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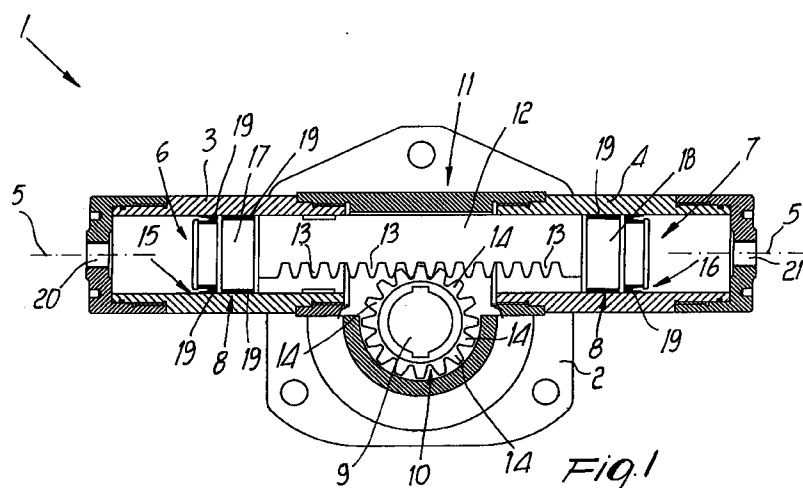
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(54) **Hydromechanically actuated rotating unit**

(57) The hydromechanically actuated rotating unit comprises: a fixed bell-shaped element (2); a first cylinder (3) and a second cylinder (4), which are mutually aligned along an axis (5) which intersects the bell-shaped element (2) and in which respectively a first piston (6) and a second piston (7) are fitted so that they can move, with sealing elements (8) interposed; a rotating shaft (9), which is mounted so that it can rotate axi-

ally in the bell-shaped element (2); a pinion (10), which is rigidly coupled to the shaft; a rack (11) which meshes with the pinion (10) and to which the first and second pistons (6, 7) are rigidly coupled; and elements for distributing pressurized fluid, which are connected to the first and second cylinders.



EP 0 918 162 A2

## Description

[0001] The present invention relates to a hydromechanically actuated rotating unit.

[0002] It is known that steering units generally of the mechanical type are used in many applications, from zootechny to the food industry to mechanics, when a high rotation force is required to move large parts.

[0003] These steering units of the mechanical type use chains or the like, which act directly on the steering axle of heavy machines, such as for example rotors and valves for silos, hydraulic power steering systems for fork-lift trucks, mechanical conveyors and others.

[0004] These conventional units are not free from drawbacks, including the fact that they require a significant use of labor, require expensive and sophisticated mechanisms, and do not ensure a particularly safe and effective steering action.

[0005] The aim of the present invention is to eliminate the above described drawbacks of conventional units by providing a hydromechanically actuated rotating unit which allows to achieve true labor savings, reduce production costs and ensure a rotary action of high quality which is reliable, powerful and resistant.

[0006] Within the scope of this aim, an object of the present invention is to provide a hydromechanically actuated rotating unit having a structure which is simple, relatively easy to provide in practice, safe in use, effective in operation and relatively low in cost.

[0007] This aim and this object are achieved by the present hydromechanically actuated rotating unit, characterized in that it comprises: a fixed bell-shaped element; a first cylinder and a second cylinder, which are mutually aligned along an axis which intersects said bell-shaped element and in which respectively a first piston and a second piston are fitted so that they can move, with sealing elements interposed; a rotating shaft, which is mounted so that it can rotate axially in said bell-shaped element; a pinion, which is rigidly coupled to said shaft; a rack which meshes with said pinion, said first and second pistons being rigidly coupled to the ends of said rack; and elements for distributing pressurized fluid, which are connected to said first and second cylinders.

[0008] Further characteristics and advantages of the present invention will become apparent from the detailed description of a preferred but not exclusive embodiment of a hydromechanically actuated rotating unit according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional front view of a hydromechanically actuated rotating unit according to the invention;

Figure 2 is a sectional top view of the rotating unit according to the invention;

Figure 3 is a sectional side view of the rotating unit

according to the invention.

[0009] With particular reference to the above figures, the reference numeral 1 generally designates a hydromechanically actuated rotating unit according to the invention.

[0010] The rotating assembly 1 comprises a fixed bell-shaped element 2 to which a first cylinder 3 and a second cylinder 4 are rigidly and hermetically coupled; said cylinders are mutually aligned along an axis 5 which intersects the bell-shaped element 2.

[0011] A first piston 6 and a second piston 7 are mounted in the two cylinders 3 and 4, respectively, so that they can move with sealing elements 8 interposed.

[0012] A rotating shaft 9 is fitted in the bell-shaped element 2 so that it can rotate axially, and a pinion 10 is keyed thereon; a rack 11 meshes with said pinion, and the first and second pistons 6 and 7 are rigidly coupled to the ends of said rack.

[0013] Advantageously, in a preferred alternative embodiment, the pinion 10 is monolithic with a rotating shaft 9 since it is formed by cutting teeth therein.

[0014] Elements meant to distribute pressurized fluid, not shown in the various figures, are connected to the first cylinder 3 and to the second cylinder 4 and are conveniently provided with valves for the access of said fluid.

[0015] The rack 11 is constituted by an elongated cylindrical body 12 affected by a longitudinal milling at which the teeth 13 are formed; said teeth are adapted to mesh with the teeth 14 of the pinion 10.

[0016] The first piston 6 and the second piston 7 are constituted by seats 15 and 16 which are formed perimetrically at the ends 17 and 18 of the cylindrical body 12 in order to accommodate sealing elements 8.

[0017] The sealing elements 8 are constituted by gaskets 19 made of a material such as rubber and of the lip and/or toroidal type.

[0018] The first cylinder 3 and the second cylinder 4 comprise, proximate to their ends, a respective intake port and/or discharge port 20 and 21 for connection to the elements for distributing pressurized fluid.

[0019] Advantageously, the end 22 of the shaft 9 is coupled to the bell-shaped element 2 by means of a first locking ring 23 and a second safety ring 24 which is adapted to prevent the spontaneous unscrewing of said shaft.

[0020] A plurality of conventional-type bearings 25 is interposed between the bell-shaped element 2 and the shaft 9. The shaft 9 has, at its free end, a seat 26 for the insertion of a hub supporting pivot 27.

[0021] The operation of the rotating unit according to the invention is as follows: pressurized fluid is fed, through one of the two ports 20 and 21, into one of the two cylinders 3 and 4, consequently producing the axial movement of one of the two pistons 6 and 7 and therefore of the rack 11 rigidly coupled thereto.

[0022] The rack 11 transmits a rotation to the pinion

10 and therefore to the shaft 9, which in turn causes the rotation of the hub supporting pivot 27, which is rigidly coupled thereto, through an angle which varies as a function of the axial movement of the rack 11.

[0023] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept. 5

[0024] All the details may further be replaced with other technically equivalent ones.

[0025] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the appended claims. 10

[0026] The disclosures in Italian Patent Application No. MO97A000213 from which this application claims priority are incorporated herein by reference. 15

[0027] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs. 20

## Claims 25

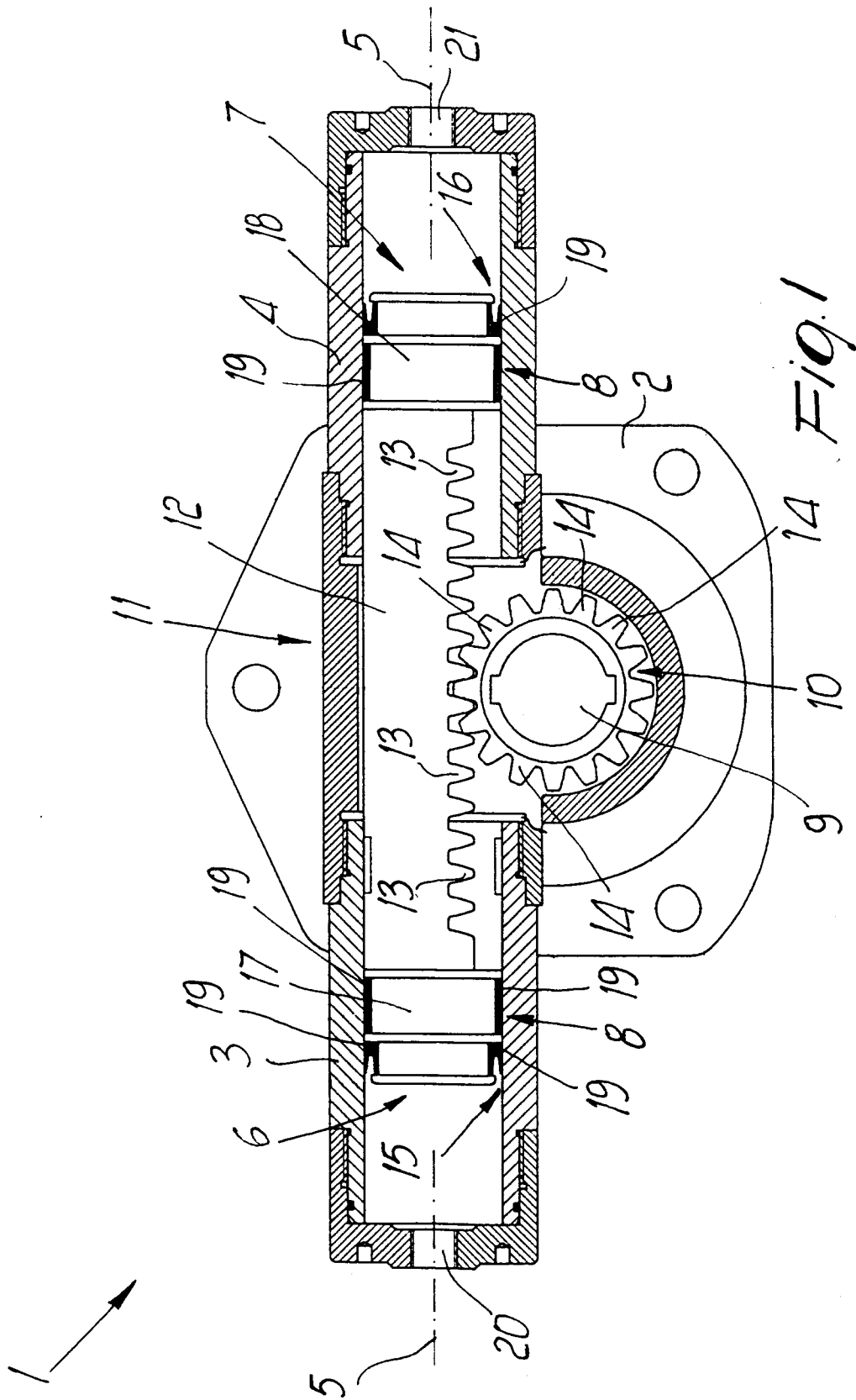
1. A hydromechanically actuated rotating unit, characterized in that it comprises: a fixed bell-shaped element; a first cylinder and a second cylinder, which are mutually aligned along an axis which intersects said bell-shaped element and in which respectively a first piston and a second piston are fitted so that they can move, with sealing elements interposed; a rotating shaft, which is mounted so that it can rotate axially in said bell-shaped element; a pinion, which is rigidly coupled to said shaft; a rack which meshes with said pinion, said first and second pistons being rigidly coupled to the ends of said rack; and elements for distributing pressurized fluid, which are connected to said first and second cylinders. 30 35 40
2. The unit according to claim 1, characterized in that said rack has teeth and is constituted by an elongated cylindrical body which is affected by a longitudinal milling at which the teeth adapted to mesh with the teeth of said pinion are formed. 45
3. The unit according to claim 1, characterized in that said pinion is keyed on said shaft. 50
4. The unit according to claim 1, characterized in that said pinion is monolithic with said shaft, being formed by cutting teeth into said shaft.
5. The unit according to claim 2, characterized in that said first piston and said second piston are formed at the ends of said cylindrical body. 55

6. The unit according to claim 2, characterized in that said first piston and said second piston are constituted by seats formed perimetrically at the ends of the cylindrical body in order to accommodate said sealing elements.

7. The unit according to claim 1, characterized in that said sealing elements are constituted by gaskets made of a material such as rubber and are of the lip and/or toroidal type.

8. The unit according to claim 1, characterized in that said first cylinder and said second cylinder are rigidly and hermetically coupled to said bell-shaped element.

9. The unit according to claim 1, characterized in that said first cylinder and said second cylinder comprise, proximate to their ends, a respective intake and/or discharge port for connection to said pressurized fluid distribution elements.



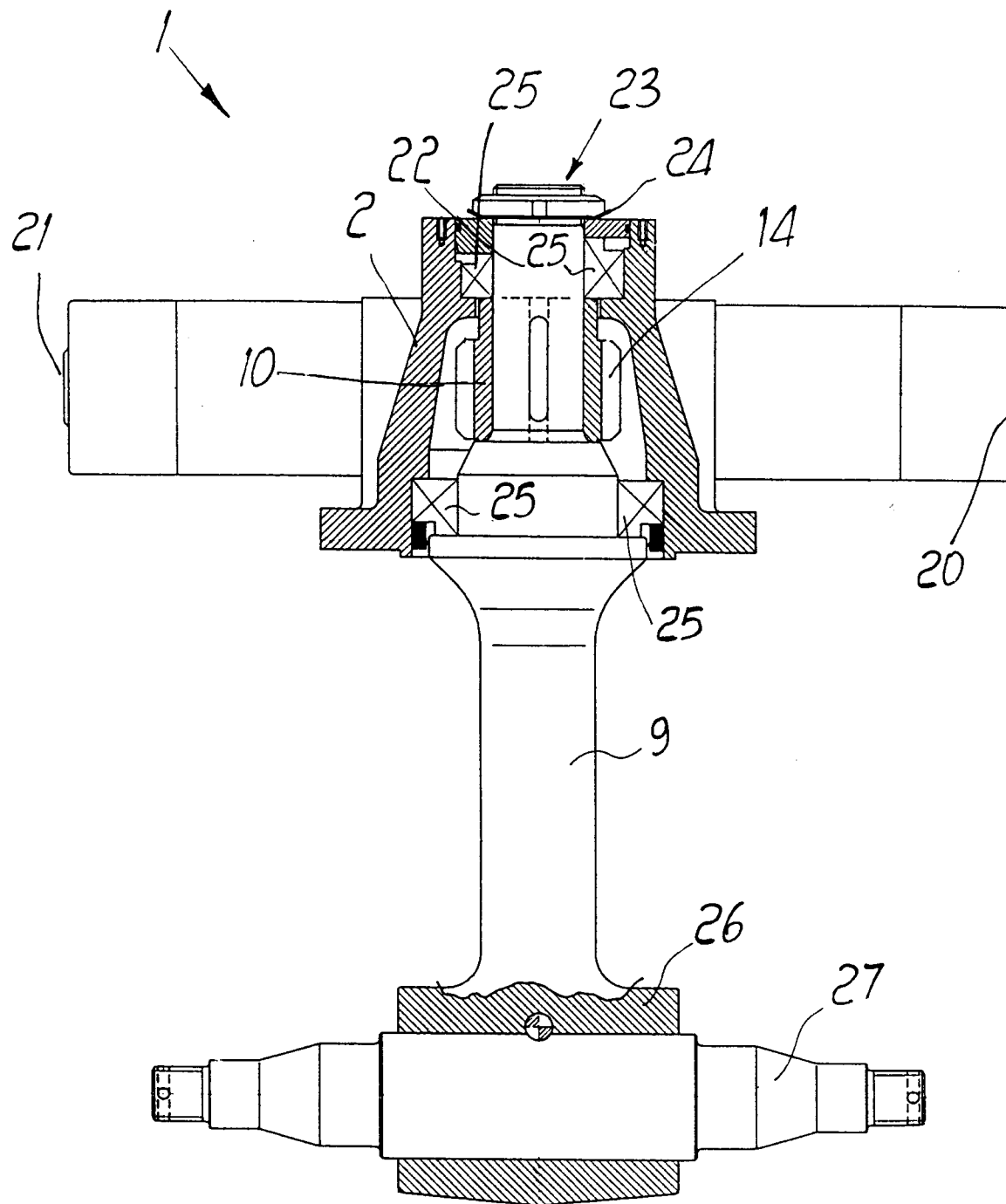


Fig. 2

