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(54) **A furniture set, including two hydraulically connected pieces of furniture**

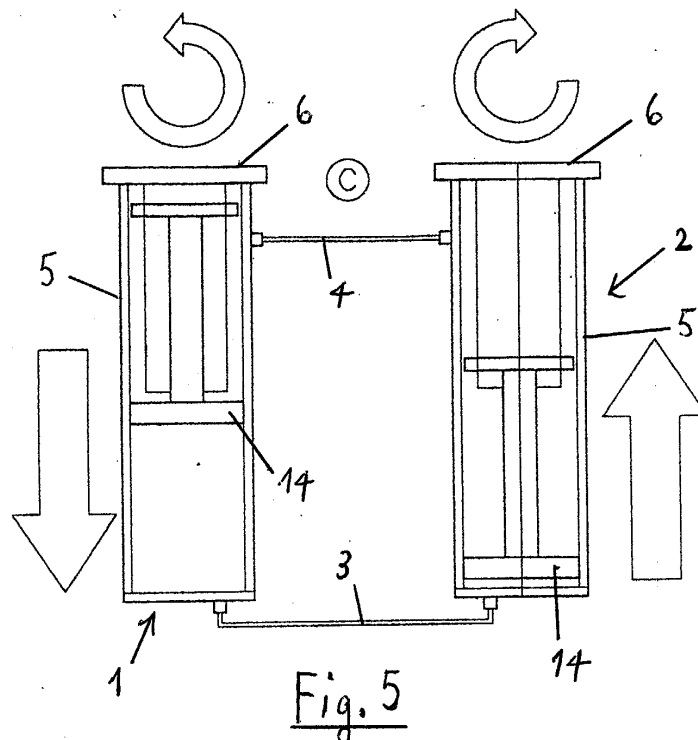
(57) A furniture set that includes two units (1, 2), which are separated from each other, but interact through a hydraulic motion-transmission system.

The first unit (1) forms a small table, or desk, whose shelf (6) can be manually actuated (rotated) by the user.

The unit (1) acts as a "pump", thereby driving the second unit (2) by means of a hydraulic conduit (3); the second unit acts as a hydraulic motor, which rotates its

own shelf (6). The hydraulic fluid flows through a return duct (4) and reaches again the first unit (1) of the furniture set.

The units (1, 2) are of a reversible kind, since their structure is identical, so that, by manually moving (rotating) the shelf (6) of the second unit (2), it is possible to "remote-control" the rotation of the shelf (6) associated to the first unit or support (1) of the first desk.



Description

[0001] In the technical field of furniture used in the domestic sector, furniture elements - usually small tables - have been produced and commercialised, which have the peculiarity that their shelves are movable and superimposable, so that the manually effected rotation of a shelf of a first small table, produces the rotation of a shelf of a second small table.

[0002] According to a specific embodiment, the rotation of the second shelf is induced by a transmission mechanism including pinions and a chain, or gear-wheels and a chain. Obviously, the effect obtained in this way is very important for the user, since it allows to modify the configuration of the furniture set that comprises the two above mentioned superimposable shelves which are mounted eccentrically on respective rotational supports.

[0003] However, although the outside appearance of this furniture element may be varied by a simple movement (operation), thereby adapting it to present needs, nonetheless, the structure of this traditional furniture element has some drawbacks. In fact, the transmission chain forms a complex system for transmitting the motion from a shelf to the other, and it cannot have an excessive length; therefore, the piece of furniture should necessarily form a single structural unit, thereby excluding the possibility to arrange the two shelves, and their respective rotational supports, in two places of a room spaced apart from each other. Thus, it can be noted that the possibility to modify the configuration of the furniture element is limited in this sense.

[0004] Therefore, a skilled person easily understands that there is a need to improve the versatility of this furniture element, without renouncing - however - to the possibility of providing superimposable shelves.

[0005] Generally, the object of the present invention is to provide a furniture element whose geometry may be varied according to current needs, and which includes two separate units, or pieces of furniture, that are nonetheless physically coupled by means of an appropriate motion transmission system (drive system).

[0006] Thus, by rotating the shelf of the first piece of furniture, the second shelf of the second piece of furniture is caused to rotate at the same time, and vice versa.

[0007] The presence of the drive system must remain "hidden" so as to create the impression that the second shelf is "animated" by an independent motion, not directly caused by the manually performed rotation of the first shelf.

[0008] Thus, one will have the sensation that a room furnished with elements according to the present invention, has "animated" or "living" pieces of furniture instead of stationary furniture elements. Besides allowing to change the configuration of the various furniture elements, the invention therefore permits to "drive" (actuate) one of the components of a furniture element, even if it is located at a distance from the first element (which

is moved manually).

[0009] The objects of the present invention are attained by a furniture element comprising two or more supports, with respective shelves rotatably mounted on said supports, characterised in that each support includes a hydraulic unit operable as a pump or motor, and said hydraulic units are connected by means of fluid flow conduits or hoses for the passage of a hydraulic fluid, whereby rotation of a shelf implies the operation of the respective hydraulic unit as a pump, and the operation as motors of the remaining hydraulic units, in order to rotate their respective shelves.

[0010] The present invention will now be described only for illustrative and non-limitative and non-binding purposes, with reference to the accompanying drawings, showing a particular embodiment thereof, and in which:

FIG. 1 is an axial, longitudinal sectional view, of the support of the first shelf, according to a first operative position;

FIG. 2 is an axial, longitudinal sectional view, of the support of the second shelf, in a second operative position;

FIG. 3 is a front view of a helical rotor received inside the supports of Figs. 1 and 2;

FIG. 4 is an axial, longitudinal sectional view of the helical rotor shown in Fig. 3, taken in the plane of the drawing;

FIG. 5 is a schematic view of the furniture set or element, according to the present invention, corresponding to a first connection scheme of the hydraulic circuit (first version of the invention's embodiment);

FIG. 6 is a schematic view of the furniture set or element, according to the present invention, corresponding to a second connection scheme of the hydraulic circuit (second version of the invention's embodiment).

[0011] The present invention consists of a furniture set, or furniture element, including two separate units that are physically and interactively coupled to each other by means of a hydraulic circuit.

[0012] Referring shortly to Fig. 5, this set comprises two supports, respectively indicated by numerals 1 and 2, having a cylindrical shape, and connected to each other by flexible pipes (hoses) 3, 4 for the passage of a suitable fluid (oil).

[0013] In practice, each support 1 and 2, having a stationary cylindrical wall 5, presents an upper (e.g. circular) shelf 6 which is rotationally mounted on the respective support 1 or 2.

[0014] In substance, when the user manually rotates the shelf 6 of the first support 1, the fluid (oil) passes through the hoses 3, 4, so as to rotate at the same time (in a manner described below) the second shelf 6 associated to the second support 2.

[0015] Conversely, the rotation of the (second) shelf 6 of the second support 2 will cause the rotation of the (first) shelf 6 associated to the first support 1 (the latter rotation occurring in the opposite sense than the second shelf 6), and it will seem that the first shelf is "animated" by an independent movement; moreover, if the hoses 4, 3 in which the fluid flows are suitably hidden, also an attentive observer will be astonished. When comparing this to the known art, it can be noted that the oil-operated hydraulic mechanism of the invention (which will be described in detail below) allows to "remote-control" the rotational movement of the second small table (second shelf 6), simply by moving the first small table (first shelf 6), and vice versa. This effect cannot be obtained by employing purely mechanical means, such as chains, pinions, gearwheels, etc. In fact, this latter solution would cause size problems and consequently a difficulty in "hiding" these drive (that is, motion transmission) means.

[0016] Before describing the technical details of the preferred embodiment of the invention, it should be noted that in the first version of this embodiment (Fig. 5) the two shelves 6 of the supports 1 and 2 rotate in opposite directions, whereas in the second version (Fig. 6) of the preferred embodiment of the invention, the shelves 6 of the supports 1 and 2 rotate in the same direction. This different behaviour is related (as described below) to the kind of connection (to the supports) of the fluid flow hoses, and moreover, this also depends on the mutual (relative) initial position of the inner fluid-displacing pistons.

[0017] In general, plates or slabs (e.g. of glass) forming the actual upper surface of the respective small table or desk, will be fixed (or glued) onto the shelves 6 themselves. If these plates or slabs are mounted in an eccentric manner (not shown) on the respective shelves 6, it will also be possible (in the same way as in the prior art) to superimpose these (glass) slabs by their rotation, thereby modifying the configuration of the present furniture set or element. In order to attain this object it will suffice to arrange or install the two supports 1 and 2 in close positions, and to arrange the two shelves 6 at different heights (this height difference obviously depends on the thickness of the slabs).

[0018] In the following part of the description we shall specifically refer to Figs. 1 to 4 in order to illustrate in detail the structure and operation of the furniture element according to the present invention. The two supports 1 and 2, respectively shown in Figs. 1 and 2, are identical, the only difference being their different operative position (condition) shown in these figures.

[0019] Therefore, referring first only to Fig. 1, it can be seen that the support 1 comprises:

- a cylindrical wall 5, with a lower lid 7 and an upper lid 8 (and respective sealing gaskets); said cylindrical wall 5 comprising - in turn - two sleeves (9 and 9') which are inserted one on the other in a manner that insures a sealing;
- a helical rotor 10, mounted on bearings 11 in a manner to be able to rotate around the geometric axis of the support, inside the upper sleeve 9 (but being prevented from moving axially);
- a flange or shelf 6, which is rigidly connected by screws 12 to the upper end 13 of the helical rotor 10, and which projects outwardly with respect to the upper lid 8;
- a piston, which is generally indicated by 14, and which includes gaskets or sealing means 15, and a stem or rod 16 whose upper end is integral with a cross member 17 having two diametrically opposite projections 18, 18'.

[0020] The helical rotor 10, which is individually shown in Figs. 3 and 4, forms a hollow body in the cylindrical walls of which there are provided two (through) slots of helical shape (also named helical tracks) 19 and 19'.

[0021] The two helical tracks 19 and 19' have the same pitch, and each of them corresponds to a maximum rotation of 360°.

[0022] In practice, this is the same as an individual, double helical track (or twin-track), with a maximum rotation of 360°.

[0023] The projection 18 of the cross member 17 is received inside the helical track 19, whereas the projection 18' of the same cross member 17 is received inside the helical track 19'.

[0024] The rotation of the shelf 6 (on whose upper side the slab, not shown, is fixed or glued) controls the rotation of the helical rotor 10, which; in turn, causes the axial movement of the cross member 17 (note that the projections 18, 18' are obliged to translate along longitudinal guides 20, 20' obtained on the inner wall of the sleeve 9). However, the cross member 17 is integral with the stem 16 and the respective piston 14, so that the latter, starting from the position of Fig. 1, reaches the final position shown in Fig. 2, which is directly adjacent the lower lid 7 (after a rotation by 360° of the shelf 6 and of the respective slab).

[0025] It should be noted that the supports 1 and 2 are completely filled with an oil of the kind used for hydraulic circuits (inside chambers A and B), and that the conduits 3 and 4 (or 3' and 4') are not shown in Figs. 1 and 2. Before filling up the supports 1 and 2 (with the oil), it is necessary to position the pistons 14 in their respective operative positions, as shown in Fig. 5 (provided opposite rotations of the shelves are desired), or as shown in Fig. 6 (provided rotations in the same direction are desired). Note that Fig. 6 shows a "cross-arrangement" of the hoses 3' and 4' in which the fluid flows; this means that in this arrangement "D" (in contrast with the

"parallel" arrangement C of Fig. 5), the chamber A of the first support (1) communicates with the chamber B of the second support (2), and vice versa.

[0026] Referring now for example to the version of Fig. 5, the piston 14 (of the support 1), while moving downwards, pushes the oil through the hose 3, and inside chamber B of support 2, thereby lifting the piston 14 of the latter support; moreover, in the same period of time, fluid flows from chamber A of support 2 towards chamber A of support 1, by passing through hose 4. While piston 14 of support 2 is lifting, shelf 6 of support 2 rotates by 360°.

[0027] The operation, for what concerns version "D", that is, the second version (shown in Fig. 6), is similar, the only difference being the initial position of the pistons 14 (which in this case is identical), and the rotation direction of the shelves 6 (which is also identical).

[0028] The filling of the oil must occur when the two supports 1, 2 have already been connected to the hoses 3, 4 (or 3', 4'); to avoid formation of air bubbles, each chamber A, B is provided at its upper end with a bleed (hole) that is thereafter hermetically closed.

[0029] The bearings 11 must not have protections, in order to allow a free circulation of the oil.

[0030] It is obvious that the two (cylindrical) projections 18, 18' and the two helical tracks 19, 19' are necessary for a "centred" sliding of the piston, and provide two diametrically opposite supports of the cross member 17, to prevent an otherwise possible seizure.

[0031] Moreover, the pitch of the two tracks 19, 19' must be adapted to the piston stroke and diameter. If the piston is designed with a greater diameter, it will push a greater amount of oil, and the force required for this movement will increase as well. A reduced pitch of the two tracks 19, 19' will then reduce the effort of the user. Summing up, the invention realises a furniture element equipped with a hydraulic mechanism suited to transmit a rotational motion between two or more shelves that are not structurally dependent from each other, but are connected only by means of a conduit apt to convey a power fluid (the various supports being arranged in series and adequately connected, in an intuitive manner for any skilled person).

[0032] This kind of mechanism operates simultaneously as a "pump" and as a "motor".

[0033] For instance, the first support acts as a pump when the slab (and hence the respective shelf 6) is moved by the hand of the user, so as to displace the fluid towards the other support; the latter will then function like a motor, and vice versa.

[0034] Furthermore, the flexible tubes 3, 4 (or 3', 4') may be suitably hidden (covered) creating the impression that one of the small tables or desks is "animated".

[0035] It may be seen, therefore, that the objects of the invention have been attained by optimising the dimensions and the aesthetic appearance.

List of reference numerals

[0036]

5	1, 2 supports
	3, 4 fluid flow conduits
	3', 4' fluid flow conduits
	5 wall of supports (1 or 2)
	6 shelves
10	7 lower lid
	8 upper lid
	9 upper sleeve
	10 helical rotor
	11 bearings
15	12 screws or bolts
	13 upper end of helical rotor
	14 piston
	15 piston ring (packing ring)
	16 piston rod
20	17 cross member
	18, 18' diametrical projections
	19, 19' helical tracks
	20, 20' axial guides for the piston

Claims

1. A furniture element comprising two or more supports (1; 2), with respective shelves (6) rotatably mounted on said supports (1; 2), **characterised in that** each support (1; 2) includes a hydraulic unit (10, 14) operable as a pump or motor, and said hydraulic units (10, 14) are connected by means of fluid flow conduits or hoses (3, 4; 3', 4') for the passage of a hydraulic fluid, whereby rotation of a shelf (6) implies the operation of the respective hydraulic unit (10, 14) as a pump, and the operation as motors of the remaining hydraulic units (10, 14) in order to rotate their respective shelves (6).
2. A furniture element according to claim 1, wherein the hydraulic unit (10, 14) comprises a helical rotor (10), rotatably mounted within the support (1; 2) and rigidly connected to the respective shelf (6), and a piston (14), whose stem or rod (16) is axially movable in response to the rotation of said helical rotor (10).
3. A furniture element according to claim 2, wherein the helical rotor (10) is formed of a hollow cylindrical body with helical grooves (19, 19') of equal pitch engaging with diametrically opposite projections (18, 18') of the piston rod (16), said piston (14) being forced to axially translate due to the presence of guides (20, 20') provided inside the support (1; 2).
4. A furniture element according to claim 3, wherein the piston (14) divides the interior of the support (1;

2) into an upper hydraulic chamber (A), where the helical rotor (10) is lodged, and a lower hydraulic chamber (B).

5. A furniture element according to claim 4, wherein said grooves (19, 19') are through slots, and the stem or rod (16) is provided with a cross member (17), which has projections (18, 18') passing through the slots (19, 19') and engaging with said guides (20, 20'). 5
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6. A furniture element according to claim 4, wherein each of said upper chambers (A) or lower chambers (B) of said supports (1; 2), is suitably connected to an upper chamber, or to a lower chamber, of another support (1; 2). 15
7. A furniture element according to claim 4, wherein the helical rotor (10) is rotatably supported on bearings (11) with no protections, in order to facilitate the free circulation of the fluid. 20

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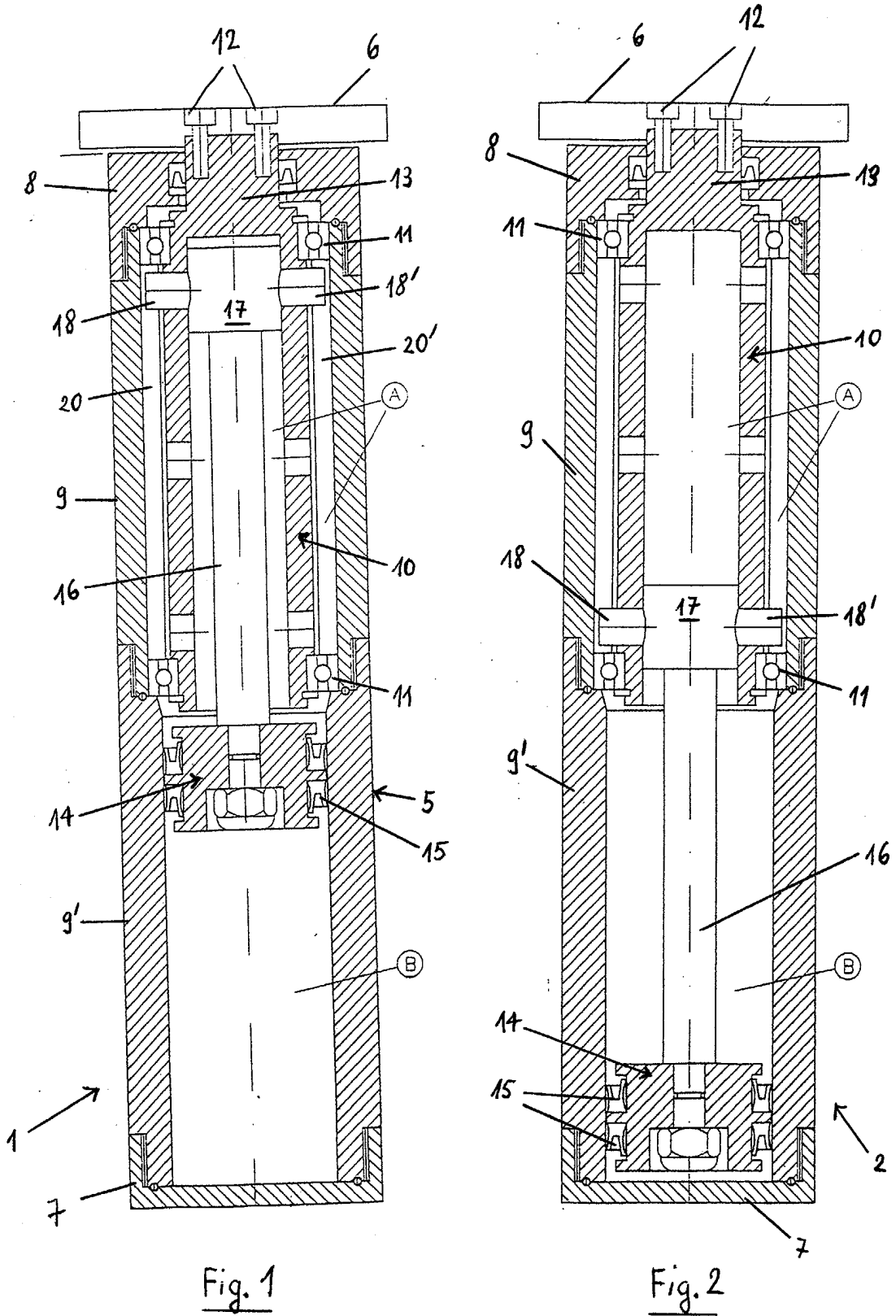
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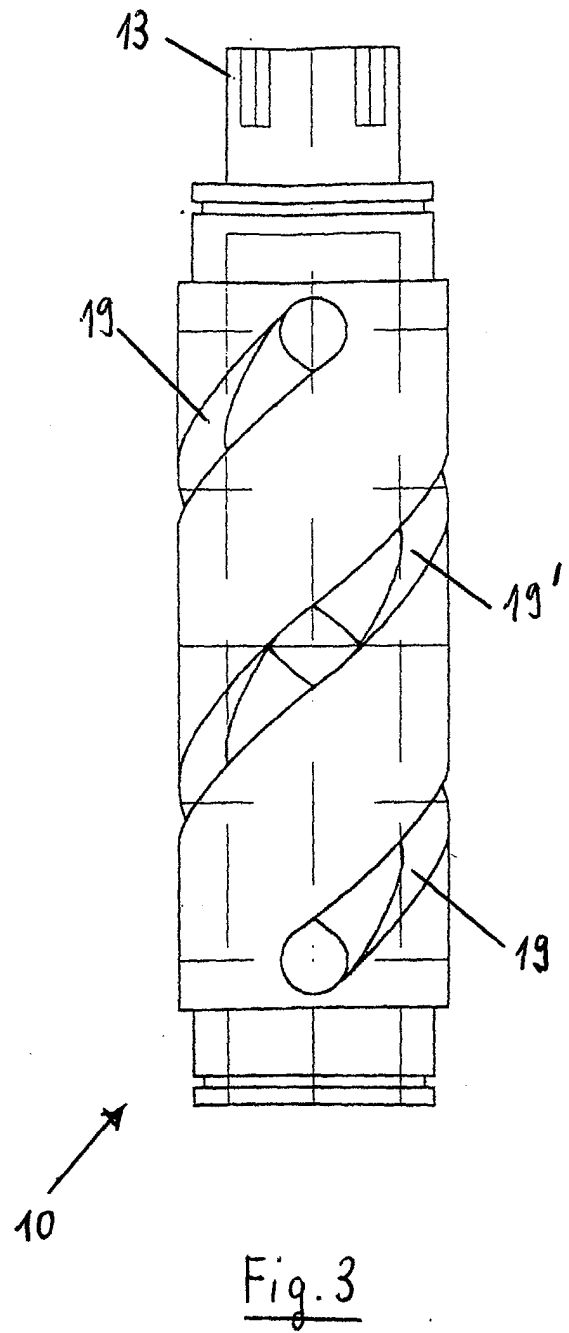
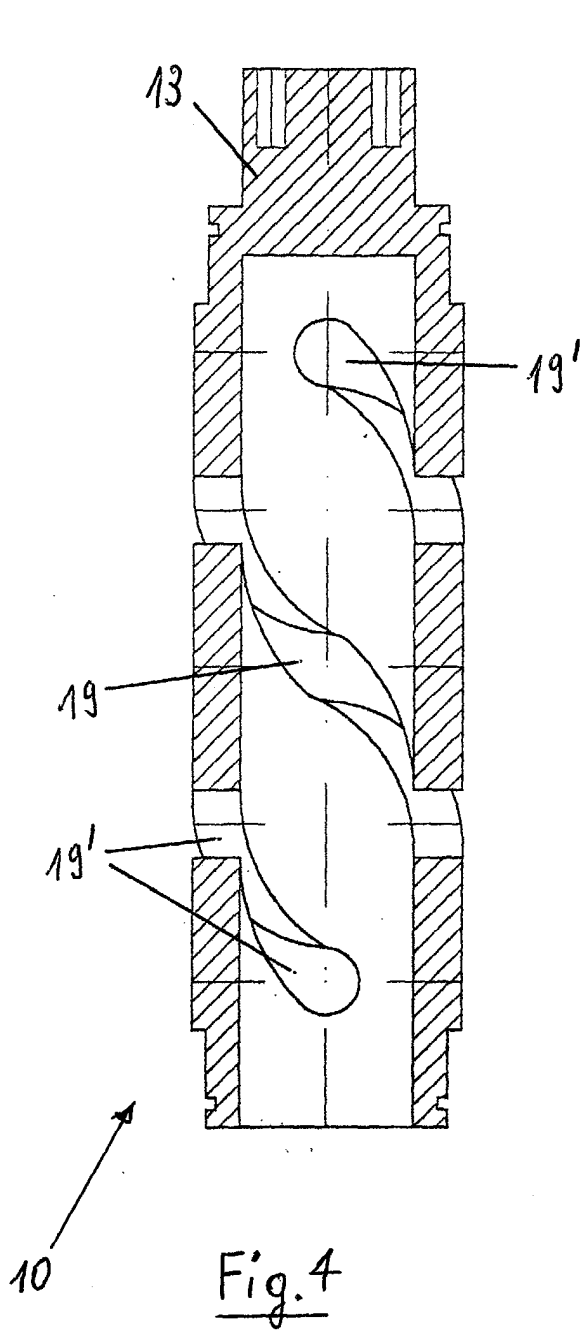
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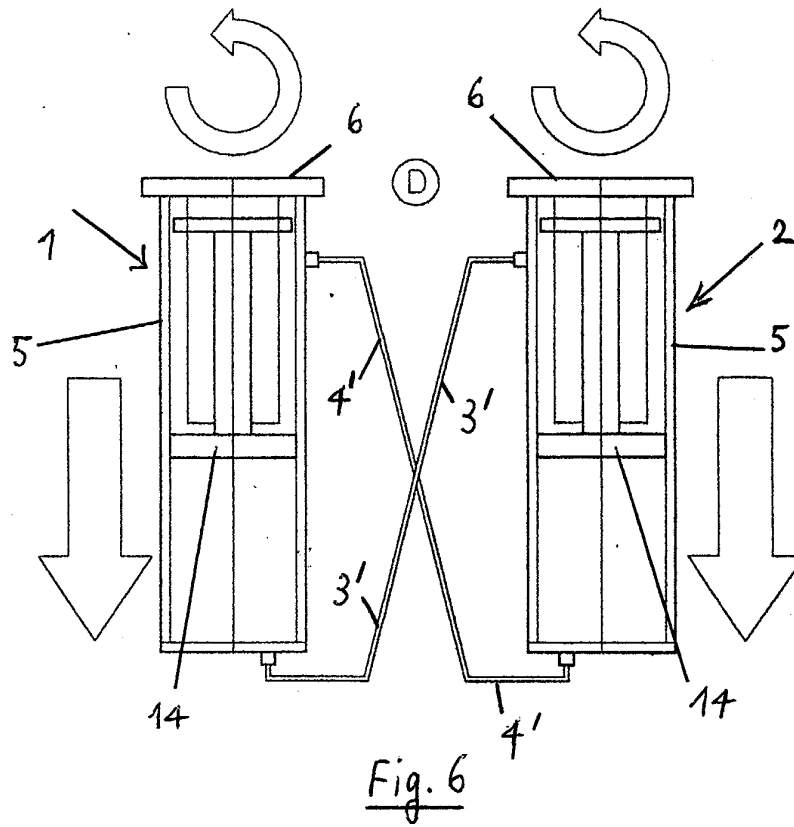
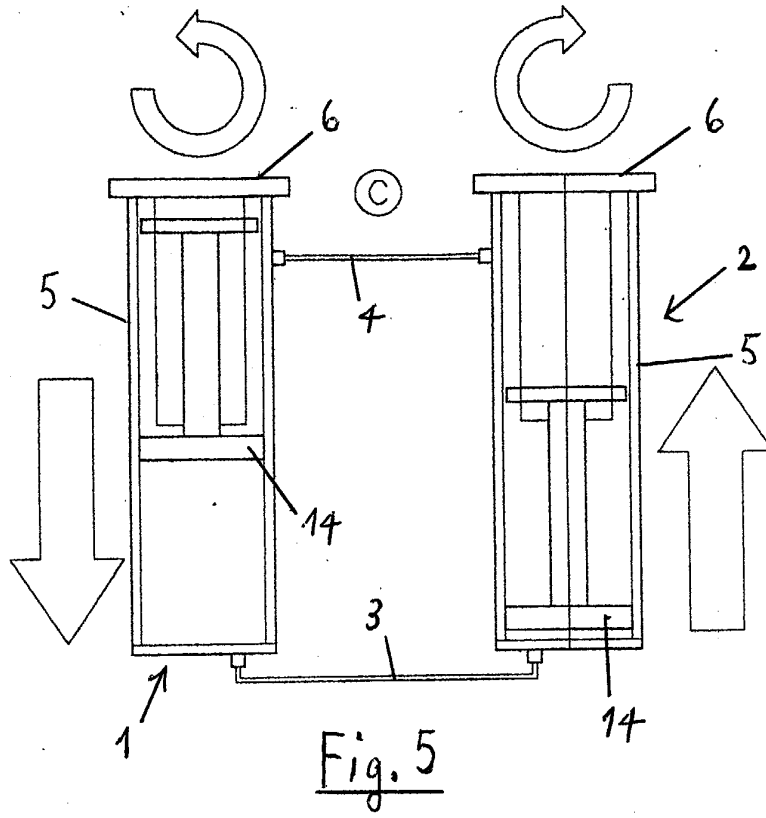
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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5825

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The present search report has been drawn up for all claims							
Place of search MUNICH		Date of completion of the search 18 March 2004	Examiner MacCormick, D				
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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