(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 653 538 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **94500179.0**

(51) Int. Cl.[6] : **E05F 11/48**

(22) Date of filing : **11.11.94**

(30) Priority : **12.11.93 ES 9302365**

(43) Date of publication of application :
17.05.95 Bulletin 95/20

(84) Designated Contracting States :
DE ES FR GB IT

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(54) Cable type window winder with simplified kinematic chain and electrical or manual drive.

(57) The invention relates to a window winder with an closed cable-type, kinematic chain (6) of great simplicity as regards its components and their arrangement, in which all the traditional items for guiding, driving or tensing the cable have been eliminated, as have the supports and parts which are welded or riveted together, all of which makes for great ease of construction, which can be performed simply, practically automatically, with the consequent very considerable saving in time and, therefore, in manufacturing cost.

Moreover, a very compact unit is presented, especially in the simple electrical version, which becomes a single item secured to the vehicle door by tightening three nuts which have been previously arranged on the corresponding bolts or screws fastened to it, thus making the assembly operation extremely easy, being extended to its use in a double rail by simply duplicating its kinematic chain and adding the synchronizing element between both.

There is a rail or quide element (1) along which a drive slide (2) moves. The rail is equipped with a set of end supports and the drive slide is connected to a steel cable (6) which travels through these supports, with the ends of the cable converging at a tensioner drum (5) mounted on the rail.

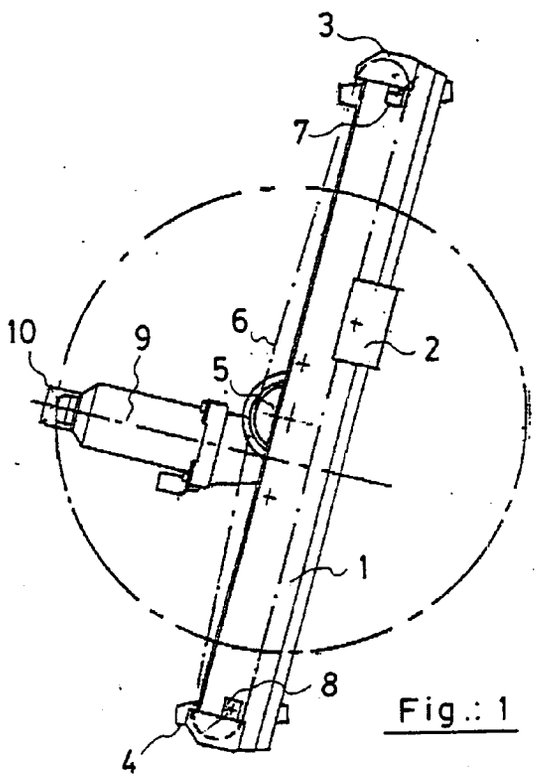

Fig.: 1

EP 0 653 538 A2

This invention relates to a cable type vehicle window winder with kinematic chain and electrical or manual drive.

Insofar as is known, the basic aim of the technique to be developed by this invention is to simplify the techniques used up to now in mechanisms used for moving the glass pane, in opening and closing operations, in automobile vehicle doors, using a new functional concept.

In order to achieve this basic objective, the invention is composed of a drive element or slide for the glass, from which two branches of cable leave, a rail or guide along which the said drive element travels, two supports at the ends of the rail or guide and, finally, a winding drum which can be self-tensioning.

With this invention, the complexity of the Bowden cable system is eliminated, with the absence of all the traditional elements for guiding, driving and tensing the cable, as well as the supports and the parts which are welded or riveted together, which in practice will mean a great ease of construction, able to be carried out in a very simple fashion. The assembly operations are also made easier.

For a better understanding of the inventive idea, the corresponding sheets of explanatory drawings are attached, in which, without any restrictive nature, the following are shown:

- Figures 1 to 4 show a general arrangement of the different practical solutions for the invention.
- Figure 5 represents another version of the invention, relating to a double rail window winder.
- Figures 6, 7 and 8 represent the incorporation of a coil (volute) spring, arranged parallel to the drum and coaxial with it, to compensate for the weight of the glass.
- Figures 9 to 12 show the fastening of the drive element to the glass.
- Figures 13 to 16 make it possible to appreciate the different shapes of rails which can be used.
- Figure 17 is an illustration of the end of the rail.
- Figure 18 shows the arrangement of the assembly of the end supports on the rail.
- Figure 19 is a representation of one version of the self-tensioning drum.
- Figure 20 is another, alternative, version of the self-tensioning drum.

Looking now at Figures 1 to 4, we can observe how the window winder device is essentially provided with a guide-rail (1), on which a drive element (2) moves, with this drive element being connected to two ends of the cable (6). The ends of the said cable (6) that leave the drive element (2) are inserted into a drum (5) through a set of end supports (3, 4), with the cable winding and tensing operations being carried out on this drum.

The drum (5) is supported by a motorized speed reducer or reducer (9), Fig. 1, in the case of the electrical drive, with the assembly being secured to the vehicle door by three points (7, 8, 10).

In the case illustrated in Fig. 2, the drive (11) is distant from the rail (1) and is connected to the drum (5) by means of a transmission line (14). The drive is secured to the door and the rail is secured by means of the fixing points (7, 8).

Other types of drive systems, for example manual ones, are shown in Figs. 3 and 4, with the drive elements themselves (12, 13) and their transmission lines (15, 16) to the drum (5).

In the cases of double rail window winders, as shown in Fig. 5, the peripheries of the tensioning drums (5) for both rails (1, 1') are provided with their corresponding ring gears (18, 19), connected to each other by means of the gear-tooth belt (17), with the synchronization thus obtained being perfect, as is the balancing of the position of the drive slide, which is carried out in a very simple manner at the time of arranging them in the door. In this particular case, any of the methods described above would be valid as a drive system, for instance, by adapting the motorized speed reducer (9) described, to one of the drums.

Parallel to the drum, and coaxial with it, it is feasible to assemble a support on which a coil spring can be received, as illustrated in Figs. 6, 7 and 8. The coil spring (43), represented in three different adaptations, is used to compensate for the weight of the glass pane in the door, and at the same time to reduce the drive torque if the drive is manual, or, if the drive is electrical, to reduce the motor power.

The drive element (2) is a support part made of thermoplastic or metalloplastic material which includes a system for fixing the glass (21). This system can be by clip-fitting directly into a drill hole in the glass itself, as illustrated in Fig. 9, by inserting a lug into the drill hole in the glass pane and fixing with a butterfly (wing) nut, Fig. 10, by nipping or gripping by means of bolts and flexible lips, Fig. 11, or by direct fastening onto the bottom edge of the glass pane by means of two bolts, Fig. 12.

These proposed solutions are offered simply for guidance, since any form of securing the glass pane to the support, within the range of habitual techniques, can be used.

As regards the guide-rail (1), it will be made up of a profile with a cross section and a moment of inertia suitable for its use, as illustrated by the rails (1, 1', 1", 1'") shown in Figs. 13 to 16. The dimension figure (22) for each one of them, which is the internal width, will be sufficiently wide to allow the drive element (2) to pass without being hampered in any way by the fixing for the motorized speed reducer or by the drum support.

In any case, it must be kept in mind that this element acts as a support for the constituent parts mentioned above and, therefore, must be appropriately resistant to be able to stand up to the corresponding

stresses in the slam tests, without becoming deformed.

The end guide-supports (3, 4), arranged also at the ends of the rail (1), are injection-moulded parts made of thermoplastic material, which on being inserted, fulfil the function of supporting the rail (1) on the door structure, while at the same time guiding the cable (6) and allowing it to slide, so as to direct it from the sliding direction of the drive element (2) to that of winding onto the drum (5).

Fig. 8, by way of example, represents in all its view a support (3) which brings together the characteristics described. This support (3') is inserted into the end of the rail (1) (Fig. 17) and is fastened to it by means of the bolt (7) with the square head and neck (24), from where it follows that assembly is easy, consisting of inserting the bolt (7) into the square hole (P), Fig. 17, at the end of the rail (1) and then sliding the support (3), in an axial direction on the rail, onto the window or cut-out (G), Fig. 17, until the tongue (L) of the support (3) becomes mounted on and fixed over the square head of the bolt (7), and being thus ready for assembly in the door.

The support (3) also has a guide (23) for the cable (6) so that the cable can slide in the guide when moving from the drum (5) to the support (2) or viceversa.

Obviously, the supports in question can be channel wheels or pulley-wheels, as long as they perform the same operational function.

The self-tensioning drum (5) of the invention is the most important part of the unit and is described in two different versions. One of these is illustrated in Figs. 19 and the other in Figs. 20.

According to the version shown in the two Figs. 19, the drum (20) is of very simple construction and is advisable whenever cables with a small amount of stretching are used.

According to the version shown in Figs. 20, the drum (20') has constant automatic tensioning and is somewhat more complex than the previous model, but most useful if the cables of the kinematic chain suffer a considerable amount of stretching during the life of the window winder.

In accordance with Figs. 19, we can observe that the drum (20) is made up of two parts (25, 26) which are coaxial with each other and duly fitted one over the other by means of the tongues (27) of the casing (25) and the edge (28) of the casing (26), so that both parts (25, 26) can turn, one over the other, but in one single direction, due to the fact that the casing (26) has a circular toothed rack and the casing (25) has its tongues (30). These tongues (30) engage in the toothed rack and immobilize one casing in relation to the other in one direction and release it in the opposite direction.

The casing (25) is the initially driving part to which turning is provided by means of the motorized speed reducer fitted at its outlet on the corresponding hub of the square, toothed or other cross section, or else by means of the toothed ring gear (35) at the outer edge of the reducer, when the drive is manual, as illustrated.

Tensing of the cable takes place by inserting the lug on the upper branch of the said cable into the gap (31) in the casing (26), once that it has been housed in the upper support and making the system turn in an anticlockwise direction until all the cable has been gathered in and it takes the drive element (2) to the upper stop of its travel path.

Having reached this point, the stop (32) from the assembly unit is moved over the outer circular toothed rack (29) of the casing (26), with which it becomes fixed to the casing (26) in its clockwise rotation. Here, the lug on the lower branch of the said cable is inserted into gap (33), after passing it through the lower support, and the system is made to turn in a clockwise direction, with which the casing (25) will rotate over the casing (26) until the cable becomes tensed, by applying the turning torque which is considered suitable. This should be performed with a turn of less than one rotation, at which moment the stop (32) is released and the kinematic chain becomes closed and ready for use without having to recur to intermediate conductors, guides, etc., as happens in Bowden systems.

The variant shown in Fig. 20, although equal externally to the model described above, is provided in its interior with a system of coplanary planetary gears of one single phase, with which, as the cable from the upper branch is wound onto the part of the drum (37), braking takes place when the slide or drive element reaches the upper stop and on inserting the other branch into the part (36), if the main planetary gear (38) continues rotating in an anticlockwise direction due to the effect of the satellites (39), the part (36) will rotate in a clockwise direction and the cable will be tensed in the way desired.

Whenever loosening or slackening occurs, the tension adjustment will be rectified on one of the travel path ends being reached and coming up against the stop, and whenever this slackening is equal to or greater than the pitch of internal toothed rack (40) linked with the toothing of the planetary ring gear (41).

All the component parts of the two units (20) and (20') corresponding to the tensing drum are manufactured in thermoplastic material with a vitreous load and obtained by injection moulding, with the exception of the shafts (41) of the unit (20'), which are made of steel and are inserted into the corresponding positions in the part (36).

It is important to point out, once having described the nature and advantages of this invention, its non-restrictive character, inasmuch as changes in the shape, material and sizes of its constituent parts will not in any way alter its essence, as long as they do not mean a substantial variation of the whole.

Claims

1 .- Cable type window winder with simplified kinematic chain and electrical or manual drive, characterized by:

- a guide element (1) made up of a profile with a cross section suitable for its use as regards its dimensions and moment of inertia, and constructed or shaped by die-casting or rolling a metallic strip of stainless or pretreated material, with ends perforated in a symmetrical manner in order to receive the fixing and support elements by their insertion or clip-fitting, and with the necessary intermediate holes to receive a motorized speed reducer (9) and a tensioner-drum (5),
- the ends of the guide element rest on two supports (3, 4) made of plastic material which are inserted into the guide by displacement and are clip-fitted over the square head of a bolt (7) which has been previously inserted into the guide, thus becoming firmly fixed in place and preventing this screw-threaded bolt from being moved axially or turning when the nut used for securing to the vehicle door is attached and tightened,
- the rail support elements (3, 4) have integrated into them the slide track for the cable or the suitable space to receive the channel wheels or pulley-wheels on which the cable will move, depending on the case, with these supports being obtained by injection moulding of thermoplastic material, as well as the channel wheels or pulley-wheels, if they are used,
- a drive element or slide (2) for the glass pane which is moved along the rail or guide by the alternating pull of two multicore steel cables (6), inserted into the slide by connection onto two pressed lugs and inserted in the same way and wound onto a drum (5) by its other end, thus forming a closed kinematic chain once that the cable runs through the gaps or pulley-wheels in the rail supports and it has been tensed,
- a kinematic chain which is reduced to two simple branches of steel cable which, starting from the drive element (2) for the glass, are joined by insertion and winding onto a tensioning drum (5) once that they have passed through the guides or pulley-wheels at the ends of the rail, without the assistance of any other guiding, driving or tensioning elements, thus eliminating flexible items which would require the use of sound-absorption materials to prevent noises by knocking or vibration,
- a tensioning drum (5) which is reached by the two branches of steel cable from the drive element or slide after having passed through the supports, closing the kinematic chain by insertion, winding and automatic tensing onto the said tensioning drum, which is made up of two coaxial parts (25, 26) clip-fitted to each other and which fix their final position by the locking of the internal circular toothed rack system in one part and the internal engaging pins (27) in the other part (26) onto the first, on being submitted to certain rotation and tension operations by the drive system chosen, whether it be electrical or manual,
- the tensing of the cable (6) is carried out by initially winding one branch of the cable onto the part (26) of the drum which has the cable tread (indentation) in a convenient pitch propeller until a certain position, with this part being immobilized by the external toothed rack (29) cut on its side perimeter, by means of the assembly tool (32), the free branch becomes locked onto the coaxially opposite part of the cylindrical drum, and on turning this in the opposite direction to the previous one, by at least one full turn, and submitting it to a pre-set tension, the kinematic chain unit is ready for use, but always at this pre-set initial tension.

2.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with claim 1, characterized in that if for reasons of the load to which the system has to be submitted, it should need the tension to be adjusted in a controlled manner during its life, a tensioner drum would be applied, also made up of two coaxial parts or casings (36, 37), but in which, at the end of the winding stage, the tension is effected by the second casing turning on the first in the opposite directionby the effect of a system of coplanary planetary gears of one single phase (38, 39) and, therefore, every time it reaches the end of its travel path, the tension will be adjusted, and whenerver the slackening or loosening produced is equivalent to the pitch of the locking system.

3.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with claims 1 and 2, characterized in that the guide element or rail (1) acts as a support for the motorized speed reducer (9) with the tensioning drum (5) attached.

4.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with claims 1 and 2, characterized in that guide element or rail (1) acts as a support for the tensioning drum (5), which is operated by a worm-gear reducer (11) with a flexible shafting (14) from a motor arranged at a distance.

5.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with claims 1 and 2, characterized in that the guide element or rail (1) acts as a support for the tensioning drum (5), which is operated by a gear-tooth belt (15, 16) from a manual drive system.

6.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with claims 1, 2 and 3, characterized in that in the case of direct drive, the positions of the motorized speed reducer in relation to the support guide or rail can be arranged within the area swept (covered) by the said motorized speed reducer in its rotation as regards the output shaft coinciding with the shaft of the tensioning drum, according to what is suitable for implantation into the vehicle door and always fixed to it by only one point,which can come out from the casing of the motorized speed reducer or from the end of the motor.

7.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with claims 1, 2, 4 and 5, characterized in that when gear-tooth belt drive is required, the ring gear is integrated into one of the portions of the said tensioning drum, with both parts being obtained by injection moulding of thermoplastic material.

8.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with claims 1, 2, 4, 5 and 7, characterized in that a spring-type torque compensator (43) can be incorporated, coaxial to the drum, to counterbalance the weight of the glass pane, in order to reduce the motor output or the manual drive torque.

9.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with the previous claims, characterized in that the electrical drive by means of motorized speed reducer and gear-tooth belt considerably reduces the thickness of the unit, making it suitable for small or limited spaces or volumes in vehicle doors.

10.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with the previous claims, characterized in that if the rotation of the tensioning drum is carried out by flexible shafting between the motor and the speed reducer, the unit can be fitted into the door in the most suitable position to counteract the impacts caused by the slamming effect.

11.- Cable type window winder with simplified kinematic chain and electrical or manual drive, in accordance with the previous claims, characterized in that the unit can be made in a parallel manner, for use in a double rail window winder version, due to the ease of synchronization between the two parts (18, 19), by having tensioning drums with ring gears with an identical number of teeth incorporated into them.

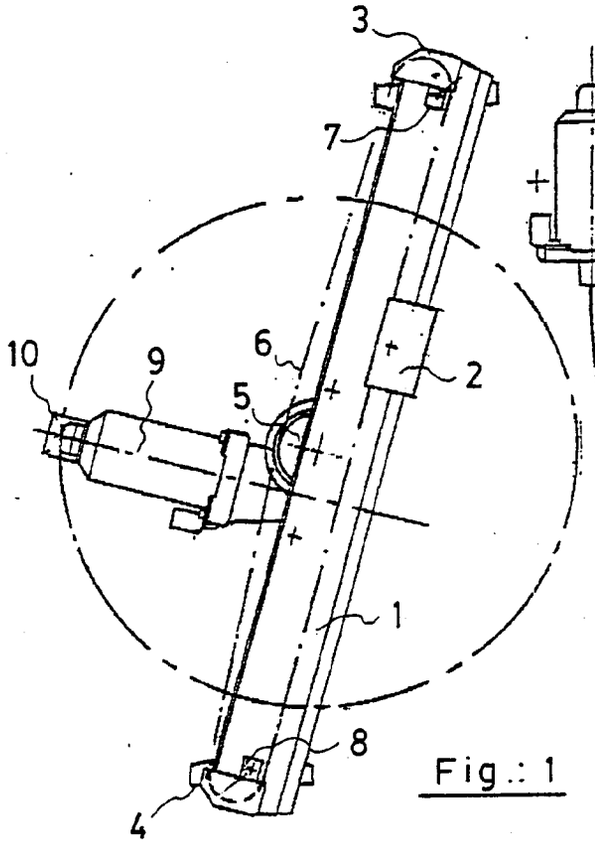

Fig.: 1

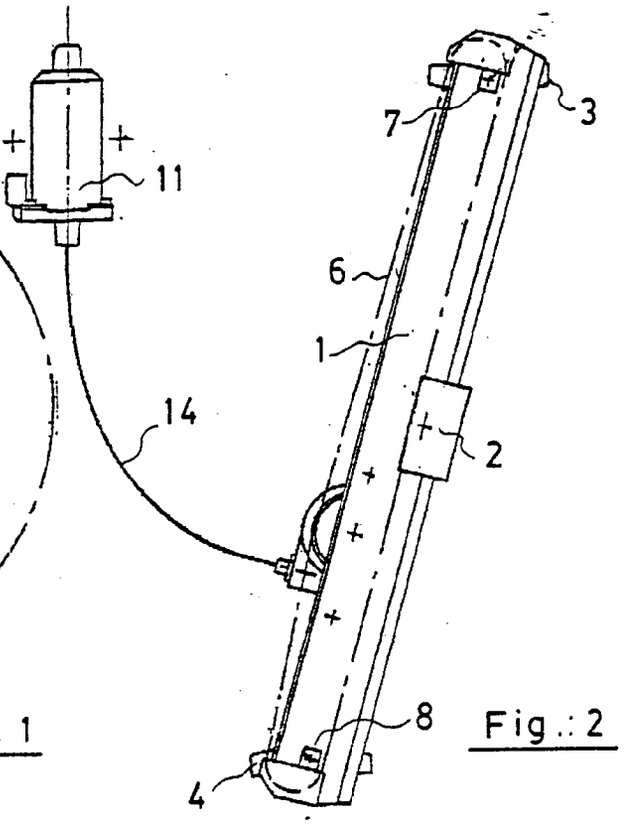

Fig.: 2

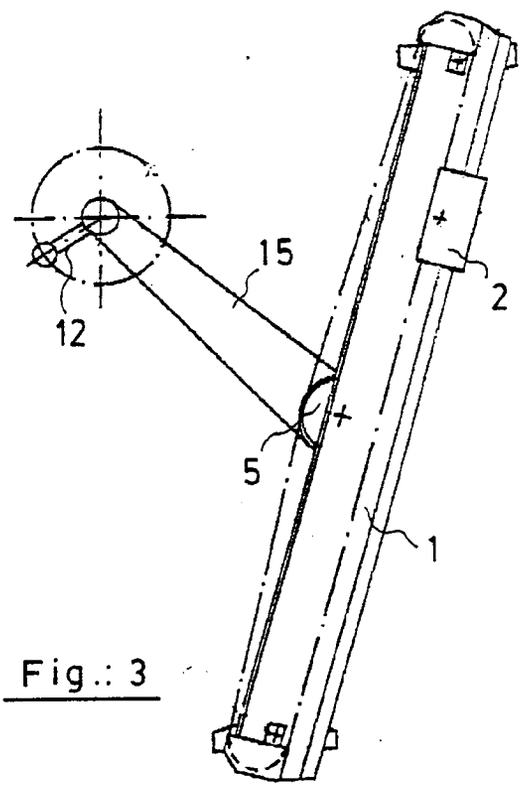

Fig.: 3

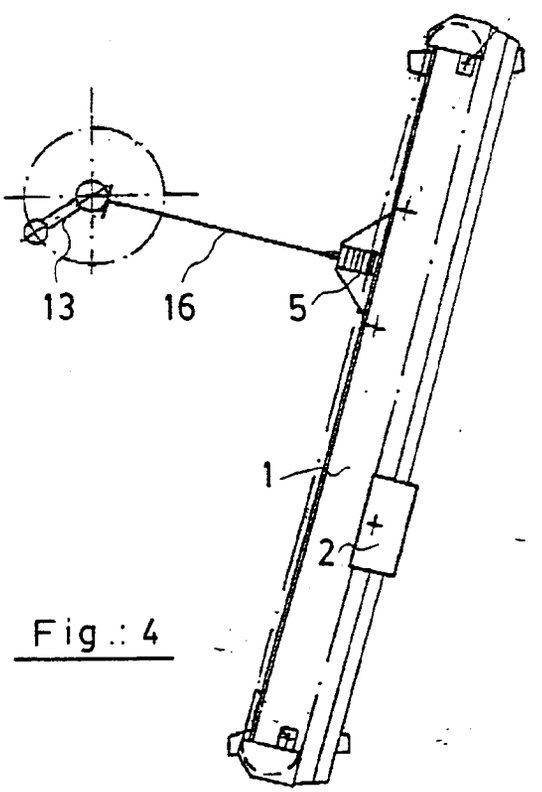

Fig.: 4

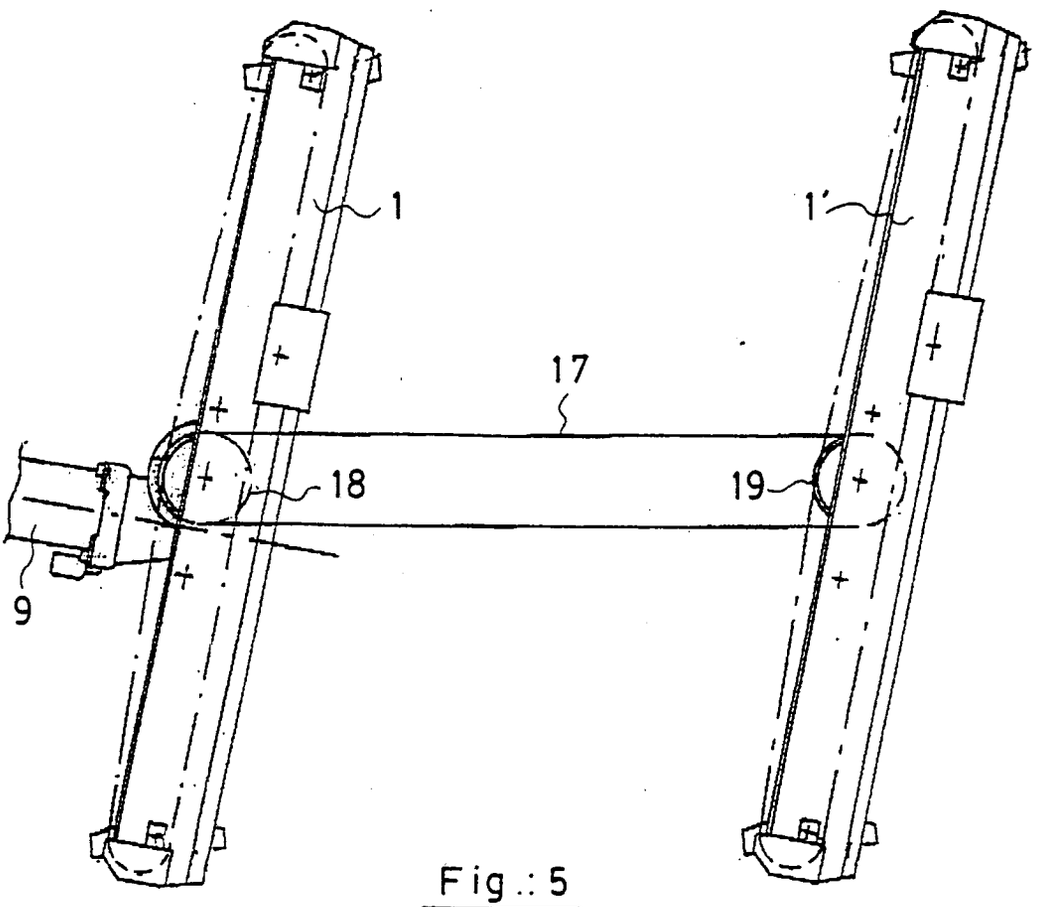

Fig.: 5

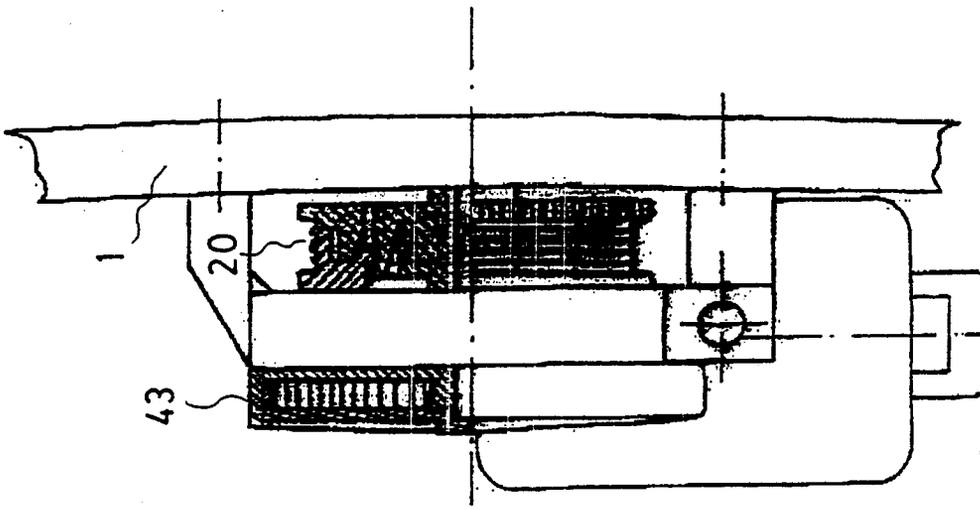

Fig.:8

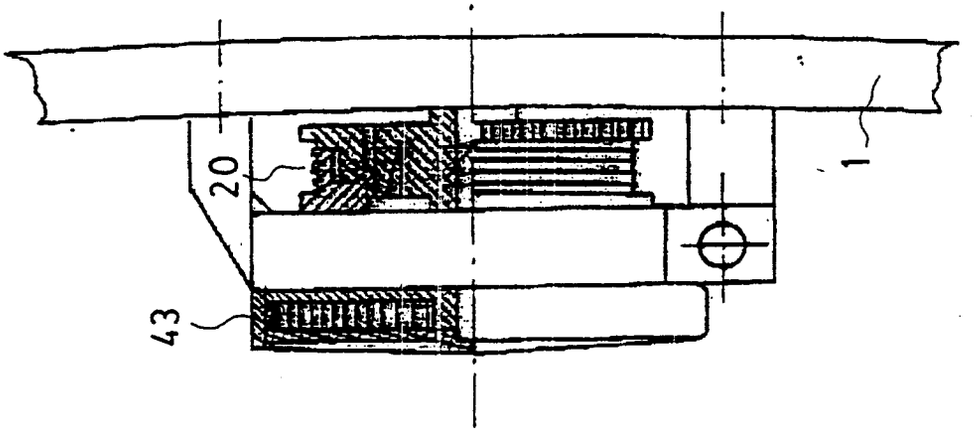

Fig.:7

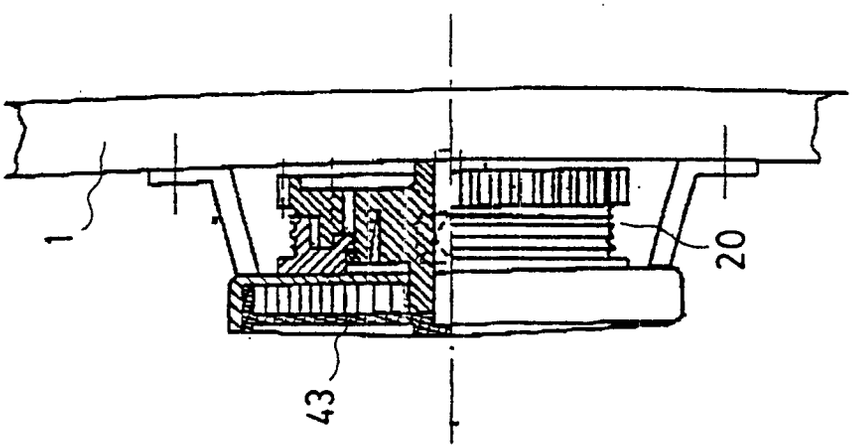

Fig.:6

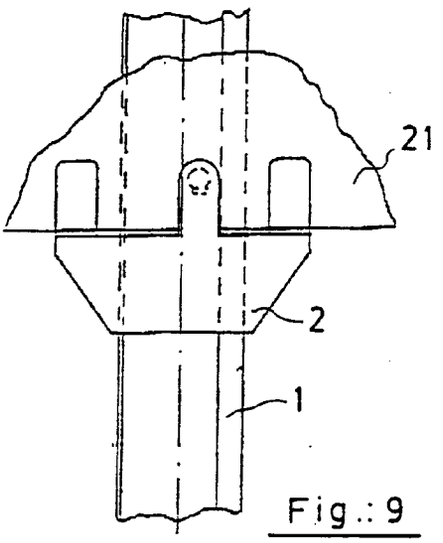

Fig.: 9

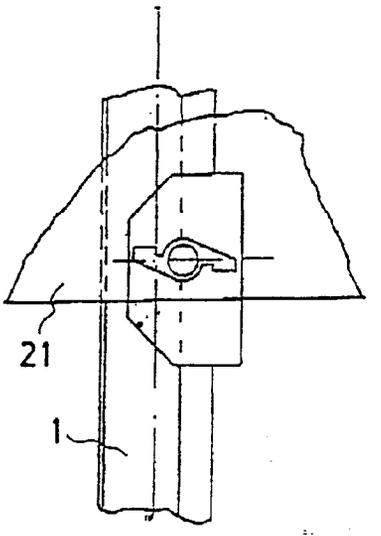

Fig.: 10

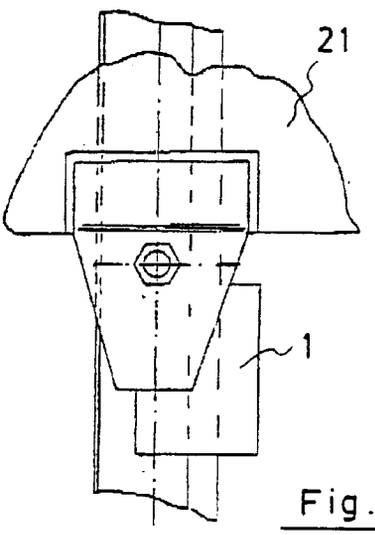

Fig.: 11

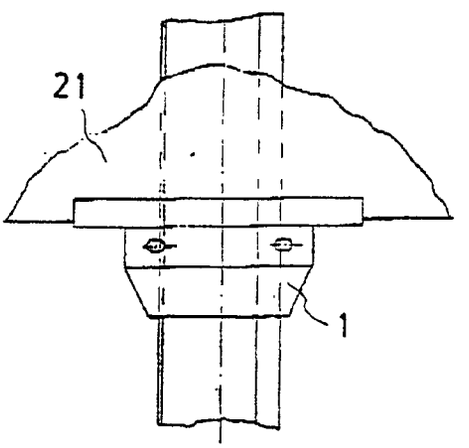

Fig.: 12

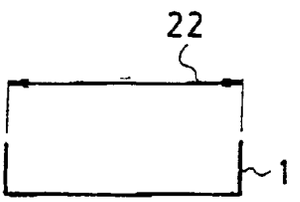

Fig.: 13

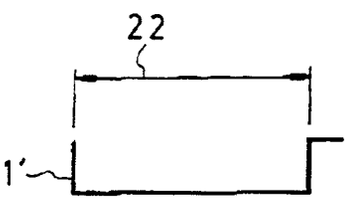

Fig.: 14

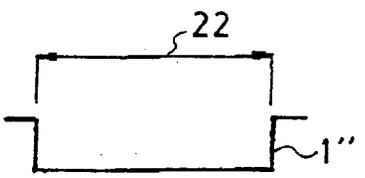

Fig.: 15

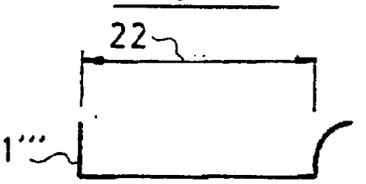

Fig.: 16

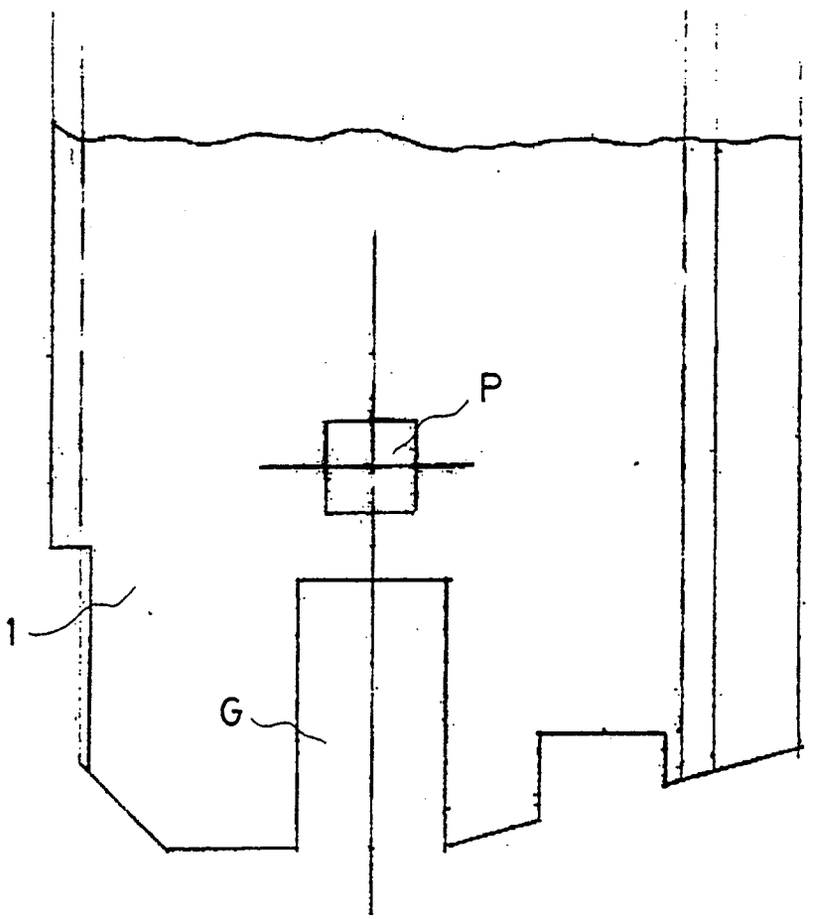

Fig.: 17

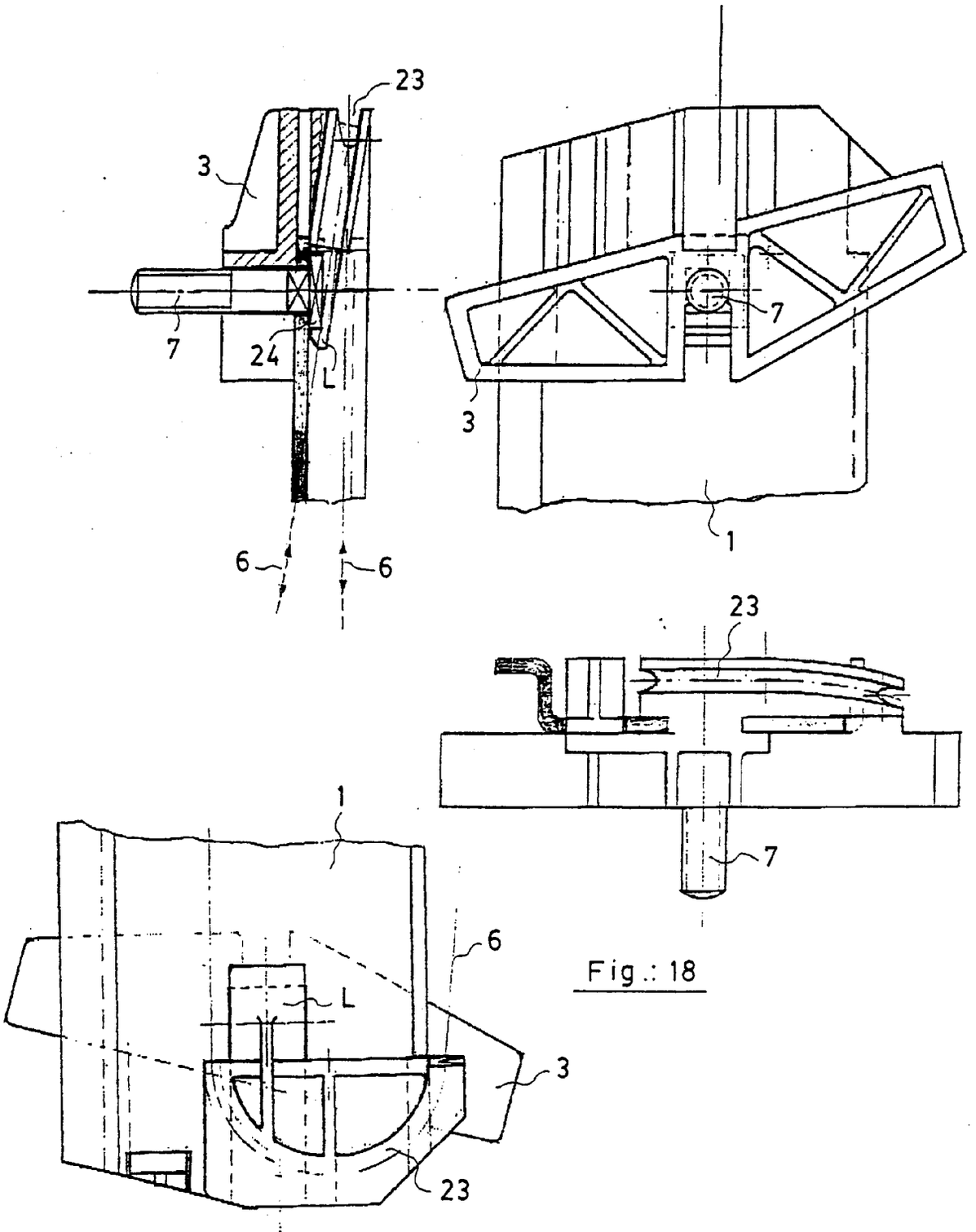

Fig.: 18

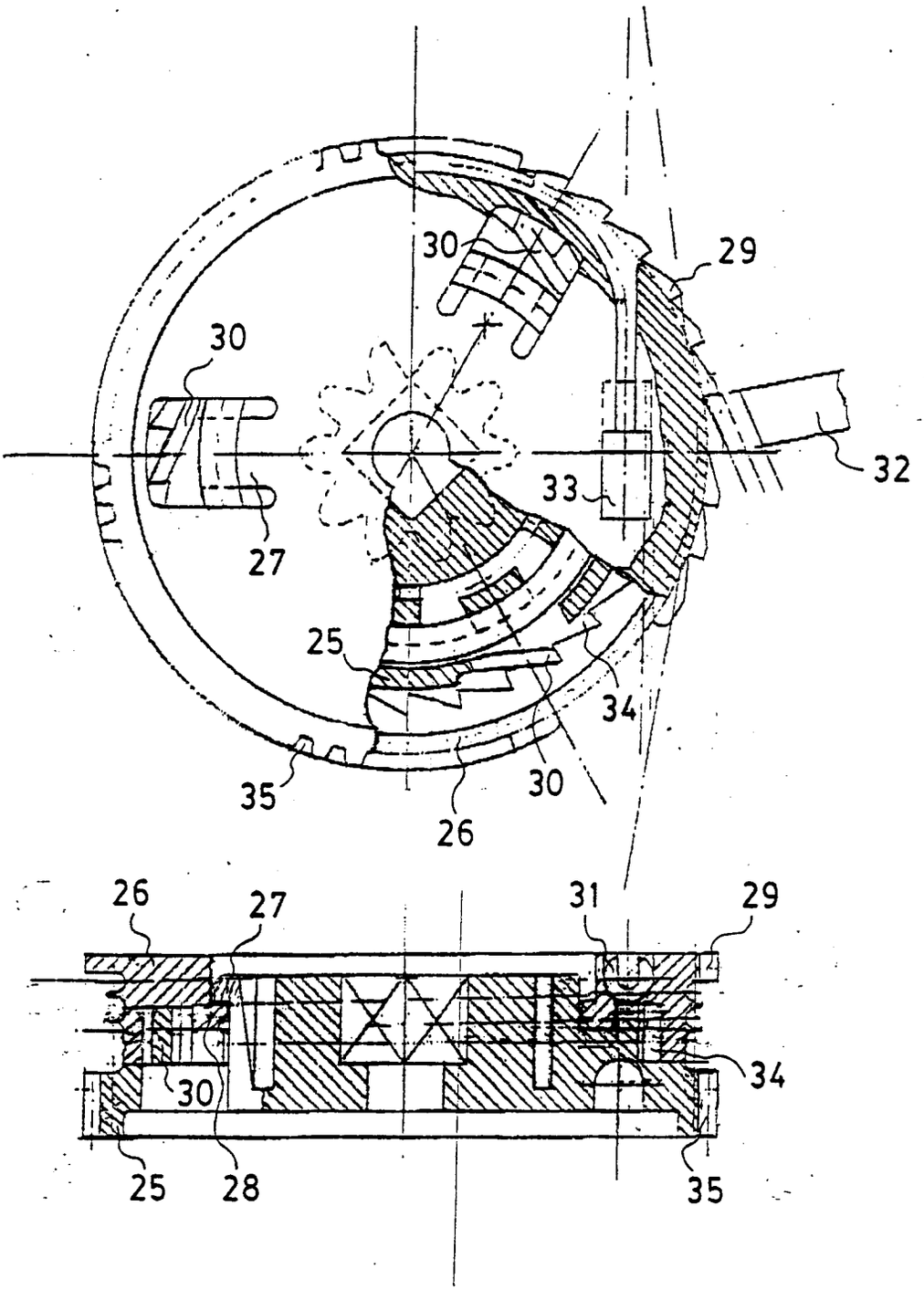

Fig.: 19

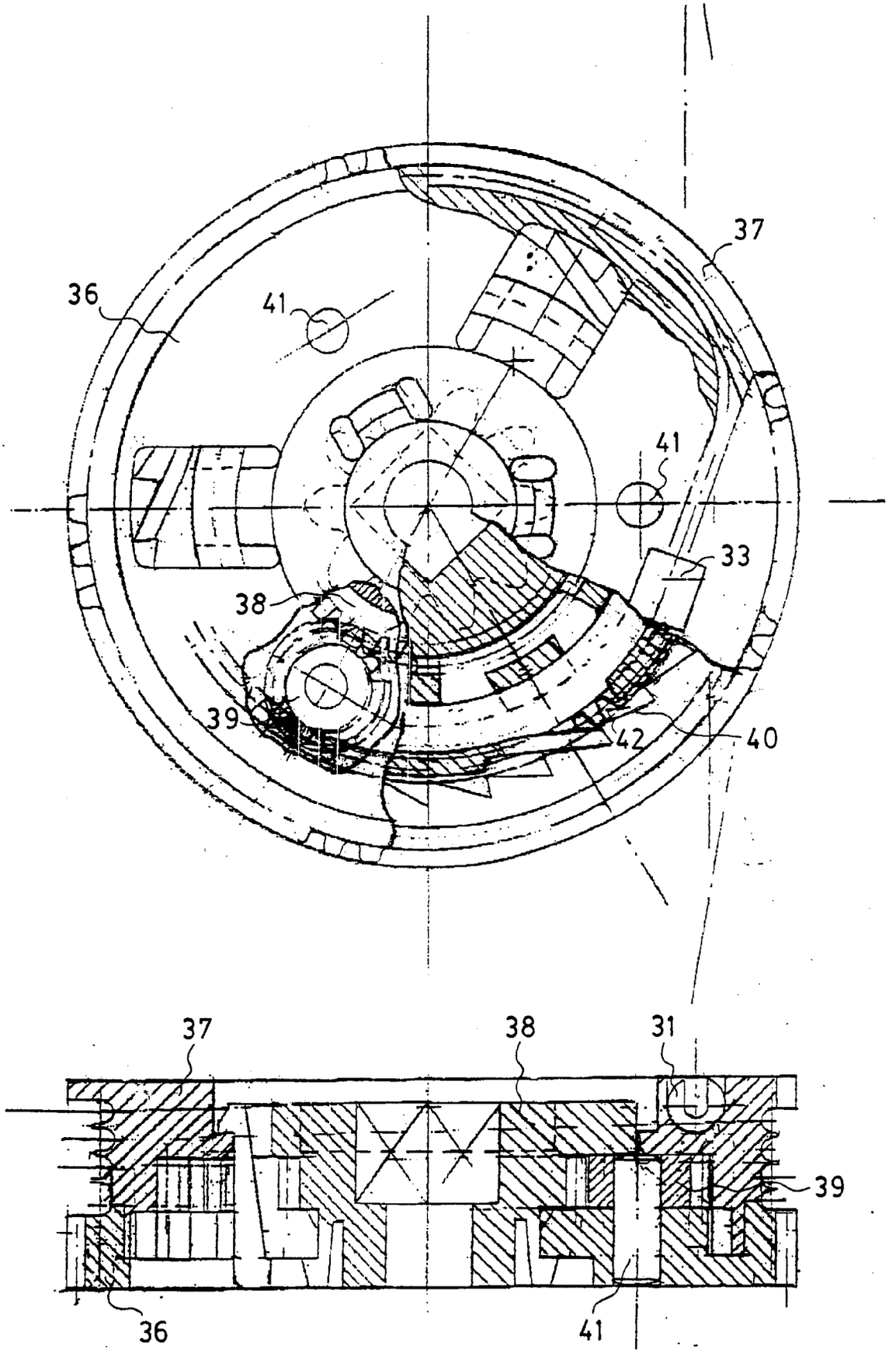

Fig.: 20