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## (54) Tilt-and-turn window for a sloping roof.

(57) A tilt-and-turn window for a sloping roof comprises a window (2) which is mounted in a tilt-and-turn manner between two pivoting arms (9) in a manner such that the outside face of the window (2) can be turned inwards in order to be washed. The pivoting arms (9) are linked to each other by a coupling tube (12) which is pivotably mounted near the top rail of the case. Pivoting arms (9) and coupling tube (12) form a rigid auxiliary frame (4) which prevents the window twisting on opening and closing. Around the coupling tube there is also mounted a pretensioned spirally wound bending spring (16) (torsion spring) which can take the weight of the opened window. In order to compensate for differences in the desired and delivered spring force, two friction rings (15) clamped between pivoting arms (9) and case arms (6) are present.

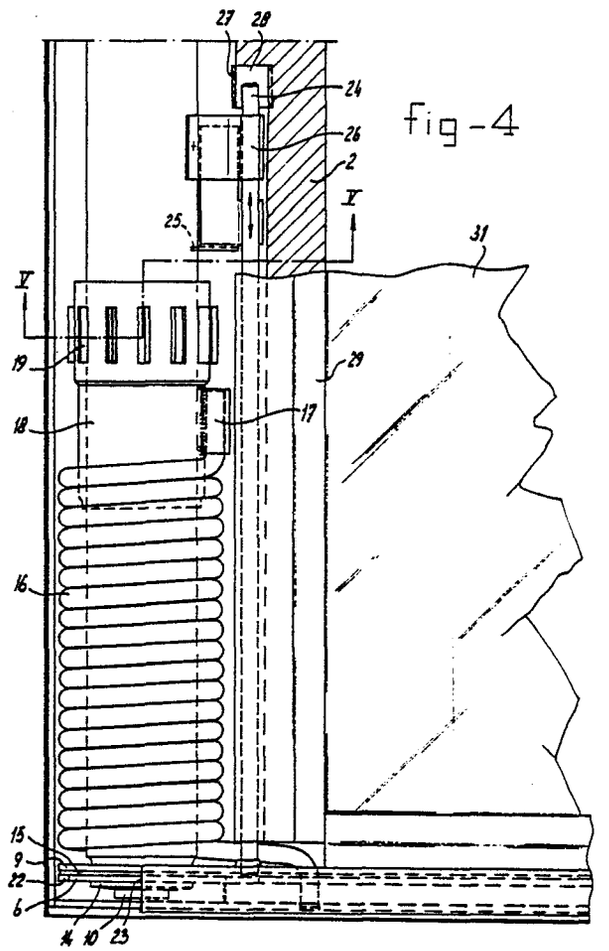


fig-4

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# Tilt-and-turn window for a sloping roof

The invention relates to a tilt-and-turn window for a sloping roof provided with a case near the top rail of which two arms are pivotably attached, a window being mounted in a tilt-and-turn manner between the said arms in a manner such that the outer face of the window can be turned inwards and means being present to take the weight of the window which has been brought to an open position by pivoting the arms upwards.

A window of this type is known from GB-A-2,005,330. Advantages thereof are that the hinge around which the window can rotate to the open position is relatively high and consequently the so-called standing height is relatively large when the window is in the fully open position, and that the outer face of the window can be tilted and turned to a position in which the said face can be washed from the roof space.

In the known construction each of the two arms has a separate hinge hub with respect to the case. As a consequence of this construction the arms are not constrained to move synchronously, which results in an increased risk of the window twisting when it is opened and closed. As a result of this and as a result of the spring construction chosen adjustment of the window may proceed less smoothly than is desired. In addition, the operating reliability is at risk.

The object of the invention is to provide a tilt-and-turn window as described in the introduction which is smoothly and infinitely adjustable without clicking noises, which is stable in any position, which is robust and operationally reliable in construction and which can easily be matched to the roof slope in relation to taking the weight of the opened window.

According to the invention the tilt-and-turn window is characterised in that the said arms are combined to form an auxiliary frame by means of a coupling tube mounted in a pivotable manner in the case, and to take the weight of the opened window at least one pretensioned, spirally wound bending (torsion) spring is mounted around the coupling tube, and that adjustable means of friction are present to compensate for differences in the desired and delivered spring force.

The spirally wound bending spring can have a relatively large length without difficulty. The flat characteristic which results from this, in conjunction with the frictional force which is transferred directly from the auxiliary frame arm to a case arm, results in a smooth execution of the pivoting movement of the window.

Easily adjustable means of friction consist of two friction rings which are each clamped between an auxiliary frame arm and a case arm solidly mounted in the case, the friction force which the pivoting auxiliary frame experiences from the friction rings being adjustable by means of at least one tensioning nut, with a cup spring being accommodated between the stopping face of the tensioning nut and the respective case arm.

As a consequence of the presence of the cup spring the pressure exerted by the tensioning nut is distributed over an area of relatively large diameter.

In order to make the friction force essentially equal on both sides of the coupling tube, a tie rod extends through the coupling tube and there is a tensioning nut screwed to one or both ends of the said rod.

The auxiliary frame formed by two arms and the coupling tube must form a rigid whole to avoid twisting of the window and to effect a synchronous pivoting of the arms.

This is assisted by the fact that the coupling tube is joined to the auxiliary frame arms in that pegs axially projecting from the two ends of the tube engage in openings of the auxiliary frame arms.

In the maximally opened position the window can be tilted and turned into the washing position. If this tilting and turning is desired, the auxiliary frame will preferably be temporarily fixed in the said maximally opened position. This means that during the time in which the window is locked against tilting and turning, there must be no locking of the auxiliary frame in the maximally opened position, while conversely the locking of the window with the auxiliary frame in the maximally opened position must take place if the window has to be able to be tilted and turned. In view of this it is preferable that a locking bar is displaceable between a first locking position in which the window is locked with a certain play with respect to the auxiliary frame and a second locking position in which the maximally opened auxiliary frame is locked with respect to the case.

The play in the locking of the window with respect to the auxiliary frame is necessary so that the window can seat in the most favourable sealing position on closing and deformation of the window as a result of thermal action or moisture remains possible.

It should be possible to match the tension of the torsion spring easily to the weight of the window and the roof slope and for this purpose one end of the torsion spring may be fixed in an opening in the case while the other end thereof is connected to a spring dowel which is mounted in a rotatable manner around the coupling tube and which can be rotated by means of a tensioning key to a position in which a locking element to be fitted locks the spring dowel with respect to the coupling tube.

The invention will now be explained more fully with reference to the figures in which an exemplary embodiment is depicted.

Figures 1 to 3 incl. show cross-sections of the tilt-and-turn window construction in the closed position, the opened position and the tilt-and-turn position of the window respectively.

Figure 4 shows a section of a part of the hinge construction of the window along the line IV-IV in Figure 5.

Figure 5 shows a section along the line V-V in Figure 4.

Figure 6 shows a side view of the part shown in Figure 4.

Figure 7 shows a part of the hinge construction in section along the centre line of the coupling tube.

Figure 8 shows a cross-section taken through the window across the tilt-and-turn joint.

The tilt-and-turn window construction depicted for a sloping roof comprises a case 1 usually consisting of wood and a glazed window 2 which is mounted in a tilt-and-turn manner on tilt-and-turn joints 3. The said tilt-and-turn joints are joined to an auxiliary frame 4 which has a hinged joint at 5 to the case arms 6 which are solidly attached to the case 1. In order to be able to fix the window in the closed position or a slightly open position at least one fixing element 7 is pivotably mounted at the position of the tilt-and-turn joints 3. This element can act in conjunction with a pin 8 secured to the frame.

The auxiliary frame 4 comprises two auxiliary frame arms 9 which over the greater part of their length have a U-shaped construction and which are connected to a coupling tube 12. The connection is effected as a result of the fact that pegs 11 extending axially from the end covers of

the coupling tube engage in openings of the arms 9. Through the said tube 12 there extends a tie rod 13, the ends of which each project through a case arm 6. A tensioning nut 10 is screwed to these ends which are provided with a screwthread, the tensioning force being transferred via a cup spring 14 to the frame arm 6. Friction rings 15 are mounted between the case arms 6 and the auxiliary frame arms 9. Around each end of the coupling tube there extends a spiral torsion spring 16, one end of which is fixed in an opening of a case arm and the other end projects into a socket 17 which forms part of a spring dowel 18 which is mounted in a rotatable manner around the coupling tube 12. A part of the spring dowel 18 is provided with teeth 19 punched outwards with which a tensioning key 20 (Figure 5) can interact in order to pretension the respective spring. In the pretensioned state the springs can be locked by means of a locking element 21 which is inserted through openings of the spring dowel 18 and the coupling tube 12 which lie in line. The pretension of the springs 16 delivers a force which can compensate for the weight of the combination of auxiliary frame 4 and window 2 when pivoted open.

It will be clear that a complete balance of the weight of the window 2 with auxiliary frame 4 and the tensioning force of the tension springs 16 is only achieved in a certain pivoted position of the window and that in other pivoted positions either the tensioning force of the torsion springs or the weight of the window is dominant. In order to make the window retain its pivoted position for relatively small differences between tensioning force and weight, the friction rings 15 already mentioned are used. The friction produced by the said rings can be adjusted by means of the tensioning nuts 10. In view of the fact that these are screwed to the same tie rod 13, on tightening up one of the tensioning nuts the force thereby produced will be exerted on both friction rings 15.

It will be clear that the window 2, locked by means still to be described more fully with respect to the auxiliary frame arms, can be pivoted by means of rotation of the coupling tube 12 from the closed position shown in Figure 1 to the open position shown in Figure 2 and vice versa, the pivoting axis (= centre line of the coupling tube) being located near the upper rail of the case 1 and the opened window taking up a relatively high position. The so-called standing height below the window is large.

The maximum opening of the window is determined by stop protrusions 22 which the end 23 of the bent part of the U-shaped auxiliary frame arms 9 comes up against. After unlocking the window with respect to the auxiliary frame, it can be tilted and turned in the maximally open position to a position in which the outer face of the glazing is turned inwards and can be washed.

During the tilting and turning the auxiliary frame 4 should be locked in the maximally open position because otherwise the window 2 may come up against the case 1, as a result of which damage may result. For both locking actions use is made of a locking bar 24 which can be moved backwards and forwards by means of an operating lip 25 inside a guide bush 26 from a first locking position depicted in Figure 4, in which an end of the locking bar 24 projects with play into a chamber 28, bounded by an angle iron 27, in the window, and a second locking position in which the other end projects into the space above the case arm 6 in the maximally open position of the window.

Because the guide bush 26 is joined to the coupling tube 12 the window, not tilted and turned, is joined to the coupling tube in the first locked position with a certain play. In the fully opened position of the window the locking bar can be brought into the second locking position in which the coupling tube is linked to the case on the one hand by the lock and on the other hand by the stop protrusion 22.

The play with which the end of the bar 24 projects into the chamber 28 in the first locked position is desired so that the window 2 can seat in the most favourable sealing position on being closed. The sealing elements are indicated by 29.

Moreover, it is of importance for a favourable loading of the sealing elements and the window that the fixing element 7 can pivot about the centre line of the tilt-and-turn joint 3 (see Figure 8).

In the figures the following details are visible in addition: the double glazing is indicated by 31. To strengthen the coupling tube 12 at the position of the part of the enclosing spring dowel 18 provided with teeth 19, two reinforcing linings 32 are fitted between the coupling tube and the spring dowel. The fixing screws for fixing the case arms 6 to the case 1 have the reference figure 33.

Within the scope of the idea of the invention various variations and modifications are possible.

**Claims**

1. Tilt-and-turn window for a sloping roof provided with a case near the top rail, of which two arms are pivotably attached, a window being mounted in a tilt-and-turn manner between the said arms in a manner such that the outer face of the window can be turned inwards and means being present to take the weight of the window, which has been brought to an open position by pivoting the arms upwards, characterised in that the said arms (9) are combined to form an auxiliary frame (4) by means of a coupling tube (12) mounted in a pivotable manner in the case, and to take the weight of the opened window at least one pretensioned spirally wound bending (torsion) spring (16) is mounted around the coupling tube (12), and that adjustable means of friction (15) are present to compensate for differences in the desired and delivered spring force.

2. Tilt-and-turn window according to Claim 1, characterised in that the means of friction consist of two friction rings (15) which are each clamped between an auxiliary frame arm (9) and a case arm (6) solidly mounted in the case, that the friction force which the pivoting auxiliary frame (4) experiences from the friction rings (15) is adjustable by means of at least one tensioning nut (10), and that while a cup spring (14) is accommodated between the stopping face of the tensioning nut and the respective frame arm (6).

3. Tilt-and-turn window according to Claim 2, characterised in that the tensioning nut (10) is screwed to the end of a tie rod (13) extending through the coupling tube (12).

4. Tilt-and-turn window according to one of the preceding claims, characterised in that the coupling tube (12) is rigidly joined to the auxiliary frame arms (9) in that pegs (11) axially projecting from the two ends of the tube engage in openings of the auxiliary frame arms.

5.Tilt-and-turn window according to one of the preceding claims, characterised in that a locking bar (24) is displaceable between a first locking position in which the window (2) is locked with a certain play with respect to the auxiliary frame (4) and a second locking position in which the maximally open auxiliary frame (4) is locked with respect to the case (1).

6. Tilt-and-turn window according to one of the preceding claims, characterised in that one end of the torsion spring (16) is fixed in an opening in the case and the other end thereof is connected to a spring dowel (18) which is mounted in a rotatable manner around the coupling tube (12) and which can be rotated by means of a tensioning key to a position in which a locking element (21) to be fitted locks the spring dowel (18) with respect to the coupling tube (12).

Fig-1

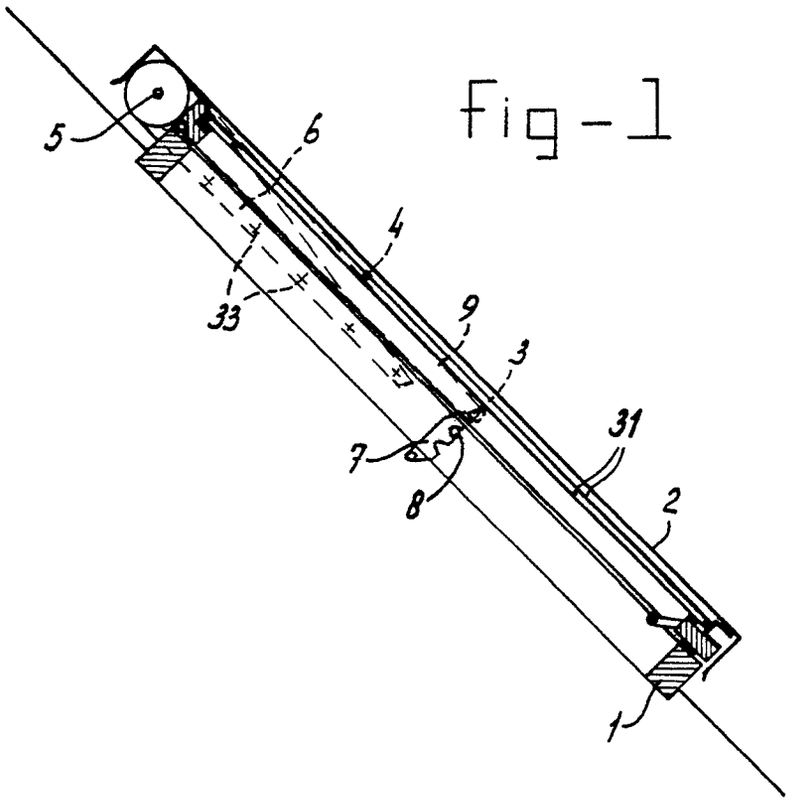



Fig-2

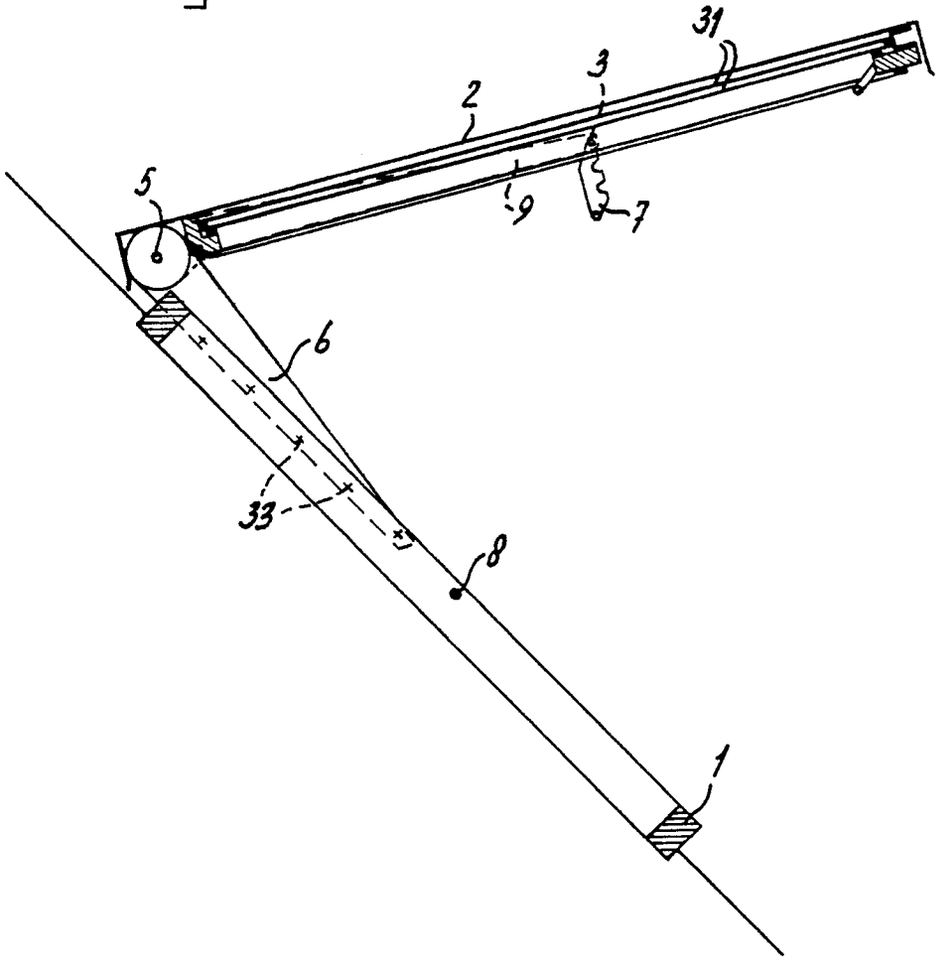
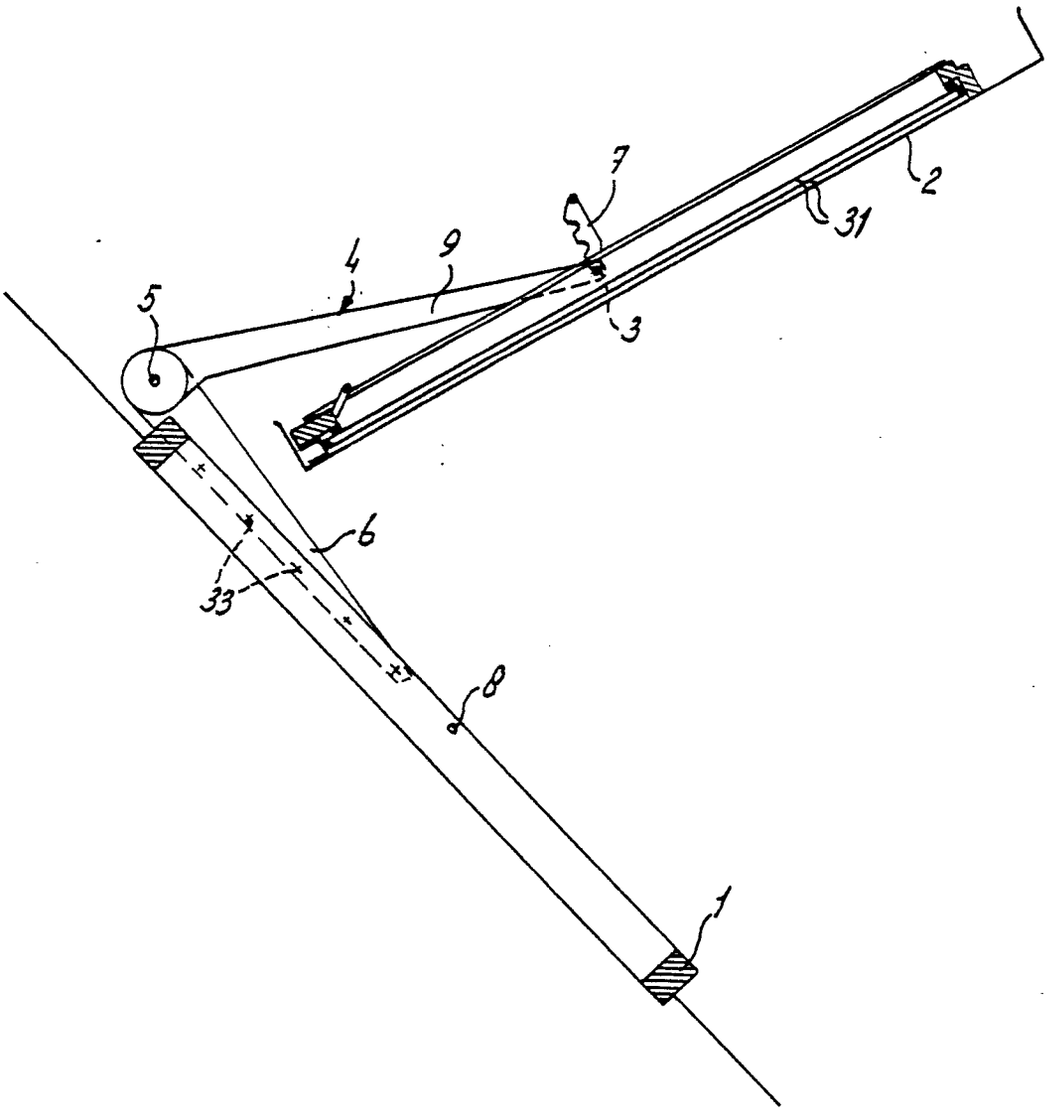


Fig - 3



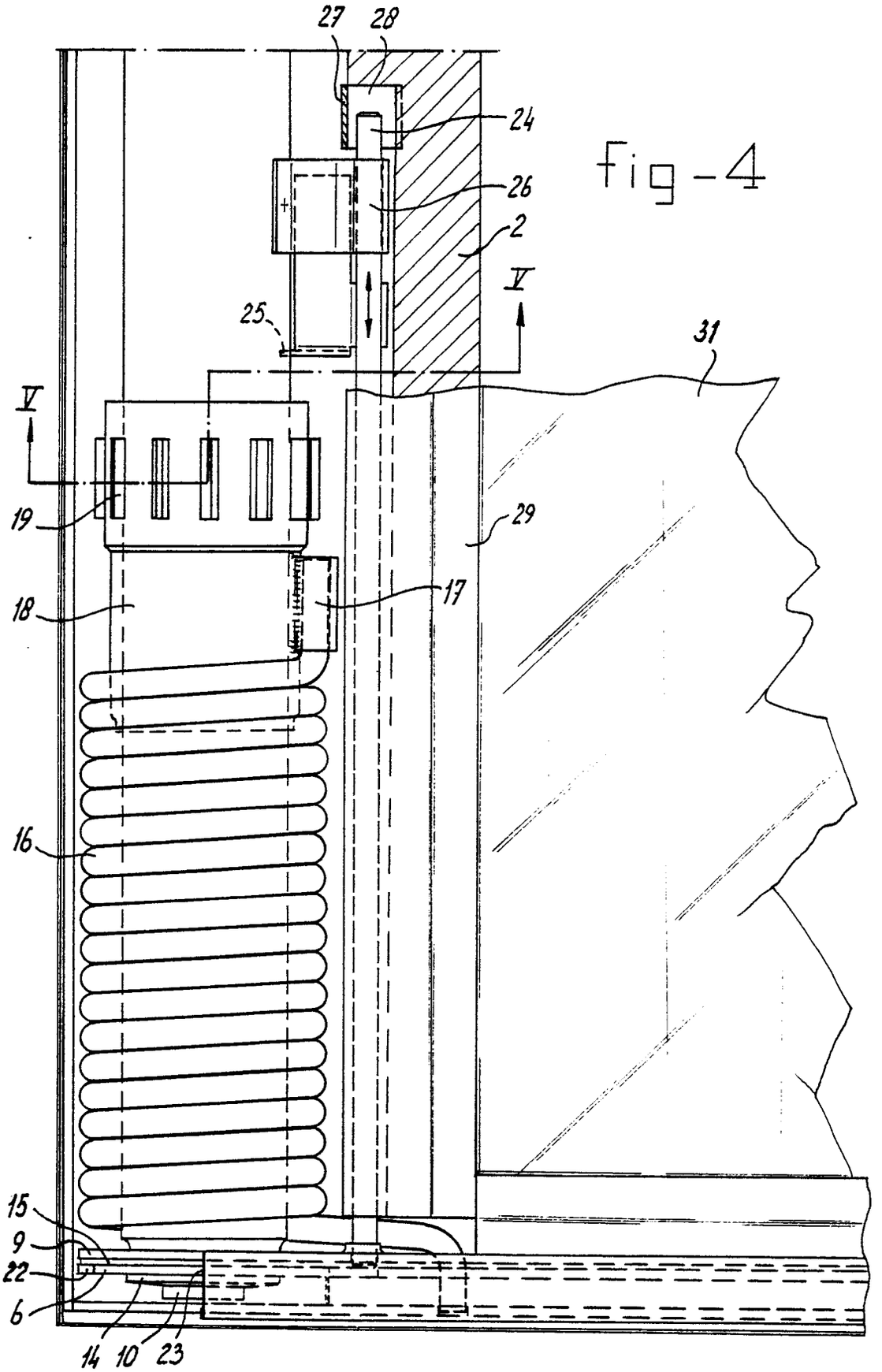



Fig-4

Fig - 5

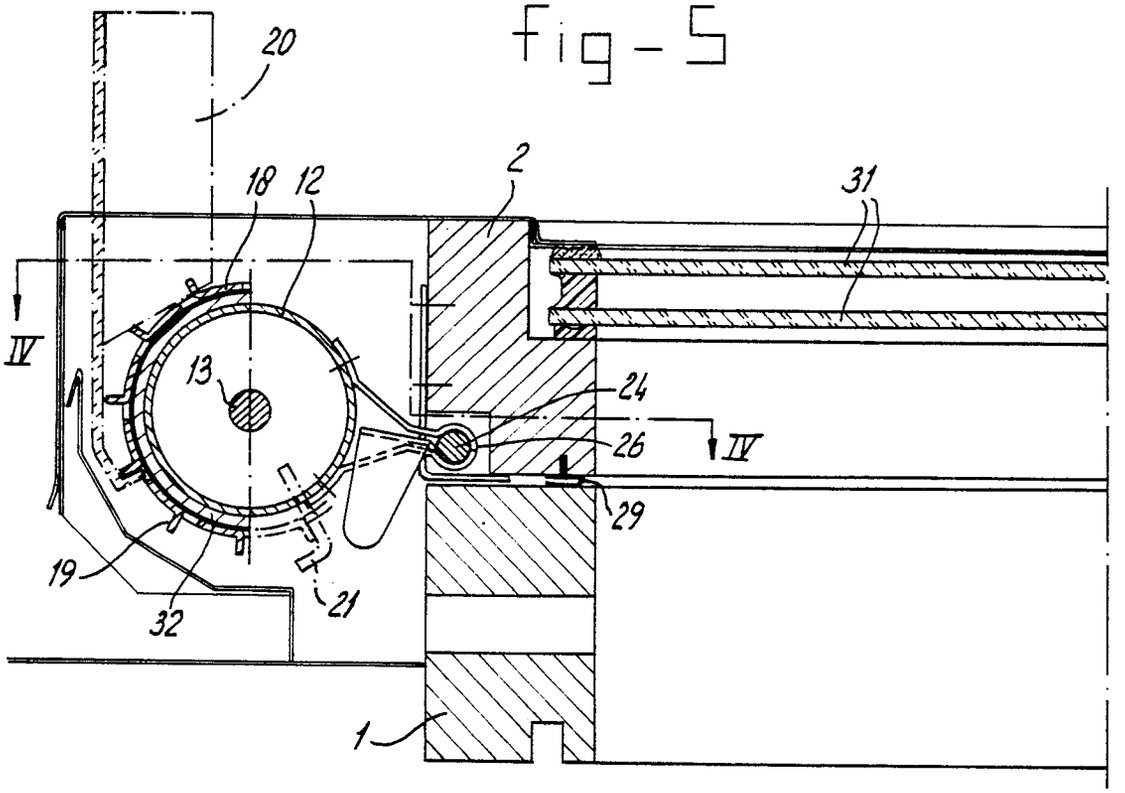



Fig - 6

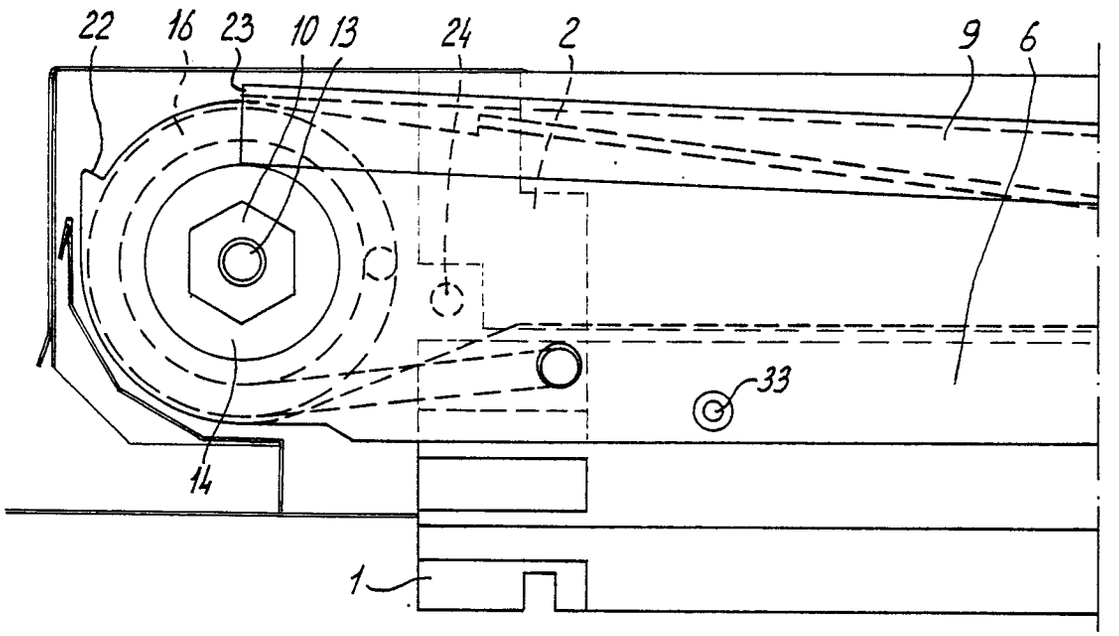


Fig - 7

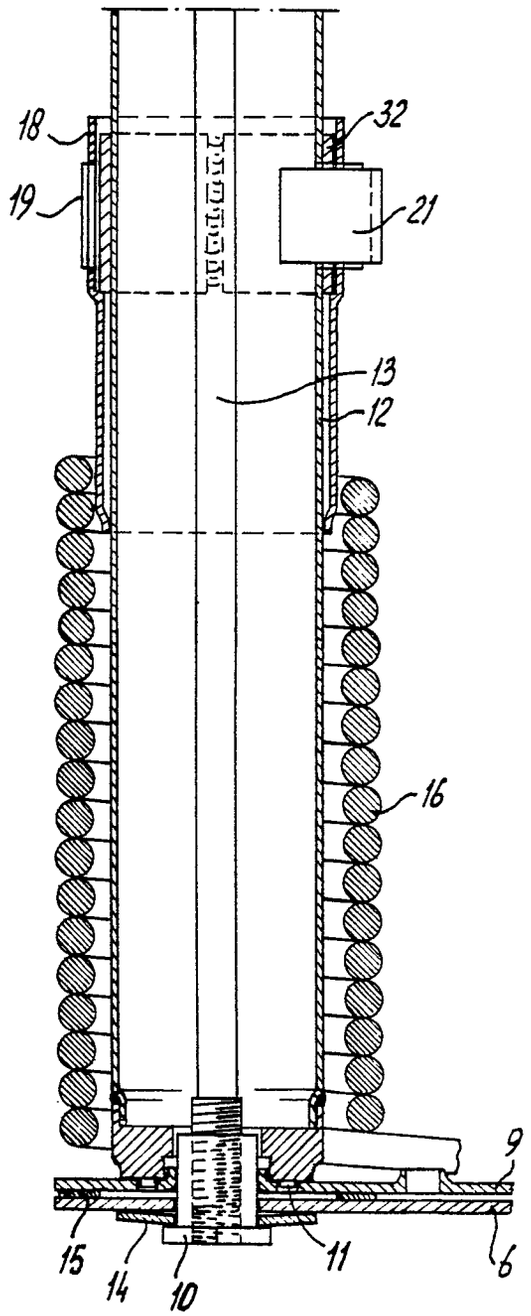
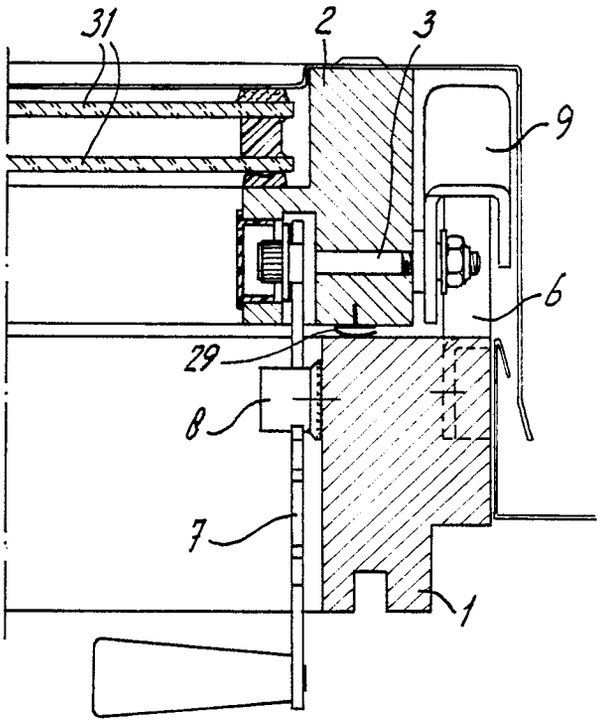



Fig - 8



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# EUROPEAN SEARCH REPORT

Application number

EP 85 20 1530

## 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.4) |
|---|---|---|---|
| D,Y | GB-A-2 005 330 (REICHSTADT) * Page 1, lines 30-55; page 2, lines 76-130; page 3, lines 1-49; figures 1,5,8 * | 1 | E 05 D 15/48<br>E 04 D 13/035 |
| A | | 8 | |
| Y | EP-A-0 046 821 (VOLLMER) * Page 3, lines 24-30; page 6, lines 20-30; page 7, lins 1-29; page 12, lines 7-10; figures 1-5 * | 1 | |
| A | FR-A-2 424 993 (BLEFA) * Page 5, lines 23-37; page 6, lines 1-3; figure 1 * | 2 | |
| A | FR-A-2 399 524 (BRAAS) * Page 9, liens 28-38; page 10, lines 1-31; figure 2 * | 1 | TECHNICAL FIELDS SEARCHED (Int. Cl.4)<br>E 05 D<br>E 04 D |
| A | GB-A-1 598 036 (BRAID) * Page 1, lines 1-38; figures 6-11 * | 1 | |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 03-01-1986 | NEYS B.G. |

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