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(11) **EP 1 024 242 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**02.08.2000 Bulletin 2000/31**

(51) Int. Cl.<sup>7</sup>: **E05F 11/48**

(21) Application number: **00300270.6**

(22) Date of filing: **14.01.2000**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE**  
Designated Extension States:  
**AL LT LV MK RO SI**

(30) Priority: **30.01.1999 GB 9902015**

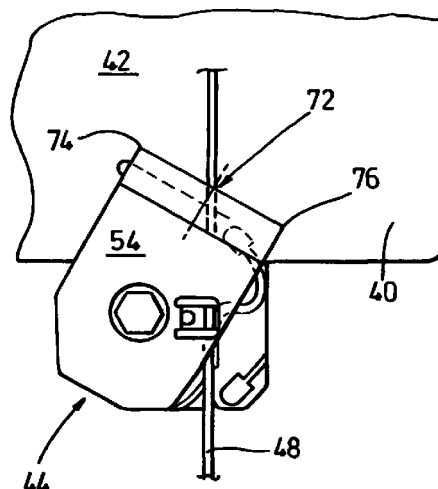
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(54) **Window lift mechanism**

(57) It is a problem in known window lift mechanisms in which a window clamp is carried at a distance from a cable guide that any movement of the window clamp is directed around the cable guide with undesirable consequences. A window lift mechanism is disclosed in which a centre of gravity (72) 72 of a window clamp 44 is arranged in line with a cable guide 48 and a guide rail 46 so any movement of the window clamp is directed towards the cable guide rather than around the cable guide.



**Fig. 3**

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**Description**

**[0001]** The present invention relates to an improved window lift mechanism, and in particular to a window clamp for a window lift mechanism for use in a motor vehicle.

**[0002]** Such window lift mechanisms typically comprise first and second guide rails upon which a window pane to be moved is guided. The window pane is guided by clamps associated with the guide rails which are adapted to slide along the guide rails. In this way, the window pane may be raised or lowered as required by a user of the motor vehicle.

**[0003]** This may be achieved by providing interengaging formations on each of the clamps and the guide rails such that the clamps may be slidably driven within the guide rails.

**[0004]** In a preferred alternative, the guiding of the clamps may conveniently be achieved by running a cable along the guide rails, connecting the cable to the clamps and driving the cable while keeping the clamps free of the guide rails.

**[0005]** In such preferred systems, the centre of gravity of the clamps when bearing the window pane is offset from a plane defined through the cable and the associated guide rail. In the past further means and members have been provided to aid in guiding the window pane as it is raised and lowered. However, modern requirements as to weight have resulted in such further means and members being removed to economise on weight. As a result, when a door is slammed, and the window is not fully raised within an associated frame, each window clamp may be urged to rotate along a radius defined between the centre of gravity of the window clamp and the cable to which the clamp is secured. This causes the window to bump into other parts of the door assembly resulting in an unwanted rattling noise when the door is closed in this way. This problem is worse for frameless windows, since it is not possible to provide any support for the window in a frame. Thus, a choice has been required between added weight or an undesirable noise.

**[0006]** It is an advantage of the present invention that it reduces or substantially eliminates this problem.

**[0007]** According to a first aspect of the present invention, a window lift mechanism comprises a first guide means and a second guide means, a carrier cable means carried by the first and second guide means, at least one window clamp associated with one of the guide means, the at least one window clamp being spaced from the associated guide means and secured to the carrier cable means to support a window pane, characterised in that a centre of gravity of the at least one window clamp when loaded with the window pane lies in a plane defined by the associated guide means and the carrier cable means.

**[0008]** The invention will now be described, by way of example only, with reference to the accompanying

drawings, in which:

Figure 1 shows in side view a section of a door assembly provided with a known window lift mechanism;

Figure 2 shows in side section a portion of a window lift mechanism according to the present invention;

Figure 3 shows in side view the portion of the window lift mechanism of Figure 2; and

Figure 4 shows a section along line IV-IV of Figure 2.

**[0009]** Referring first to Figure 1, a door assembly 2 incorporating a known window lift mechanism 4 is shown. The window lift mechanism 4 comprises a frame having first and second guide rails 6,8 secured to a door panel 10, a cable 12 fed along a circuit including the first and second guide rails, means to drive the cable around the circuit, and first and second window clamps 16,18 secured to the cable and associated respectively with the first and second guide rails. In use, a window pane 20 is supported at a lower edge 22 by the first and second window clamps. The cable is typically a cable of the Bowden kind, and may be driven by a motor 14. In the illustrated embodiment, the motor is mounted to the first guide rail 6.

**[0010]** In order to allow for ease of construction, the window clamps are secured to the cable by way of integral connecting means 26,28 such that the window clamps are disposed to one side of the guide rail and the cable.

**[0011]** In Figure 1, the window pane, together with its associated window clamps, is shown in a fully lowered position 30 and in a fully raised position 32. It will be appreciated that when the window pane 20 is in the fully raised position the window pane is held in position both by the window clamps at the lower edge but also at an upper edge 24 of the window pane by an upper edge of the door panel 10. When the window pane is lowered, the window pane is no longer held by the upper edge of the door panel and so obtains a measure of freedom of movement.

**[0012]** When the door is moved into a closed state from an open state, the door panel will be halted by a door frame of the vehicle. The window will have a momentum of its own and if not fully raised will continue to move. When supporting the window pane, the window clamps have a centre of gravity through the window clamps. The centre of gravity is offset from the cable by the connecting means, and so the momentum of the window pane acting through the centre of gravity leads to a tendency for each of the window clamps to swing about the cable. It will be understood that the cable also has some resilience, and so does not act to prevent this occurring. In addition to moving the window pane into contact with the door frame and also perhaps other parts of the door assembly to cause an undesirable

knocking noise, the twisting of the window clamps about the cable also places undesirable stresses and strains upon the window pane.

**[0013]** Referring now to Figures 2 to 4, a portion of a window lift mechanism according to the present invention is shown. A lower edge 40 of a window pane 42 is shown supported in a window clamp 44. The window pane may be constructed of glass, plastics or any other suitable material. A guide rail 46 is shown located to the rear of a guide cable 48. The guide cable extends along the guide rail. The guide cable may conveniently be driven by a motor (not shown).

**[0014]** The window clamp 44 comprises a rubber or plastics gripping portion 50 supported by a first member 52 and a second member 54 disposed opposite to one another. The first member is secured to the guide cable 48 by any suitable means. Each of the members is provided with a recess 56,58 at an upper edge. The members are each provided with an opening through which a threaded fastener, such as a bolt 60 extends. The bolt is used to draw the first and second members together, thereby causing the gripping portion 50 of the window clamp to grip the window pane.

**[0015]** The gripping portion is generally "U" shaped in side section and is provided with a flange 62,64 along first and second arms 66,68 of the gripping portion. In use, the flanges serve to overlap the upper edge of each member to locate the gripping portion 50 in position with respect to the first and second members. The gripping portion is conveniently as deep as the recesses 56,58 provided in each member. An inner surface of the gripping portion may be provided with ridges 70 to aid in gripping the window pane. The gripping portion is not essential but serves to prevent unwanted damage to the window pane that may occur if the window pane is gripped directly by the first and second members.

**[0016]** Referring to Figure 3, it can be seen that when the window clamp 44 supports the window pane 42 it has a centre of gravity 72 extending downward from a point midway between a top point 74 of the upper edge of the second member and a bottom point 76 of the upper edge of the second member. It can be seen that the centre of gravity of the window clamp 44 is in line with the guide cable 48 and the guide rail 46. Accordingly, when the door is shut, the window clamp may urge the cable guide towards the guide rail, rather than being twisted about the guide cable.

**[0017]** With the arrangement of the present invention a lightweight solution to the problem of rattle experienced by prior window lift mechanisms is achieved.

## Claims

1. A window lift mechanism comprises a first guide means (6) and a second guide means (8), a carrier cable means (12;48) carried by the first and second guide means (6,8;46), at least one window clamp (16,18;44) associated with one of the guide means

(6,8;46), the at least one window clamp (16,18;44) being spaced from the associated guide means (6,8;46) and secured to the carrier cable means (12;48) to support a window pane (20;42), characterised in that a centre of gravity (72) of the at least one window clamp (16,18;44) when loaded with the window pane (20;42) lies in a plane defined by the associated guide means (6,8;46) and the carrier cable means (12;48).

2. A window lift mechanism according to claim 1, characterised in that the at least one window clamp (16,18;44) comprises a gripping portion (50) supported by a first member (52) and a second member (54) disposed opposite to one another
3. A window lift mechanism according to claim 2, characterised in that the first member (52) is secured to the carrier cable means (12;48).
4. A window lift mechanism according to claim 2 or claim 3, characterised in that each of the first and second members (52,54) is provided with a recess (56,58) at an upper edge.
5. A window lift mechanism according to claim 4, characterised in that the gripping portion (50) extends as far as the recesses (56,58) provided in each of the first and second members (52,54).
6. A window lift mechanism according to any of claims 2 to 5, characterised in that the first and second members (52,54) are each provided with an opening through which a threaded fastener (60) extends, in use to draw the first and second members (52,54) together.
7. A window lift mechanism according to any of claims 2 to 6, characterised in that the gripping portion (50) is generally "U" shaped in side section and is provided with a flange (62,64) along first and second arms (66,68) of the gripping portion (50).
8. A window lift mechanism according to claim 7, characterised in that the flanges (62,64) serve to overlap the upper edge of each of the first and second members (52,54) to locate the gripping portion (50) in position with respect to the first and second members (52,54).
9. A window lift mechanism according to any of claims 2 to 8, characterised in that an inner surface of the gripping portion (50) is provided with ridges (70) to aid in gripping the window pane (12;42).
10. A window lift mechanism according to any of claims 2 to 9, characterised in that the centre of gravity (72) of the at least one window clamp (16,18;44)

extends downward from a point midway between a top point (74) of an upper edge of the second member (54) and a bottom point (76) of the upper edge of the second member (54).

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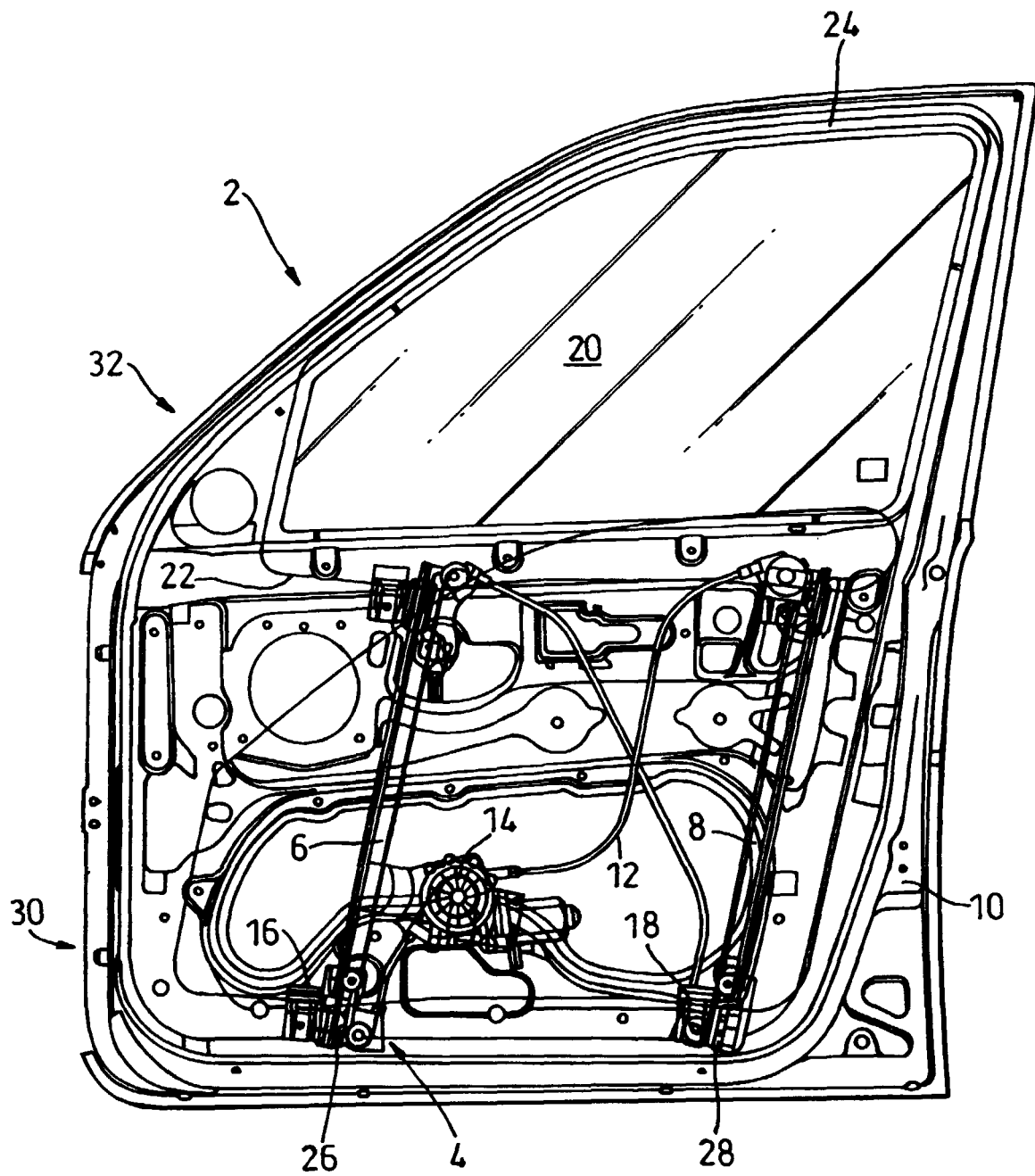
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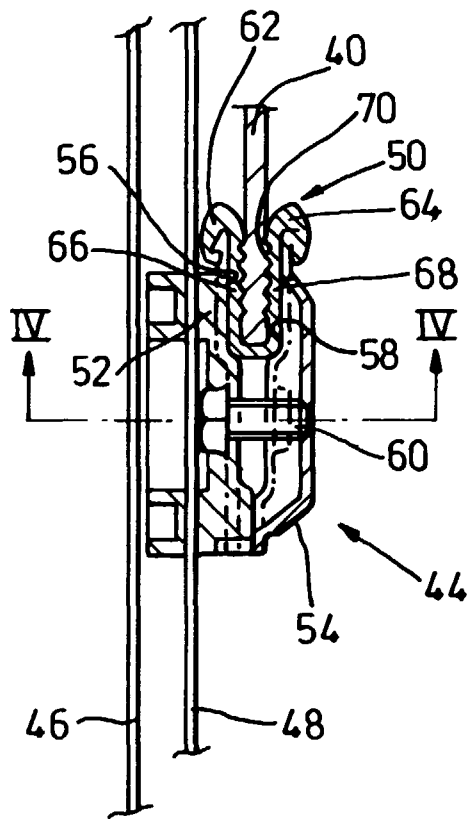
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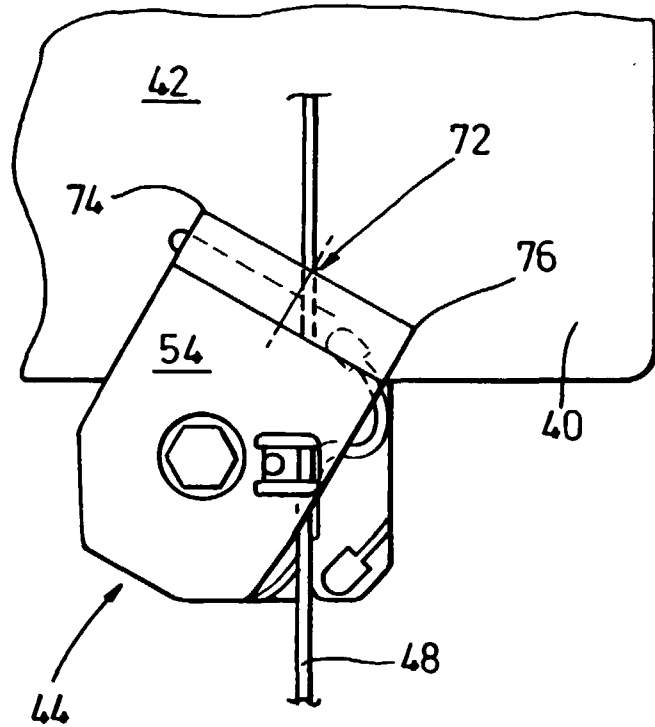
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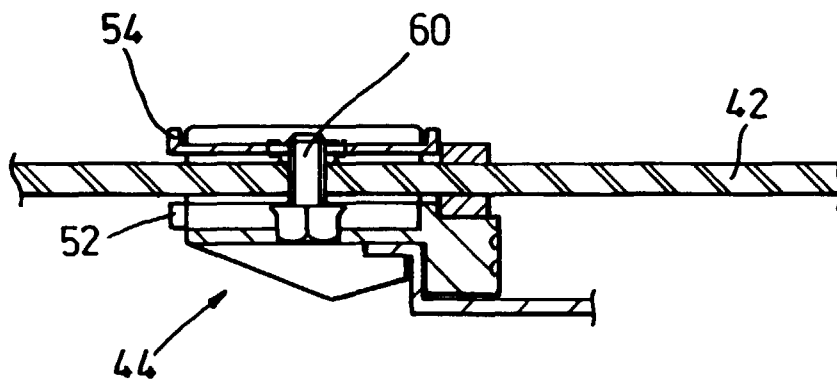
*Fig. 1*



**Fig. 2**



**Fig. 3**



**Fig. 4**