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(54) **Window with combined pivoting and sliding motion.**

(57) A window (2) with elongate guides (3) for a first guide member (12, 36) pivotally coupled to the end of the window elongate guides for a second guide member pivotally coupled to a first arm, which is also pivotally connected to the window and pivotally connected to a second arm pivotally connected to the window frame, the pivotal connection between the window (2) end and the first guide member (12, 36 being such that the first phase of the pivotal movement during opening of the window (2) coincides with a movement away from the window frame (1).

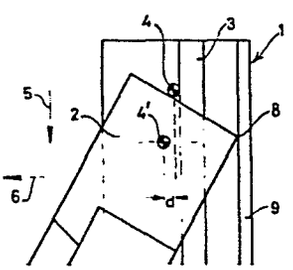

Fig. 1c.

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Window with combined pivoting and sliding motion.

This invention relates to a window with combined pivoting and sliding motion having on either side of the frame an elongate guide for a first guide member coupled to the end of the window so as to pivot about a fulcrum parallel to the plane of the window, and an elongate guide for a second guide member pivotally coupled to the end of a first arm, the other end of which is pivotally connected to the window and which arm is pivotally connected, between its ends, to a second arm the end of which is pivotally connected to the window frame.

A window of this kind is known from published Netherlands Patent Application No. 79,05178. The advantage of such known windows over conventional sliding or pivoting windows is that when the window is in the completely slid over position, in which the top edge of the window is thus near the bottom edge of the rebate, the outside of the window can be reached from inside, so that the glass can be cleaned or replaced. When the window is in the horizontal position it is possible to obtain good

ventilation of the room in which the window is disposed.

During the opening of the window the top edge of such window performs both a downwardly directed movement and a pivoting movement about the fulcrum of the coupling member. Of course the edge of the window must be prevented from jamming against the rebate; this is possible if the fulcrum is situated above the window or coincides with its top edge. However, this requires a special configuration and special means in the window and rebate, and this makes the window structure much more expensive. A construction in which the fulcrum is at a specific distance beneath the top edge of the window is both the most favourable and the simplest structurally, but unless special precautions are taken the edge of the window will jam in the rebate.

This can be obviated by rounding the edge of the window, but this makes the window inevitably more expensive (in the case of wooden windows an extra operation is necessary while windows made from section material require special section members). In addition, it becomes more difficult to obtain a good seal between the window and the rebate and special sealing sections are required.

The object of the invention is to provide a window of the kind referred to hereinbefore in which the window is

prevented from jamming against the rebate in a simple manner. To this end, according to the invention, the coupling member is so constructed that the first phase of this rotation during the opening of the window coincides with a movement of the fulcrum directed away from the window frame.

The invention is based on the realization that the required effect can be readily obtained if the window fulcrum is shifted inwardly over a predetermined distance during the initial phase of the pivoting movement. No special steps are then required nor special section members on the windows; the window may be made from conventional standard elements and in the conventional measurements from thin material.

The shifting of the fulcrum proposed according to the invention can be obtained of each guide member bears a first pivot which is directed towards the window and which has a control pin spaced therefrom, said pivot fitting in a corresponding recess in an intermediate member continuing into a second cylindrical pivot, which forms the fulcrum of the window and the axis of which is spaced from that of the first pivot and which fits in a bore on the window around which a curved guide path is formed, into which there leads a receiving cavity for the control

pin, the latter being received therein when the window is closed, the arrangement being such that during the initial phase of the window movement the control pin situated in the receiving cavity acts as a reversing point and the second pivot performs a swinging movement around the first pivot. Preferably, the guide member, control pin and first pivot are made in one piece.

Good guidance of the fulcrum is obtained if, during the end of the window movement, the control pin co-operates with the outer surface of the intermediate member.

The parts can be well contained with respect to one another and the path can be correctly determined if the intermediate member fits in a recess in the guide from which it projects, said recess limiting the movement of the intermediate member.

Preferably, the bore provided on the window to receive the second pivot and the guide surfaces disposed thereabout are formed in an element intended to be mounted separately in the window.

An embodiment is also possible in which a pivot directed towards the window and forming the fulcrum, and a control pin spaced therefrom, project from the coupling member, the pivot fitting in a slot on the window side directed towards the guide, around which slot a curved guide path

is formed, terminating in a recess directed towards one end of the slot in order to receive the control pin, the latter being received in said recess when the window is closed, the arrangement being such that during the initial phase of the window movement the control pin situated in the recess acts as a reversing point and the pivot moves from one end of the slot to the other.

Even better guidance is obtained if a second guide path is formed on the window side directed towards the pivot and the control pin and consists of a bent portion situated opposite the first bent guide path and terminating in a straight portion directed tangentially away therefrom, said second guide track co-operating with a second control pin disposed on the guide diametrically opposite the control pin.

In one preferred embodiment, the slot and guide paths are formed in a separate element intended to be fixed in the side of the window.

A preferred embodiment in which a simple guide is used and which occupies very little space in the direction of the plane of the window comprises a swing arm mounted between the guide and the window, one end being pivotally connected to the guide and the other end being pivotally connected to the window, the guide bearing a control pin which is directed towards the window and

which co-operates with a sloping guide path containing the control pin and formed on the window, the bottom end terminating in a receiving cavity in which the pin rests when the window is closed, the arrangement being such that during the opening of the window the guide path runs against the pin, is thereby pressed aside and moves the window aside via the swing arm. Preferably, the guide path is then formed on an element intended to be separately fitted to the top edge of the window. This construction is particularly suitable for windows made of hollow section members.

The invention is explained with reference to the drawing.

Figs. 1a - to 1c are side elevations of part of a combined pivoting and sliding window according to the application and illustrate the movement produced by means of the application.

Fig. 2 is a perspective exploded view of a preferred embodiment of a guide coupling member according to the application to give the required movement of the fulcrum.

Fig. 3a is a cross-section thereof;

Fig. 3b is an end elevation of the part thereof to be fitted in the window;

Fig. 3c is an end elevation of the part shown in Fig. 3a;

Fig. 3d is a half elevation and half section of the part;

Fig. 4a is a diagrammatic cross-section through a second

embodiment of the application;

Fig. 4b is an end elevation of the part thereof to be fitted in the window;

Fig. 4c is an end elevation of the part situated on the guide;

Fig. 4d is a side elevation of that part;

Fig. 5 is a diagrammatic side elevation of a third embodiment.

Referring to Fig. 1a, reference 1 denotes a window frame in which there is suspended a window 2 with a combined pivoting and sliding motion, only the top end of which is shown. The window is of the type known from Netherlands Patent Application No. 79,05178; the top end of the window can move vertically along a fixed vertical guide track denoted diagrammatically by the chain-dotted line 3 and in so doing pivots about a fulcrum 4 situated between the end of the window 2 and a guide (not shown) movable over the track 3. On opening the window, it performs a movement in the direction of the vertical arrows 5 and in the direction of the horizontal arrow 6. The top end of the window performs a pivoting movement in the direction of arrow 7 around fulcrum 4.

Fig. 1b shows how the result of this movement is that the point 8 of the window 2 runs against the draught strip 9 of the frame 1 at place 10. As explained in the

introduction, the invention provides steps to obviate this.

Fig. 1c is a diagram showing how the steps according to the invention lead to the required result: the free movement of the corner 8 of the window 2 along the strip 9. According to the invention, the coupling between the guide moving over the track 3 and the window is so constructed for this purpose that the window fulcrum 4 moves in the direction of the arrow 6 during the downward movement. Fulcrum 4 moves from the initial position to the position 4' during the first stage of the pivoting movement and thus moves to the left over a distance d. As a result, during the first stage of the pivoting movement of the window the corner 8 thereof remains free of the draught strip 9.

Fig. 2 and Figs. 3a - 3d relate to a first embodiment of a coupling member to be fitted between the guide and the window to achieve this effect.

Referring to Fig. 2, reference 11 denotes the complete guide moving over the vertical track 3 (not shown in this drawing) provided in the rebate. The guide member comprises the channel section 12 engaging the track 3 and with a base 13 secured thereto, from which the pivot 14 and control pin 15 project. Element 16 turns about the pivot 14 and consists of an intermediate member 17 and the second pivot 18. Intermediate member 17 is formed with a bore 19 by means of which the intermediate member 16 fits exactly around the

first pivot 14. The centre-line of the latter is radially spaced from the centre-line 18' of the second cylindrical pivot 18. The system is retained in the assembled state by means of the locking pin 19 which is fitted through the fulcrum 14 and through the opening 19a in the security plate 20 and then clinched.

It should be noted that a recessed portion 21 is formed in base 13, and the intermediate member 17 fits into this portion 21, thus limiting the pivoting movement of the intermediate member, although this is not essential.

The element to be secured in the window comprises a stepped cylindrical housing 22 having a wide portion 23 and a narrower portion 24 (see also Fig. 3d). Portion 24 has a stepped bore comprising a first part 25 and a second part 26; the diameter of part 25 is the same as the outside diameter of the safety plate 20 and the diameter of part 26 is the same as the outside diameter of the second pivot 18. Part 23 has a specially formed recess 27 which will be described in greater detail hereinafter and in which the intermediate member 17 and the control pin 15 fit. Housing 22 can be secured in the rebate by gluing or by means of a fixing screw 23a passing through a suitable bore.

The configuration of recess 27 is shown in Fig. 3b, having an edge boundary 28 one end of which terminates in the

hollow 29 and the other end in the semi-circular boundary 30.

The coupling member described above operates as follows:

When the window is in the closed state, the control pin 15 rests in the hollow 29 as shown in broken lines in Fig. 3b. At the beginning of the window opening movement, the centre-line of the pivot 18 is in the position 18a. On the downward movement of the window, the control pin 15 initially remains in the recess 29 and the centre-line 18' turns from position 18a to position 18b and hence moves aside over a distance d (see Fig. 3c). On a further movement of the window, the control pin 15 is free of the recess 29 and moves along the guide path formed by the edge boundary 28, to the position 30. In these conditions the inside of the control pin 15 runs against the outer surface of the intermediate member 17 so that the complete system is well contained and the movement of the parts is accurately determined. The path of the window fulcrum formed by the outer surface of the pivot 18 and the inner surface of the bore 26 is well determined so that the window cannot twist or jam.

The above movements take place in the reverse direction on the closing of the window.

Figs. 4a to 4d relate to a second embodiment. The guide

having the general reference 35 consists of a, for example, channel section 36 fitting around the guide track 3 and continuing in a base 37 from which the pivot 38 and the two control pins 39 and 40 project. These co-operate with the element 41 secured in the window and made, for example, from plastics by injection moulding. Element 41 consists of a cylindrical fixing portion 42 fitting in the window and secured by means of the screw 43, and the guide portion 44 projecting therefrom. The latter has two guide paths, a first curved path 45 terminating in the receiving cavity 46, and a second guide path consisting of a straight portion 47 and a curved portion 48 also terminating in the receiving cavity 46. A slot 49 is formed in the middle and the pivot 38 fits therein.

When the window is in the closed condition, control pin 40 is in the cavity 46 as shown at 40a and pin 38 is on the left in the slot 49 in Fig. 4b while finally pin 39 bears against the straight guide path 47, indicated at 39a.

When the window is then opened and pivots in the direction of arrow 50, pin 40 initially remains in the recess 46 and pivot 38 moves to the right with respect to the slot 49 - in fact part 41 moves with respect to the pivot 38 - so that the fulcrum between the coupling member and the frame moves to the left as considered in Fig. 4b. On further

movement of the window, control pin 40 is free of the recess 46 and moves over the guide path 45 while control pin 39 moves over the guide paths 47, 48 until the parts finally reach the positions 40b and 39b respectively. During the opening movement of the window the corner of the window moves freely of the draught strip or rebate.

Fig. 5 relates to an embodiment which has the advantage of being capable of very flat construction and in which the major parts can be fitted at the top of the window. This is important for windows with a hollow structure, e.g. constructed from hollow section members.

In this case the guide used has the form shown in Fig. 4d with just one control pin 53 and only the pivot 54 which fits in the top end of an arm 55 connected at fulcrum 56 to window 57. At the top this window bears a guide element 58 with a guide path 59 terminating in a receiving cavity 60 in which the control pin 53 fits.

On opening of the window, during which the latter moves in the direction of arrow 61, the wall of the cavity 60 exerts a force on the pin 53 so that the top of the window will move in the direction of the arrow 62 and the point 63 of the frame stays free of the draught strip or rebate 64.

Claims:

1. A window (2) with combined pivoting and sliding motion having on either side of the frame (1) an elongate guide (3) for a first guide member (12, 36) coupled to the end of the window so as to pivot about a fulcrum (4) parallel to the plane of the window (2), and an elongate guide for a second guide member pivotally coupled to the end of a first arm, the other end of which is pivotally connected to the window and which arm is pivotally connected, between its ends, to a second arm the end of which is pivotally connected to the window frame,
characterized in that
the pivotal connection between the window (2) end and the first guide member (12, 36) is via a coupling member (11) so constructed that the first phase of the rotation about the fulcrum (4) during opening of the window (2) coincides with a movement of the fulcrum (4) directed away from the window frame (1).

2. A window according to claim 1,
characterized in that
the each guide member (12) bears a first pivot (14) which is directed towards the window and which has a control pin (15) spaced therefrom, said pivot (14) fitting in a corresponding recess (19) in an intermediate member (16)

It is observed that the reference numerals in the claims are not intended to restrict the scope thereof and are only intended for clarification.

Claims:

continuing into a second cylindrical pivot (18) which forms the fulcrum of the window and the axis of which is spaced from that of the first pivot and which fits in a bore (26) on the window around which a curved guide path (27) is formed, into which there leads a receiving cavity (29) for the control pin (15), the latter being received therein when the window is closed, the arrangement being such that during the initial phase of the window movement the control pin (15) situated in the receiving cavity (29) acts as a reversing point and the second pivot (18) performs a swinging movement around the first pivot (14).

3. A window according to claim 1, characterized in that the guide member (12), control pin (15) and first pivot (14) are made in one piece.

4. A window according to claims 2 and 3, characterized in that during the end of the window movement the control pin (15) co-operates with the outer surface of the intermediate member (16).

5. A window according to claims 2 to 4, characterized in that the intermediate member (16) fits in a recess (21) in the guide (11) from which it projects, said recess (21)

limiting the movement of the intermediate member (16).

6. A window according to claims 2 - 5, characterized in that the bore (26) provided on the window to receive the second pivot (18) and the guide surfaces (27, 28) disposed therearound are formed in an element (22) intended to be mounted separately in the window.

7. A window according to claim 1, characterized in that a pivot (38) directed towards the window and forming the fulcrum, and a control pin (39) spaced therefrom project from the coupling member (35), the pivot (38) fitting in a slot (49) on the window side directed towards the guide (36), around which slot a curved guide path (45) is formed, terminating in a recess (46) directed towards one end of the slot (49) in order receive the control pin (39) the latter being received in said recess when the window is closed, the arrangement being such that during the initial phase of the window movement the control pin (39) situated in the recess (46) acts as a reversing point and the pivot (38) moves from one end of the slot (49) to the other.

8. A window according to claim 7, characterized in that a second guide path (47, 48) is formed on the window side

directed towards the pivot and the control pin and consists of a bent portion (48) situated opposite the first bent guide path (45) and terminating in a straight portion (47) directed tangentially away therefrom, said second guide path (47, 48) co-operating with a second control pin (40) disposed on the guide diametrically opposite the control pin.

9. A window according to claim 7 or 8, characterized in that the slot (49) and guide paths (45, 47, 48) are formed in a separate element (41) intended to be fixed in the side of the window.

10. A window according to claim 1, characterized by a swing arm (55) mounted between the guide (35) and the window, one end (54) being pivotally connected to the guide and the other end (56) being pivotally connected to the window, the guide bearing a control pin (53) which is directed towards the window and which co-operates with a sloping guide path (59) containing the control pin and formed on the window, the bottom end terminating in a receiving cavity (60) in which the pin (53) rests when the window is closed, the arrangement being such that during the opening of the window the guide path (59) runs against

the pin (53) is thereby pressed aside and moves the window aside via the swing arm.

11. A window according to claim 10, characterized in that the guide path (59) and the cavity (60) are formed on an element which is intended to be separately fitted to the top edge of the window.

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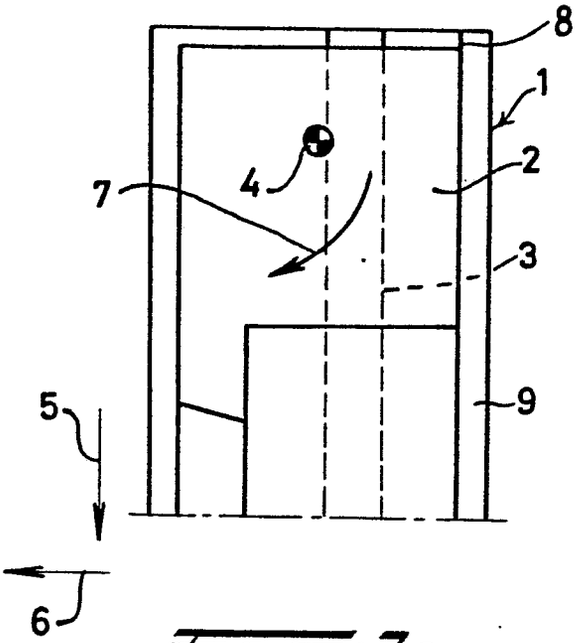

Fig: 1a.

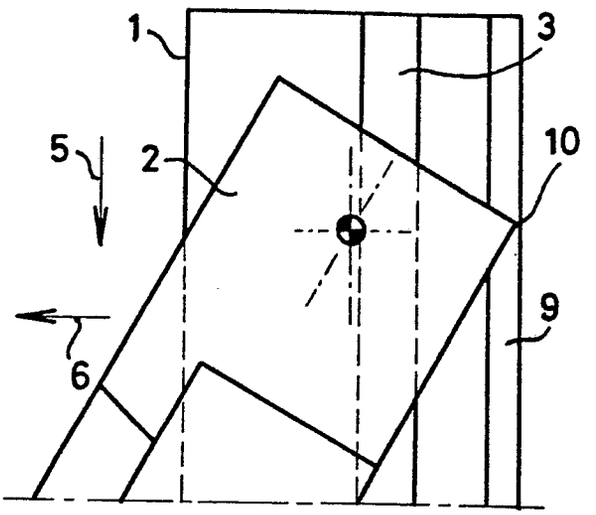

Fig: 1b.

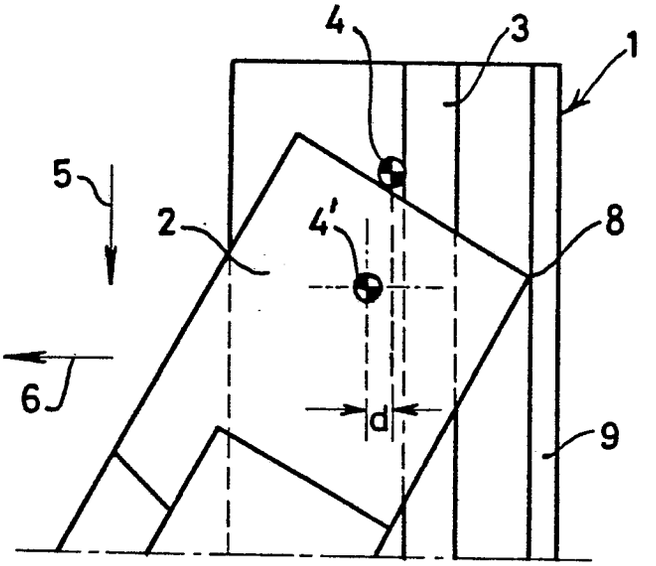

Fig: 1c.

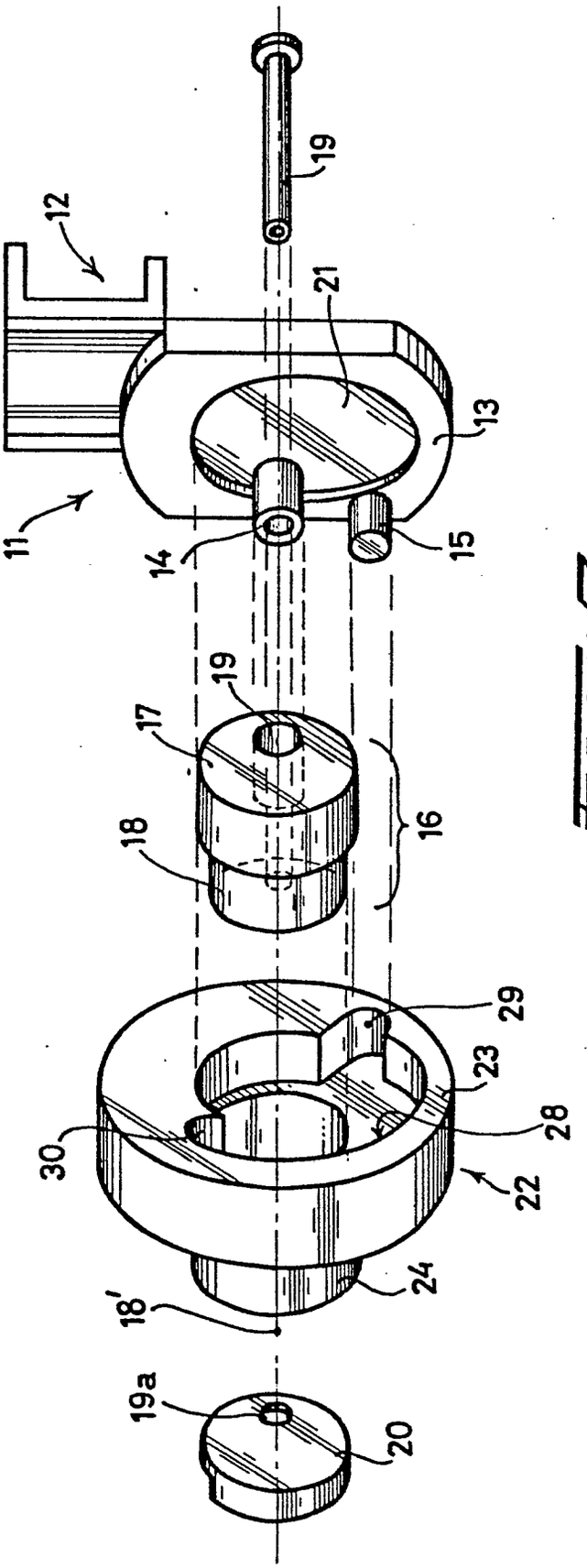

FIG. 2.

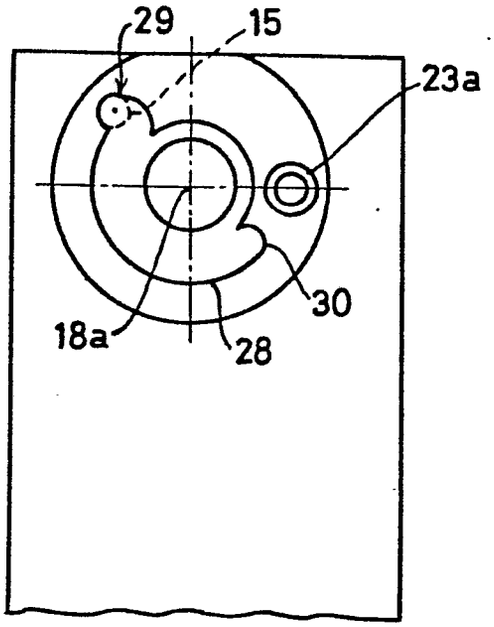

Fig: 3b.

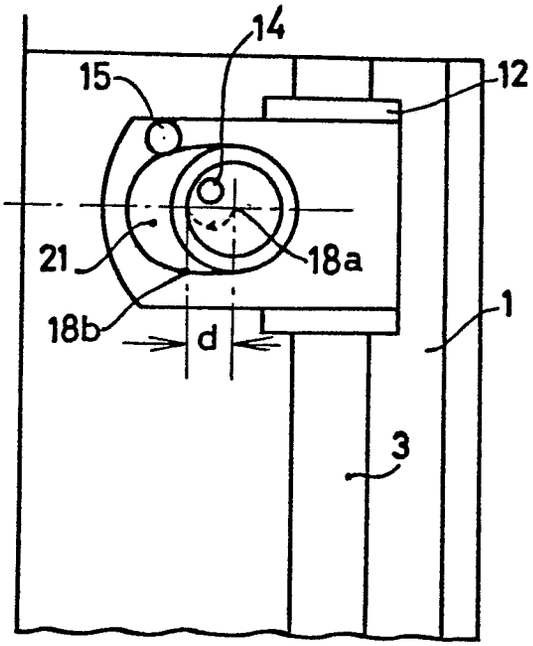

Fig: 3c.

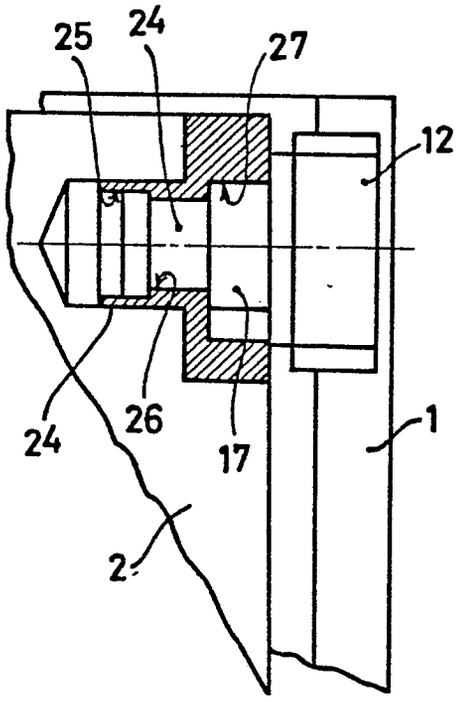

Fig: 3d.

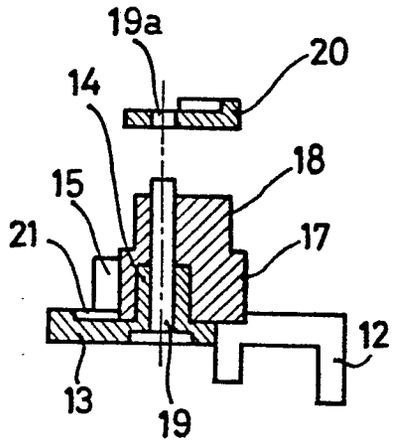

Fig: 3a.

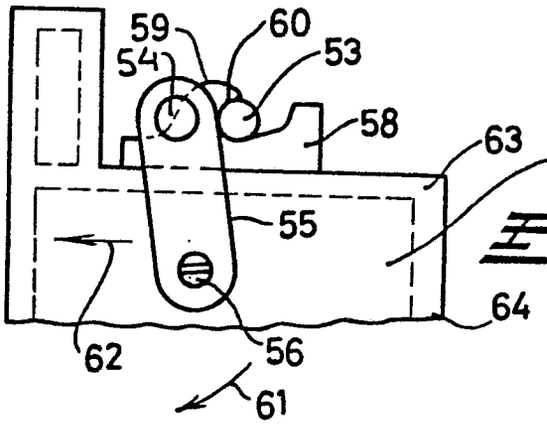

Fig: 5.

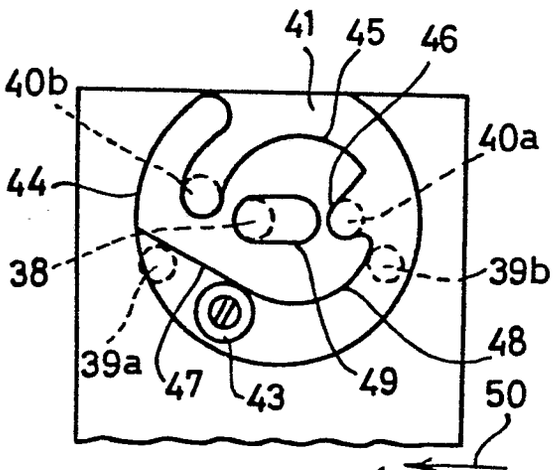

Fig: 4b.

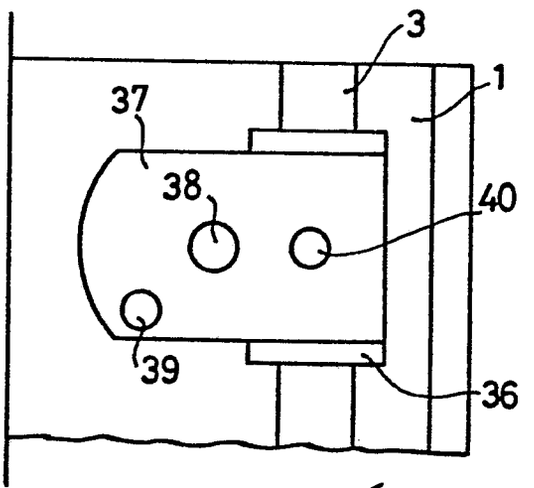

Fig: 4c.

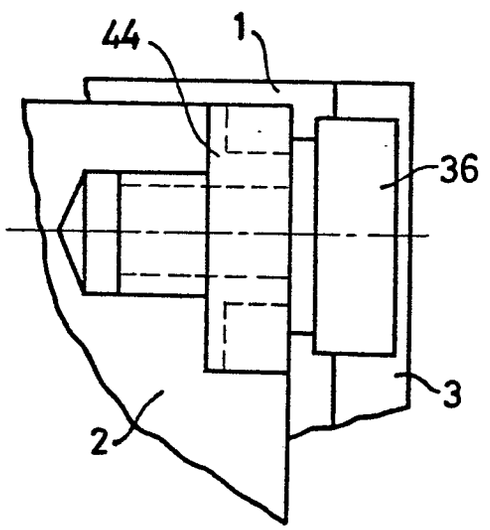

Fig: 4a.

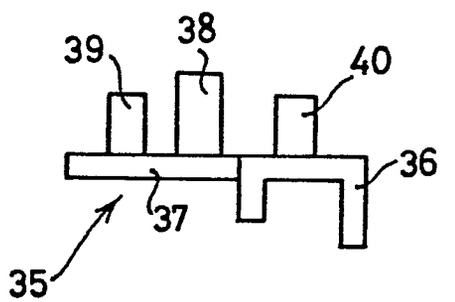

Fig: 4d.

European Patent Office

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Application number

EP 82 20 0156

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Y	EP-A-0 001 487 (INTERLOCK INDUSTIRES LTD) *Page 9, lines 1-5; figures 4-8*	1,10	E 05 D 15/44
Y	GB-A-2 022 669 (CODE DESIGNS) *Page 1, lines 69-130; figures 1-3*	1,10	
Y,D	GB-A-2 025 499 (STRAND) *Abstract; figure 1*	1	
A	DE-B-1 178 738 (SCHMID) *Column 3, lines 20-63; figures 1-8*	1,2	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

E 05 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18-05-1982	NEYS B.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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