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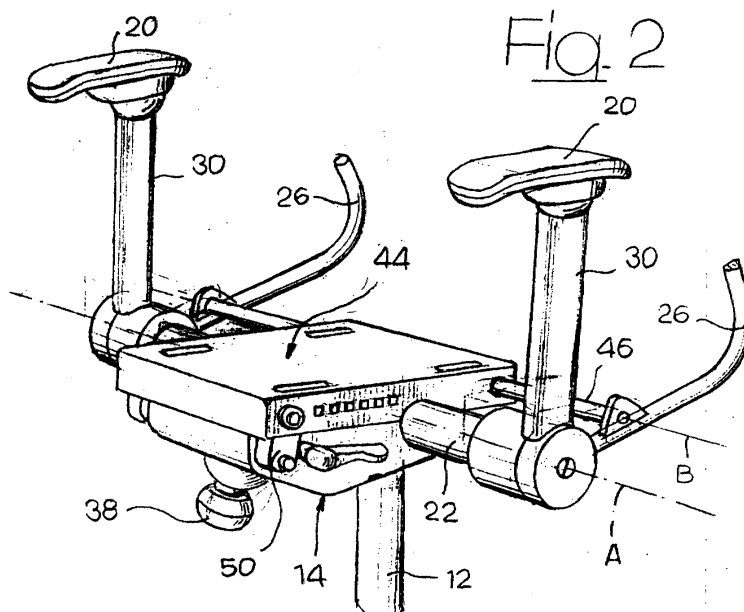
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(54) Chair with seat and backrest that oscillate in a synchronized way

(57) A chair with seat and backrest that oscillate in a synchronized way, comprising:

- a base structure (14);
- a backrest-supporting structure (26) articulated to the base structure (14) about a first transverse axis (A);
- a seat-supporting structure (44) which is mobile with respect to the base structure (14) in a way synchronized with the movement of oscillation of the

- backrest-supporting structure (26); and
- elastic means (24) tending to counteract the oscillation backwards of the seat and backrest. One rear part of the seat-supporting structure (44) is articulated to the backrest-supporting structure (26) about a second axis of oscillation (B) parallel to the aforesaid first axis (A), and one front part of the seat-supporting structure (44) is connected to the base structure (14) by means of at least one articulation element (50).



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Description

[0001] The present invention relates to a chair with seat and backrest that oscillate in a synchronized way. More precisely, the invention relates to a chair of the type comprising:

- a base structure;
- a backrest-supporting structure articulated to the base structure about a first transverse axis;
- a seat-supporting structure which is mobile with respect to the base structure in a way synchronized with the movement of oscillation of the backrest-supporting structure; and
- elastic means tending to counteract the oscillation backwards of the seat and backrest.

[0002] Ergonomic studies have shown that the movements of oscillation of the seat and backrest of a chair must be correlated in a precise way to obtain ideal conditions of comfort in every position of the backrest. The mechanisms that enable a desired correlation to be obtained between the movements of oscillation of the seat and backrest are usually complex, costly and unwieldy.

[0003] The purpose of the present invention is to provide a chair of the type specified above that enables the aforesaid drawbacks to be overcome.

[0004] According to the present invention, the above purpose is achieved by a chair having the characteristics that form the subject of the main claim.

[0005] The present invention will now be described in detail with reference to the attached drawings, which are provided purely by way of non-limiting example, and in which:

- Figures 1A and 1B are side elevations of a chair according to the present invention in two operating conditions;
- Figure 2 is a partial perspective view of the mechanism of the chair indicated by the arrow II in Figures 1A and 1B;
- Figure 3 is a section according to the line III-III of Figure 2;
- Figures 4 and 5 are sections according to the line IV-IV of Figure 3 in two operating positions;
- Figures 6 and 7 are sections according to the line VI-VI of Figure 3 in two operating positions;
- Figure 8 is a perspective view of the control device indicated by the arrow VIII in Figure 3;
- Figures 9 and 10 are sections according to the line IX-IX of Figure 8, illustrating the control device respectively in the releasing position and in the blocking position;
- Figure 11 is a section according to the line XI-XI of Figure 10; and
- Figure 12 is a section according to the line XII-XII of Figure 9.

[0006] With reference to Figures 1A and 1B, the number 10 designates a chair comprising a central support 12, which is height-adjustable (of a type of itself known) and carries at its top a base structure 14. The base structure 14 carries a seat 16, a backrest 18, and a pair of armrests 20.

[0007] With reference to Figures 2 to 5, the base structure 14 is generically box-shaped, open at the top, and fixed to the top end of the central support 12. A transverse tubular element 22 is fixed to the base structure 12 and carries, inside it, a torsion bar 24 consisting, for example of a pack of metal laminas.

[0008] The backrest 18 comprises a supporting structure including two shaped tubular elements 26, the bottom ends of which are articulated to the tubular element 22 about a first transverse axis A. The tubular elements 26 constituting the backrest-supporting structure are fixed to the opposite ends of the torsion bar 24. Each armrest 20 is carried by an upright 30 which is height-adjustable and which, at its bottom end, is fixed to the corresponding end of a tubular element 26 of the backrest-supporting structure. In this way, as illustrated in Figures 1A and 1B, the armrests 20 can oscillate in an integral way with the backrest 18 about the transverse axis A.

[0009] With reference to Figures 3, 6 and 7, a central area of the torsion bar 24 is fixed to an adjusting lever 32. This fixing may be obtained, for example, by shape-fitting between the rectangular section of the torsion bar 24 and a hole having a corresponding shape made in the adjusting lever 32. As is illustrated in Figures 6 and 7, one end of the adjusting lever 32 is connected to the base structure 14 by means of an adjusting device 34 that enables modification of the pre-loading of the torsion bar 24. The adjusting device 34 comprises a screw 36 fixed to an adjusting knob 38. The screw 36 engages an internal thread 40 which co-operates with the top part of a pressure element 42. The said pressure element 42 rests on one end of the adjusting lever 32 and is shaped in such a way as to provide shape-fitting with the lever 32 so as to prevent rotation of the pressure element 42 about the axis of the screw 36. It will be realized that rotation of the adjusting knob 38 enables modification of the angular position of the adjusting lever 32 with respect to the base structure 14. As illustrated in Figures 6 and 7, the variation in position of the lever 32 in turn modifies the elastic pre-loading of the torsion bar 24, i.e., the force that must be applied to the backrest to overcome the force of contrast of the spring and cause an oscillation of the backrest backwards about the transverse axis A.

[0010] With reference to Figures 2 to 5, the chair 10 comprises a seat-supporting structure 44, which is generally box-shaped and open at the bottom, and on which the seat 16 with the corresponding padding is fixed. As is illustrated in Figure 3, the two shaped tubular elements 26 constituting the backrest-supporting structure are connected together by a transverse rod 46 parallel

to the articulation axis A. The seat-supporting structure 44 is articulated in its rear part about the rod 46. As shown in Figure 3, the said articulation is obtained, for example, by means of a pair of bushings 48 which are carried by opposite side walls of the seat-supporting structure 44 and engage the rod 46 in a rotating way. The seat-supporting structure 44 is thus articulated to the backrest-supporting structure 26 about an axis B (Figure 3) parallel to the articulation axis A between the backrest-supporting structure 26 and the base structure 14.

[0011] The front part of the seat-supporting structure 44 is articulated to the base structure 14 by means of a pair of connecting rods 50, each of which has a bottom end articulated to the base structure 14 about an axis 52 and a top end articulated to the seat-supporting structure 44 about an axis 54. The articulation axes 52 and 54 are parallel to the articulation axes A and B. From the kinematic standpoint, the seat-supporting structure 44 is connected to the base structure 14 by means of an articulated-quadrilateral mechanism, the said quadrilateral being formed by the lines joining the articulation axes A and B and, respectively, 53 and 54.

[0012] It will be realized that the movements of oscillation of the backrest and seat are always rigidly correlated together in so far as the seat-supporting structure 44 is articulated to the backrest-supporting structure 26 and is forced to follow the movement of oscillation of the latter.

[0013] The seat 10 is moreover provided with a device for blocking the seat and backrest in a plurality of different positions. With reference to Figures 3, 4 and 5, the blocking device comprises a rocker arm 56 having a central part articulated on the transverse tubular element 22 about the axis A, a first end articulated to the rod 46 about the axis B, and a second end provided with a plurality of holes 58, 60 which can be engaged by respective blocking elements. The rocker arm 56 is preferably provided with a pair of elastic inserts 62, 64, which, as illustrated in Figures 4 and 5, are designed to bear upon the base structure 14 to define a position of maximum inclination forwards (Figure 4) and a position of maximum inclination backwards (Figure 5).

[0014] With reference to Figures 8 to 12, the chair 10 comprises a control device 66 that can be operated manually to block or release synchronized oscillation of the seat and backrest. The control device 66 comprises a support 68 fixed to the base structure 14 of the chair. A control shaft 70 is carried by the support 68 in an oscillating way about its own axis and can oscillate between a blocking position and a releasing position. The shaft 70 carries, at one of its ends, a control lever 71 that can be operated manually. A transverse pin 72 is fixed to the shaft 70 and has a head 74 which projects out from the support 68. The pin 72 co-operates with an arrest mechanism 76 designed to define two retention positions corresponding to the blocking position and to the releasing position. In the embodiment illustrated in

the drawings, the arrest mechanism 76 comprises a first arrest element 78 and a second arrest element 80 provided with respective seats having a semicircular shape that are set facing one another and are designed to grip, between them, a portion of the pin 72 to perform the action of retention. The two retention elements 78, 80 are slidable one with respect to the other along the axis of the shaft 70 and are elastically pushed against one another by an elastic element constituted, for example, by a helical spring in compression 84. It will be realized that by applying a torque higher than a pre-set value on the axis of the shaft 70 by means of the control lever 71 it is possible to cause the pin 72 to move by snap action from one to the other of the two operating positions illustrated in Figures 9 and 10.

[0015] The control device 66 comprises a pair of blocking pins 86, 88 which are slidable within respective seats 90 integral with the base structure 14. As may be seen in Figures 9 and 10, the blocking pins 86, 88 are slidable, in a direction orthogonal to the rocker arm 56, between the releasing position illustrated in Figure 9 and the blocking position illustrated in Figure 10.

[0016] The control device 66 comprises a pair of pin springs 92, each of which has a first arm 94 that engages the head 74 of the pin 72 and a second arm 96 which engages a radial appendage 98 of a respective blocking pin 86, 88. Each pin spring 92 has a central portion which is carried, so that it is free to turn, by a pin 100 integral with the support 68 of the control device 66. As may be seen from a comparison between Figure 9 and Figure 10, the movement of the pin 72 from the releasing position to the blocking position controls, by means of the springs 92, sliding of the blocking pins 86, 88 from a retracted position of release (Figure 9) to an extracted position of blocking (Figure 10).

[0017] In the operating configuration of Figure 9, the springs 92 withhold the blocking pins 86, 88 in an inoperative, retracted, position. In this configuration, the rocker arm 56 is free to oscillate about the axis A. The backrest and seat are pushed by the torsion spring 24 towards the position illustrated in Figure 1A and are free to oscillate backwards (i.e., to be inclined backwards) under the action of a thrust exerted backwards by the user.

[0018] In order to block the seat and backrest in a generic position inclined backwards, the user sets the desired position of the seat and backrest and moves the lever 71 towards the blocking position. The oscillation of the lever 71 shifts the pin 72 towards the blocking position illustrated in Figure 10. In this operating configuration, the blocking pins 86, 88 are pushed towards the rocker arm 56 by the elastic force of the springs 92. As soon as a hole 58 or 60 is in a position corresponding to a pin 86 or 88, the pin is pushed into the hole, so that it engages the hole, by the respective spring 92. In the blocking position, as illustrated in Figure 10, the rocker arm 56 is integral with the base structure 14, given that the engagement of one of the blocking pins 86 or 88 in

a corresponding hole 58 or 60 prevents rotation of the rocker arm 56 about the axis A. It will be appreciated that the blocking of the rocker arm 56 prevents the movement of oscillation of the seat and backrest and that each hole 58, 60 defines a different blocking position of the seat and backrest.

[0019] As illustrated in Figure 3, the chair is also provided with a second lever 102, which may be operated manually to control, in a way in itself known, a gas-operated spring which controls height-adjustment of the chair.

Claims

1. A chair with seat and backrest that oscillate in a synchronized way, comprising:

- a base structure (14) ;
- a backrest-supporting structure (26) articulated to the base structure (14) about a first transverse axis (A);
- a seat-supporting structure (44) which is mobile with respect to the base structure (14) in a way synchronized with the movement of oscillation of the backrest-supporting structure (26); and
- elastic means (24) tending to counteract the oscillation backwards of the seat and backrest,

characterized in that one rear part of the seat-supporting structure (44) is articulated to the backrest-supporting structure (26) about a second oscillation axis (B) parallel to the aforesaid first axis (A), and one front part of the seat-supporting structure (44) is connected to the base structure (14) by means of at least one articulation element (50).

2. The chair according to Claim 1, **characterized in that** the backrest-supporting structure (26) is mounted in an oscillating way about a transverse tubular element (22) carried by the base structure (14) and is fixed to the outer ends of a torsion bar (24) set inside said transverse tubular element (22).

3. The chair according to Claim 2, **characterized in that** the backrest-supporting structure (26) comprises a pair of side tubular elements (26) set at the opposite ends of said transverse tubular element (22).

4. The chair according to Claim 3, **characterized in that** the aforesaid side tubular elements (26) are connected together by a transverse rod (46) defining the aforesaid second articulation axis (B).

5. The chair according to Claim 1, **characterized in that** the seat-supporting structure (44) is connected to the base structure (14) by means of an articulat-

ed-quadrilateral mechanism.

6. The chair according to Claim 5, **characterized in that** the aforesaid front part of the seat-supporting structure (44) is articulated to the base structure (14) by means of a pair of connecting rods (50).

7. The chair according to Claim 5, **characterized in that** the aforesaid torsion bar (24) co-operates with an adjusting device (32) including a lever (32) fixed to a central portion of the torsion bar (24) and a screw mechanism (36, 38) designed to adjust the position of said lever (32) with respect to the base structure (14).

8. The chair according to Claim 1, **characterized in that** it comprises a blocking device (56, 66) for blocking the seat and backrest in at least one selected position.

9. The chair according to Claim 8, **characterized in that** the aforesaid blocking device (56) comprises a lever (56) articulated to the base structure (14) about the aforesaid first transverse axis (A) and articulated to the backrest-supporting structure (26) about the aforesaid second transverse axis (B), the blocking lever (56) cooperating with a control device (66) including at least one blocking element (86, 88) movable between an inoperative, releasing, position and an operative, blocking, position.

10. The chair according to Claim 9, **characterized in that** the aforesaid control device (66) comprises a pair of blocking pins (86, 88) slidable in a direction orthogonal to the plane of oscillation of the blocking lever (56) and cooperating with respective arrays of holes (58, 60) provided on the blocking lever (56).

11. The chair according to Claim 10, **characterized in that** the aforesaid control device (66) comprises an oscillating shaft (70) carrying a transverse pin (72) which controls sliding of the aforesaid blocking pins (86, 88) by means of a pair of pin springs (92).

12. The chair according to Claim 11, **characterized in that** the aforesaid control device (66) comprises a retention device (76) designed to withhold said oscillating shaft (70) respectively in a blocking position and in a releasing position.

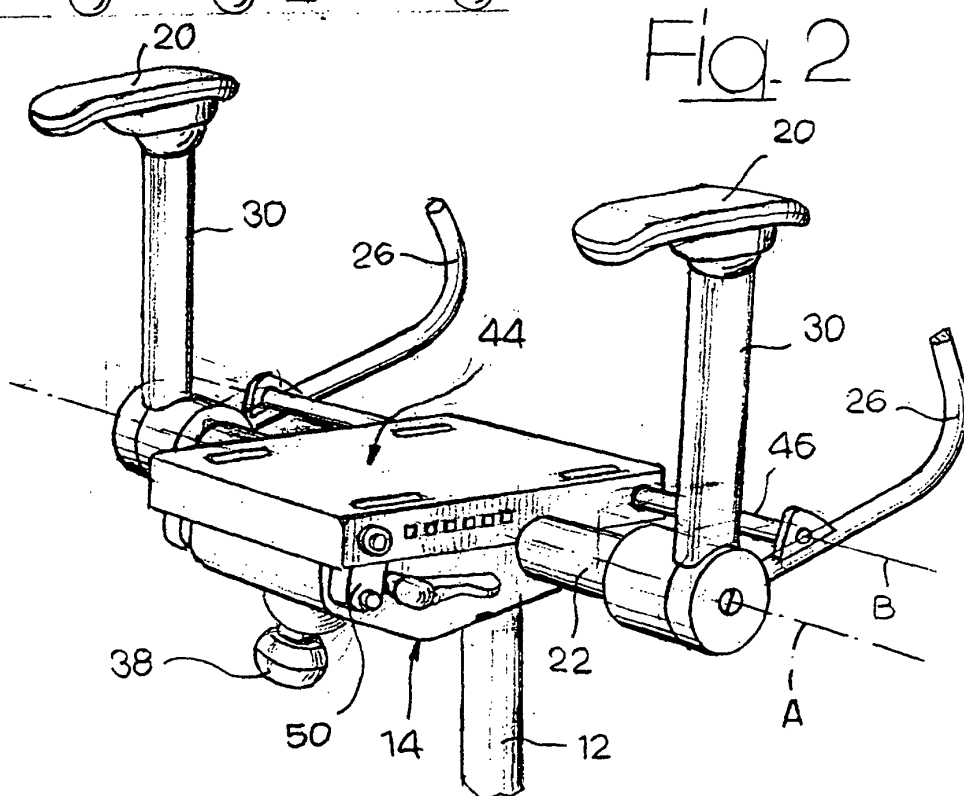
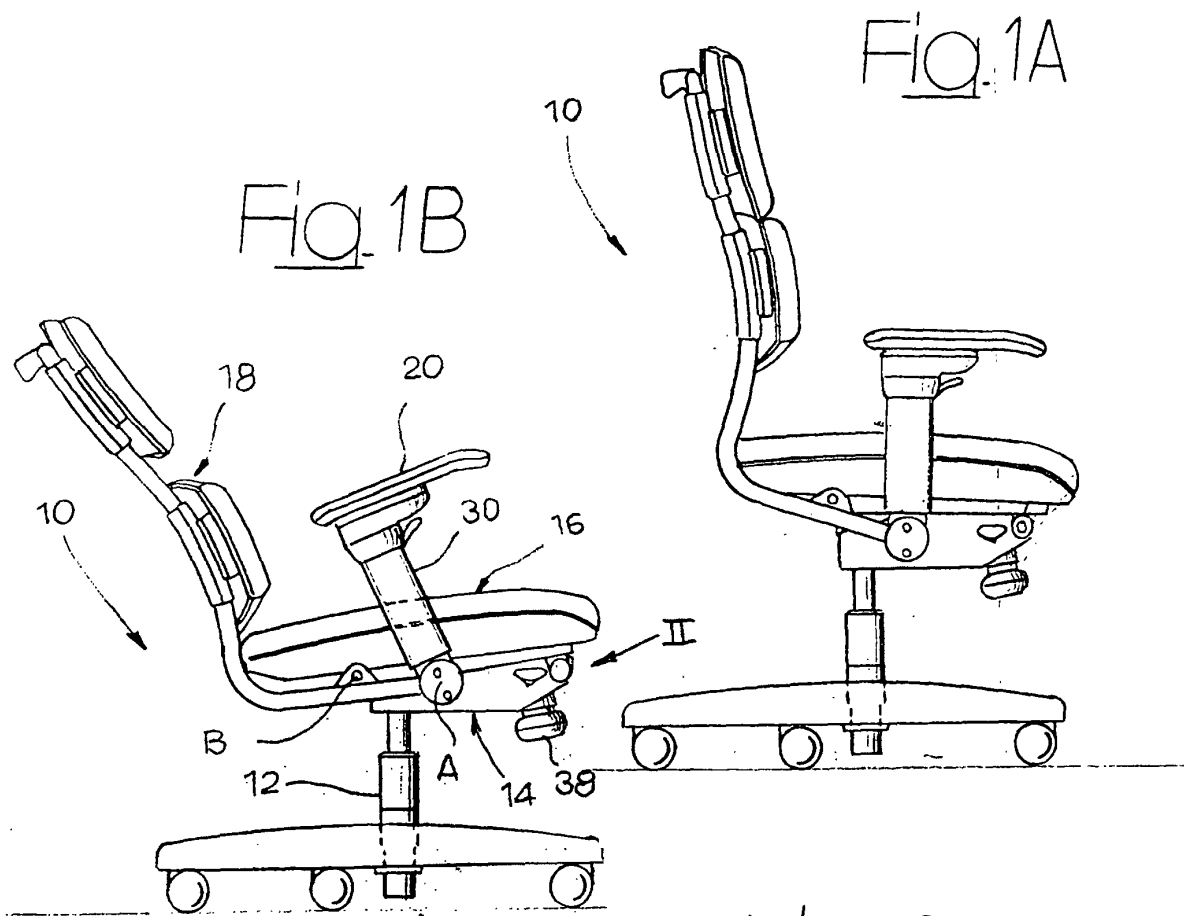
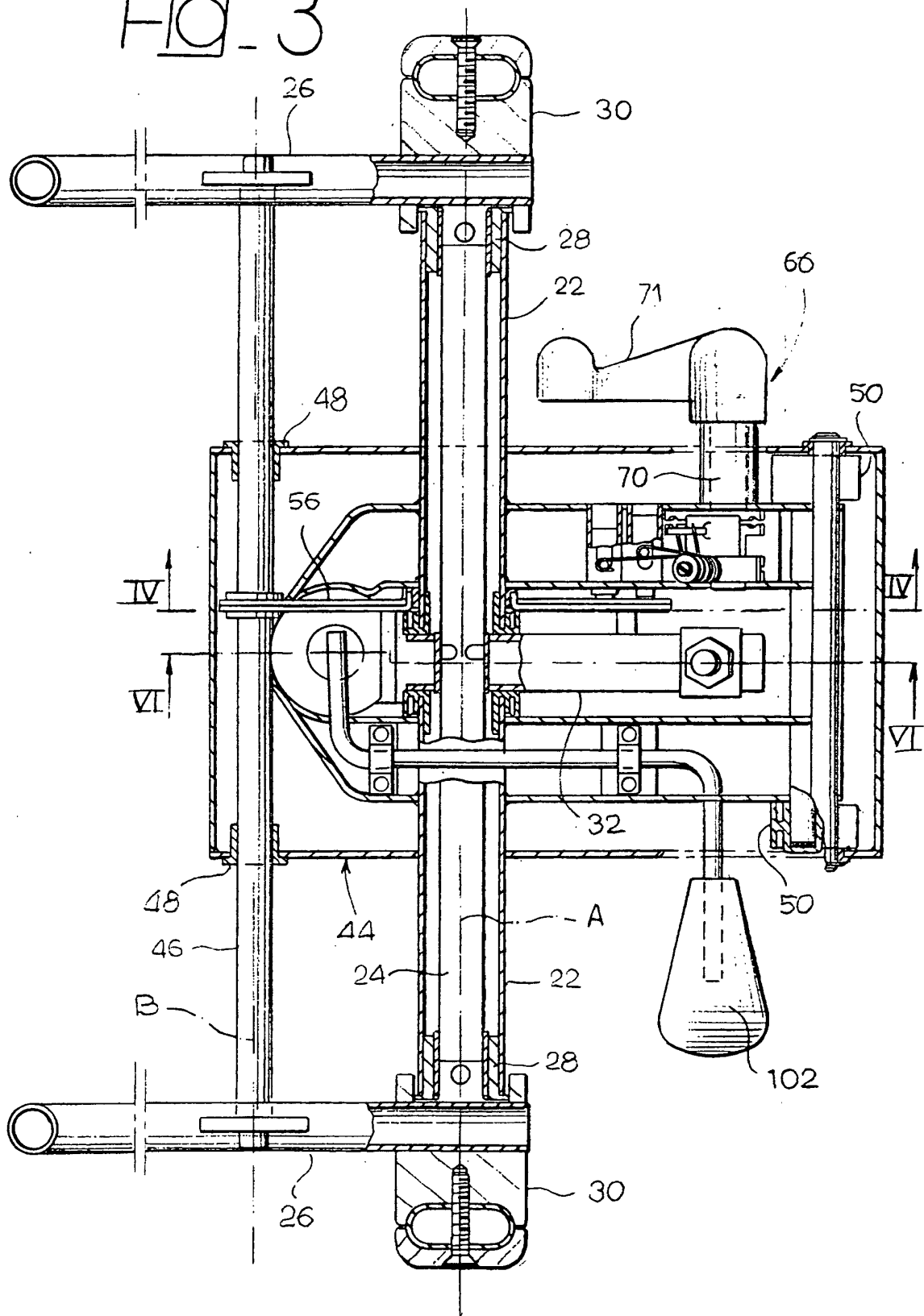


Fig. 3



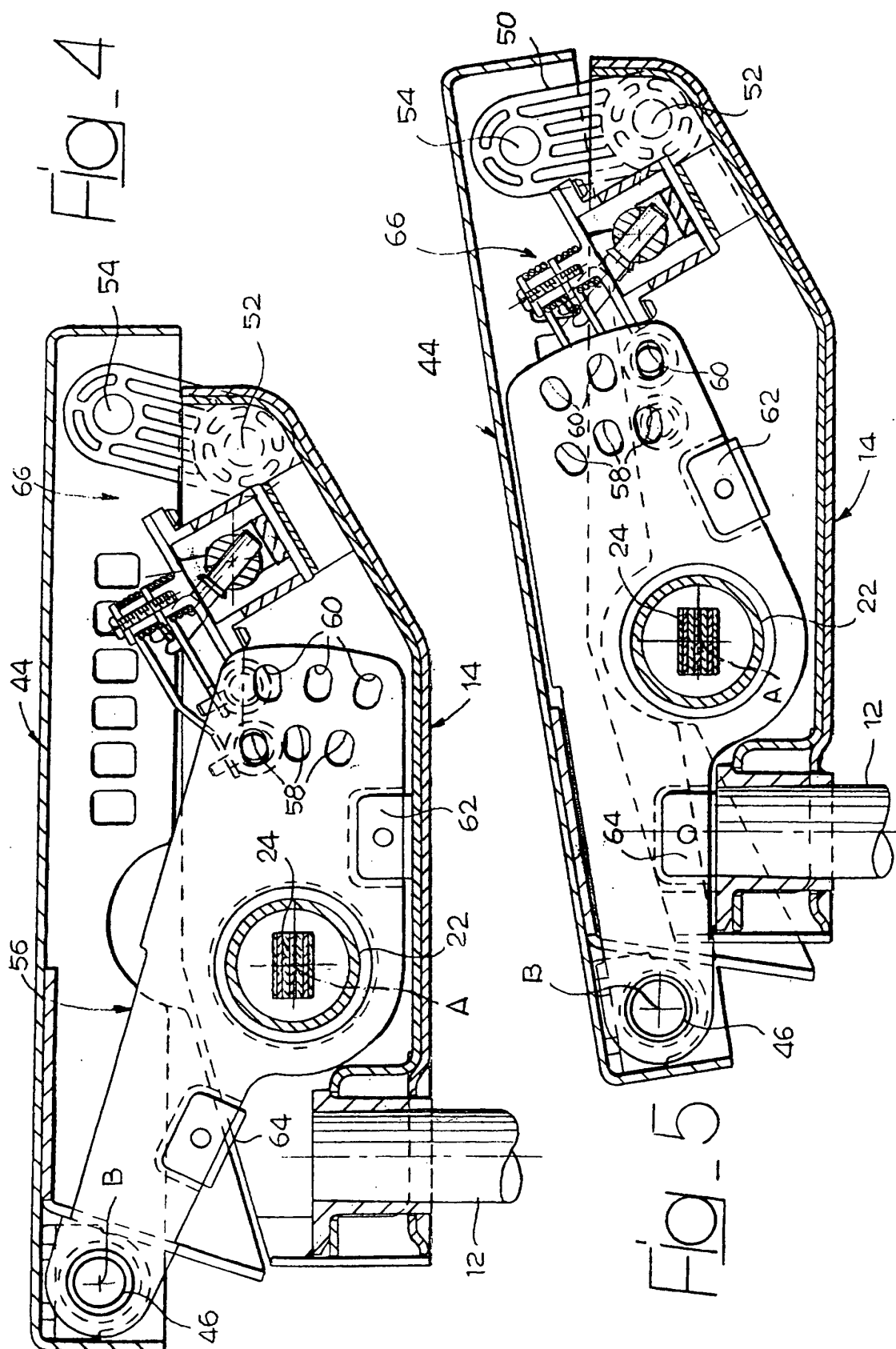


FIG. 6

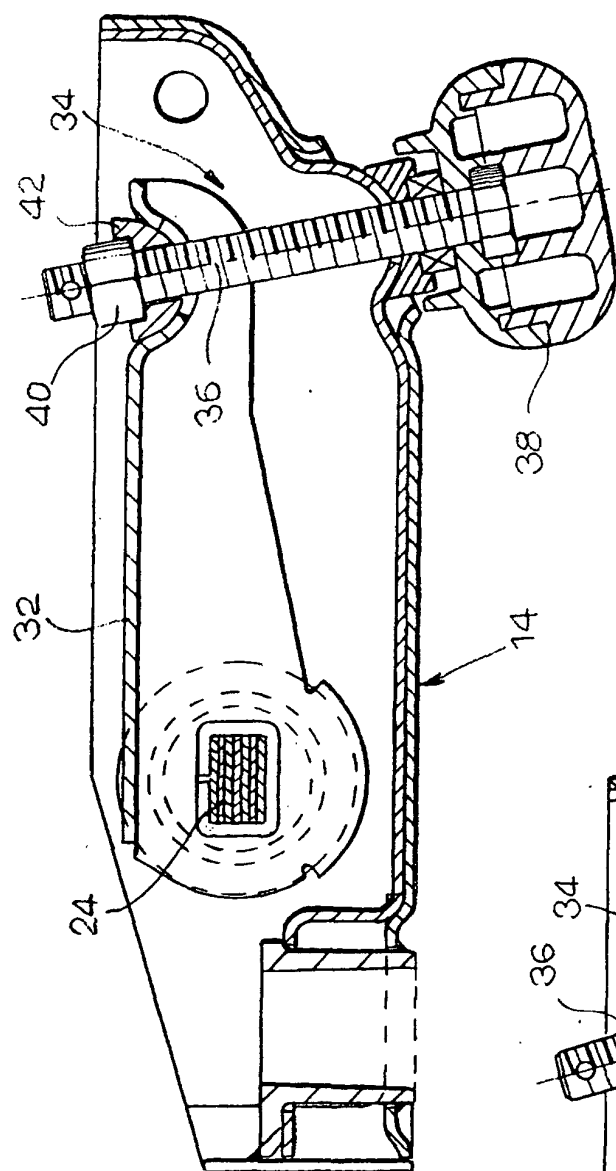


FIG. 7

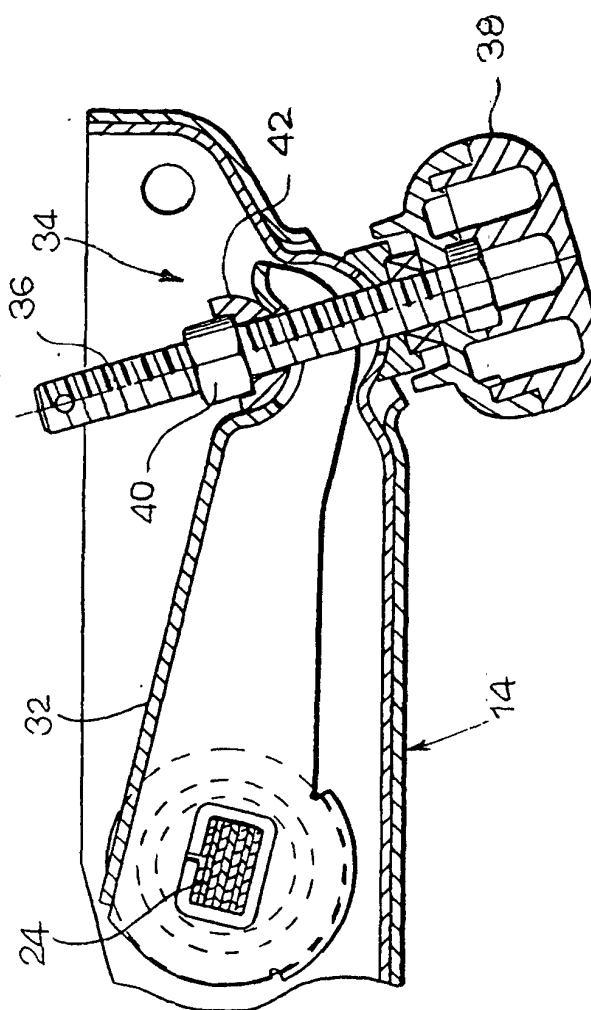


Fig. 8

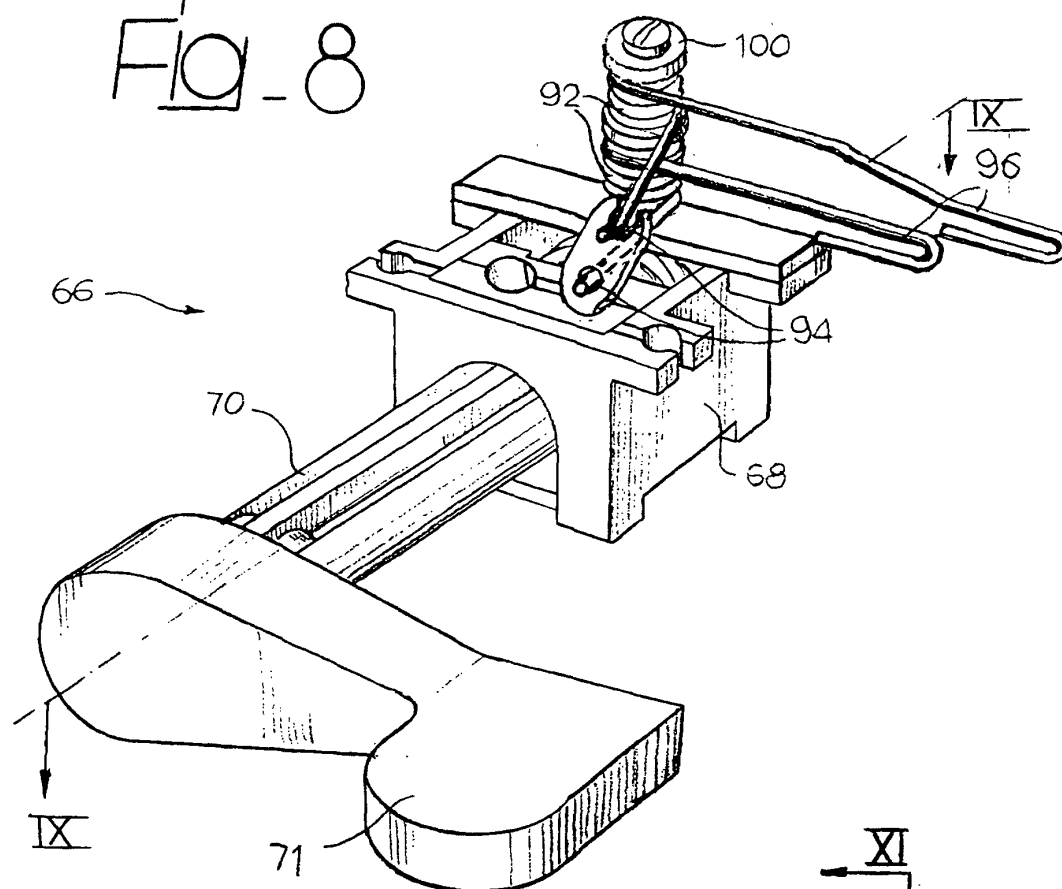
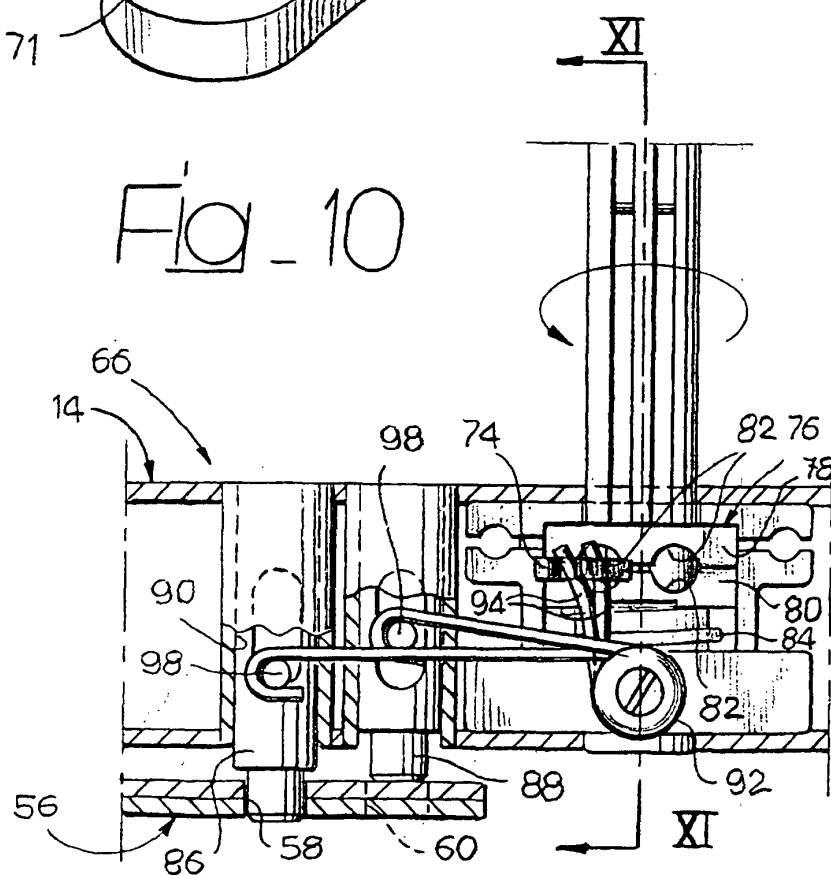
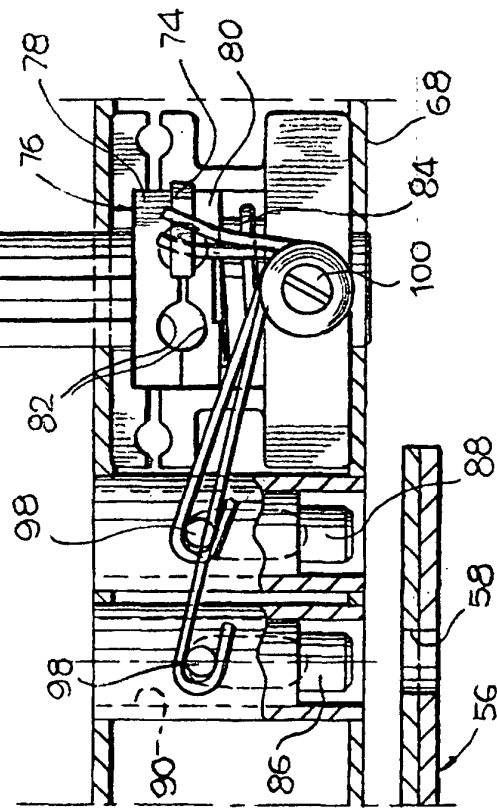
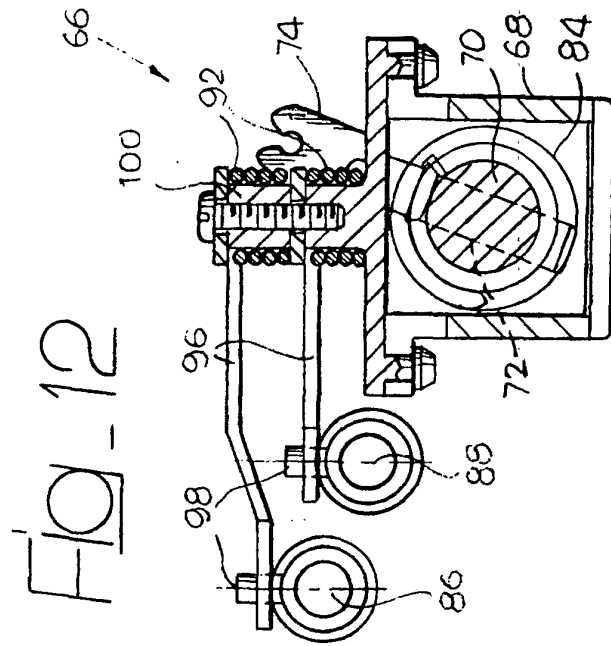
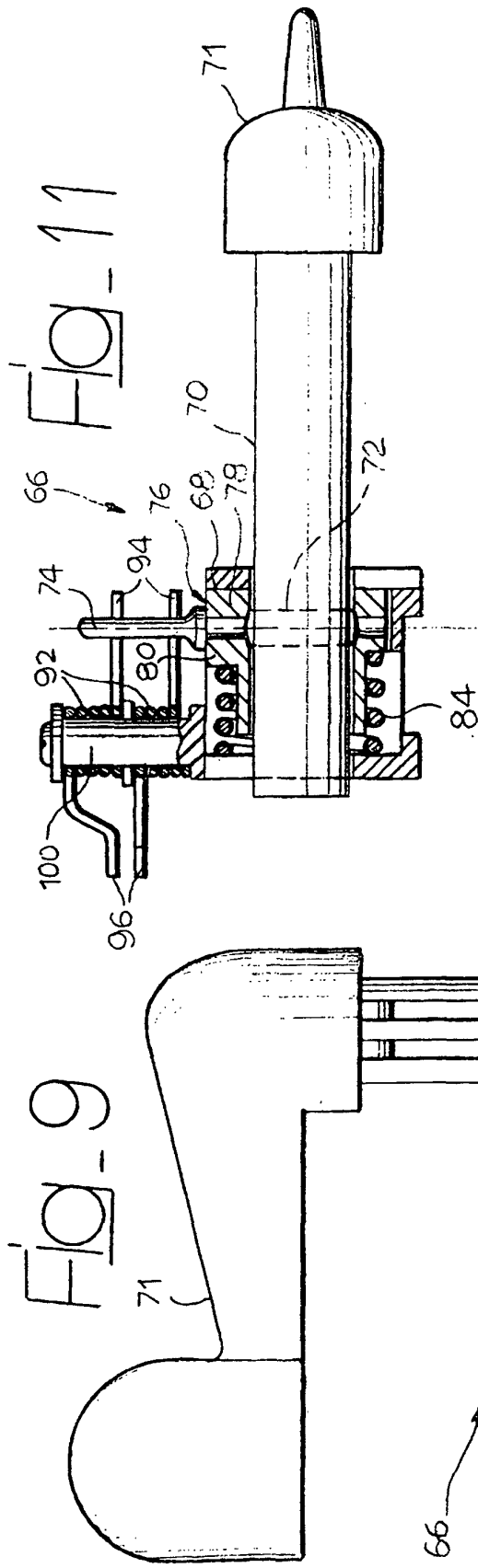


Fig. 10







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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 3143

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
X	WO 00 22959 A (PROTONED) 27 April 2000 (2000-04-27) * abstract; figures 3,4 *	1,2,5-7	A47C1/032
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			TECHNICAL FIELDS SEARCHED (Int.CI.7)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		12 September 2001	VandeVondele, J
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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