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(54) A window comprising a pasquil locking mechanism and a window operator with an operating member

(57) In an openable window, the frame of which may be locked to the main frame by means of a pasquil locking mechanism comprising a locking rod (2,3) longitudinally displaceable in a frame member (1,1') for actuating locking means (4) to engage and disengage engagement means (5) connected with the main frame structure, the frame being openable from the closed position to a ventilation position by means of a manually operated or electrically driven window operator with an operating member (8), the locking mechanism is actuated thereby that a driver member (11) connected with the locking rod (2,3) is brought into engagement with a coupling member (14) connected with the operating member (8) for actuation of the locking rod (2,3) in continuation of the movement of the operating member (8), when the window is closed, and ahead of the movement of the operating member, when the window is open. A stopping means (15,16) prevents in connection with the closing movement actuation of the driver member (11) and the locking rod (2,3) until the frame is tightened against the main frame and the locking means (4) are positioned opposite engagement members (5) in the main frame structure.

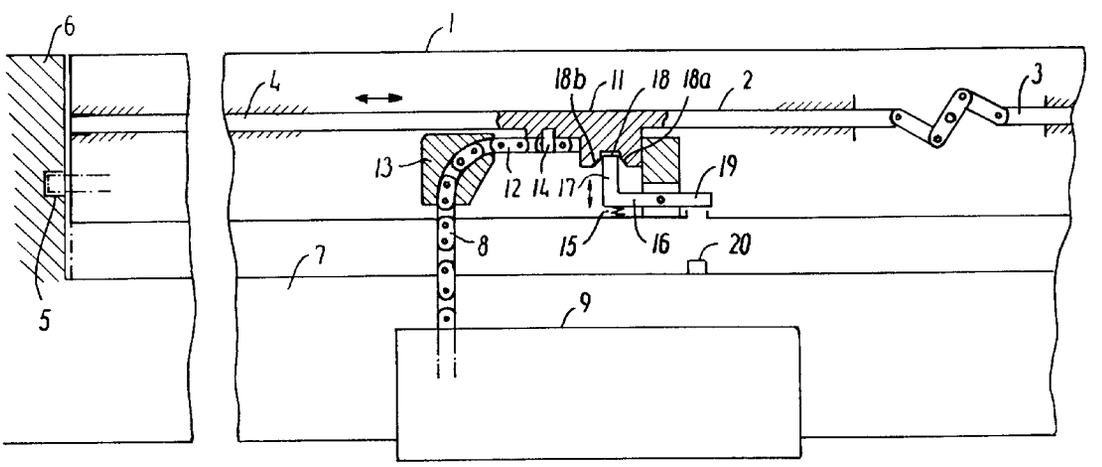

FIG.1

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Description

The present invention relates to a window having a frame which is openable relative to a main frame and which in a closed position may be locked relative to the main frame by means of a pasquil locking mechanism comprising a locking rod longitudinally displaceable in a frame member for actuating locking means likewise mounted in the frame to engage and disengage engagement means connected with the main frame structure by longitudinal displacement of the locking rod in one direction or the other and an actuator device for actuating and releasing the locking mechanism in said closed position of the frame, the frame being openable from the closed position to a ventilation position by means of a manually operated or electrically driven window operator with an operating member which is accommodated in a housing connected with the main frame structure and which has a free end connectable with the openable frame.

In known windows of this type with an electrically driven window operator a problem is to ensure that the operator is not activated when the window is closed until the locking means have been released from their engagement with engagement members fastened to the main frame structure, and the other way about in connection with the closing of the window to ensure that activation or operation of the locking mechanism is not possible until the frame has been tightened completely against the main frame, the locking means being positioned opposite the engagement members in the main frame structure, said members being normally designed as striking plates.

To overcome this problem it has been suggested in EP Patent Application No. 0 610 948 to connect the locking rod in a pasquil locking mechanism with the operator device by means of an intermediate piece preventing the opening movement from being initiated until the frame has been released from its locking to the main frame.

Operation of the pasquil locking mechanism is, however, performed in a conventional manner by means of an operating means, usually a turning handle, which is independent of the operator. Operation of the locking mechanism and the operator thus still has to be performed by two different operator devices.

On this background the object of the invention is to provide a window construction of the described type with a simplified operation, where activation and deactivation of the pasquil locking mechanism may be carried out by the operator itself.

To meet this object the window according to the invention is characterized in that the actuator device of the locking mechanism comprises a driver member connected with the locking rod, that one end section of the operating member at its free end is adapted to be received in the frame member of the locking rod and thereby be guided in parallel with the locking rod, said end section being adapted to be connected with a coupling member connected with the driver member for activating the locking rod to said longitudinal displacement in continuation of the movement of the operating member when closing the window and ahead of the movement of the operating member when opening the window, and that a stopping means engaging the driver member and/or the coupling member in connection with the closing movement only releases the driver member and the locking rod to said longitudinal displacement when the frame in the closed position is tightened against the main frame, said locking means being positioned opposite the engagement members fastened to the main frame structure.

By the coupling of the driver member connected with the locking rod to the coupling member connected with the end section of the operating member, longitudinal displacement of the locking rod for locking or release of the frame relative to the main frame will be carried out automatically in continuation of the closing movement and prior to the opening movement, respectively, said stopping means ensuring at the same time that the actuation of the locking mechanism in connection with the closing movement does not take place until the locking means in the frame have been positioned opposite striking plates or other engagement means in the main frame, such that damage to these parts is prevented.

Advantageous embodiments and further suitable development of the invention are stated in the dependent claims.

The invention will be explained in detail in the following with reference to the accompanying schematic drawing which only depicts the parts necessary for understanding the invention of a pasquil locking mechanism and an open/closing operator for an openable window, respectively,

Fig. 1 showing in a simplified way a sectional view of the frame/main frame structure in a first embodiment of a window according to the invention,
Figs 2-4 illustrating purely schematically the functioning of another embodiment, and
Figs 5-8 showing likewise purely schematically the functioning of yet another embodiment.

In the window shown in Fig. 1 a pasquil locking mechanism is for instance built into the bottom member 1 of the openable frame, which in the example shown comprises two articulated, longitudinally displaceable locking rods 2 and 3, the end parts of which form locking means 4, which, from the position shown in the figure, in which they are retracted into the frame member, may be displaced as shown by a double arrow into engagement with an engagement member in the form of a recess 5 in a striking plate fastened to a main frame side member 6.

Locking rods of the type shown may also be con-

nected with locking means in form of catch hooks which may engage locks with striking plates or other engagement members fastened to the main frame bottom member 7.

For opening and closing of the window frame between a closed position, in which it is completely tightened in the rebate formed by the main frame members 6,7, and a ventilation position an operator with an operating member is used, in the embodiment shown a chain operator with a chain 8, which in a manner known per se is accommodated in a housing 9 connected with the main frame bottom member 7 and its free end is connected with the frame bottom member 1. The operator may be manually operated or electrically driven by means of an electromotor placed in the housing 9.

The operating member 8 does not necessarily have to be a chain, but may also be a bowden-cable, other types of flexible operating members or rod mechanisms.

In the embodiment shown the locking rod 2 is in accordance with the invention connected with a driver member 11, and an end section 12 of the operating chain 8 at its free end being received in the frame bottom member 1 and by means of a purely schematically shown guide means 13 guided in parallel with the locking rod 2.

A coupling member 14 is connected with this end section 12, said coupling member engaging the driver member 11, such that the locking rod 2 by continued movement of the chain 8, after it has tightened the frame member 1 against the main frame bottom member 7, will pull the locking rod 2 to the left for activation of the locking engagement between the locking means 4 and the recess 5 in the striking plate fastened to the main frame side member 6.

In the embodiment of Fig. 1 the coupling member 14 may have the shape of a screw or pin which is directly anchored in the driver member 11.

To make sure that the locking mechanism during the closing movement is not activated until the frame bottom member 1 is tightened in the main frame rebate with the locking means positioned opposite the recesses 5 in the main frame structure, a stopping means is mounted in the frame bottom member 1, said stopping means comprising in the embodiment shown a spring-loaded 15 engagement member 16 with a hook portion 17 which is in engagement with a recess 18 in the driver member 11. Due to this longitudinal displacement of the locking rod 2 for activation of the locking means 4 cannot take place until the hook portion 17 has been released from its engagement with the recess 18.

This release may take place either by such a dimensioning of the spring-load acting on the engagement member 16 that it may be overcome by a predetermined, increased pull load on the driver member 11, when the frame bottom piece 1 has been tightened against the main frame bottom piece 7, and the recess 18 is provided with bevellings 18a,18b with a view to facilitating the release of the hook portion 17 from the recess 18.

Another possibility is to design the engagement member 16 as shown as a lever arm with an activating part 19, which in the tightened position of the frame bottom member 1 is actuated by a stop 20 for release of the hook portion 17 from its engagement with the recess 18 in the driver member 11.

In window constructions, in which a resilient gasket has been arranged in the main frame rebate, the locking means in the frame will not be positioned opposite striking plates or other engagement members in the main frame structure until the gasket has been compressed under surmounting of the gasket pressure. In connection with the embodiment shown in Fig. 1 a problem may arise due to the fact that the gasket pressure after the tightening of the frame bottom member 1, but before the locking means 4 start engaging the recesses 5 in the main frame structure, may move the frame outwards in the opening direction, such that the locking means 4 are displaced relative to the recesses 5, and therefore it is ensured with a suitable adjustment of the length of the stop 20 that the locking means 4 will not be activated until they are positioned opposite the recesses 5.

According to a further development of the invention this problem may also be overcome by making the construction as shown schematically in Figs 2-4.

The coupling member connected with the operating chain 21 by means of a pin 25 is here designed as a coupling member 22 of substantially U-shaped cross-section, said coupling member being displaceably mounted and connected with the driver member 24 connected with the locking rod 23, such that the coupling member 22 from an inactive position shown in Fig. 2, in which the frame is open, is brought to an active position in a way described in detail in the following.

The displacement of the coupling member 22 from the inactive to the active position is effected thereby that a stopping means designed as a spring-loaded lever arm 26, which in the inactive position through striking against a fixed stop 27 provided on the chain guiding means 13' will prevent movement of the coupling member 22, is activated by a stop or striking member 28 fastened to the main frame structure and thereby makes it possible for the coupling member 22 to activate the driver member 24 and consequently the locking rod 23.

As will be seen the striking member 28 may be designed as a cylindrical pin with a constriction 28a. In connection herewith, as best shown by b in Figs 2-4, a keyhole notching 29, which is positioned in the displacement direction, is provided in the wall of the U-shaped coupling member 22 facing the main frame, said notching having a circular section 30 fitting the tap 28 and a locking section 31.

In the open position of the window shown in Fig. 2 the lever arm 26 in the coupling member 22 is activated and will by striking against the fixed stop 27 prevent the displacement of the locking rod 23 by the coupling member 22. By the closing movement of the chain 21 in di-

rection of the arrow 32, the frame bottom member 1' will be moved towards the main frame bottom member 7', to which the operator housing 9' is fixed.

In the position shown in fig. 3 the frame bottom member 1' is pulled so far against the main frame bottom member 7' that the striking pin 28 is passed partially through the circular section 30 in the keyhole notching 29, and not until the frame bottom member 1' has been tightened completely against the main frame bottom member 7' under surmounting of the gasket pressure, will the striking pin 28 activate the lever arm 26, such that it as shown in Fig. 4 may pass the fixed stop 27, such that the coupling member 22, the driver member 24 and the locking rod 23 by continued movement of the chain 21 may be longitudinally displaced, the locking means 4' being passed into the recess 5' in the engagement member fastened to the main frame structure. By this movement of the coupling member 22, the keyhole notching 29 will be taken along, such that the locking section 31 engages the constriction 28a of the striking pin 28, which will be seen from Fig. 4.

The keyhole notching 29 is in this connection designed and dimensioned such that the locking section 31 starts engaging the constriction 28a and keeps the frame bottom member 1' in a position, in which the locking means 4' is positioned opposite the recess 5', before the locking means is introduced into the recess.

A spring 33 may be inserted between the coupling member 22 and a fixed point on the frame structure to ensure a precise functioning, but the spring is not an absolute condition.

In the embodiments described above the operating member is fixedly connected with the coupling member and thus with the window frame. In some cases it may be desirable that the window frame is manually openable, for instance in case of power failure or if the window is to be used as an emergency exit and consequently requires a bigger opening angle than permitted by the length of the operating member.

In Figs 5-8 a further development of the embodiment in Figs 2-4 is shown, said development being suited for this purpose. Only the parts which differ from the embodiment described in Figs 2-4 will be explained in detail, and for the parts having similar or analogous functioning the same reference numerals as in these figures are used.

In the open position of the frame, shown in Fig. 5 which corresponds to Fig. 2, the operating member in the form of an operating chain 34 is with its free end guided in a chain guide means 35 in the frame bottom member 1' and is connected with the coupling member 22 by means of a mechanism comprising a sprocket wheel 36 which is pivotally mounted on the chain guide means 35, and a toothed wheel 37 connected with the sprocket wheel 36 in a rotationally locked manner, said toothed wheel being in engagement with a toothed rack 38 which is connected with the coupling member 22. The operating chain 34 is in this figure passed around the sprocket wheel 36 to its end position, the toothed wheel 37 being in engagement with one end section of the toothed rack 38. The lever arm 26 prevents in the same way as described above the coupling member 22 from displacing the driver member 24 and subsequently the locking rod 23 at the closing of the frame.

In the position shown in Fig. 6 the operating chain 34 has pulled the frame bottom member 1' completely against the main frame bottom member 7', and the locking means 4' are positioned opposite the recesses 5'. The striking pin 28 activates the lever arm 26 to release the coupling member 22, and the operating chain 34 pulls through its continued movement the sprocket wheel 36 and thus the toothed wheel 37, which then via the toothed rack 38 moves the coupling member 22 and thus the locking rod 23, such that the locking means 4' is displaced into the recess 5' for the attainment of the position shown in Fig. 7.

From this figure it will further be seen that the operating chain 34 is pulled substantially completely into the operator housing 9'. In this position the window frame is locked in the same way as before, viz. partly through the engagement of the locking means 4' with the recesses 5', partly by the striking pin 28 with its constriction 28a being kept in the locking section 31 in the keyhole notching 29.

Opening of the window may now either take place by actuation of the operating chain 34, which after coupling with the coupling member 22 moves it to its inactive position, following which the window is openable, or by operating the locking mechanism manually by means of a handle (not shown), which brings the locking means 4' out of engagement with the recesses 5' during simultaneous displacement of the coupling member 22, such that the striking pin 28 is positioned opposite the circular section 30 of the keyhole notching 29, following which the now completely released frame may, as shown in Fig. 8, be pushed up to an open position.

The invention is not limited to the above embodiments, but may be changed within the scope of the accompanying claims. It is also a possibility to accommodate the locking mechanism after suitable modifications on the main frame instead of on the frame, whereby the operator has its housing on the frame.

Claims

1. A window having a frame which is openable relative to a main frame (6,7) and which in a closed position may be locked relative to the main frame by means of a pasquil locking mechanism comprising a locking rod (2,3;23) longitudinally displaceable in a frame member (1,1') for activating locking means (4,4') likewise mounted in the frame to engage and disengage engagement means (5,5') connected with the main frame structure by longitudinal displacement of the locking rod (2,3;23) in one direc-

tion or the other and an actuator device for activating and releasing the locking mechanism in said closed position of the frame, the frame being openable from the closed position to a ventilation position by means of a manually operated or electrically driven window operator with an operating member (8,21,34) which is accommodated in a housing (9,9') connected with the main frame structure and which has a free end connectable with the openable frame, **characterized** in that the actuator device of the locking mechanism comprises a driver member (11,24) connected with the locking rod (2,3;23), that one end section (12) of the operating member (8) at its free end is adapted to be received in the frame member (1) of the locking rod (2,3) and thereby be guided in parallel with the locking rod (2,3), said end section (12) being adapted to be connected with a coupling member (14,22) connected with the driver member (11,24) for activating the locking rod (2,3; 23) to said longitudinal displacement in continuation of the movement of the operating member (8,21,34) when closing the window and ahead of the movement of the operating member when opening the window, and that a stopping means (16;26) engaging the driver member (11,24) and/or the coupling member (14,22) in connection with the closing movement only releases the driver member (1,24) and the locking rod (2,3;23) to said longitudinal displacement when the frame in the closed position is tightened against the main frame, said locking means (4,4') being positioned opposite the engagement members (5,5') fastened to the main frame structure.

2. A window according to claim 1, **characterized** in that said coupling member (14) and the driver member (11) are fixedly coupled and that the stopping means (16) comprises a spring-loaded member mounted in said frame member (1) for engaging the driver member (11).

3. A window according to claim 2, **characterized** in that the stopping means (16) comprises a hook portion (17) intended for engaging a recess (18) in the driver member (11).

4. A window according to claim 3, **characterized** in that said hook portion (17) and recess (18) are designed such that the hook portion (17), against the spring-load (15), may be released from engagement in the recess (18) by a predetermined pull load applied by the operating member (8) to the driver member (11) in the tightened position of the frame.

5. A window according to claim 2 or 3, **characterized** in that said stopping means (16) is designed as a lever arm which in the tightened position of the frame is actuated to release the engagement with the driver member (11) by a stop (20) fastened to the main frame structure.

6. A window according to claim 1, **characterized** in that the coupling member (22) connected with the operating member (21,34) is coupled to and displaceable along with the driver member (24) position, in which it may cause a longitudinal displacement of the locking rod (23) and that said stopping means (26,27) is connected with the coupling member and not releasing it for movement to the active position until it is actuated by a striking member (28) fastened to the main frame structure.

7. A window according to claim 6, **characterized** in that said striking member (28) is designed as a pin which, when the frame is tightened to the locking position is passed through a key hole notching (29), which is positioned in the displacement direction, in the coupling member (22) for, by the movement activated by the stopping member (26,27) of the coupling member (22) to the active position, being displaced to a locking section (31) in said notching (29), in which the coupling member (22) is held by said pin (28) for keeping the frame in the tightened position prior to the actuation of the pasquil locking mechanism.

8. A window according to claim 6 or 7, **characterized** in that the connection between the operating member (34) and the coupling member (22) is releasable and that the pasquil locking mechanism may be activated and deactivated manually.

9. A window according to claim 8, **characterized** in that the releasable connection is established by a mechanism comprising a toothed rack (38) and a toothed wheel (37) which is connected in a rotationally locked manner to a sprocket wheel (36) which is stationary and rotationally mounted relative to the coupling member (22), and in that the free end of the operating member (36) causes the displacement of the coupling member (22) between its active and inactive position.

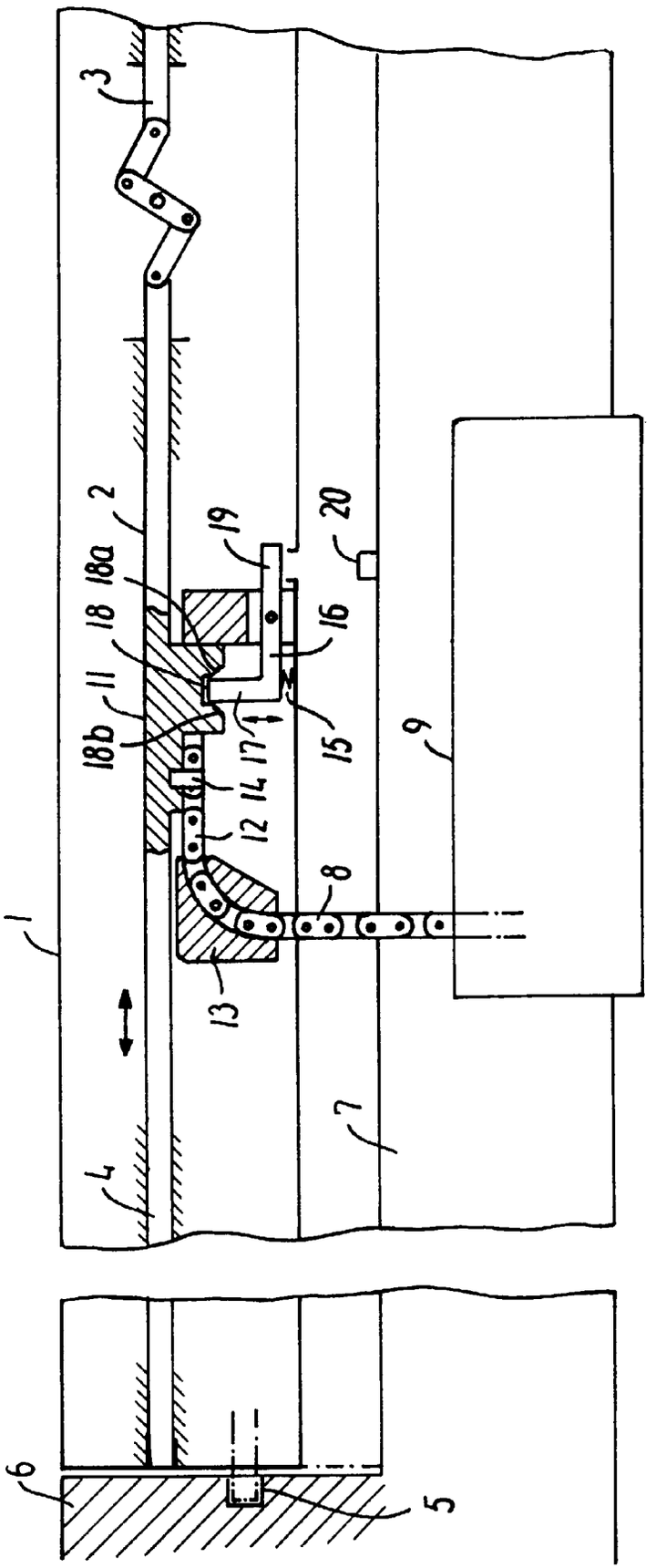

FIG.1

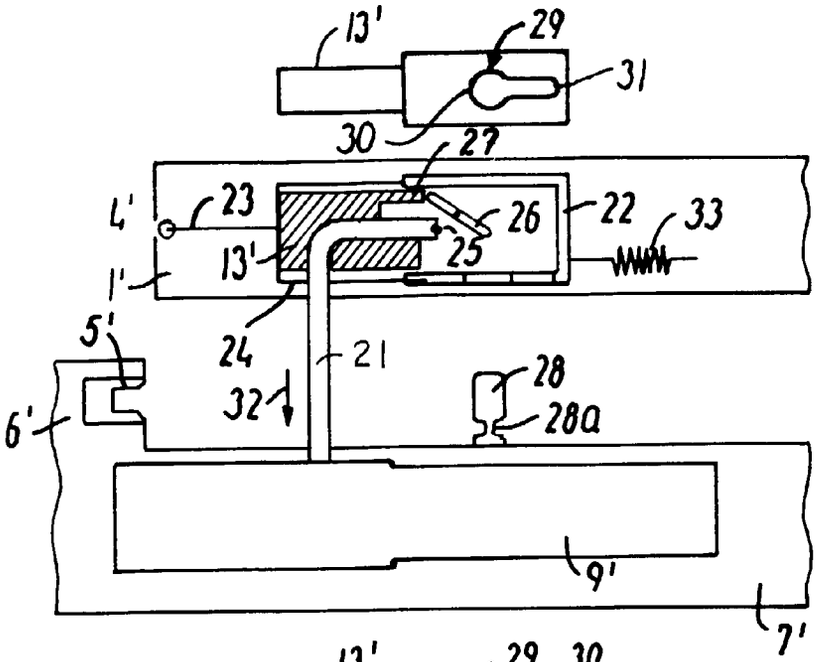

FIG.2

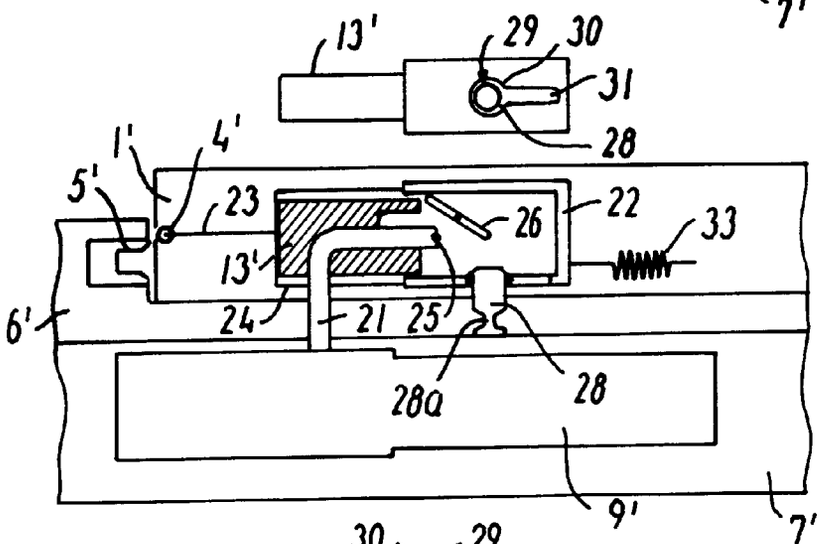

FIG.3

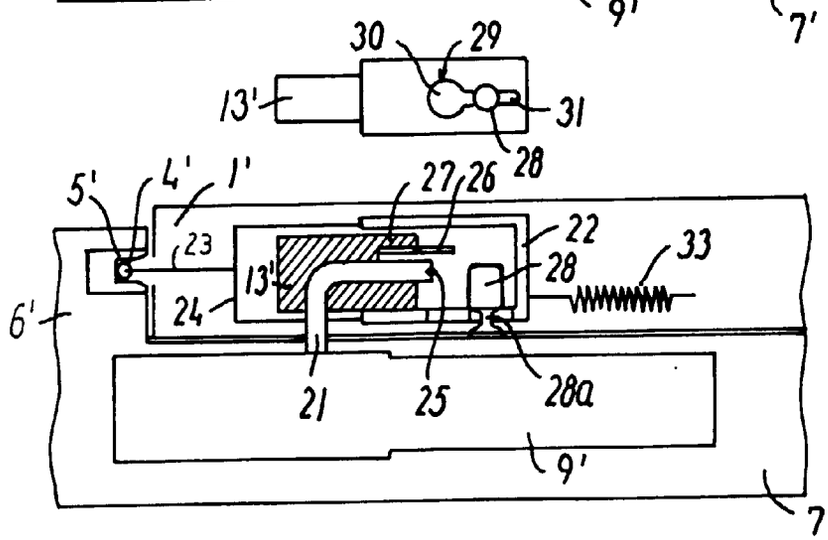

FIG.4

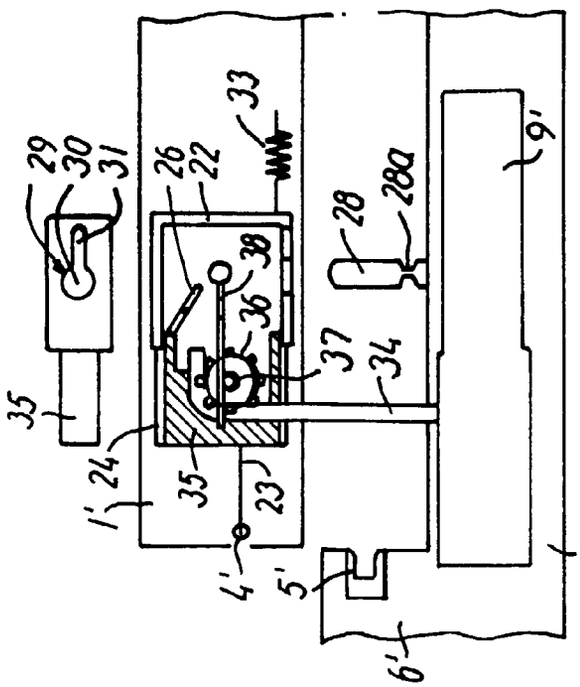

FIG.5

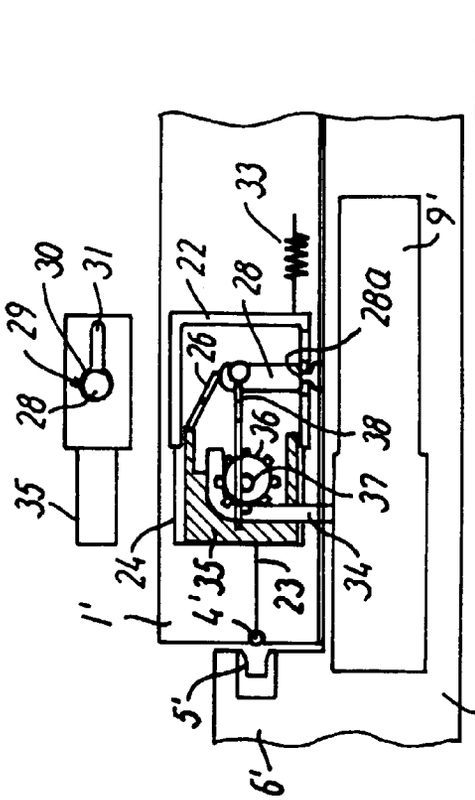

FIG.6

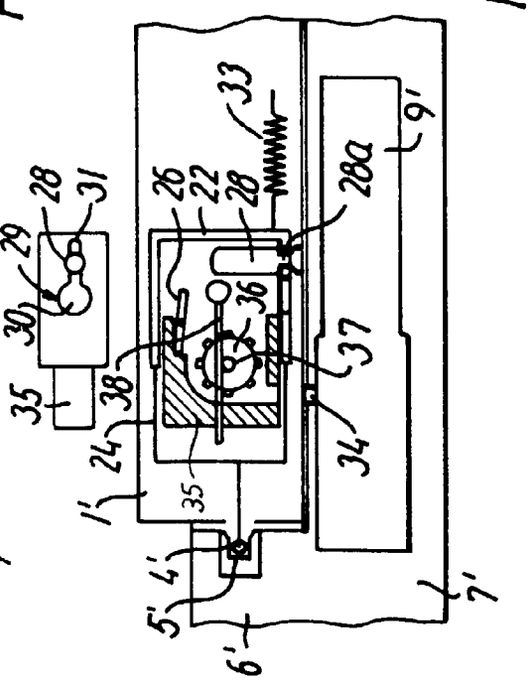

FIG.7

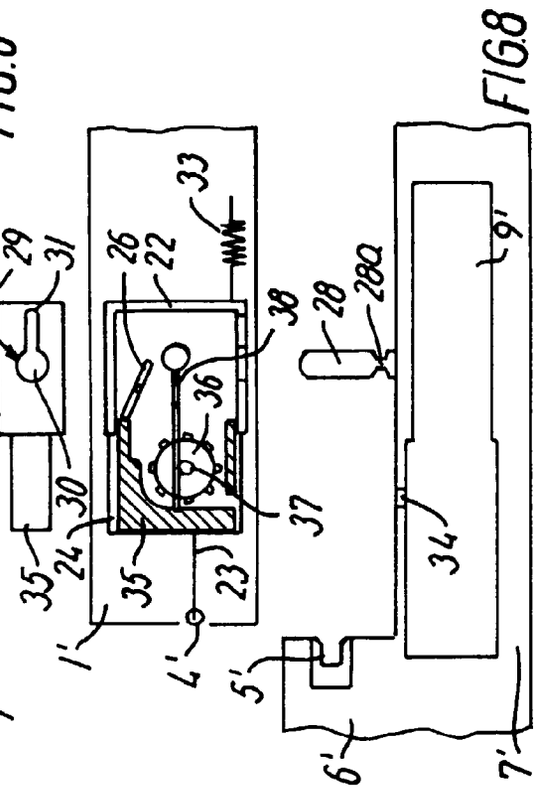

FIG.8

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EUROPEAN SEARCH REPORT

Application Number
EP 97 61 0001.6

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.6)
Y	EP 0599809 A2 (AUG. WINKHAUS GMBH & CO. KG), 1 June 1994 (01.06.94) --	1-2	E05F 15/12
Y	US 4796385 A (M.E. TYLER), 10 January 1989 (10.01.89) --	1-2	
A	US 3481076 A (N.M. BEDARD), 2 December 1969 (02.12.69) -----		

TECHNICAL FIELDS SEARCHED (Int. Cl.6)

E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	22 April 1997	WENDENIUS CHRISTER

CATEGORY OF CITED DOCUMENTS

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