

[54] PERISTALTIC PUMP CONSTRUCTION
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[58] Field of Search..... 417/475, 476, 477, 417/238, 239; 29/156.4 R

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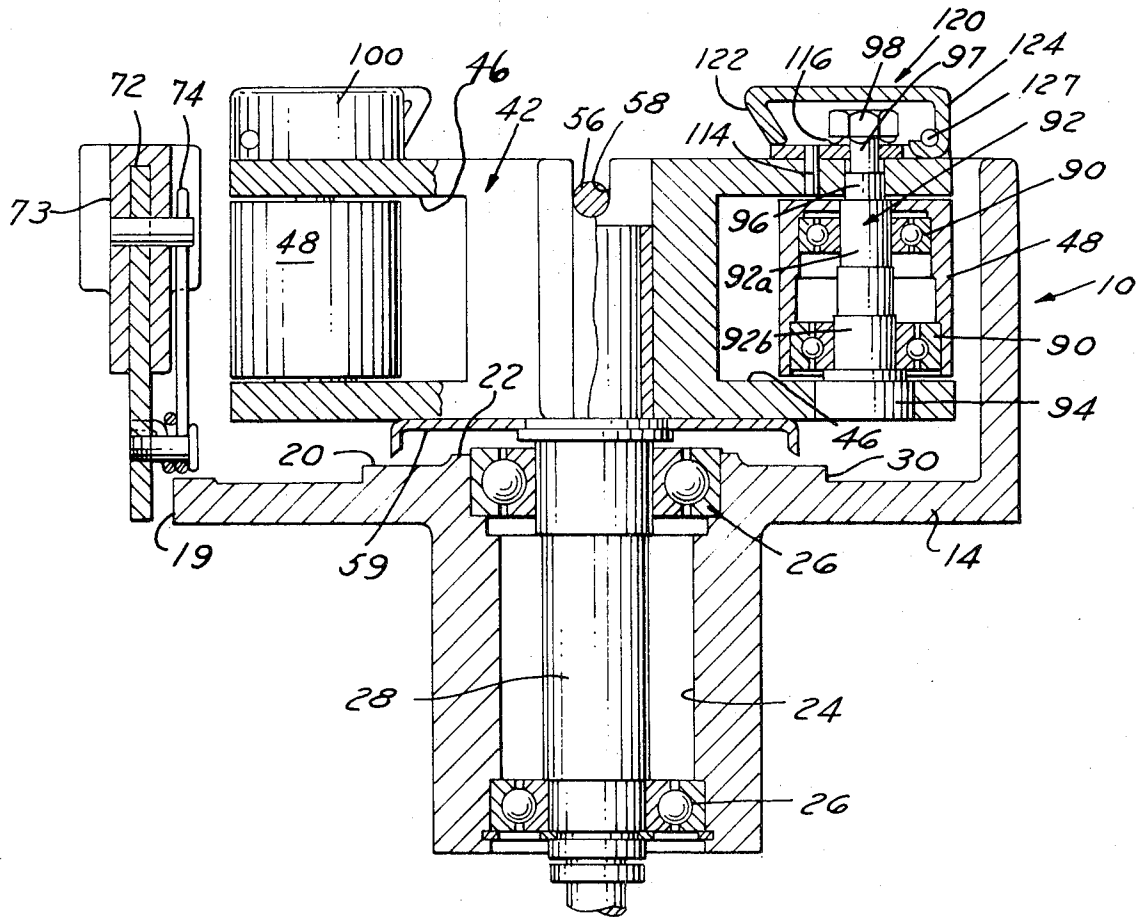
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[57] ABSTRACT

A peristaltic pump assembly utilizing a housing with a circular inner wall and a rotor for progressively squeezing a tube lying against the wall, and the provision of a multiple capacity assembly which permits the use of optional walls selectively usable with corresponding rotors for each wall. A tube guide for clamping the ingress and egress ends of the tube is provided also to adapt to different size tubes which will be used with the optional wall units.

7 Claims, 13 Drawing Figures



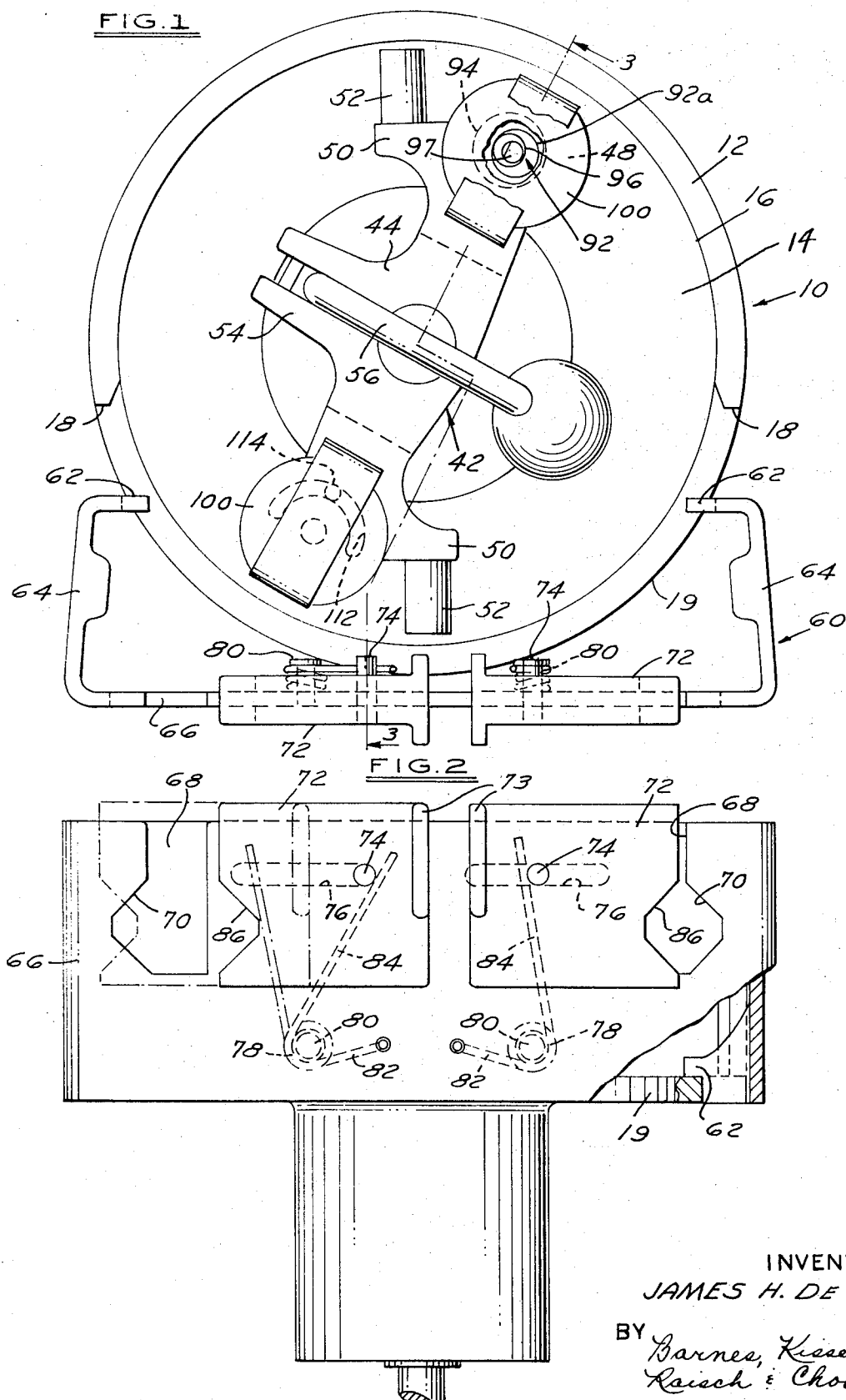


FIG. 3

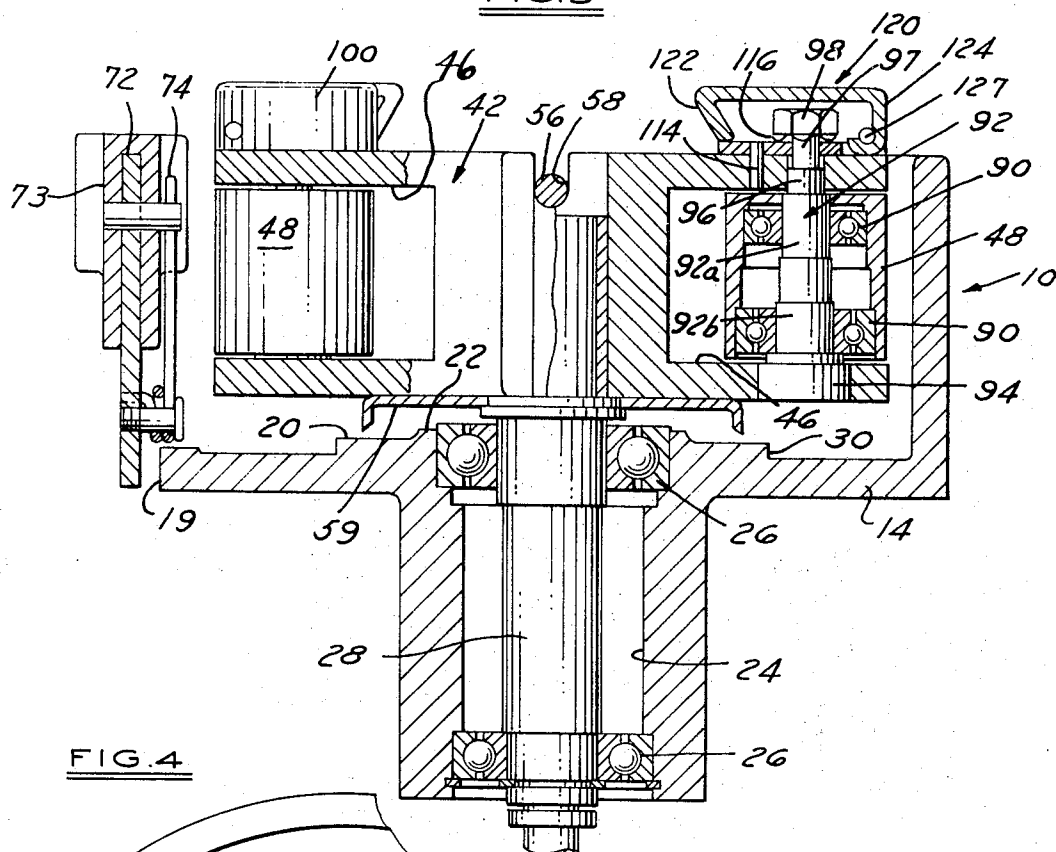
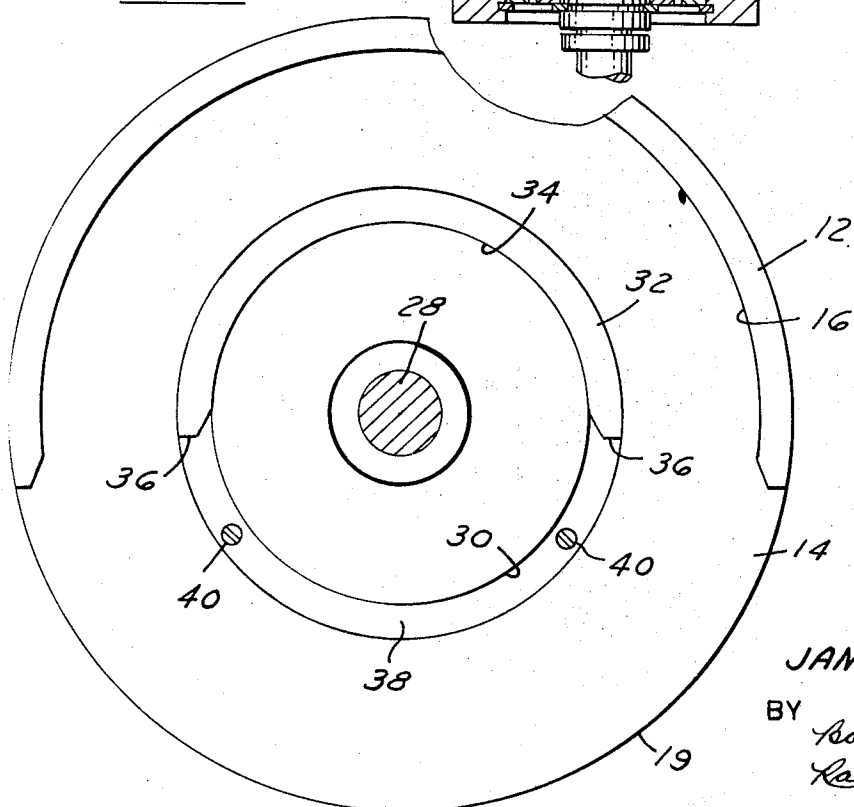
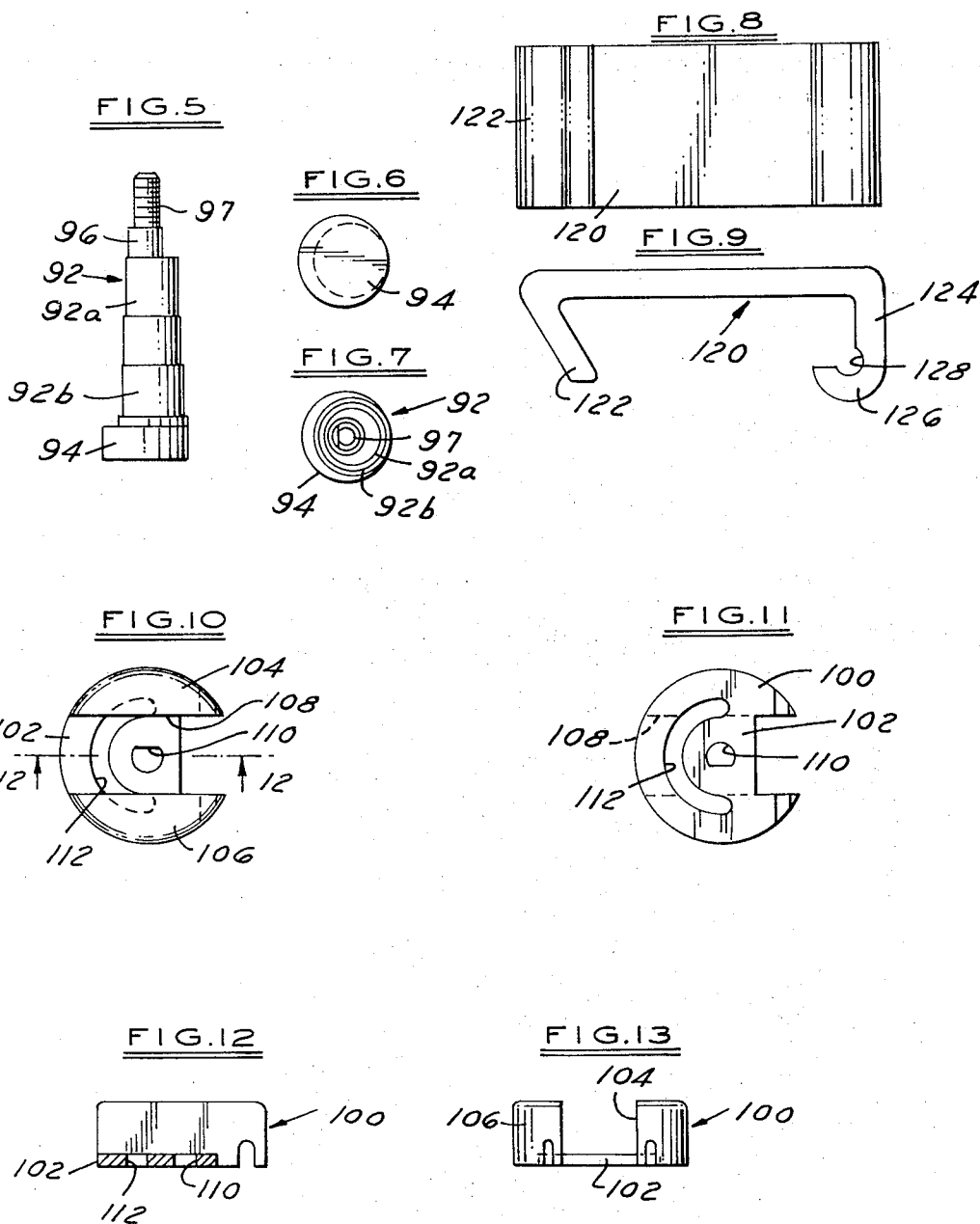


FIG. 4



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PERISTALTIC PUMP CONSTRUCTION

This invention relates to a Peristaltic Pump Construction and more particularly to a pump design which can be utilized selectively for different capacity pumps utilizing different size rotors. An adaptable tube holder is used in connection with the pump housing to accept tubes of different sizes from different diameter pump recesses.

It is an object of the present invention to provide a pump assembly which can be manufactured with less expense and which is adaptable to multiple size pumps and rotors.

It is an object to provide a pump housing which is circular and which has an attachment which can be utilized for controlling the pump tubes in a convenient fashion.

Other objects and features of the invention relating to details of construction and operation are set forth in the following description and claims wherein the principles of operation and use are set forth in connection with the best mode presently contemplated for practicing the invention.

Drawings accompany the disclosure and the various views thereof may be briefly described as:

FIG. 1, a top view of a pump assembly.

FIG. 2, a front view of a pump assembly.

FIG. 3, a sectional view on line 3—3 of FIG. 1 staggered through the rotor to illustrate the parts thereof.

FIG. 4, a top view showing an optional housing assembly.

FIGS. 5, 6, and 7, elevation and end views of a roller mounting pin.

FIGS. 8 and 9, bottom and side views, respectively, of a snap lock for a roller control knob.

FIGS. 10 and 11, top and bottom views, respectively, of a control knob.

FIG. 12, a sectional view on line 12—12 of FIG. 10.

FIG. 13, an end view of the control knob.

REFERRING TO THE DRAWINGS

The main pump housing 10 has a circular wall 12 rising from a circular base plate 14. This wall has a circular inner surface 16 which serves as the back-up or pressure wall for the peristaltic tube which lies around this surface in the operation of the device. The wall 12 terminates at 18 on each side leaving a free circular edge 19 around the remainder of the base plate. The top surface of the base of the housing has a first boss portion 20 and a second boss 22 around a shaft well 24 (FIG. 3) containing bearings 26 which mount a power drive shaft 28. Outside the boss 20 is a circular shoulder 30 which serves to locate a second pump recess ring 32 shown in FIG. 4 having a circular pump pressure wall 34 which terminates at 36 on each side, the ring continuing in a lower wall 38 which is screwed down to the base 14 by screws 40.

On the top of the shaft 28 is a peristaltic pump rotor 42 which revolves about the axis of the shaft, this rotor having two radial arms 44 which are provided with recesses 46 at their distal ends to provide axially spaced plate extensions to receive rollers 48. Wing portions 50 extend circumferentially from the radial arms to provide a mount for guide rollers 52 which extend axially on either side of the rollers 48 to guide the peristaltic tube as the rollers move through their orbit.

Another radial projection in the form of a clevis 54 mounts a crank element 56 in a pivotal way so that the crank may be stored as shown in FIG. 1 or lifted up to serve as a manual lever for rotating the rotor. In the stored position, the crank arm passes through a notch 58 in the top of the shaft 28 and thus provides a mechanical engagement between the power shaft and the rotor.

Subjacent to rotor 42 and also mounted on shaft 28 is a splash guard ring 59 having a downturned flange which extends to a plane close to the top surface of base 14 to protect the bearings 26. This, together with the shoulder 30, keeps unwanted liquids away from the bearings. The splash guard rotates with the power shaft and thus the centrifugal action will keep liquid away from the bearings.

The circular housing 10 which has a free circular edge 19 has a frame 60 attached to the fore part at 62 by welding or suitable screws. This frame has forward extending legs 64 which are connected by a bar 66 extending along the front of the pump. This bar 66 is notched from the top edge to provide an opening 68 which enlarges at 70 to provide an essentially V-shaped recess spaced downwardly from the top edge.

Slidable on this top edge of the bar are U-shaped slides 72 with knob projections 73 and having a pin 74 extending therethrough and out beyond the back of the element 72. This pin slides in a slot 76 in the bar 66 spaced downwardly from the top edge. This slot will limit the sliding movement by contact of the pin 74 with the ends of the slot. The slides 72 are biased respectively by coil springs 78 mounted on pins 80. These coil springs have one end 82 which is anchored in the bar 66 and another end 84 which extends upwardly to contact the pins 74. Thus, the springs will tend to move the slides outwardly from the center of the assembly. The slides have also V-shaped notches 86 in their leading edges positioned to register with the notches 70 in the front cross bar 66.

Reference to FIG. 2 will show that these openings formed by the notches 70—86 can be large as shown at the right or relatively small as shown at the left. In addition, the slides can be shifted to the point that tubes can be introduced through the openings 68 to facilitate the threading of the unit.

It will be appreciated that while FIG. 1 shows the unit in the condition to utilize the inner wall 16 as the pressure wall for the pumping action, the unit shown in FIG. 4 is designed for use of the pressure wall 34 formed by the ring housing 32 which is mounted and located on shoulder 30 on the bottom wall or base plate 14. A rotor exactly similar to that shown in FIG. 1, but in small scale, can be selectively mounted around the shaft 28 and otherwise the function is the same. In each case, the tubes pass through the openings in the cross plates 66 and are held under resilient pressure by the slides 72.

In FIG. 3, the mounting of the rollers 48 is illustrated. These rollers on suitable bearings 90 are mounted on a pin 92 at concentric portions 92a and 92b of the pin and are designed to be adjustable radially. Details of pin 92 are illustrated in FIGS. 5, 6 and 7. This adjustment is accomplished by placing a mounting projection 94 at the bottom of the pin 92 eccentrically of the pin and also disposing a top portion 96 of the pin similarly eccentric to the main body portion 92. This eccentricity is shown in dotted lines in FIG. 1. The top of the pin

has a concentric threaded stem 97 to remove a nut 98.

The rotative position of pin 92, and thus the degree of radial adjustment of the rollers 48, is controlled by a lock cap 100 shown in FIGS. 1 and 3 and detailed in FIGS. 10 to 13. This cap has a central base 102 which connects two arcuate portions 104 and 106 between which is a diametrical slot 108. The base has a central opening 110 with a chordal flat at one side to fit over and engage the threaded stem 97 of the pin 92. The base also has an arcuate slot 112 to cooperate with a pin 114 (FIG. 3) to limit the motion of the pin and the lock cap control.

Thus, the lock cap slips over the stem 97 wherein the respective flats in hole 110 and on stem 97 engage, and is held in place by nut 98 acting on a wave washer 116. A snap lock member 120 is designed to fit in slot 108 between arcuate portions 104, 106. The distal operative end of this member has a turned in flap 122 which serves as a stop and the opposite end has a turn down 124 terminating in a cam heel portion 126 eccentric to a pivot opening 128.

The lock cap is shown in closed position in FIG. 3, the anchor or hinge portions 124 being mounted on a cross-pin 127 having its ends mounted in openings in arcuate side portions 104-106. In this position, the eccentric heel 126 is slightly overcenter but maintaining a pressure on wave washer 116 to hold lock cap 100 in place. When the snap-lock member 120 is pivoted upwardly around pin 127, the pressure on the wave washer is relieved and the lock cap can be readily rotated to adjust the position of eccentric roller mount pin 92 and the roller 48 carried by it. In the unlocked position, the member 120 serves to assist in the movement of the lock cap and as an angle indicator in controlling the position relative to the other lock cap so that each may be positioned similarly or at desired points of rotation relative to the rotor per se.

Thus, a relatively simple control is available for adjusting the position of rollers 48 relative to the pressure wall in an infinite number of control positions.

I claim:

1. A peristaltic pump assembly comprising:

- a. a base plate having an opening for a power drive shaft,
- b. first means forming a circumferential wall on said base plate to serve as a pressure wall for a peristaltic pump rotor,
- c. a locator means on said base plate concentrically

within said wall and outside said opening to serve as locator for a second pressure wall of smaller dimension than said first means, and

- d. a power shaft in said base plate opening shaped to support selectively a plurality of peristaltic pump rotors having respective dimensions to cooperate with said first and second pressure walls, whereby said pump may be operated with varying capacities depending on the installation of said second pressure wall.

2. A peristaltic pump assembly as defined in claim 1 in which said base plate is circular in shape and said first means forming the circumferential wall extends around a portion of the base leaving the remainder of the base as a circular edge.

3. A peristaltic pump assembly as defined in claim 2 in which a tube holding bracket is associated with said base at the circular edge comprising a front plate to lie in a plane substantially parallel to the axis of said base plate having spaced tube openings extending from one edge thereof, slide means on said front plate to cooperate with said openings to contact a tube passing through said openings, and means to exert a resilient bias on said slide means to accommodate the openings to varying size tubes.

4. A peristaltic pump assembly as defined in claim 3 in which legs extend from each end of said front plate to said circular edge to mount said front plate in a position tangential to said circular edge.

5. A peristaltic pump assembly as defined in claim 3 in which said tube openings have a V-shape and said slides are provided with V-openings in a reverse direction to register with said first V-opening in a manner to provide adjustable openings to fit varying tube sizes.

6. A peristaltic pump assembly as defined in claim 1 in which rotary bearing means are provided in said base plate to support said power shaft, and a splash guard for protection of said bearings mounted to rotate with said shaft and positioned to overlie said bearings in a position closely adjacent said base plate.

7. A peristaltic pump assembly as defined in claim 6 in which said locator means on base plate comprises a raised plateau portion centrally thereof below said splash guard surrounding said power shaft opening and terminating in an annular shoulder, said shoulder serving to locate a selected small ring to serve as a pressure wall.

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