Jan. 14, 1947. B. BOGOSLOWSKY 2,414,355

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Fig. 1.

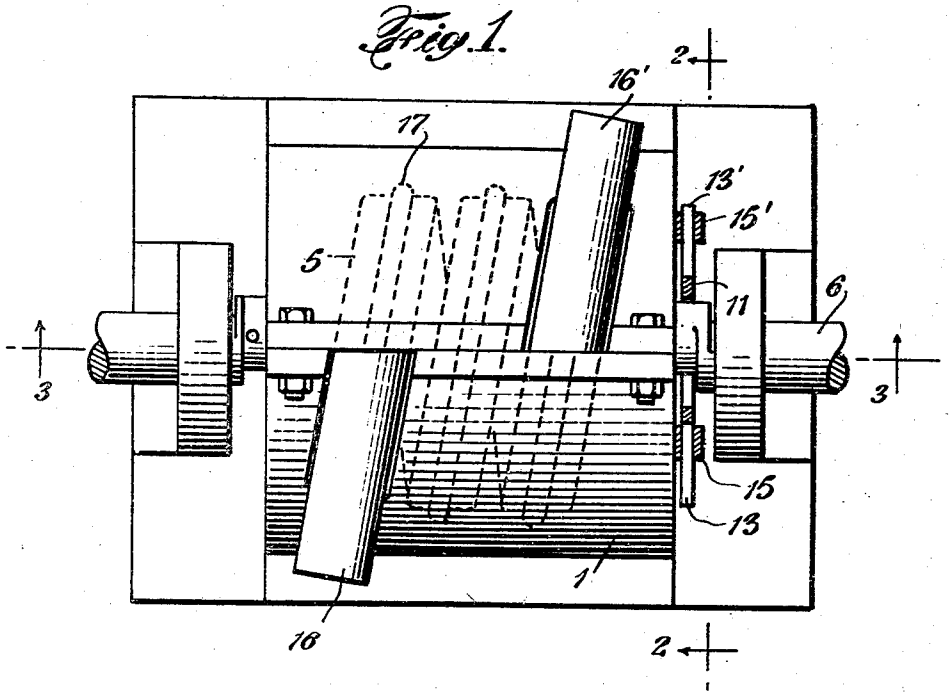

Fig. 2.

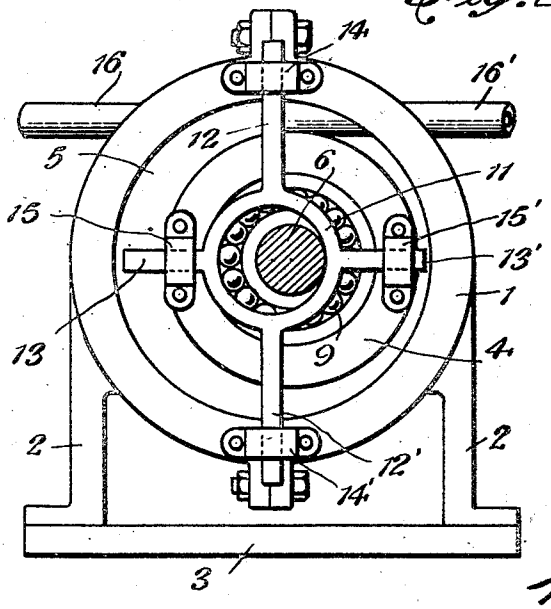

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Fig. 3

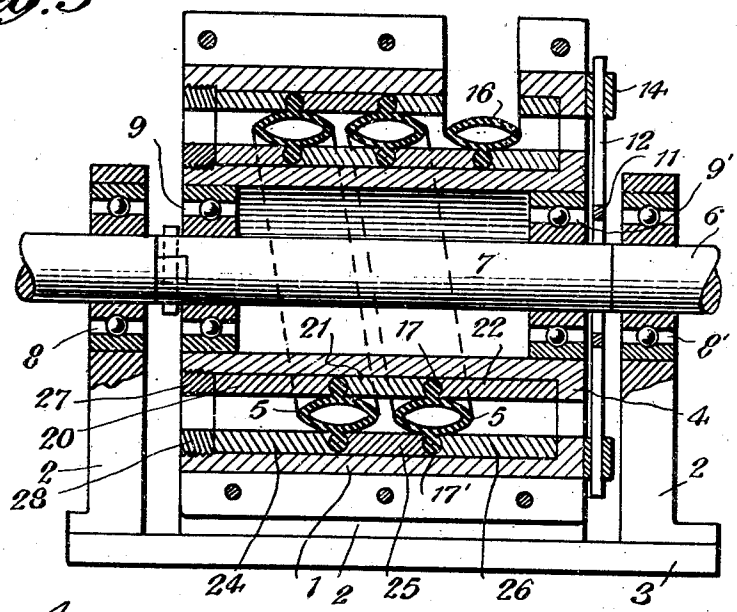

Fig. 4.

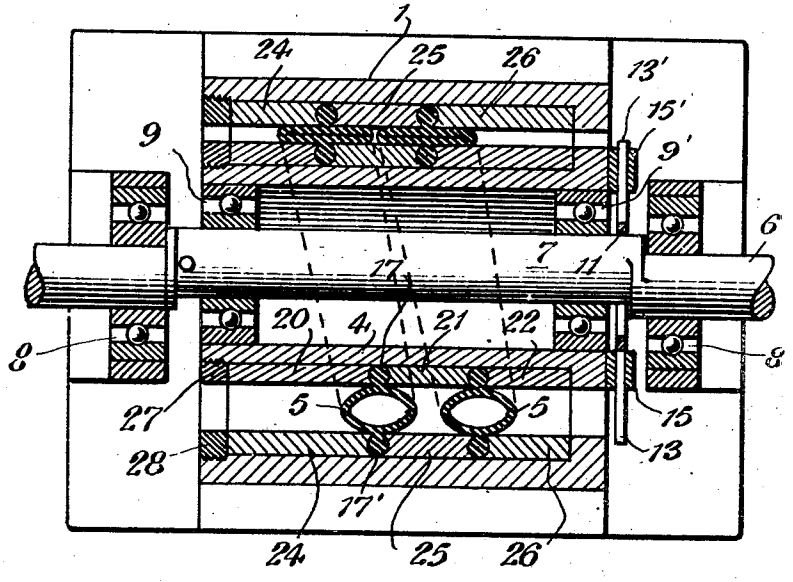

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Fig. 5.

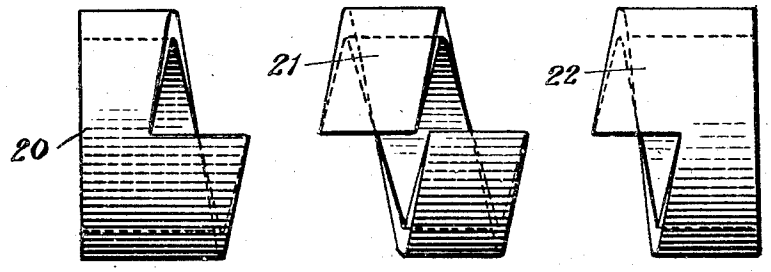


Fig. 6.

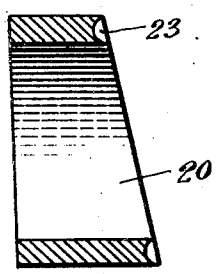


Fig. 7.

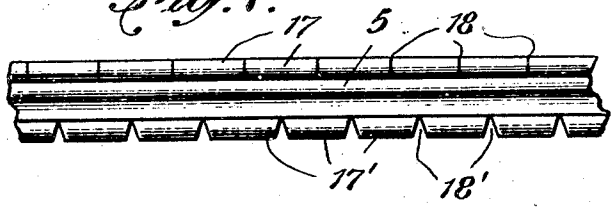
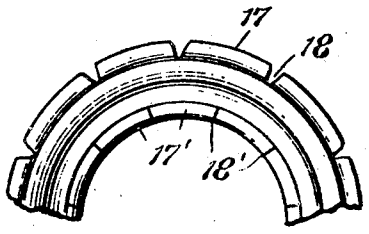


Fig. 8.



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Patented Jan. 14, 1947

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UNITED STATES PATENT OFFICE

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PUMP

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Application August 8, 1945, Serial No. 609,558

5 Claims. (Cl. 103—149)

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This invention relates to pumps and pertains more particularly to pumps of the type disclosed in my prior Patent No. 2,249,806, dated July 22, 1941, in which a flexible tube is used to carry the fluid being transferred.

It is an object of the invention to provide further improvements in pumps of this type.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawings in which

Fig. 1 is a top plan view.

Fig. 2 is a section on the line 2—2 of Figure 1.

Fig. 3 is a section on the line 3—3 of Figure 1.

Fig. 4 is a section on the line 4—4 of Figure 2.

Fig. 5 is an exploded side elevation of a set of tube locking members.

Fig. 6 is a section through one of said locking members.

Fig. 7 is a side elevation of a length of tubing.

Fig. 8 is a similar view showing the tubing viewed as when wrapped around a supporting member.

Referring to the drawings the pump comprises an outer stationary supporting member 1, preferably cylindrical and having legs 2 secured to any suitable base 3. Mounted within the member 1 is an inner movable supporting member 4, also preferably cylindrical, the member 4 being so mounted that its longitudinal axis extends in a direction parallel to the longitudinal axis of the member 1.

The inner, movable supporting member 4 is of a smaller outside diameter than the inside diameter of the stationary supporting member, thereby providing a space therebetween for the reception of a length of tubing 5 which is wrapped around the supporting member 4 in the manner hereinafter described.

The movable supporting member 4 is mounted for eccentric motion with respect to the stationary supporting member 1, being carried on the shaft 6 having the eccentric portion 7 extending through the member 4. The shaft is carried in bearings 8, 8' and the eccentric portion 7 is connected to the member 4 through bearings 9, 9'.

In the operation of the pump, it is important to prevent rotation of the movable supporting member with respect to the stationary supporting member, and it is important that the means used for preventing such rotation be independent of the tubing, in order that the tubing may be relieved of stresses to which it would otherwise be subjected. In the preferred embodiment illustrated, such means comprise a floating member 11, having a central aperture through which the

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shaft may pass, and having oppositely disposed pairs of arms 12, 12' and 13, 13' in sliding engagement with guide brackets 14, 14' and 15, 15' mounted on the stationary supporting member and on the movable supporting member, respectively. The guide brackets 15, 15' permit relative sliding motion between the floating member and the movable member 4 in one direction only, i. e., horizontal motion, while the guide brackets 14, 14' permit relative sliding motion between the floating member and the stationary supporting member in another direction only, i. e., vertical motion. Thus, the movable member 4 is positively restrained from rotation with respect to the stationary member.

The tubing 5 is wrapped around the movable supporting member 4, preferably in a series of spaced spiral convolutions as shown in Figures 1, 3 and 4, said tubing having inlet and outlet portions 16, 16' projecting through the stationary supporting member as shown in Figure 1. The tubing is made of any suitable flexible material, as for example rubber or polyvinyl alcohol, preferably molded to elliptical cross section as shown in Figures 3 and 4, and having integral ribs 17, 17' extending lengthwise of the tubing and projecting in opposite directions from opposite sides thereof. Preferably said ribs are bulbous to facilitate anchoring the wrapped portion of the tubing to the movable and stationary supporting members as hereinafter described. A length of such tubing is shown in Figure 7, and in order to permit wrapping of the tubing around the movable supporting member the ribs 17, 17' are notched at intervals as shown at 18, 18' so that the tubing may be wrapped without undue distortion.

The opposite sides of the wrapped portion of the tubing are anchored to the movable and stationary members, respectively, in order that the tubing may be positively expanded when opposed portions of the working surfaces of the supporting members move apart as the eccentric motion takes place. In the embodiment illustrated this anchoring is accomplished by the provision of two sets of locking members, one set being mounted on and forming part of the movable supporting member, and the other set being mounted on and forming part of the stationary supporting member. One such set of locking members, adapted to be mounted on the movable supporting member, is shown in Figure 5, and comprises three tubular sections 20, 21 and 22 each having spiral end surfaces adapted to cooperate with a similar opposed spiral end surface of the next

adjacent section. Each of said spiral end surfaces is preferably grooved as shown at 23 of Figure 6 to engage the bulbous rib of the tubing. A similar set of locking members 24, 25 and 26 of larger diameter are provided for the stationary supporting member. Thus, when the locking members are assembled on the supporting members with their spiral end surfaces engaging the bulbous ribs of the tubing, they provide continuous grooves which anchor the opposite sides of the tubing along the entire length of the wrapped portion thereof. The locking members may be held in position by threaded rings 27, 28.

In operation, rotation of the shaft 6 produces eccentric motion of the movable member with respect to the stationary member so that the point of closest approach between the working surfaces moves progressively along the tubing thus forcing the fluid along the tubing. At the same time the tubing is positively expanded at the opposite side of the moving member thus drawing fluid into the intake end of the tubing.

As is the case with the pump described in my prior Patent No. 2,249,806, this pump is also simple and requires no valves, no packing, no internal lubrication, and may be easily disassembled for inspection and repair. The pump may also be used for both compression and for suction. Extremely high vacuums may be produced, if desired. The pump may also be used as a motor or as a meter if desired.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. A pump comprising two supporting members, one of said supporting members being located within the other, and having opposed spaced, parallel working surfaces, one of said supporting members being movable with respect to the other, a length of compressible tubing having a fluid inlet at one end and a fluid outlet at the other end, a portion of said tubing between said inlet and outlet being wrapped around the inner of said supporting members within the space between said working surfaces, means for anchoring one side of the wrapped portion of said tubing to the inner of said supporting members, means for anchoring the opposite side of the wrapped portion of said tubing to the outer of said supporting members, and means for moving one of said supporting members eccentrically with respect to the other, and means independent of said tubing for positively preventing relative rotation between said supporting members.

2. A pump comprising two supporting members, one of said supporting members being located within the other, and having opposed spaced, parallel working surfaces, one of said supporting members being movable with respect to the other, a length of compressible tubing having a fluid inlet at one end and a fluid outlet at the other end, a portion of said tubing between said inlet and outlet being wrapped around the inner of said supporting members within the space between said working surfaces, the wrapped portion of said tubing having integral ribs extending lengthwise of said tubing and projecting outwardly from opposite sides thereof, means providing spiral grooves in the inner of said supporting members for receiving and anchoring one of said ribs, means providing spiral grooves in the outer of said supporting members for receiving and anchoring the other of said ribs, and means for moving one of said supporting members eccentrically with respect to the other.

3. A pump comprising two supporting members, one of said supporting members being located within the other, and having opposed spaced, parallel working surfaces, one of said supporting members being movable with respect to the other, a length of compressible tubing having a fluid inlet at one end and a fluid outlet at the other end, a portion of said tubing between said inlet and outlet being wrapped around the inner of said supporting members within the space between said working surfaces, the wrapped portion of said tubing having integral ribs extending lengthwise of said tubing and projecting outwardly from opposite sides thereof, a series of spaced locking members on the inner of said supporting members, each of said locking members having spiral end surfaces engaging and anchoring one of said ribs, a series of spaced locking members on the outer of said supporting members, each of said locking members having spiral end surfaces engaging and anchoring the other of said ribs, and means for moving one of said supporting members eccentrically with respect to the other.

4. A pump comprising two supporting members, one of said supporting members being located within the other, and having opposed spaced, parallel working surfaces, one of said supporting members being movable with respect to the other, a length of compressible tubing having a fluid inlet at one end and a fluid outlet at the other end, a portion of said tubing between said inlet and outlet being wrapped around the inner of said supporting members within the space between said working surfaces, means for moving one of said members eccentrically with respect to the other, and means for preventing relative rotation between said supporting members, said means comprising a floating member, guides on the inner of said supporting members engaging said floating member and permitting reciprocating sliding motion therebetween in one direction, and guides on the outer of said supporting members engaging said floating member and permitting reciprocating sliding motion therebetween in another direction at right angles thereto.

5. In a pump, a compressible tubing comprising a length of flexible tubular material having a substantially elliptical cross section, a portion of said tubing being formed in a series of spiral convolutions, said tubing having integral ribs extending lengthwise thereof, said ribs projecting in opposite directions from opposite sides thereof.

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