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(56) Documents cited  
**GB A 2153005                      GB 0346172**  
**GB 1501392                      GB 0311033**  
**GB 0492388                      GB 0175818**  
**GB 0453688**

(58) Field of search  
**E2M**  
**Selected US specifications from IPC sub-class E05F**

(54) **Window or door operating mechanism**

(57) The mechanism has a plate (24) adapted to be attached to the window or door frame (13) and a bar (26) to be attached to the window light or door, the plate and the bar being interconnected by two or more links. The window or door is moved by rotation of a handle (30) which drives a worm (29) in mesh with a wormwheel (28A) attached to one of the links (25). The opening light or door is carried by the bar (26) pivoted to a link (25) and via a link (27) to a slider (26A) which slides in a track of the plate (24) contained in a channel (31) in the window or door frame.

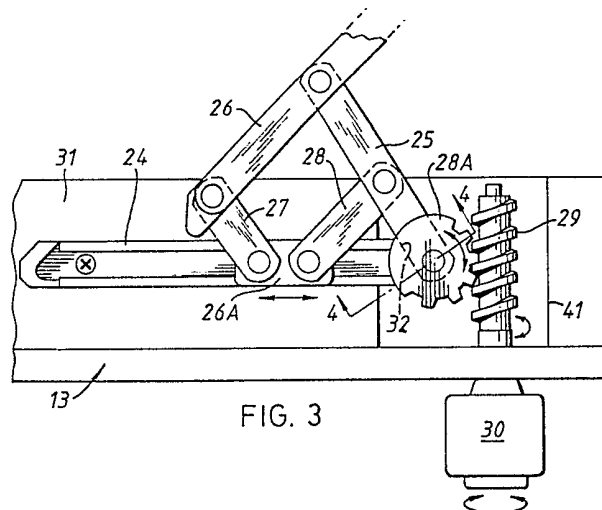
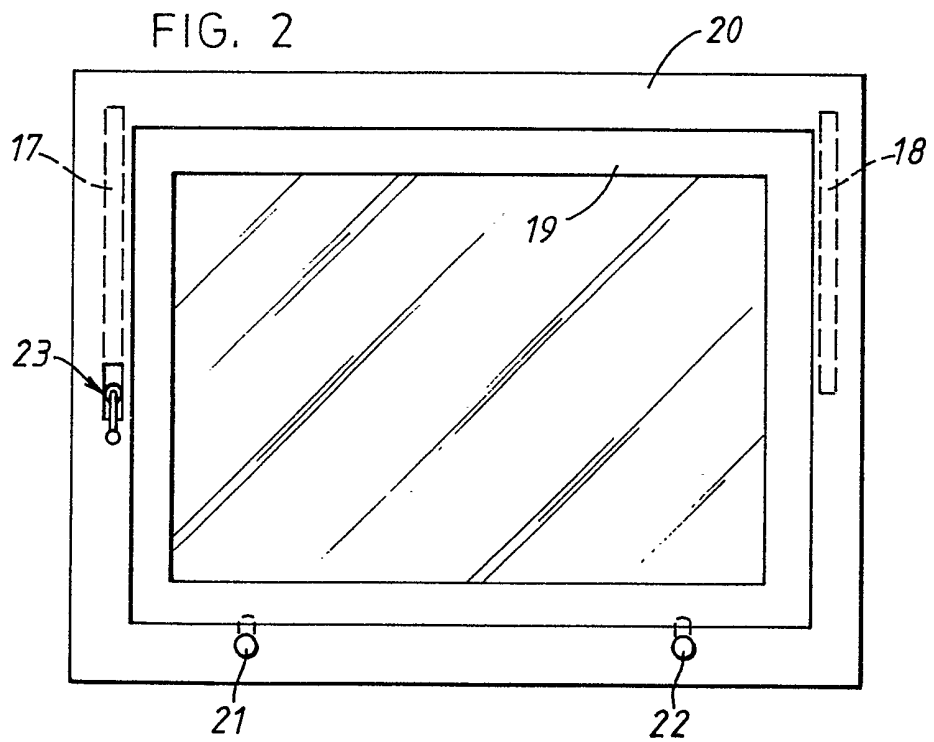
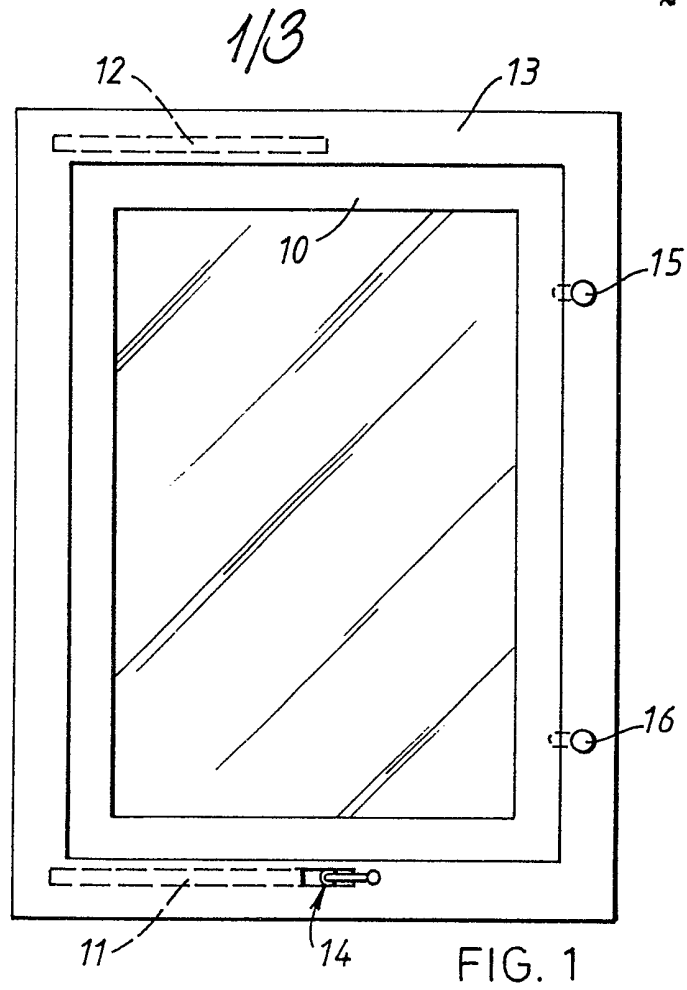


FIG. 3



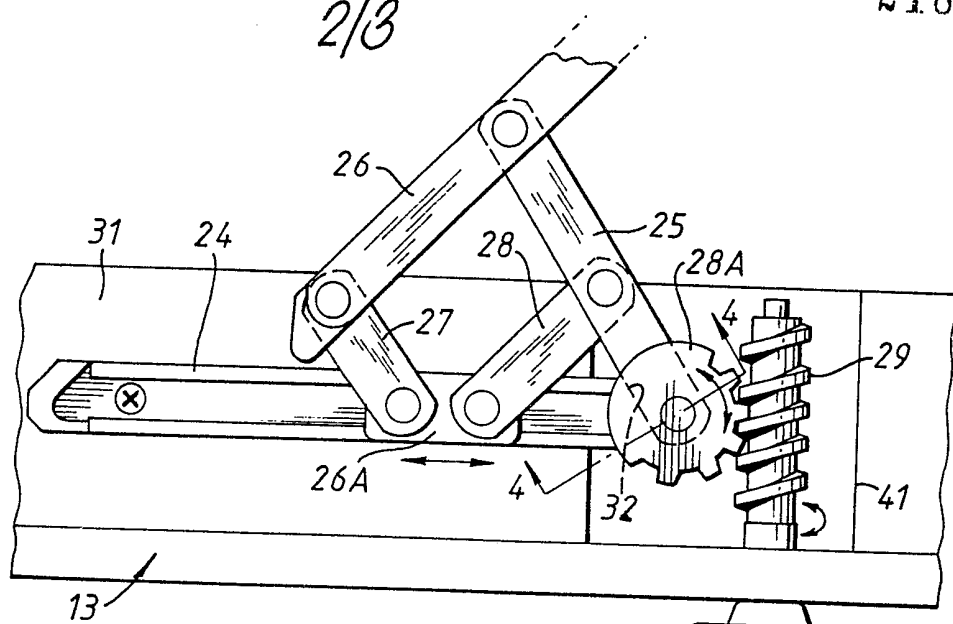


FIG. 3

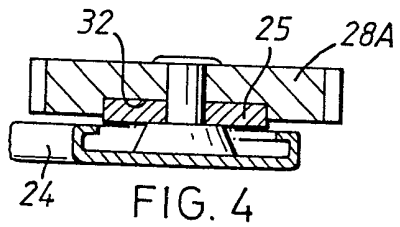


FIG. 4

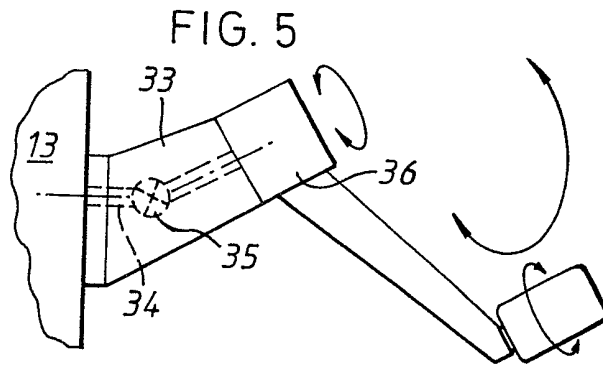


FIG. 5

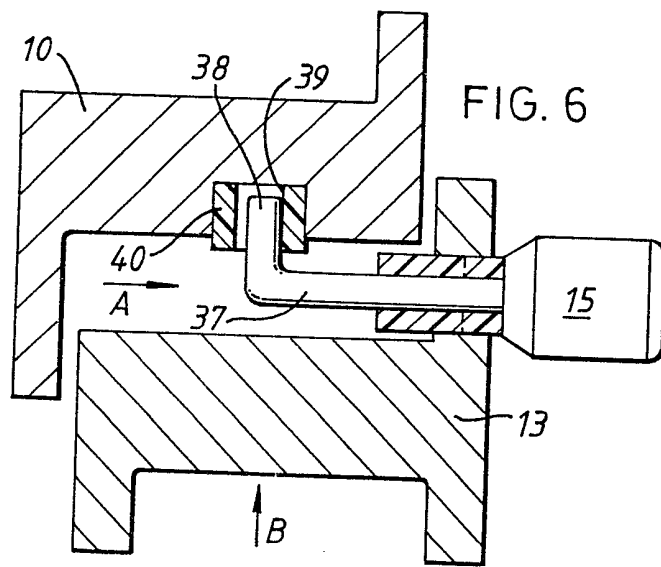
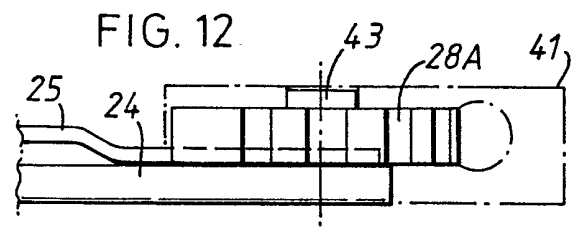
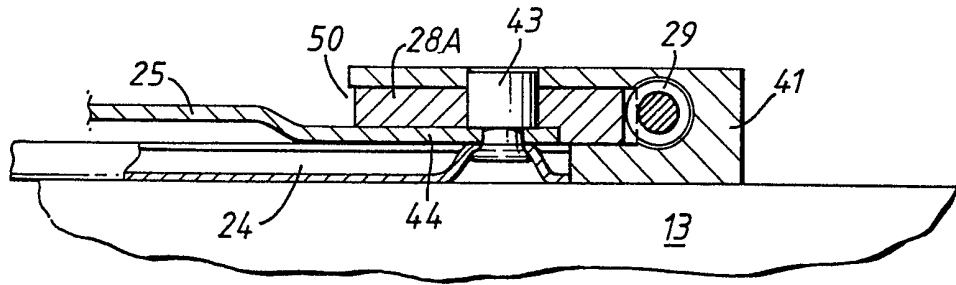
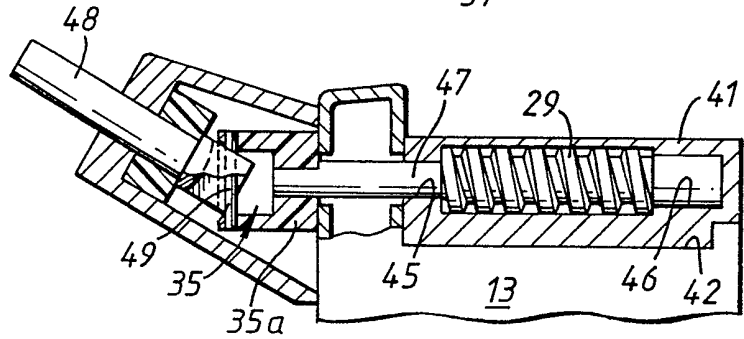
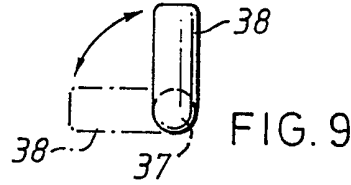
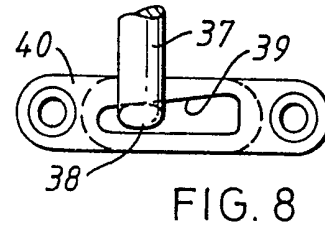
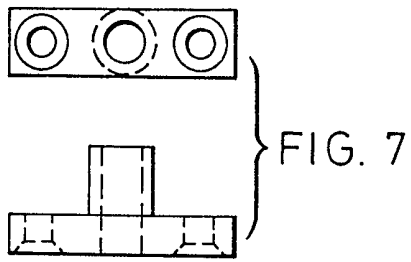


FIG. 6



## SPECIFICATION

**Window or door operating mechanism**

5 This invention relates to operating mechanisms for windows or doors and is particularly concerned with the type of stay used to support opening and closing windows and doors, which has a plate adapted to be attached to the window or door frame and a bar adapted to be attached to the window light or door, the plate and the bar being interconnected by two or more links. One example of such a supporting stay is illustrated in our UK Patent 2081803B.

An object of the present invention is to provide a compact mechanism for opening and closing a window or door supported by such stays.

It has been proposed in the past to employ a mechanism which is separate from the stays and which involved the introduction of additional links or flexible drives into the space within the window or door frame.

Particularly in relation to modern windows in which the frames are formed from extruded metal such as aluminium or from extruded plastics space is at a premium and the use of very flat compact hinges such as the stays described in our above-mentioned patent specification has enabled the width of the channels in the frame containing the stays to be kept to a minimum thus improving the appearance of the frames etc. One result of this is that there is not space within existing types of frames to introduce known window opening mechanisms involving additional struts etc.

An object of the present invention is to provide a window opening and closing mechanism which occupies very little space additional to the space currently occupied by the stays themselves and which is effective and inexpensive to produce.

In accordance with one aspect of the present invention there is a combination of a stay, for use on a window or door, with an operating mechanism; the stay being of the kind which has a plate adapted to be attached to a window or door frame and a bar adapted to be attached to the window light or door, and two links interconnecting the bar and the plate, the operating mechanism comprising a driven gear fixed to one of the links and a driving gear operable by handle or motor.

From another aspect the invention comprises a window or door opening and closing mechanism in which the window or door is supported in a frame by stays of the type comprising a plate adapted to be attached to the window or door frame, a bar adapted to be attached to the window or door, and links interconnecting the plate and the strut, said mechanism comprising a direct drive onto one of said links.

Preferably the direct drive comprises a gear fixed to one end of a link adjacent the point where the link is pivoted to the plate, so that rotation of the gear will cause pivotal movement of the link, and a second gear meshing with the first gear, the second gear being manually rotatable or being rotatable by a motor so as to cause the opening and closing movements of the window or door.

Preferably the first gear is a pinion gear and the second gear is a worm gear and the link may be fitted into a recess in the first gear.

The drive mechanism may be contained in a two-part housing which fits over the end of the link and contains the first and second gears and provides the bearing surfaces. Preferably the two-part housing is formed as a metal die casting, such as aluminium, or a plastics moulding which may be for example from Delrim 100, an Acetal plastic manufactured by Du Pont. The bearing surfaces for the gears and recesses for the gear and related shafts may then be die-cast into the metal housing or moulded into the plastic housing.

The gears may be operable by a winding handle either directly or via a universal joint so arranged that the axis of the handle is at an angle to the axis of the second gear.

The mechanism may be used on side-hung or top and bottom hung windows and a single mechanism may be used on one of the stays where two stays support a window.

One or more locking handles may be located along one edge of the window, being an edge lying between the two hinged edges, so as to draw the windows into its final sealed position when it has been closed by the opening and closing mechanism.

In the accompanying drawings:-

*Figure 1* is a diagrammatic front elevation of a plastics framed side-hung window embodying the present invention;

*Figure 2* is a diagrammatic front elevation of a plastics framed top-hung window embodying the present invention;

*Figure 3* is a plan of the window mechanism embodying the invention shown diagrammatically as incorporated into the window of *Figure 1* or *Figure 2*;

*Figure 4* is a section on line 4--4 showing how a link fits into a pinion gear forming part of the mechanism;

*Figure 5* shows a universal joint which may be used to set the operating handle at an angle to the worm gear shown in *Figure 4*;

*Figures 6-9* show a locking handle and the details of its mounting and operation

*Figures 10-12* show details of the housing of the mechanism and its practical constructions.

In *Figure 1* is shown a side-hung window, the window vent 10 being supported by a pair of stays 11 & 12 located respectively at the bottom and top of the window frame 13 and contained within the cavities in the plastics moulding of the frame 13.

The stays 11 and 12 are preferably of the kind illustrated in our British Patent Specification 2144173A.

To open the window an opening and closing mechanism generally indicated at 14, and embodying the present invention, is employed.

To ensure that the window is fully closed and sealed after the operating mechanism has moved the window to its closed position a pair of locking handles 15 and 16 are used in the position shown. Alternatively a single locking handle located centrally could be used.

A top-hung window is shown in Figure 2 and here the stays 17 and 18 are located vertically on either side of the window vent 19 in a frame 20. Again locking handles 21, 22 are employed and the window opening and closing mechanism 23 which will be described in detail with reference to the other figures of the drawings.

An operating mechanism for opening and closing the windows is shown diagrammatically in Figure 3.

Each of the stays comprises a plate or track member 24 to which is pivoted a link 25. On the track member 24 is a slider 26A. The opening light is carried by a bar 26 and the bar is joined to the track 24 by the link 25 and also by a second link 27 in turn attached to the slider 26A. A further link 28 is provided between the slider and the link 25. The mechanism for opening the window and closing it comprises a wormwheel 28A attached to the link 25 and a worm drive gear 29 in mesh with the wormwheel 28A and operable by means of a handle 30.

As is conventional the stay, or hinge is located within a channel 31 in the window frame 13 and a hole is provided in the frame 13 through which the handle or a shaft from the worm 29 protrudes so as to operate the worm.

Because the link 15 sits in a recess 32, (see Figures 3 and 4), in the wormwheel 28A it is possible to keep the whole mechanism very flat and to arrange it in a flat housing which occupies very little greater depth than the original strut.

A simple handle 30 can be used or the handle can be replaced by a handle that is set at an angle to the frame by using a universal joint as shown in Figure 5. The universal joint housing 33 can be attached to the frame 13 and a shaft 34 from the worm 29 can be connected through a universal joint 35 to a handle 36. By use of this universal joint with its offset handle any problems arising from the proximity of other parts of the frame can be overcome.

The locking handles 15 and 16 can be of the type shown in Figures 6-9. In figure 6 part of the vent 10 and frame 13 are shown diagrammatically and a handle 15 is shown which has a shaft 37 having an offset portion 38. The offset portion 38 engages in a wedge-shaped slot 39 in a keep plate 40. Figure 9 illustrates the movement from an open to a locked position and it will be seen that by turning the handle 15 the offset 38 engaging in the wedge-shaped slot 39 draws the vent in the direction of the arrow A to seal against the frame.

Figures 10 and 11 are a vertical section through the operating mechanism and a section on line A-A (of Figure 10) respectively. It will be seen that the gearbox housing 41 (also shown diagrammatically in Figure 3) fits into a recess 42 in the frame 13. The wormwheel 28A rotates on a rivet 43 which also serves to attach the gear box to the end 44 of the link 25, which may be offset as shown.

The housing 41 provides bearing surfaces 45, 46 for the shaft 47 of the worm gear 29. The shaft 47 is attached to the housing 35a of the universal joint 35 and another shaft 48 is held in the universal joint by the usual pin mechanism 49. The shaft 48 can be used for the attachment of the handle 36 as shown in

Figure 5.

The housing may be split in two along a transverse section for ease of assembly. It will be noted that the housing is open at 50 so as to allow for movement of the link as the gear 28A rotates.

Instead of using a worm wheel and worm drive alternative forms of drive could be used depending upon the location of the driving handle. Two simple meshing gears could be used or bevel gears.

If it is necessary to operate the handle from a remote location the worm shaft could be connected via a flexible drive to the remote location.

The additional locking handles 21, 22 could be ganged together or an espagnollette mechanism can be employed to operate the two locking handles simultaneously.

The invention is particularly useful for modern PVC framed windows and for aluminium framed windows but can be applied to any form of window or door where stays are used to support the window or door in a frame.

#### CLAIMS

1. A combination of a stay, for use on a window or door, with an operating mechanism; the stay being of the kind which has a plate adapted to be attached to a window or door frame and a bar adapted to be attached to the window light or door, and two links interconnecting the bar and the plate, the operating mechanism comprising a driven gear fixed to one of the links and a driving gear operable by handle or motor.
2. A window or door opening and closing mechanism in which the window or door is supported in a frame by stays of the type comprising a plate adapted to be attached to the window or door frame, a bar adapted to be attached to the window or door, and links interconnecting the plate and the strut, said mechanism comprising a direct drive onto one of said links.
3. A mechanism according to claim 2 and in which the direct drive comprises a gear fixed to one end of one of the links adjacent to the point where the link is pivoted to the plate, so that rotation of the gear will cause pivotal movement of the link, and a second gear meshing with the first gear, the second gear being manually rotatable or being rotatable by a motor so as to cause the opening and closing movements of the window or door.
4. A mechanism according to claim 3 and in which the first gear is a pinion gear and the second gear is a worm gear and the link is fitted into a recess in the first gear.
5. A mechanism according to any of claims 2 to 4 in which there is a two-part housing which fits over the end of the link and contains the first and second gears and provides the bearing surfaces.
6. A mechanism according to claim 6 and in which the two-part housing is formed as a metal die casting.
7. A mechanism according to claim 6 and in which the two-part housing is formed as a plastics moulding.
8. A mechanism according to claim 6 or claim 7

and in which the bearing surfaces for the gears and recesses for the gear and related shafts are die-cast into the metal housing or moulded into the plastic housing.

5 9. A mechanism according to any of claims 2 to 8 and in which the gears are operable by a winding handle either directly or via a universal joint so arranged that the axis of the handle is at an angle to the axis of the second gear.

10 10. A mechanism according to any preceding claim when used on a side-hung or top and bottom hung windows, a single mechanism being used on one of the stays where two stays support a window.

15 11. A mechanism according to any preceding claim in which one or more locking handles are located along one edge of the window, being an edge lying between the two hinged edges, so as to draw the window into its final sealed position when it has been closed by the opening and closing or  
20 operating mechanism.

12. A window or door opening or closing mechanism substantially as hereinbefore particularly described and as illustrated in the accompanying drawings.