



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.10.2008 Bulletin 2008/42

(51) Int Cl.:
F04B 43/12 (2006.01) F04B 15/02 (2006.01)

(21) Application number: **08153035.4**

(22) Date of filing: **19.03.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(71) Applicant: **Musiani, Giancarlo**
40065 Pianoro, (BO) (IT)

(72) Inventor: **Musiani, Giancarlo**
40065 Pianoro, (BO) (IT)

(74) Representative: **Porsia, Dino et al**
c/o Succ. Ing. Fischetti & Weber
Via Caffaro 3/2
16124 Genova (IT)

(30) Priority: **12.04.2007 IT BO20070262**

(54) **Device for the adjustment of the orbital position of the operating rollers of the rotor of a peristaltic pump**

(57) The device for simplified adjustment of the orbital location of operating rollers (10, 10') of the rotor of a peristaltic pump, in particular for pumps for conveying concrete, cement mixes, plaster, mortar, sludge or the like, comprises crank means (15) which are mounted rotatably on the walls of the rotor, opposite the said rollers (10, 10') and parallel to the axis of rotation (7) of the rotor (9) of the pump. The crank means, by their very nature, may be operated with a rotation applied to only one of

their ends which is provided with means (17-19) for reversible fastening to the adjacent wall of the rotor, so as to be able to stabilise the crank in the given angular position, the stem of the said crank and the spindle of the said operating rollers being designed and kinematically connected together using any means such that, with rotation of the crank, it is possible to vary the orbital position of the operating rollers (10, 10') on the rotor (9) of the pump.

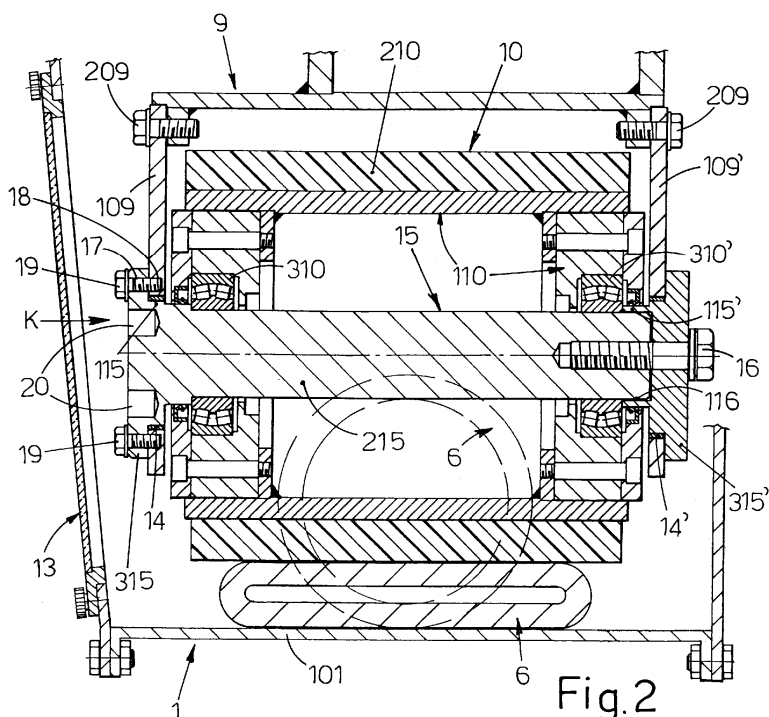


Fig.2

Description

[0001] The invention relates to peristaltic pumps of the cylindrical type and in particular to those pumps suitable for conveying over a distance concrete, cement mixes, plaster, mortar, sludge or similar products.

[0002] In order to understand better the proposed objects of the invention, reference should be made to Figure 1 of the sole accompanying sheet of drawings which shows a side elevation view of a peristaltic pump of the type in question, with parts cross-sectioned so that part of the internal rotor is visible. The pump comprises a stator body 1 with a cylindrical shape which has on the side surface, in a tangential arrangement, two nozzles 2 and 3, which are for example horizontal, the bottom nozzle 2 of which communicates with the bottom of a loading hopper 4 into which the product to be pumped is introduced and mixed thoroughly, while the upper nozzle 3 is connected to a pipe 5 for conveying over a distance the pumped product. The same nozzles 2 and 3 are connected if necessary in an easily removable manner, in order to facilitate routine and extraordinary maintenance operations, to the ends of a robust flexible tube 6 which is housed inside the stator 1, which rests with a U-shaped arrangement on the inner side surface 101 of the said stator and which acts as a variable-volume chamber for forcing the material from the loading or intake nozzle 2 to the discharge or delivery nozzle 3. A rotor 9, which is for example lozenge-shaped, rotates inside the stator 1, on a central shaft 7, owing to the action of a hydraulic motor 8 which is flanged onto an outer end wall of the said rotor, said rotor having at its opposite ends rollers 10, 10' which are freely rotatable on their spindles 11, 11' which are parallel to each other and to the axis 7 of the rotor. The rollers 10, 10' are usually lined with an elastomer material and during rotation, for example in the clockwise direction indicated by the arrow F, compress in succession the tube 6, forming a portion 106 of this tube - situated in front of the active roller and communicating with the discharge nozzle 3 - which gradually diminishes in length and volume consequently, so as to push the internal material towards the said nozzle 3, and forming a portion 206 of the same tube 6 - situated behind the active roller and communicating with the intake nozzle 2 - which gradually increases in length and volume consequently, so as to draw the material from the hopper 4. After each rotation of the rotor through about 180°, the rollers 10, 10' reverse their position on the flexible tube 6, ensuring continuity in the intake and delivery of the material through the nozzles 2 and 3.

[0003] In order to ensure the correct arrangement of the tube 6 with respect to the rollers 10, 10' of the rotor, the same rotor 9 is provided with vanes, not shown, which keep the same tube correctly centred in the middle of the inner side surface of the stator 1. Moreover, in order to ensure correct operation of the pump, it is also envisaged that the internal space of the stator 1 is kept under a suitable degree of vacuum by a dedicated pump, which,

like the said vanes, has also not been shown in the drawings, since not necessary for an understanding of the invention.

[0004] In order to ensure correct operation of the pump with a variation in the fluidity characteristics of the product to be pumped and the flexibility characteristics of the tube 6 which must be periodically replaced since it is subject to a considerable amount of mechanical stress and which for this reason has a flexibility which varies over time, the spindles 11, 11' of the operating rollers 10, 10' are mounted with their ends on the walls of the rotor 9, via means 12 for adjusting the radial position of the said rollers 10, 10', namely for varying the distance of these rollers from the inner side surface of the stator 1, for the purpose of modifying the compressive action which the rollers exert on the flexible tube 6.

[0005] In order to be able to operate on these adjustment means 12, the stator 1 usually has, in one or more positions on its end walls, sealed ports 13, 13' which if necessary may be opened to allow an operator to carry out mechanical operations on the said means 12. At present the adjustment means 12 comprise slides 112 which support the ends of the spindles 11, 11' of the said operating rollers, which travel between parallel guides 212 fixed on the end walls of the rotor 9, with a radial arrangement suitably inclined and perpendicular to the axis of rotation 7, and comprise adjusting screws 312 which are screwed onto a reaction cross-piece 412 and connected with their ends to the said slides 112 so that, by adjusting these screws, it is possible to displace irreversibly the said slides and, together with them, the operating rollers 10, 10', so as to vary the depth with which they deform the tube 6 and the synchronism of these rollers. It is evident that the aforementioned adjustment presupposes simultaneous operation on both the adjustment devices provided at the opposite ends of each spindle 11 or 11' of the operating rollers 10, 10', so that, in order to perform this adjustment, it is necessary to provide inspection ports 13, 13' on both end walls of the stator 1, and the simultaneous action of two persons is required.

[0006] In the case of the aforementioned pumps or similar pumps and/or pumps which have the same problems, the invention proposes a new device for adjusting the orbital position of the operating rollers 10, 10' of the rotor, which may be operated by a single operator, acting on only one of the ends of the spindles of these rollers. The device according to the invention is based on the following proposed solution, as characterized in Claim 1 and in the subsequent dependent claims. Crank means are mounted rotatably on the end walls of the rotor, opposite the said operating rollers 10, 10' and parallel to the axis of rotation 7 of the rotor 9, which crank means, by their very nature, may be operated with a rotation applied to only one of their ends which is provided with means for reversible fastening to the adjacent wall of the rotor, so as to be able to stabilise the said crank means in the angular position which is defined in each case.

Means of any suitable type are envisaged for transmitting to the operating rollers of the rotor, suitably arranged, the radial displacement which is obtained with rotation of the said crank means. According to a preferred embodiment of the invention, the operating rollers 10, 10' of the rotor are mounted directly on the middle crank stem of the said crank means.

[0007] Further characteristic features of the invention and the advantages arising therefrom will emerge more clearly from the following description of a preferred embodiment thereof, provided purely by way of a non-limiting example, in the figures of the accompanying sheet of drawings in which, in addition to the already considered Figure 1:

- Fig. 2 shows the device in question associated with one of the rollers of the stator cross-sectioned along a plane which passes through the axis of rotation of this roller and through that of the said stator;
- Fig. 3 is a front view of the adjusting end of the device according to Figure 2, shown in the direction indicated by the arrow K.

[0008] In Figure 2, 109, 109' denote plates fixed removably by means of screws 209 to the ends of the rotor 9, so as to support the spindle of one of the operating rollers 10 or 10' mentioned above with reference to Figure 1. According to the invention, the said plates 109, 109' rotatably support, via bushes 14, 14' made of material with a low friction coefficient, the cylindrical axially aligned end pins 115, 115' of a crank means 15, the middle stem 215 of which, suitably eccentric with respect to the said end pins, rotatably supports via bearings 310, 310' the internal metal cage 110 of the aforementioned operating rollers 10, 10', provided with an outer lining 210 of a material which is non-destructive during co-operation with the tube 6 of the pump, for example an elastomer material.

[0009] The crank means 15 envisage that one of the end pins 115 is for example formed as one piece with the middle stem 215 and that the other end pin 115' is instead mounted and fixed onto the said stem 215, for example by means of a male and female precision joint 116 and using an axial fixing means 16 in the form of a screw. The said end pins 115, 115' of the crank means 15 are formed as one piece with outer flanges 315, 315' which bear directly on the said support plates 109, 109' directly or via washers made of material with a low friction coefficient, not shown, such as to eliminate substantially the axial displacements of the crank 15, but so as to allow, if necessary, easy rotation of the said crank 15 about its end pins 115, 115'.

[0010] The flange 315 is provided perimetally with one or more holes 17 which are equidistant from each other both radially and angularly, for example eight such holes, as can be seen in the detail according to Figure 3, and along the same orbit of these holes, the adjacent plate

109 has one or more threaded holes 18 inside which it is possible to screw screws 19 which pass through corresponding aforementioned holes 17 in the flange 315 of the crank means. The said flange 315 is designed in any case such that it is possible to fit onto it a rotational tool and, for this purpose, may be provided, for example, with blind holes 20 which are equidistant from each other both angularly and radially and which are able to receive, inserted therein, corresponding laterally projecting pins of a spanner for ring nuts, not shown, which can be operated directly or via a dynamometer set which allows rotation at predetermined maximum torque values to be performed.

[0011] From Figures 2 and 3 it can be seen how, by temporarily removing the screws 19 and causing rotation of the crank means 15 via its end flange 315, it is possible to modify the radial and angular position of the crank stem 215 and thus of the operating roller 10, producing the desired modification in the orbital position of the said operating roller and the desired degree of compression by the latter of the flexible tube 6 of the peristaltic pump, and this new condition may then be fixed and maintained by repositioning the screws 19 in the holes 17 of the flange 315 and fixing these screws in the underlying and corresponding threaded holes 18 of the plate 109.

[0012] A reference mark 21 will be provided on the fixed plate 109 and special increasing alphanumeric symbols, as indicated for example by 22, may be provided on the flange 315 opposite the holes 17, in order to indicate to the user the angular position of the stem 215 of the crank 15 and thus the radial and orbital position of the rotating spindle of the operating roller 10 or 10'. The adjustment will therefore be indicated by means of that particular alphanumeric symbol 22 which is aligned with the fixed reference mark 21.

[0013] It is understood that the flange 315 may be provided with one or only two holes 17, while the threaded holes 18 may be about eight in number and that in this case the position of the aforementioned reference marks 21 and 22 may be reversed. It is also understood that the flange 315 may be provided with means different from those described for rotation of the crank means 15, for example with a perimetral form of the hexagonal type, so as to be able to be firmly gripped using a spanner of the conventional type.

[0014] Finally, it is understood that the description relates to a simple and preferred embodiment of the invention to which numerous variations and constructional modifications may be made. According to one of these variations, the crank means 15 may be located outside the operating roller 10 or 10', parallel to the latter, or may be rotatably supported by the parallel walls of the rotor 9 or may be connected with its crank stem, via connecting rods, to a guide and slide set 12 as can be seen from Figure 1, where the said connecting rods replace the adjusting screws 312.

Claims

1. Device for the adjustment of the orbital location of operating rollers (10, 10') of the rotor of a peristaltic pump, in particular for pumps for conveying concrete, cement mixes, plaster, mortar, sludge or the like, **characterized in that** crank means (15) are mounted rotatably on the walls of the rotor, opposite the said rollers (10, 10') and parallel to the axis of rotation (7) of the rotor (9) of the pump, which crank means may be operated with a rotation applied to only one of their ends which is provided with means (17-19) for reversible fastening to the adjacent wall of the rotor, so as to be able to stabilise the crank in the given angular position, the stem of the said crank and the spindle of the said operating rollers being designed and kinematically connected together using any means such that, with rotation of the crank, it is possible to vary the orbital position of the operating rollers (10, 10') on the rotor (9) of the pump. 5
2. Device according to Claim 1, in which the operating rollers (10, 10') of the rotor (9) are mounted rotatably on the middle stem (215) of the crank means (15). 10
3. Device according to one or more of the preceding claims, in which the parallel plates (109, 109') of the rotor (9) rotatably support, via bushes (14, 14') made of material with a low friction coefficient, the axially aligned rotational end pins (115, 115') of the said crank means (15), the middle stem (215) of which rotatably supports via bearings (310, 310') the internal metallic cage (110) of the aforementioned operating rollers (10, 10'), provided with an outer lining (210) of material suitable for co-operating in a non-destructive manner with the flexible tube (6) of the pump. 15
4. Device according to one or more of the preceding claims, in which one of the rotational end pins (115) of the said crank means (15) is formed as one piece with the middle stem (215) of the same crank, while the other end pin (115') of the said crank is mounted and fixed onto the said stem (215), by means of a radial and axial precision joint of the male/female type (116) and using an axial fixing means (16), for example in the form of a screw. 20
5. Device according to Claim 4, in which the said end pins (115, 115') of the crank means (15) are provided integrally with outer flanges (315, 315') which bear against the said support plates (109, 109') of the rotor (9) so as to eliminate substantially the axial displacements of the said crank means (15), but in such a way as to allow, if necessary, easy rotation of the crank about its ends pins (115, 115'), one of the said flanges (315) being provided perimetally with one or more holes (17) which are equidistant from each other both radially and angularly and on the same orbit of these holes, the adjacent support plate (109) having one or more threaded holes (18) inside which it is possible to screw screws (19) which pass through corresponding aforementioned holes (17) in the said flange (315) of the crank means, which flange is provided with any suitable means (20) such that it is possible to fit onto it, if necessary, a rotational tool, which if necessary may also be of the dynamometer type. 25
6. Device according to Claim 5, in which the said outer flanges (315, 315') of the end pins (115, 115') of the crank means (15) co-operate with the adjacent support plates (109, 109') via washers made of material with a low friction coefficient. 30
7. Device according to one or more of the preceding claims, in which the said flange (315) designed for adjustment of the round-angle position of the crank means (15) and the zone of the support plate (109) which surrounds the said flange (315) are provided, in any suitable relative location, with reference marks (21) and alphanumeric symbols (22) with progressive values, for displaying the angular position of the stem (215) of the crank (15) and thus the angular position and the distance of the spindle of the operating roller (10, 10') with respect to the axis (7) of the rotor (9) of the pump. 35
8. Device according to Claim 1, in which the crank means (15) may be located outside the operating roller (10, 10'), parallel thereto, supported rotatably by the parallel walls of the rotor (9) and may be connected with the crank stem, via connecting rods, to a guide and slide set (12) of the known type, where the said connecting rods replace the adjusting screws (312) of this known set (12). 40

