

Nov. 23, 1954

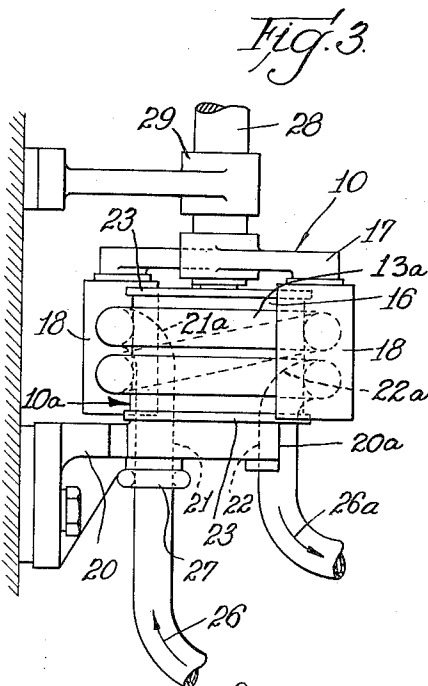
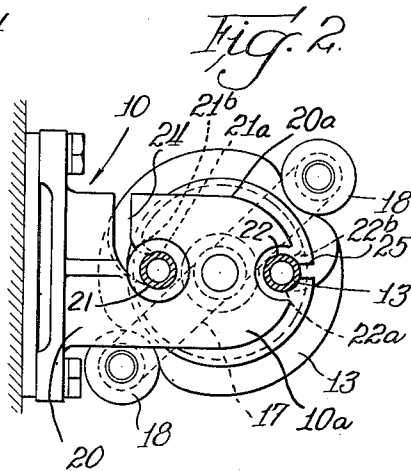
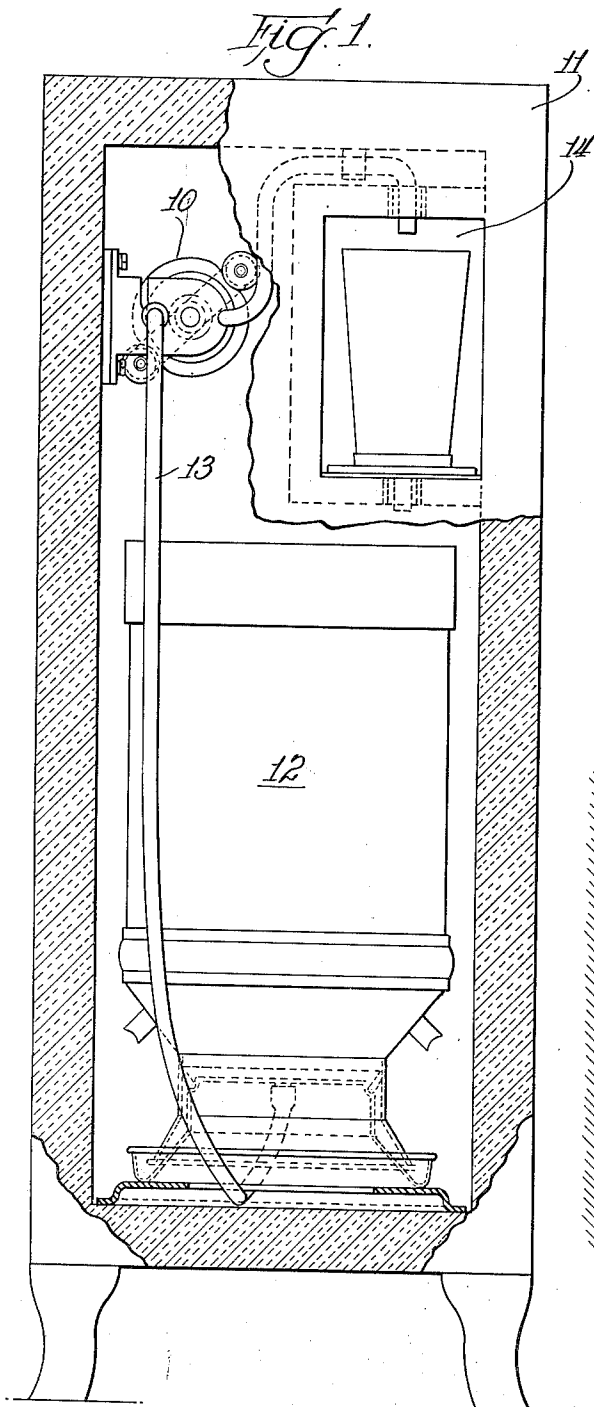
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2,694,984

LIFT

Filed Jan. 24, 1952

3 Sheets-Sheet 1



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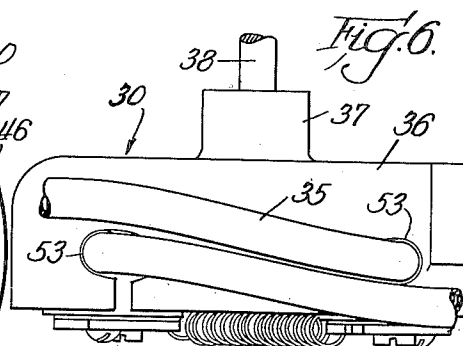
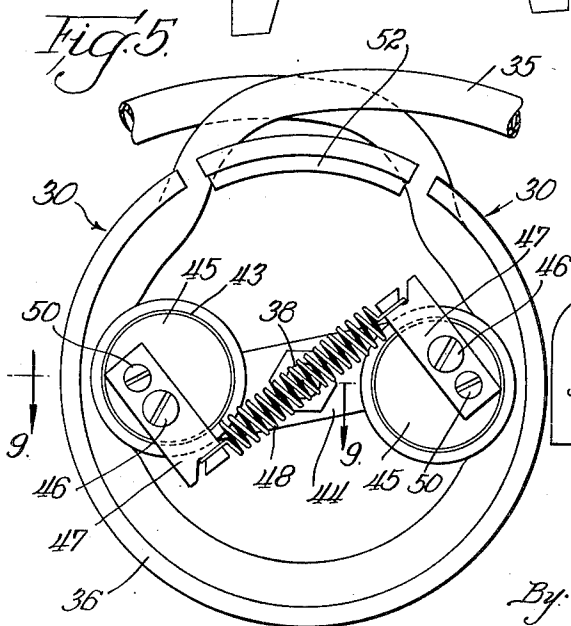
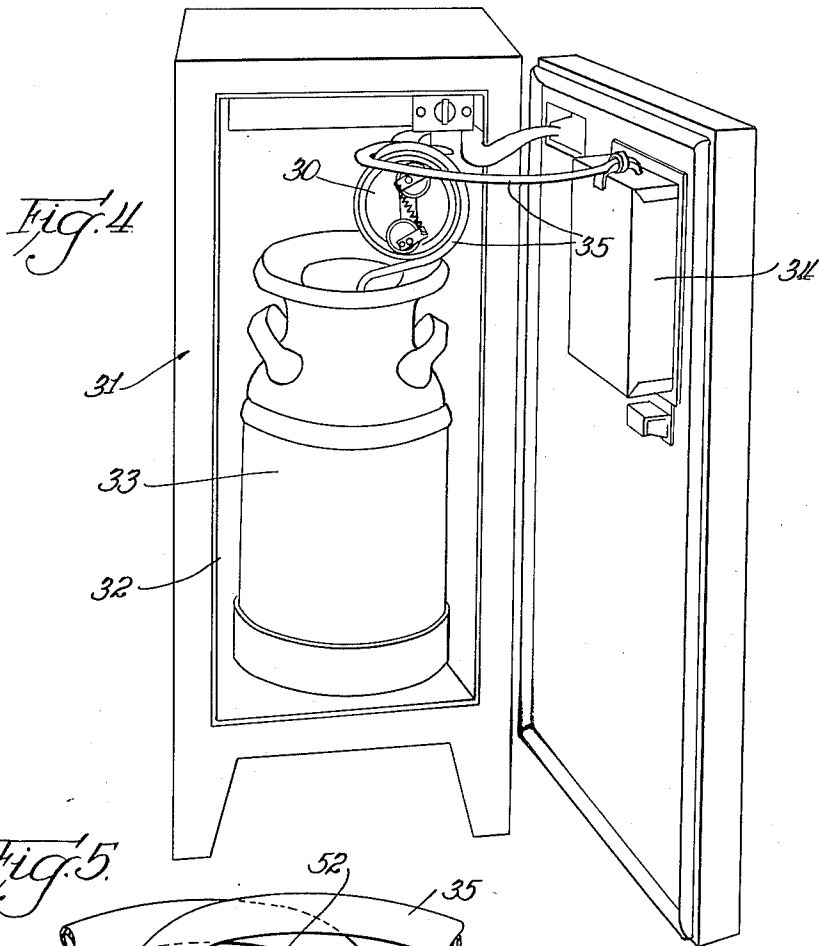
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2,694,984

LIFT

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3 Sheets-Sheet 2



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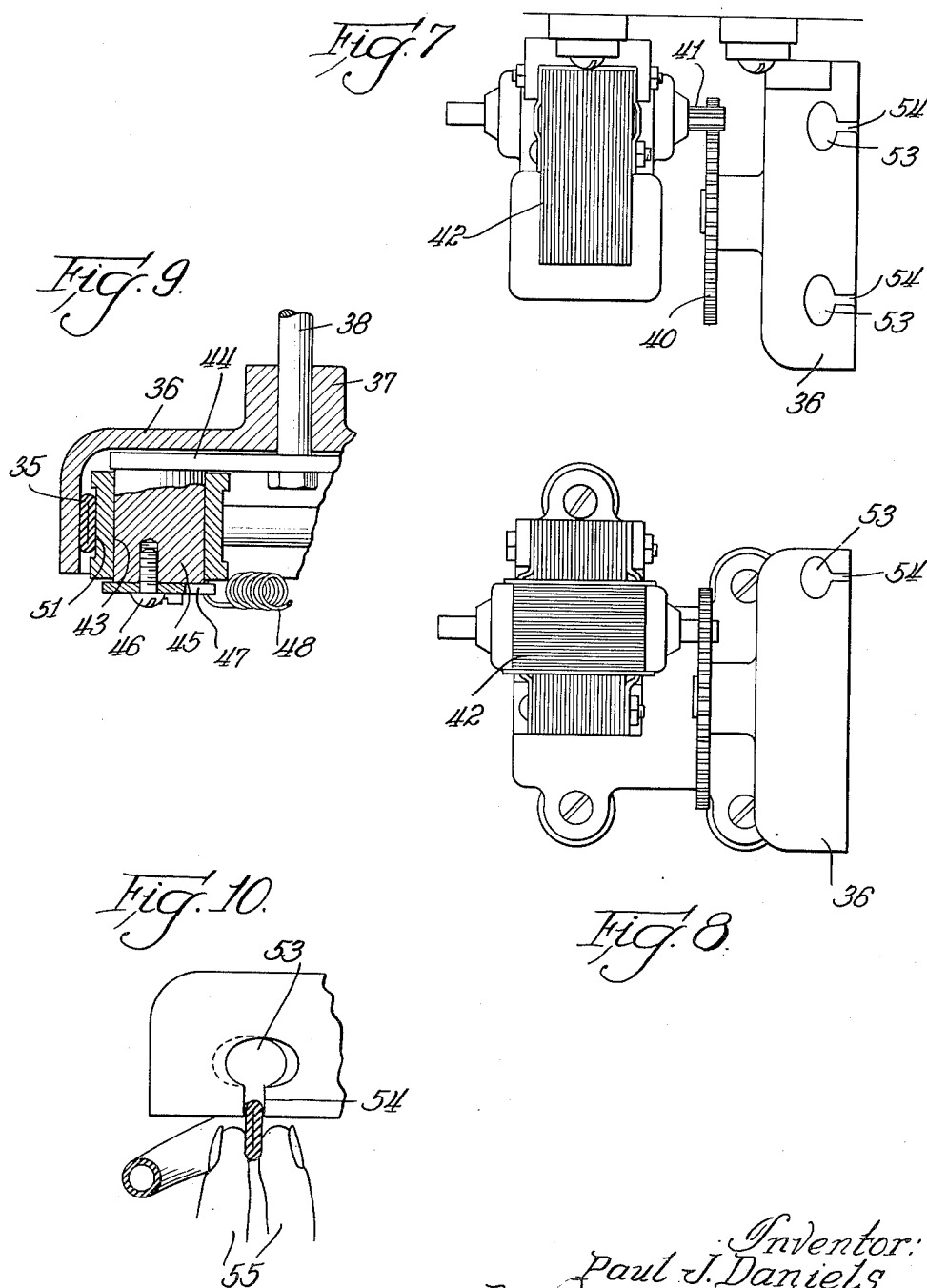
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2,694,984

LIFT

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3 Sheets-Sheet 3



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2,694,984

LIFT

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Application January 24, 1952, Serial No. 268,105

4 Claims. (Cl. 103—149)

This invention relates generally to lifts and more particularly to an improved lift of the type wherein a resilient flexible tube is wrapped about a cylinder and is progressively compressed by rotating rollers to induce a flow of fluid therethrough.

This application is a continuation-in-part of my earlier filed application for Beverage Dispensing Apparatus, Serial No. 182,019. This application is also related to my application for Beverage Dispensing Apparatus, Serial No. 268,104, filed on even date herewith. The disclosures of both of these applications are incorporated herein by this reference.

One object of this invention is to provide a lift which includes a flexible tube wound about a cylinder, which tube is progressively compressed by moving rollers to induce fluid flow, the lift being simply constructed with a minimum of parts, delivering a steady non-pulsating flow, being quiet in operation and having a long service life.

Another object is to provide a lift having an improved arrangement for holding the flexible resilient tube in position on the cylinder which positively holds the tube in position during pumping.

A further object is to provide a lift which is so constructed that the flexible tube element may be quickly and easily removed from the lift and replaced so that the lift is suitable for use in beverage dispensers such as those described in my above referred to applications.

A further object is to provide a lift which requires a minimum of servicing and which is so simply constructed that inexperienced personnel such as soda fountain attendants may readily install or remove the tubing from the lift.

Other objects and advantages of the lift of this invention will present themselves to those familiar with the art upon reading the following specification in conjunction with the drawings and the appended claims.

In the drawings:

Fig. 1 is an elevation, partly in section, showing one embodiment of the lift of this invention installed in a beverage dispenser;

Fig. 2 is an enlarged elevation of the lift;

Fig. 3 is an enlarged top plan view of the lift;

Fig. 4 is a perspective view showing a preferred embodiment of the lift of this invention installed in a beverage dispenser;

Fig. 5 is an enlarged elevation showing the front of the preferred embodiment of the lift;

Fig. 6 is an enlarged top plan view of this embodiment of the lift;

Fig. 7 is a top plan view of the preferred form of lift and motor assembly shown with the tube removed;

Fig. 8 is a side view of the assembly with the tube removed;

Fig. 9 is a section taken on line 9—9 of Fig. 5; and

Fig. 10 is a view showing one of the ways in which the tube is slipped into a slot to install it in the preferred form of lift.

A fundamental concept of this invention is to provide a lift in the form of a cylinder about which a flexible tube may be wrapped and a pair of rollers which progressively compress the tube as they rotate about the cylinder, an improved arrangement being provided for supporting the tube on the cylinder which facilitates easy installation and removal thereof. The ready installation and removal of the tube is effected by providing a pair of round openings through which the tube is led into the cylinder and each opening is provided with a keyhole-like slot extend-

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ing to the edge of the cylinder so that the tube may be squeezed together or stretched and inserted through the slots instead of being threaded through the openings by passing an end of the tube through one opening, winding the tube about the cylinder and passing the end through the other opening. Thus tubes, which by necessity have both ends continuously connected, may be threaded or unthreaded at will without disconnection. This factor is important when the lifts of this invention are used as surgical lifts.

The lift of this invention, however, has been designed to be especially suited for use in a beverage dispensing apparatus such as those described in the two copending applications set forth above and, accordingly, the lifts have been illustrated herein as installed in such dispensing apparatus.

In Fig. 1 a pump or lift 10 is shown installed in dispenser 11 which comprises a beverage container 12, a withdrawal tube 13, and a dispensing station 14 in addition to the lift 10. The dispensing tube 13 extends from the top of the inverted container 12 upwardly to the lift 10, and thence to the dispensing station 14. As stated in my earlier application, Serial No. 182,019, each time a container 12 is emptied a new container and a new dispensing tube 13 are installed. This necessitates removal of the tube from the lift 10 and reinstallation of a similar tube. Inasmuch as the dispensers are operated by soda fountain or restaurant personnel, it is highly desirable that the installation procedure be as simple as possible.

The details of lift 10 are illustrated in Figs. 2 and 3 of the drawings. The lift 10 comprises a stationary body 10a having a cylindrical wall 16 about which the tube 13 is wrapped, and a rotatable member 17 which carries two rollers 18 for progressively compressing the tube 13 to cause fluid to be forced therethrough as the member 17 is rotated. The wall or cylinder 16 has an integrally formed bracket 20 which supports it on the wall of the dispenser cabinet 11 and defines an edge 20a bordering the cylinder. Two openings 21 and 22 are provided in the bracket 20 for leading the tube 13 in an axial direction onto the cylinder 16. The opening 21 which is nearer to the base of the bracket 20 is located at a greater depth in the bracket than the opening 22 so that the tube 13 may be wrapped at least a turn and one-half around the cylinder 16 as shown in the drawings. A flange 23 is provided at each end of the cylinder 16 to prevent the tube from moving off of the cylinder 16.

The openings 21 and 22 in the bracket portion 20 of the cylinder are provided with slots 24 and 25 which extend to the edge 20a of the bracket. These openings and slots extend in an axial direction into the cylinder 16 so that the portions of the openings 21 and 22 which are present in the cylinder are axial grooves 21a and 22a on the surface of the cylinder. The groove 21a is the longer of the two as shown in Fig. 3 to enable the first turn 13a of the tube 13 to be located proximate to that one of the flanges 23 which is remote from the slot 24. Thus the tube 13 may be readily installed in the openings as shown in Figs. 2 and 3 by simply pressing the walls thereof together and guiding it through the slots 24 and 25 to the openings 21 and 22.

The preferred method of installing the tube 13 on the cylinder 16 is to first compress a portion of the tube between the fingers and guide it into the slot 24 until it is received in the opening 21 and the associated groove 21a in the cylinder. The tube 13 is then pulled in the direction indicated by the arrow 26 until the annular collar 27 attached to the tube engages the edge of the opening 21. In the dispenser illustrated, the location of this collar is such that it permits just the proper length of tubing to be located beyond the opening 21. The member 17 is then rotated in a clockwise direction as viewed in Fig. 2, the action of the rollers 18 wrapping the tube around the cylinder. When a turn and one-half have been made, the portion of the tube 13 adjacent to the slot 25 is compressed, and the tube is inserted through this slot into the opening 22. The end of the tube which extends beyond the opening is then led to the dispensing station 14 as shown in Fig. 1. The edges of the grooves 21a and 22a are rounded or beveled as at 21b

and 22b to accommodate the bend of the tube where it passes over the edges to follow the contour of the cylindrical surface.

The collar 27 serves an additional function when the lift is operating, in that it prevents the tube from creeping around the cylinder 16 as the rollers 18 roll about the wound tube, progressively compressing portions thereof to cause fluid flow in the direction indicated by the arrows 26 and 26a. If desired, of course, any conventional clamp arrangement may be used to hold the tube from creeping, but the fixed collar 27 is preferred for use in dispensers because it also serves to properly locate the tube during installation on the cylinder 16.

To operate the lift a conventional motor 42 is coupled to the drive shaft 28 which is journaled in a bearing element 29 supported on the dispenser wall 11. Once the tubing has been installed, the operation of the lift is substantially conventional to induce fluid flow whenever the shaft 28 is rotated to move the rollers 18 about the cylinder 16.

The removal of the tube from the lift is just as simple as the installation, for it is accomplished by simply compressing the tube so that it may be withdrawn through the slots 24 and 25 and unwrapping it from the cylinder. It is preferred first to compress the tube at the opening 22 freeing the discharge end. Next the cross-arm 17 is rotated manually to release the tubing turns on the cylinder, and then the portion of the tube adjacent to the opening 21 is compressed and removed through the slot 24.

A preferred embodiment 30 of the lift of this invention is illustrated in Figs. 4-10 of the drawings. In Fig. 4 this lift is illustrated installed in a beverage dispenser 31 which is similar to that disclosed in my copending application filed on even date herewith for Beverage Dispensing Apparatus, Serial No. 268,104. This apparatus comprises a refrigerated insulated cabinet 42 housing a beverage container 33, a lift 30, and a dispensing station indicated at 34. The withdrawal tube 35 is connected to dip conduit (not shown) extending to the bottom of the container and passes through the lift 30 to the dispensing station 34. The operation of this dispenser 31 is substantially the same as that shown in Fig. 1.

The preferred embodiment of the lift 30 comprises a hollow element 36 which is essentially cup-shaped having an internal cylindrical wall 36 and an external projecting boss 37 on its rear face which serves as a journal bearing for the drive shaft 38. This shaft is keyed to a large gear 40 which is driven by a small gear 41 on the armature of the drive motor 42 as shown in Figs. 7 and 8.

The withdrawal tube 35 is wound around the inside of the wall or cylinder 36, the wound portion being engaged by a pair of rollers 43 which are journaled on the ends on a cross-arm 44 attached to the inner end of the shaft 38. As shown in Fig. 9 the rollers 43 are journaled upon eccentrically mounted hubs 45 which are rotatably secured to the cross-arm by screws or studs 46 which also serve to support projecting arms 47 whose outer ends are slotted for attachment of a spring 48 which acts through the arms to urge each hub to rotate in a direction to move the rollers 43 outwardly. Additional screws 50 extend through the projecting arms 47 to secure them to the hubs 45.

In order to simplify the drawing, the rollers 43 have been illustrated as journaled directly upon the hubs 45. Actually it is preferred to employ a suitable sleeve or needle bearing between each roller and hub to reduce friction at this point. The outer surface of the rollers 43 is preferably provided with a wide groove 51 (Fig. 9), which arrangement helps to maintain the withdrawal tube 35 in proper position.

An important feature of the lift 30 is the fact that the tube 35 makes less than a full revolution within the cylinder 36. This makes the operation of installing the tube in the lift much easier than in conventional lifts or where more than one turn is used. To prevent pulsating flow as the rollers pass over the points at which the tube enters and leaves the cylinder, a novel arrangement is employed in that a strip of rubber 52 (Fig. 5) having substantially the same durometer of resilience as the tube is secured to the cylinder intermediate the two openings 53 through which the tube enters and leaves the cylinder. This arrangement has been found not only to greatly reduce pulsating flow but also to increase the life of the lift substantially by eliminating oscillations of the rollers

on their pivoted eccentric hubs as the cross-arm rotates. The elimination of these oscillations, of course, results in vibration free, quiet operation.

To facilitate installation and removal of the tube each of the openings 53 which is beveled to avoid cutting and bending of the tube is connected to the edge of the cylinder element 36 by a slot 54 as in the first described embodiment. This eliminates the need for threading the tube by inserting an end through each of the openings 53. The method of installing the tubing is best illustrated in Fig. 10 and is substantially the same as in the first described embodiment. The operator simply pinches the portion of the tube 35 between his fingers 55 or stretches by pulling a section of the tube to flatten it and slips it through the slot 54. As soon as the pressure of the side walls of the tube is released, it springs outwardly and is securely locked in the opening 53. Incidentally, both of the openings 53 are essentially circular in section. They appear elliptical in the drawings because of the particular angle at which they are viewed.

To install the tubing of the lift the tube is initially slipped into one of the openings 53 as described. The next step is to rotate the cross-arm 44 so that the roller 43 moves downwardly past the opening 53 in the direction the tube is to be wound. When a complete revolution in this direction has been completed, the tubing is inserted in the other opening 53 through the slot 54, and the installation is complete, the various parts appearing as shown in Figs. 5 and 6.

The lift is now ready to operate upon rotation of the motor 42. As shown in Fig. 9 the tubing 35 is squeezed flat at each of the rollers 43, and revolution of the lift shaft 38 in either direction will produce flow in the corresponding direction. An unexpected feature of the tubing lead-in arrangement is that once the lift is pumping the pressure of the fluid being pumped prevents the tubing from being flattened for withdrawal through the slot 54. Thus positive locking occurs at the lead-out opening.

To remove the tube 35 from the moving parts of the lift the reverse of the installation procedure is followed; namely, squeezing or stretching the tube to remove it from one of the openings 53, rotating the cross-arm 44 to free the tubing from the rollers 43, and removal from the other opening 53 through the slot 54.

The unique tensioning arrangement wherein the tube rollers are urged outwardly by a single spring has been found to be especially advantageous since it results in uniform compression by each roller regardless of irregularities of tubing thickness and the matching of the tubing thickness to resilient pad 52. This has been found to prolong the life of the moving parts as well as operativeness of the tubing 35.

From the foregoing it will be apparent that a superior pump has been provided which is extremely simple to operate, operates with little noise, and otherwise fulfills the objects set forth herein.

Various changes or modifications such as will present themselves to those familiar with the art may be made without departing from the spirit of this invention.

What is claimed is:

1. A lift comprising a body having a cylindrical wall defining a bordering edge at one end, a flexible resilient tubing, a pair of rollers mounted for bodily rotation in a path concentrically with said wall, and means for maintaining said rollers in close proximity to said cylindrical wall, said body having a pair of spaced elliptical openings through its wall adjacent the bordering edge thereof for holding a length of the flexible resilient tubing in place on the surface of the wall in the path of rotation of said rollers, said openings being beveled on their edges over which the tube passes, said body also containing slots connecting said elliptical openings with said bordering edge, said slots having a width greater than twice the wall thickness of the tubing so that when the sides of the tubing are pressed inwardly to flatten same said tubing may be introduced laterally into said openings but said slots being of less width than the tubing in its normal shape to hold said tubing in its said place on said cylindrical wall during operation of said rollers.

2. The lift called for in claim 1 in which the walls of said slots are disposed radially with respect to said cylindrical wall.

3. The combination called for in claim 1 including a shaft journaled at the axis of said cylindrical wall, a

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cross arm mounted on said shaft for rotation on the axis of said cylindrical wall, a pair of rotatable hubs eccentrically pivoted upon said cross arm at opposite ends thereof, said pair of rollers being mounted for rotation on said hubs, and said means for maintaining said rollers in close proximity to said cylindrical wall including a resilient member interconnecting said hubs eccentrically thereof for urging said rollers towards said cylindrical wall.

4. The combination called for in claim 1 in which said body comprises an open-ended cup-shaped stationary member having an inwardly facing cylindrical wall terminating in said edge bordering the wall.

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