to slide that member forwards, thus pulling the operating rod 25 and releasing the latch. Forward pivoting of the handle 11 causes rearward pivoting of the arm 14 whereby the lever 37 is pivoted in a clock-wise direction (as drawn). The lower end of the lever 37 engages the collar 43 and pulls the operating rod 25 to release the door latch so that the door can be drawn forwards from its latched open position. The biassing springs 18, 19 which act on the arm 14 have been omitted from Figure 6 for clarity. Whilst the handle 11 has been described as being pivotally mounted it will be appreciated that it could readily be slidably mounted so as to be slidable a short distance forwards and rearwards (or up and down if used on a vertically moving closure member) to release the relevant latch and then draw the door across the opening.

Claims

1. A closure member which in use closes an opening in a structure and is movable to and fro across the opening, and may also be movable into and out of the opening, has a latch releasably engageable with a latch member (34) on or adapted to be mounted on, the structure to retain the closure member in one position relative to the opening, a handle (11) movable between first and second positions connected to the latch by connecting means (14,20,24,25,36,37) for operating the latch, and is characterised in that biassing means acts on the handle (11) to bias it to the first position and the connecting means (14,20,24,25,36,37) is operated to release the latch by movement of the handle (11) to the second position against the bias of the biassing means (18,19) whereby the closure member is free in use to be drawn across the opening and to be so drawn by the continued application of force in the same sense on the handle (11).

2. A closure member according to claim 1 characterised in that the handle (11) is mounted for pivotal movement between the first and second positions.

3. A closure member according to claim 1 characterised in that the handle (11) is mounted for sliding movement between the first and second positions.

4. A closure member according to any preceding claim characterised in that a second latch member (34) is provided adapted to be fixed on the structure to be engaged by the latch to retain the closure member in another position relative to the opening, and in that the handle (11) is movable to a third position by application thereto of a force against the bias of the biassing means (18,19) and, through the connecting means (14,20,24,25,36,37), the movement of the handle (11) to the third position causes release of the latch whereby when the closure member is in use and the latch has been engaged with the second latch member (34) the release of the latch frees the closure member to be drawn across the opening away from the said other position, and to be so drawn by the continued application of force on the handle (11) in the sense in which the force to move the handle (11) to the third position is applied.

5. A closure member according to any of claims I to 3 characterised in that a second latch member (35) is provided adapted to be fixed on the structure, a second latch (27) is mounted on the closure member to co-operate releasably with the second latch member (35) to retain the closure member in another position relative to the opening, and the handle (11) is operatively connected by second connecting means (20,24,29,28) to the second latch (27) and is movable to a third position by application thereto of a force against the bias of the biassing means (18,19) and, through second connecting means (20,24,29,28), the movement of the handle (11) to the third position causes release of the second latch (27) whereby when the closure member is in use and the second latch (27) has been engaged with the second latch member (35) the release of the second latch (27) frees the closure member to be drawn across the opening away from the said other positions, and to be so drawn by the continued application of force on the handle (11) in the sense in which the force to move the handle (11) to the third position is applied.

6. A closure member according to claim 5 characterised in that the second latch (27) has an operating member (31) by which the second latch (27) is releasable from the second latch member (35) independently of the handle (11).

7. A vehicle comprising a structure having an opening, a latch member (34) fixed on the structure, a door (6) for closing the opening, means (1,2,3',4,9) supporting the door (6) on the structure and guiding the door for sliding movement across the opening between first and second positions in which the door respectively covers and uncovers the opening, the door (6) having a latch releasably engageable with the latch member (34) to retain the door (6) in one of its first and second positions and a handle (11) movable between first and second

positions connected to the latch by connecting means (14,20,24,25,36,37) for operating the latch, and characterised in that biassing means (18,19) acts on the handle (11) to bias it to its first position and the connecting means (14,20,24,25,36,37) is operated to release the latch by movement of the latch (11) to its second position against the bias of the biassing means (18,19) whereby the door (6) is free to be drawn across the opening and to be so drawn by the continued application of force in the same sense on the handle (11).

8. A vehicle according to claim 7 characterised in that a second latch member (34) is fixed on the structure at a position for the latch to be releasably engageable with it in the other of the first and second positions of the door (6), and in that the handle (11) is movable to a third position by application thereto of a force against the bias of the biassing means (18,19) and in moving to the third position the handle (11), through the connecting means (14,20,24,25,36,37), causes release of the latch whereby the door (6) is free to be drawn across the opening away from its said other position and to be so drawn by the continued application of force on the handle (11) in the sense in which the force to move the handle (11) to the third position is applied.

9. A vehicle according to claim 7 characterised in that a second latch (27) is mounted on the door (6) and a second latch member (35) is fixed on the structure at a position for the second latch (27) to be releasably engageable with the second latch member (35) when the door (6) is in the other of its first and second positions, second connecting means (14,20,24,29,28) operatively connects the handle (11) to the second latch (27), the handle (11) is movable to a third position by application thereto of a force against the bias of the biassing means (18,19) and in moving to the third position the handle (11), through the second connecting means (14,20,24,29,28), causes release of the second latch (27) from the second latch member (35) to free the door (6) to be drawn across the opening away from its said other positions and to be so drawn by the continued application of force on the handle (11) in the sense in which the force to move the handle (11) to the third position is applied, and movement of the handle (11) to its second position to release the latch causes the second connecting means (14,20,24,29,28) to operate the second latch (27) for engagement with the second latch member (35).

10. A vehicle according to claim 9 in which the connecting means (14,20,24,25) connecting the handle (11) to the latch has a lost motion connection (26) with the second connecting means (14,20,24,29,28) whereby, when the door (6) is in its said other position and the second latch (27) is engaged with the second latch member (35), movement of the handle (11) to the third position releases the second latch (27) from the second latch member (35) through the second connecting means (14,20,24,29,28), but the connecting means (14,20,24,25) is not operated by the movement of the latch (11) and consequently the latch is not operated.

11. A vehicle according to claim 9 characterised in that the connecting means (14,20,24,25) is connected to the second connecting means (14,20,24,29,28) and the second latch (27) has an operating member (31) which acts through the second connecting means (14,20,24,29,28) whereby movement of the operating member (31) to release the second latch (27) causes the second connecting means (14,20,24,29,28) to operate the connecting means (14,20,24,25) to release the latch also.

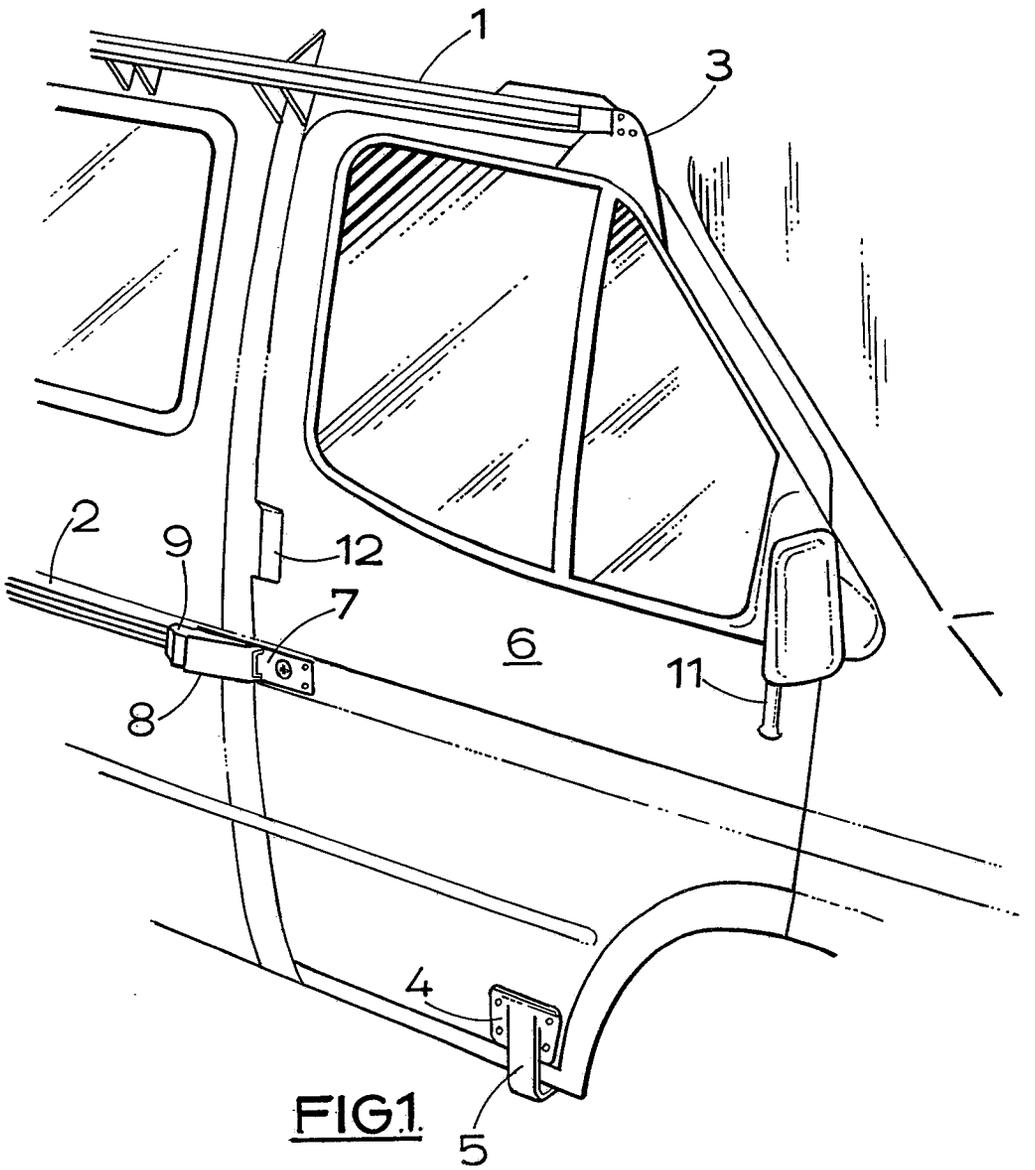

FIG1

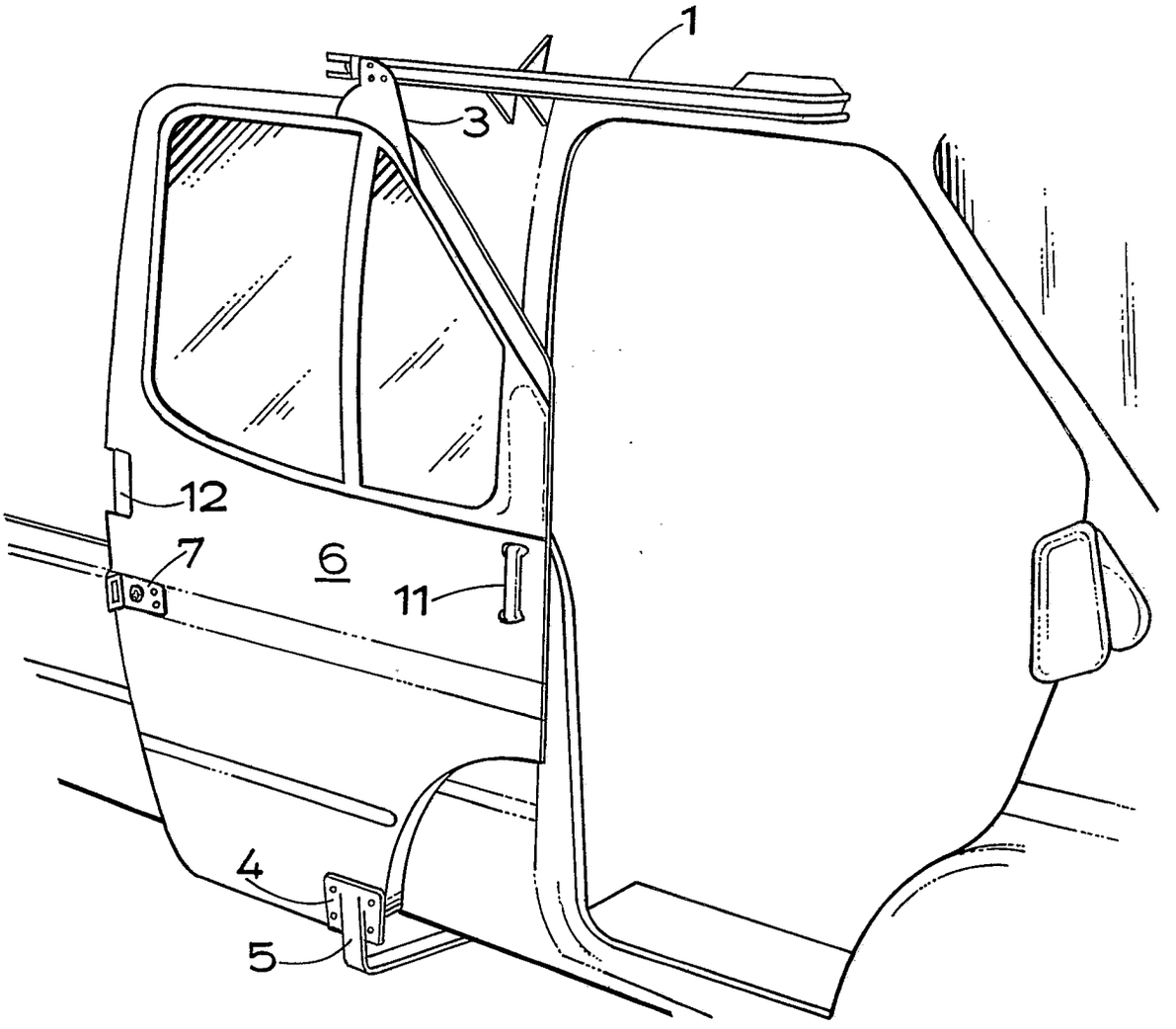

FIG.2.

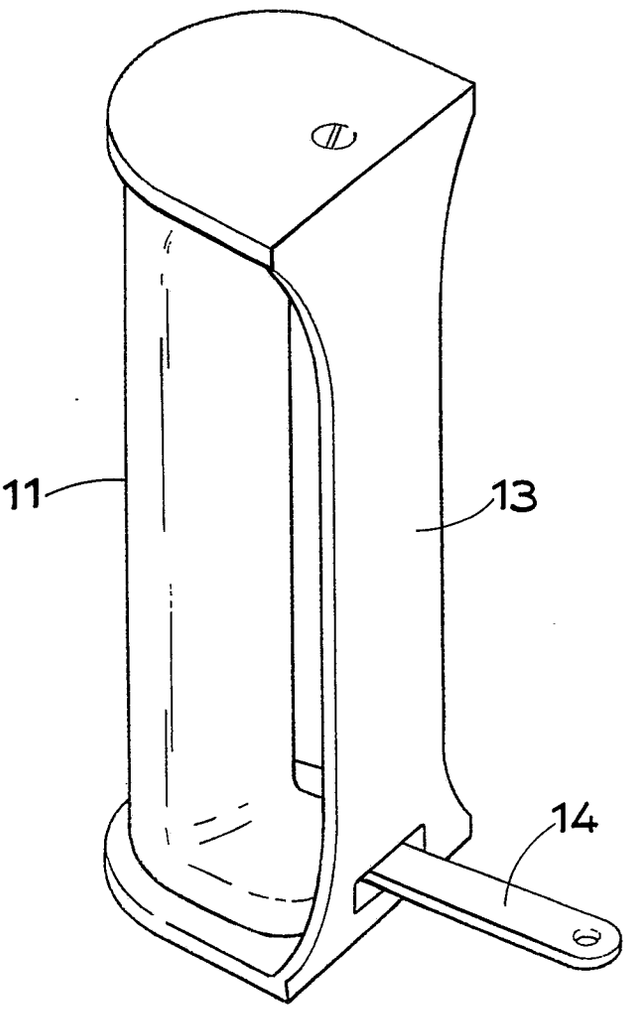

FIG.3.

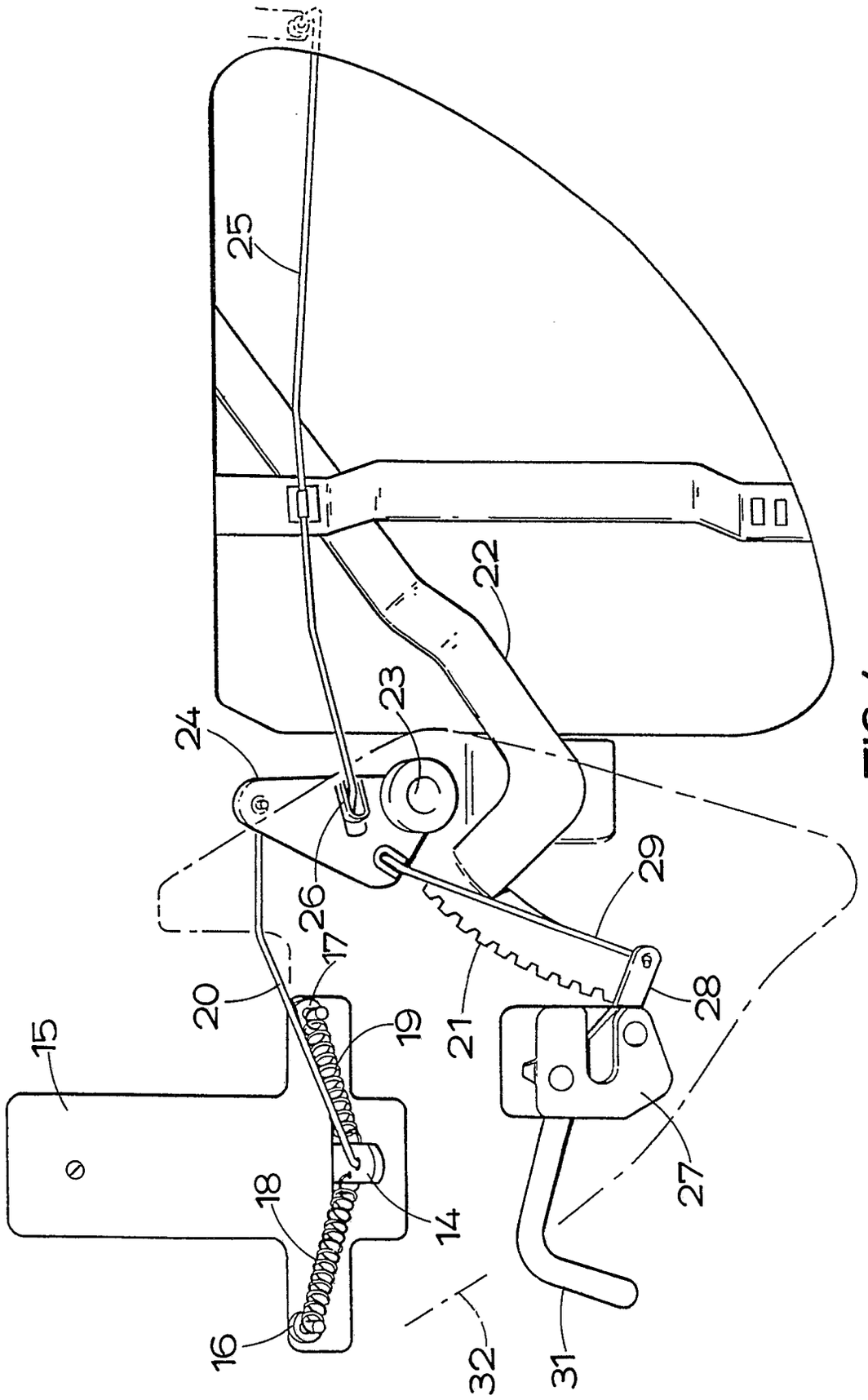

FIG.4.

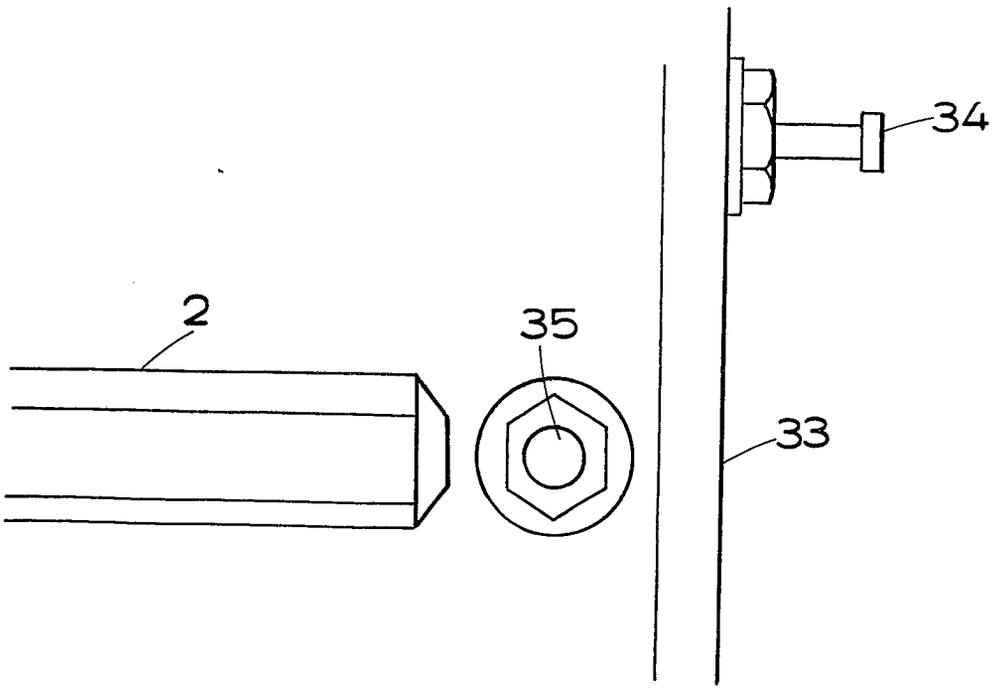

FIG.5.

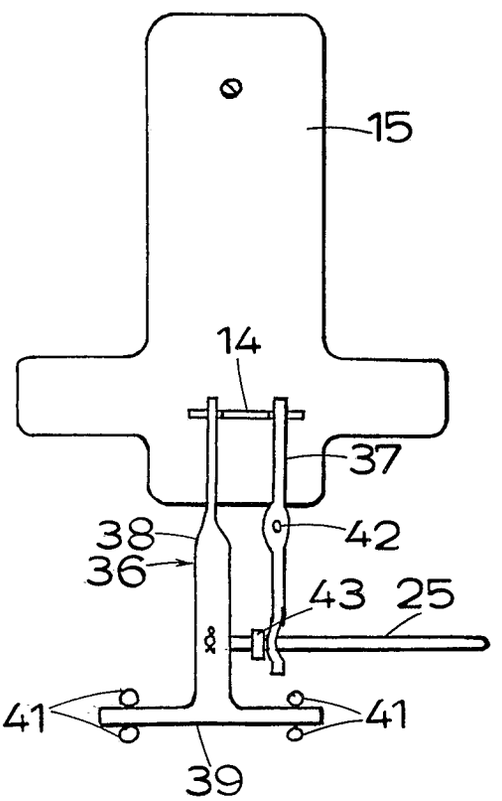

FIG.6.