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(54) Friction device for adjusting the inclination of a seat, in particular an office chair.

(57) The device for adjusting the inclination of a seat, in particular an office chair (1), and of its possibly associated backrest (6), is of the type comprising a box casing (4, 40) rigid with the frame (3) and within which there are pivoted sectors (13, 13', 130) possibly associated with a linkage (15, 16) providing connection to box-shaped blocks (8, 9, 80, 90) containing a seating (10, 100) for the chair column (2) and for the shaft (5) which supports the backrest (6), and is characterised by comprising a friction clutch associated with said box casing (4, 40) and with said sectors (13, 13', 130), and means for engaging and disengaging said friction clutch.

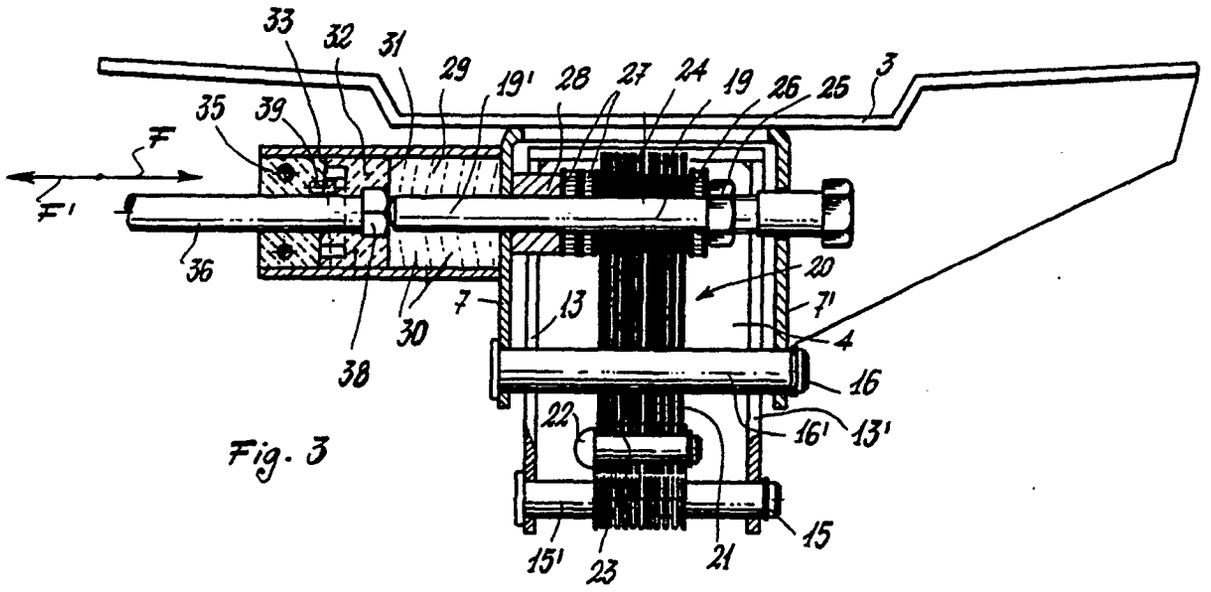

Fig. 3

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This invention relates to a friction device for adjusting the inclination of a seat.

The invention finds particular application in office chairs provided with a backrest in which the seat adjustment can also involve simultaneous and synchronous inclination of the backrest, so making the position of the occupant as comfortable as possible.

Various devices of the aforesaid type are known, but are all structurally complex and consequently of high cost. In general these known devices are controlled by one or more gas springs combined with linkages of various types. There are also seat inclination adjustment devices of substantially mechanical structure, ie without using gas springs, but such mechanical devices have the serious drawback of not allowing micrometric adjustment of the seat inclination.

An object of the present invention is to provide a device for adjusting the inclination of a seat, in particular an office chair, formed in such a manner as to obviate the drawbacks of conventional devices.

This and further objects of the invention will be apparent to the expert of the art on reading the description and claims given hereinafter.

The device for adjusting the inclination of a seat, in particular an office chair, and of its possibly associated backrest, of the type comprising a box casing rigid with the frame and within which there are pivoted sectors possibly associated with a linkage providing connection to box-shaped blocks containing a seating for the chair column and for the shaft which supports the backrest, is characterised by comprising a friction clutch associated with said box casing and with said sectors, and means for engaging and disengaging said friction clutch.

The device is illustrated by way of non-limiting example in the figures of the accompanying drawings, in which:

Figure 1 shows a typical office chair provided with the adjustment device of the invention;

Figure 2 is a longitudinal section through the box casing containing the device;

Figure 2 is a partly sectional front view, with some parts omitted for clarity, of the device provided with a preferred embodiment of the clutch engagement/disengagement control;

Figures 3a, 3b and 3c are sections on the lines A-A, B-B and C-C of Figure 3 respectively;

Figure 3d is a view in the direction of the arrow D of Figure 3;

Figure 4 shows a modification of the clutch engagement/disengagement control;

Figure 5 is a longitudinal section through the box casing containing a second embodiment of the device;

Figure 6 is a view of the device of Figure 5 from below;

Figure 7 is a section on the line VI-VI of Figure 6; and

Figure 8 is a longitudinal section through the box casing containing a third embodiment of the device.

With reference to said figures and in particular to Figures 1 to 4, the device of the invention is of particular but not exclusive application to an office chair such as that indicated overall by the reference numeral 1 in Figure 1, of the type comprising a central column 2 supporting a frame 3 which constitutes the seat and is rigid with a box casing 4, from which a shaft 5 extends to support a backrest 6.

The frame 3 and backrest 6 can be conveniently covered with a suitable padding material (not shown).

As can be seen from Figures 2 and 3 in particular, the box casing 4 comprises two lateral longitudinal walls 7, 7′ between which two box-shaped blocks 8 and 9 are conventionally housed, the block 8 comprising a seating 10 for receiving the upper end of the column 2 and a spring assembly, indicated overall by 11, for urging the frame 3 into the horizontal position, the block 9 comprising a seating 12 for receiving the lower end of the shaft 5 which carries the backrest 6.

Within the box casing 4, in proximity to the walls 7 and 7′, there are provided two sectors 13, 13′ which are pivoted to said walls by a transverse pin 14 (Figure 2). The sectors 13, 13′ are conventionally connected to the block 8 by a first bar 15 pivoted on a pin 15′ transverse to the sectors 13, 13′ and on a pin 15″, and are connected to the block 9, pivoted at 17 on the box casing 4, by a second bar 16, which is pivoted on a pin 16′ transverse to the sectors 13, 13′ and on a pin 16″. Such a linkage enables the inclination of the frame 3 and of the backrest 6 to be synchronized, as is known in this field.

According to the invention, the sectors 13, 13′ each comprise an arched slot 18 through which a pin 19 passes transverse to the box casing 4 and idle at the walls 7 and 7′, to contain and guide a friction clutch indicated overall by 20 and consisting of a plurality of plates 20 connected together at one end by a common pin 22 with interposed washers 23, and traversed at the opposite end by the pin 19, with discs 24 of material having a high coefficient of friction interposed between one plate and the next. Within the box casing 4, the pin 19 comprises a nut 25 engaging an end washer 26 of the friction clutch 20, there being provided at the opposite end to the washer 26 at least one (two in the illustrated case) further washer 27 abutting against a fixed block 28.

The free end 19′ of the pin 19 emerging from the wall 7 of the box casing 4 is contained in a compartment 29 containing a plurality of cup springs 30 resting against the face 31 of a mobile block 32, the opposing face 33 (Figures 3a, b, c and d) of which is in the form of an inclined plane with steps 34 cooperating with corresponding steps provided on the opposing face, also of inclined plane extension, of a fixed block 35 axial to the mobile block.

A rod 36 projecting laterally from the frame 3 and provided with a knob passes freely through the fixed block 35, its end distant from the knob engaging the mobile block 32 by way of a fixed nut 38, so that a rotation of the rod 36 produces a corresponding rotation of said mobile block 32 and consequently, by virtue of the presence of the opposing inclined faces, a movement of the rod 36 in the direction of the arrow F, so thrusting the pin 19 in the same direction against the action of the cup springs 30. In this manner the contact pressure between the plates 21 and discs 24 is reduced, so releasing the clutch 20 and enabling the frame 3 and backrest 6 to assume the desired inclined position with continuity.

If the rod 36 is rotated in the opposite direction, the action of the cup springs 30 causes the pin 19 to move in the direction of the arrow F′ and lock the clutch 20, to fix the inclination at the desired point.

As a replacement for the steps 34 or in combination therewith, the limitation on the rotation of the mobile block 32 can be obtained by a pin 39 slidable in a semicircular guide 39′ provided in the opposite block.

In the modified embodiment shown in Figure 4, the movement (arrows F, F′) of the pin 19 is obtained by swivelling the rod 36 in the direction of the arrows H, H′ to cause a cam element 36′ to act.

The ends 18′ of the slots 18 act as limit stops for the inclination of the assembly 3, 6.

Whatever system is used for controlling the clutch 20, it is apparent that with the clutch released the assembly 3, 6 can be inclined to any extent within the limits imposed by the length of the slots 18, and that the inclination can be adjusted micrometrically by using the clutch 20.

With particular reference to Figures 5 to 8, the box casing 40 comprises two lateral longitudinal walls 70, 70′ between which two box-shaped blocks 80 and 90 are conventionally housed, the block 80 comprising a seating 100 for receiving the upper end of the column 2 and a seat 110 for housing a conventional spring assembly (not shown) for urging the frame 3 into the horizontal position, the block 90 comprising a seating 120 for receiving the lower end of the shaft 5 which carries the backrest 6.

Within the box casing 40 there is provided a group of four (in the represented embodiment) sectors 130 pivoted on two common pins 140 provided in the box-shaped block 80, said sectors being spaced apart by the insertion of spacers 150 along said pins 140.

In a position substantially distant from the pins 140, the sectors 130 each comprise an arched slot 160 and, in proximity to said slot, a through hole for a pin 170 connecting said sectors to one end of bars 180, the other ends of which are pivoted to the box-shaped block 90 by a pin 190.

As can be seen from Figure 6, the device comprises two bars 180 for each sector 130, between the opposing bars 180 of two adjacent sectors there being provided a spacer 200. The spacers 150 provided on the pins 140 and the spacers 200 provided on the pin 190 are of material having a high coefficient of friction.

Through the arched slots 160 of the sectors 130 there passes a pin 210, the head 220 of which comprises a square appendix 220′ which penetrates and abuts against the lateral wall 70 of the box casing 40, its opposite end 230 being threaded to receive the female end 240 of a control rod 250 carrying a knob 260.

As can be seen specifically from Figure 7, when the knob 260 is rotated, the end 240 of the rod 250 screws onto the threaded part 230 of the pin 210 until it abuts against a bush 270 which passes through the lateral wall 70′ to abut against a bush 280 interposed between said wall 70′ and the first sector 130. Bushes 290 are interposed between the various sectors 30 mounted on the pin 210, between the last sector 130 and the lateral wall 70 there being interposed a further bush 300, the bushes 280, 290 and 300 being of material of high coefficient of friction.

In the described embodiment, the variation in the position of the frame 3 and backrest 6 is obtained synchronously by the interconnection between the sectors 130 and bar 180 via the pin 170, the position of these components being controlled by the control rod 250. In this respect, on screwing this rod down on the threaded pin 210, the sectors 130 mutually tighten to prevent their position varying relative to the pin 210, by virtue of the interposed bushes. This thus locks the system, which is released by unscrewing said rod.

The embodiment shown in Figure 8 differs from the preceding merely in that instead of the bars 180′ being pivoted on the sectors 130, they comprise at their end distant from the pin 190 elongate slots 310 through which the pin 210 passes. The clutch control remains unchanged. In this latter embodiment the independence of the movements (inclination) between the frame 3 and

backrest 6 is apparent.

Claims

1. A device for adjusting the inclination of a seat, in particular an office chair (1), and of its possibly associated backrest (6), of the type comprising a box casing (4, 40) rigid with the frame (3) and within which there are pivoted sectors (13, 13′, 130) possibly associated with a linkage (15, 16) providing connection to box-shaped blocks (8, 9, 80, 90) containing a seating (10, 100) for the chair column (2) and for the shaft (5) which supports the backrest (6), characterised by comprising a friction clutch associated with said box casing (4, 40) and with said sectors (13, 13′, 130), and means for engaging and disengaging said friction clutch.

2. A device as claimed in claim 1, characterised in that said friction clutch consists of a plurality of plates (21) which face each other to form a pack, disc means (24) constituting friction means being interposed between said plates.

3. A device as claimed in claim 3, characterised in that said plate pack is interposed between said sectors (13, 13′) and is kept in position at one end by being traversed by a pin (19), with discs (24) of material having a high coefficient of friction being interposed between adjacent plates.

4. A device as claimed in one or more of the preceding claims, characterised in that said sectors (13, 13′) each comprise a slot (18) traversed by said pin (19).

5. A device as claimed in one or more of the preceding claims, characterised in that said pin (19) comprises means (25-28) for limiting its axial movement, one end (19′) of said pin emerging from one of said walls (7) of said box casing (4) and abuttingly cooperating with said means (31, 42) for engaging and disengaging said clutch (20).

6. A device as claimed in claims 1 and 5, characterised in that said means for engaging and disengaging the clutch (20) consist of a pair of blocks (32, 35), one of which is fixed and the other is free to rotate by the action of a control rod (36), said blocks cooperating face-to-face via inclined planes, the mobile block acting on the end of said pin (19) against the opposing action of springs (30).

7. A device as claimed in claims 1 and 5, characterised in that said means for engaging and disengaging the clutch (20) consist of a cam element which opposes the end of said pin (19) and is rotated by the swivel movement of a control rod (36).

8. A device as claimed in claim 1, characterised by comprising a friction clutch (210-300) associated with said box casing (40), said sectors (130) each comprising an arched slot (160) for the passage of means (210, 270) forming part of said clutch.

9. A device as claimed in claim 8, characterised in that said sectors (130) are pivoted on a common pin (140) provided in said box-shaped block (80), said sectors being spaced apart by the insertion of spacers (150) along said pin (140).

10. A device as claimed in claims 8 and 9, characterised in that in positions substantially distant from said pins (140), said sectors (130) each comprise an arched slot (160) and, in proximity to said slot, a through hole for a pin (170) connecting said sectors to one end of bars (180), the other ends of which are pivoted to said box-shaped block (90) by a pin (190).

11. A device as claimed in claims 8 to 10, characterised in that through said arched slots (160) there passes a pin (210) provided at one end with a head (220) and at its opposite end with a thread (230) to engage a female thread of a control rod (250), bushes (280, 290) of high coefficient of friction being interposed along said pin (210) between said sectors (130), and between said sectors and the lateral walls (70, 70′) of said box casing (40).

12. A device as claimed in claims 8 to 11, characterised in that said sectors (130) are associated with said bars (180′), these latter being provided with an end comprising an elongate slot (310) through which said pin (210) passes.

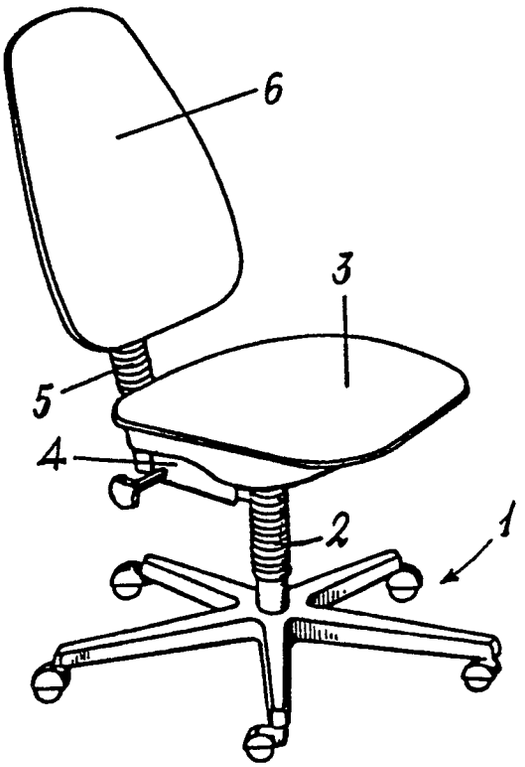
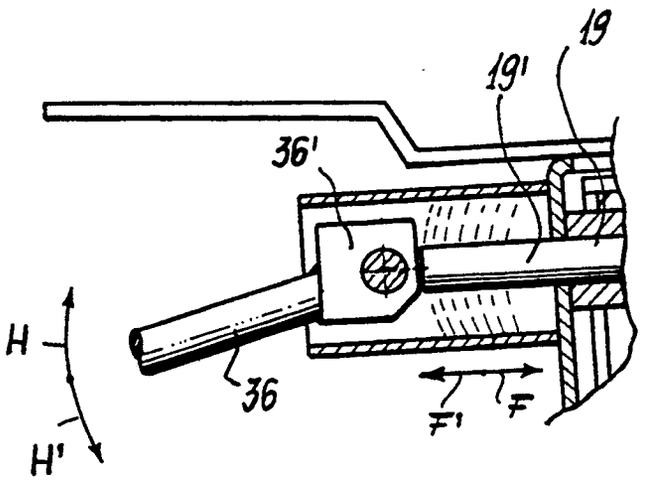


Fig. 1

Fig. 4



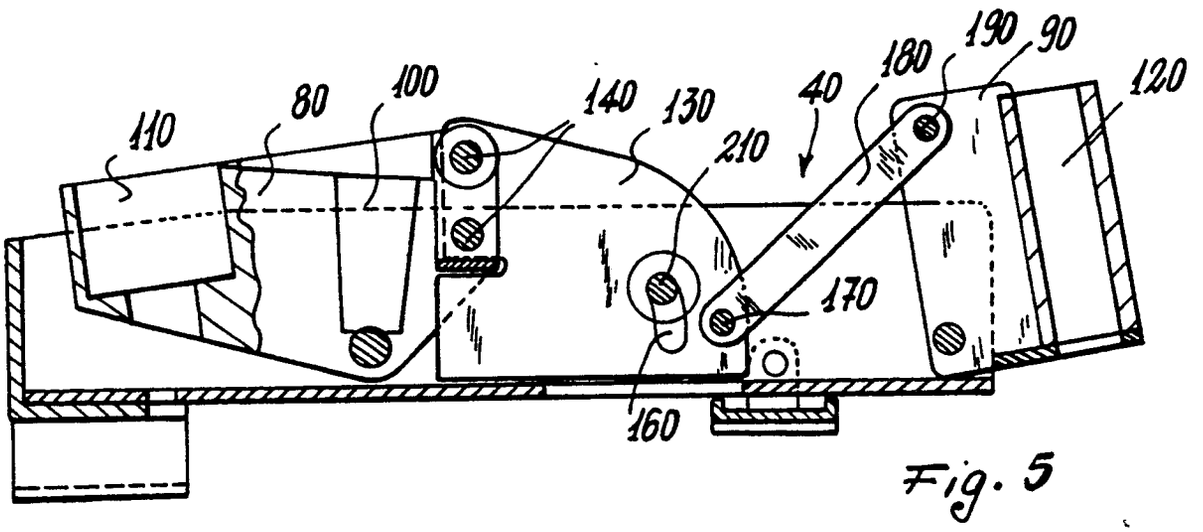


Fig. 5

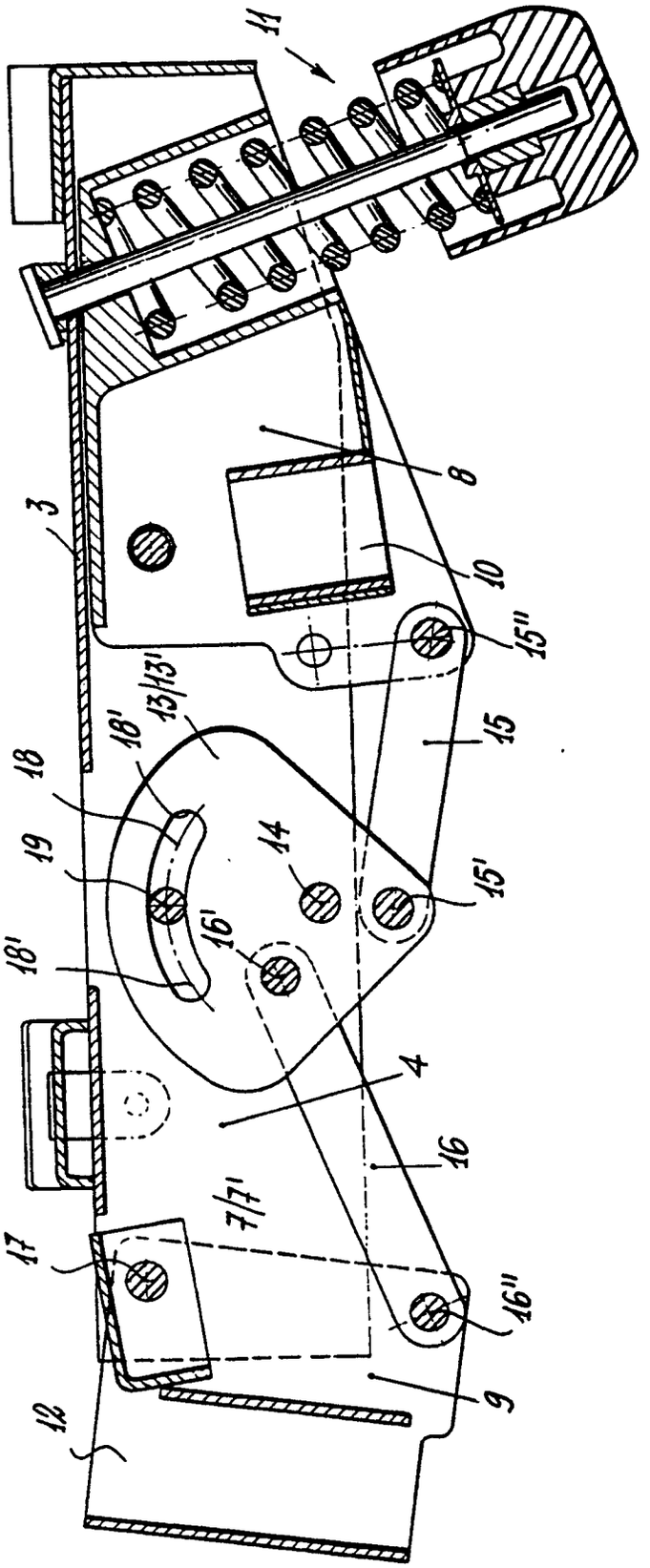


Fig. 2

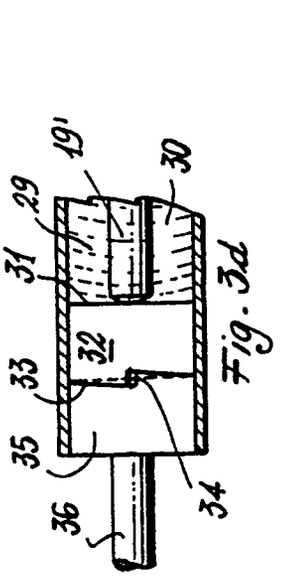


Fig. 3d

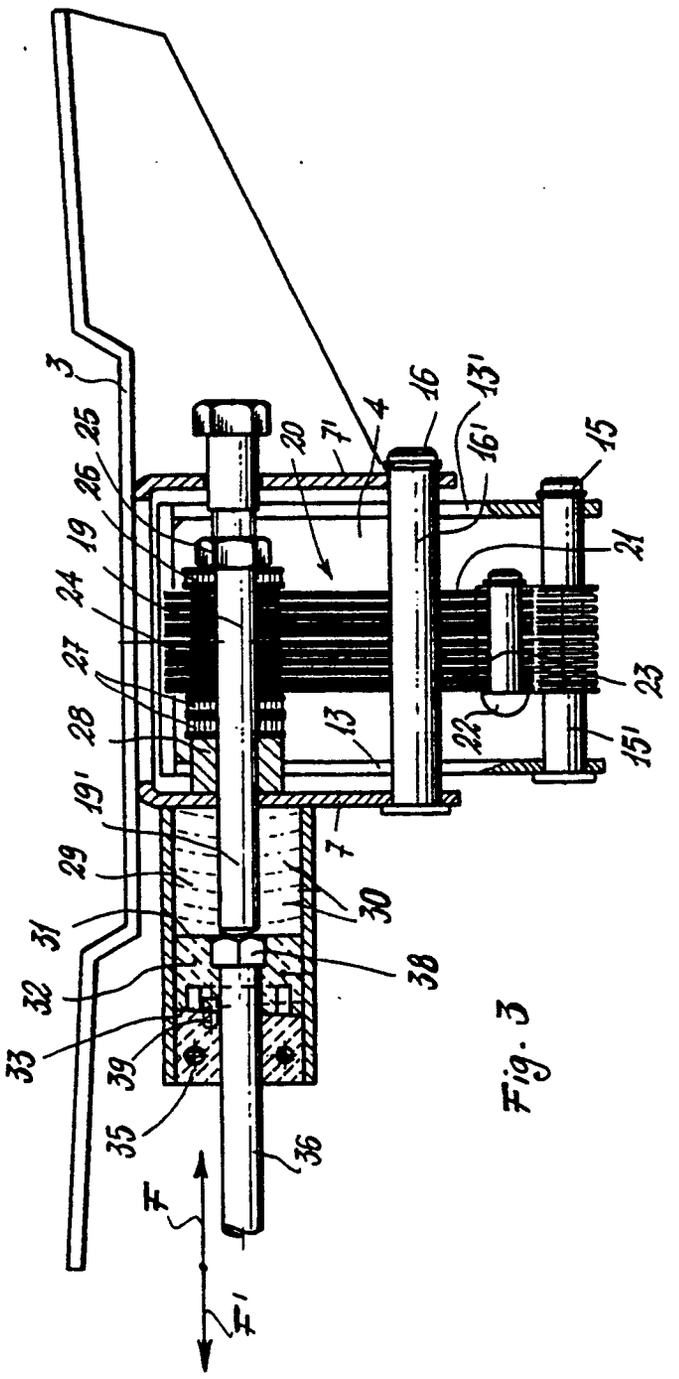


Fig. 3

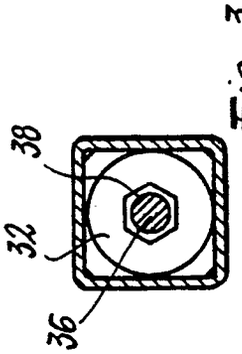


Fig. 3c

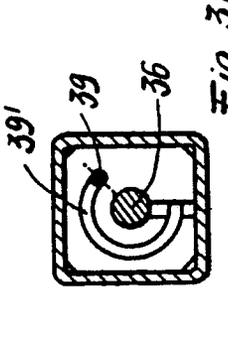


Fig. 3b

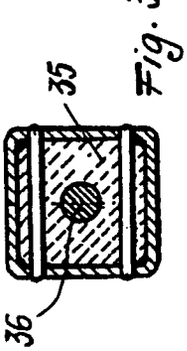


Fig. 3a

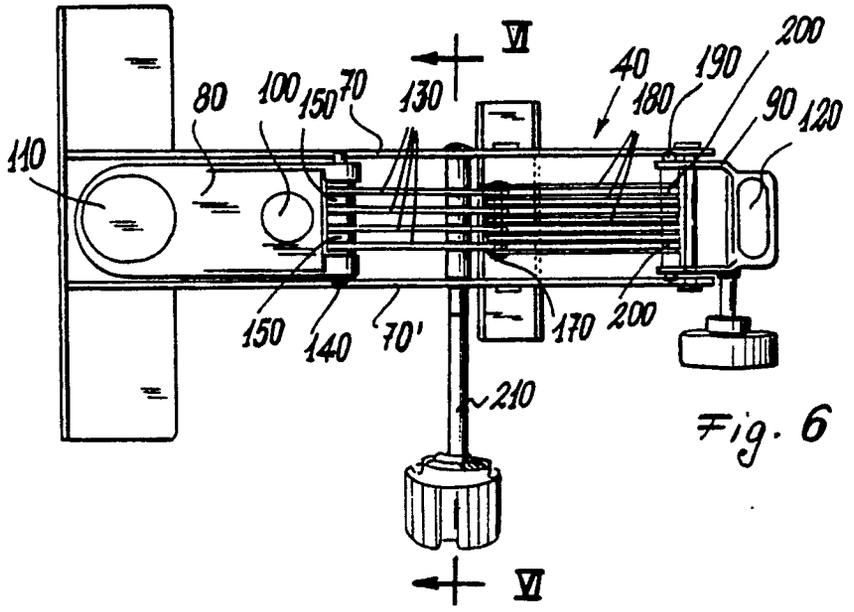


Fig. 6

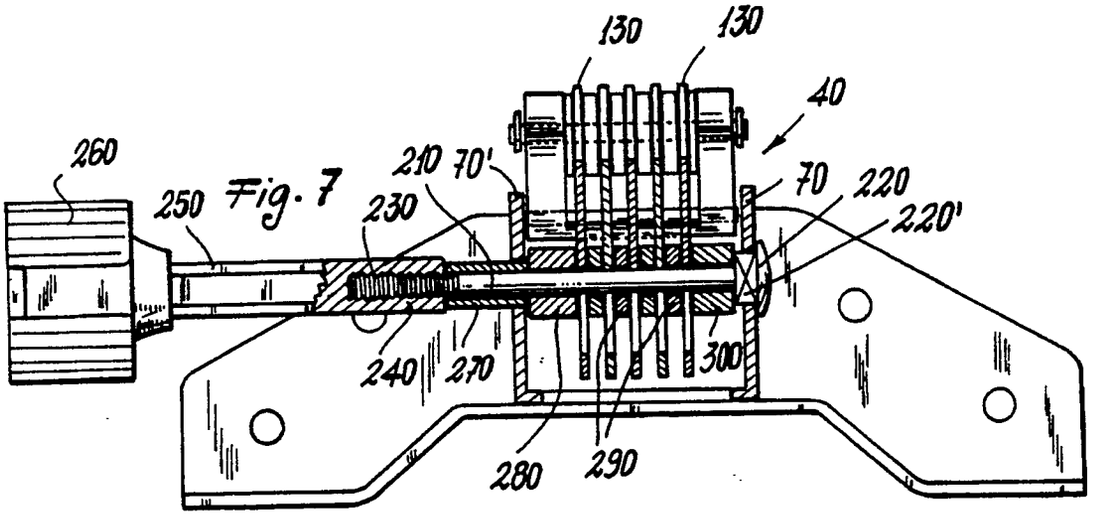


Fig. 7

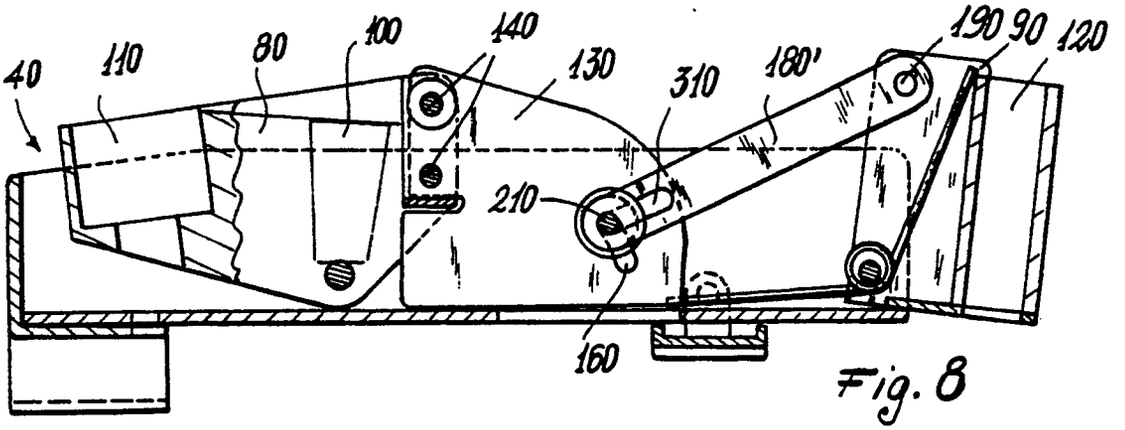


Fig. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 10 7132

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.5)
A	EP-A-0 265 782 (VÖLKLE) * Figures 2,3,5; column 3, line 16 - column 4, line 55 *	1	A 47 C 1/027
A	GB-A-2 193 884 (CHAIR MECHANISM LTD) * Figure 2 *	1	
A	WO-A-8 600 508 (VÖLKLE) * Figures 3,3a,6a *	1	
A	EP-A-0 045 925 (STEIFENSAND) * Figure 5 *	2,7	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 47 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26-06-1990	MYSLIWETZ W.P.

CATEGORY OF CITED DOCUMENTS

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