

Feb. 16, 1960

A. MASCARO

2,925,045

PUMP

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FIG. 1.

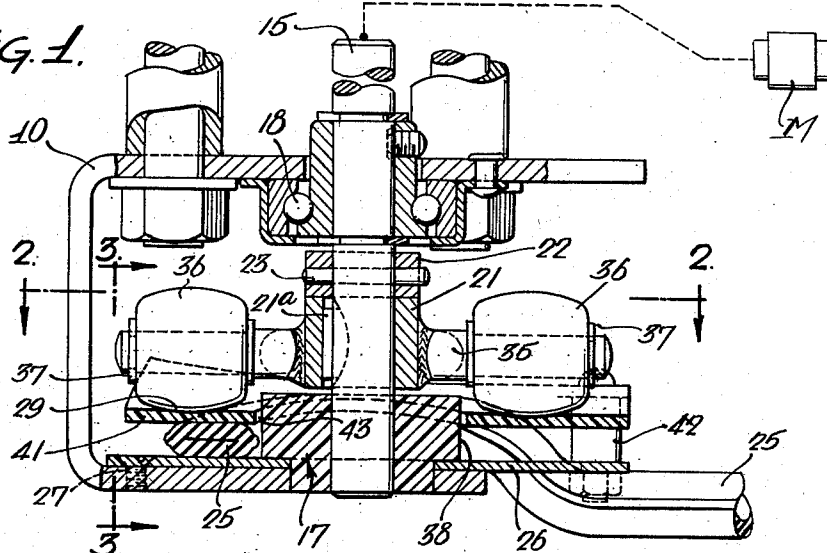


FIG. 2.

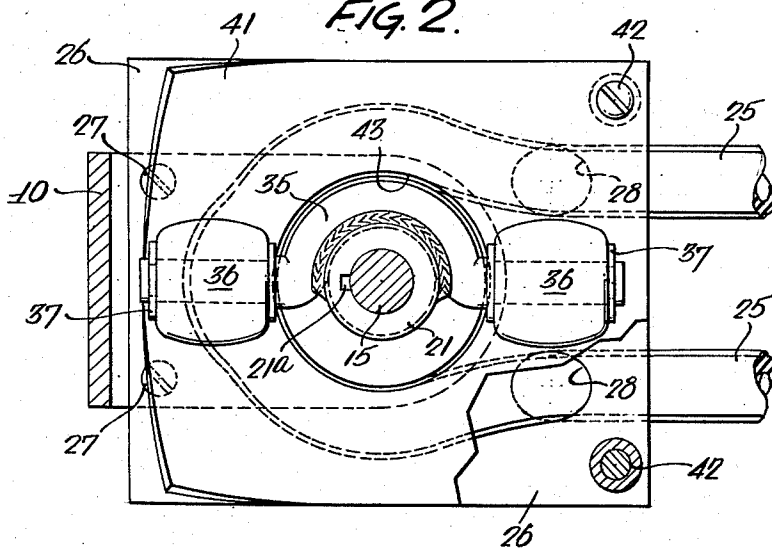


FIG. 3.

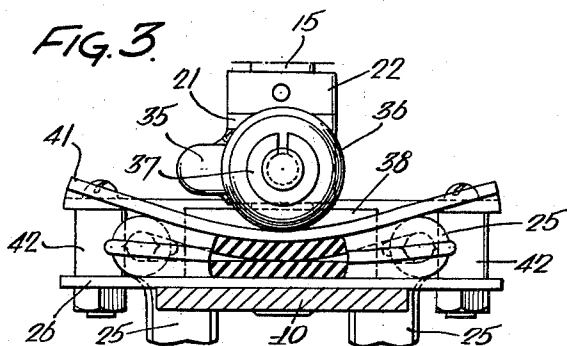
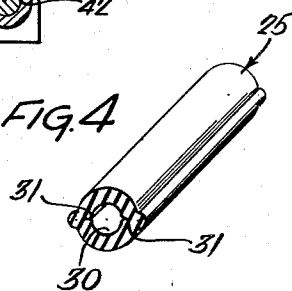


FIG. 4.



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1

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5 Claims. (Cl. 103—149)

The present invention relates to pumps, and more particularly to a pump for pumping liquids having a high solid content. This application is a continuation-in-part of my copending application, Serial No. 624,153, filed November 23, 1956, which was a continuation-in-part of my abandoned application, Serial No. 564,293, filed February 8, 1956.

Prior to the present invention, considerable difficulty has been encountered in handling liquids having a high solid content. The conventional pumps are not entirely satisfactory since the solid content in the liquid imparts considerable wear on the operating parts of the pump. In addition, the conventional pumps are necessarily large and are not adapted for installation in confined areas.

With the foregoing in mind, a primary object of the present invention is to provide a novel pump which is not adversely affected by high solid content in the liquid being pumped.

Another object in the present invention is to provide a pump which is durable, yet is readily disassembled for replacement and repair of the parts.

A further object of the present invention is to provide a compact pump which is of simple construction and of highly economical manufacture, but is fully effective in pumping liquids having a high solid content.

All of the objects of the present invention and the various features and details of the construction and operation thereof are more fully set forth hereinafter with reference to the accompanying drawing in which:

Fig. 1 is a view in elevation with portions broken away of a pump made in accordance with the present invention;

Fig. 2 is a transverse section through the pump taken on the line 2—2 of Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 1; and

Fig. 4 is a fragmentary perspective view of the tubing for carrying the liquid through the pump.

Referring now to the drawing, the illustrated assembly comprises a pump housing 10 and a shaft 15 journaled in the pump housing 10 in suitable bearings indicated at 17 and 18 respectively, and mounting an impeller 21 keyed thereto as indicated at 21a. As shown in Fig. 1, the shaft 15 has a collar 22 pinned thereto as indicated at 23 which positions the impeller 21 axially on the shaft 15.

The impeller 21 operates to pump liquid through a collapsible conduit or tube section 25. The tube section 25 is mounted on a backing plate 26 which is mounted in the housing 10, for example as indicated at 27. The plate 26 is provided with spaced apertures as indicated at 28, 28 to permit the hose to pass through the plate 26 and extend in a semi-circular arc centered about the axis of the shaft 15.

The impeller 21 operates to collapse the tubing 25 against the body portion 29 of the plate successively along the arcuate portion of the tubing 25 as the impeller 21 is rotated by the shaft 15. To this end, the

2

impeller includes an axle shaft 35 mounted integrally thereon and projecting radially outward at diagonally opposite points on the shaft 15. The projecting portions of the axle 35 each mounts a roller 36 for rotation thereon. Preferably, the rollers 36 are mounted on the axle by snap washers 37, 37 seated in grooves on the axle.

By virtue of this construction, as the shaft 15 is rotated by the motor M, the rollers 36, 36 longitudinally traverse the tubing 25 collapsing it and impelling the liquid therein in a similar direction. It is noted that sufficient pressure is applied by the rollers 36 on the tubing 25 by reason of the thrust bearing 18 mounting the shaft 15.

Substantial durability of the pump is afforded by the construction of the tubing 25. To this end, as shown in Fig. 4, the bore of the tubing 25 is lip-shaped in cross section. By this, it is meant that the bore 30 is generally cylindrical, but at diagonally opposite points 31, 31, the walls curve outwardly into tangential relation. The points 31 are contained in a plane parallel to the backing plate so that when the roller 36 traverses the tubing, the bore is readily collapsed to the position shown in Fig. 1, without severely distorting the wall of the tube at the point where it is bent upon itself. This particular construction of the tubing insures prolonged usage of the tubing without deterioration thereof which would normally be caused by excess distortion.

The passage of the conduit 25 through the apertures 28, 28 positions the conduit on the backing plate 26. To prevent lateral displacement of the conduit inwardly of the axis of the shaft 15, the bushing 17 extends upwardly beyond the upper surface of the plate 26 in the form of an enlarged ring portion 38. The bushing 17 preferably is a self-lubricating member, for example formed of Teflon or similar plastic material. As shown in Fig. 2 the tubing 25 is wrapped snugly around the periphery of the enlarged portion 38 of the bushing 17. Thus the enlarged portion 38 cooperates with the apertures 28, 28 in the backing plate 26 to position the tubing on the backing plate. The bushing 17 is retained in engagement with the backing plate 26 by the limited clearance between the enlarged portion 38 and the lower surface of the impeller 21.

In accordance with another feature of the invention the tubing is held against outward displacement from the plate by means of a flexible flap 41, in the present instance formed also of Teflon or similar plastic material. The flap 41 is secured to the backing plate 26 by spacer element and bolts indicated at 42, 42 and is disposed between the roller 36 and the tubing 25. The flap 41 has a central aperture 43 which embraces the enlarged portion 38 of the bushing 17 so that the flap is free to pass downwardly over the enlarged portion 38 as the rollers 36, 36 compress the tubular portion 25.

The flap 41 not only retains the tube 25 against the backing plate 26 but also protects the tubing 25 against damage by the rollers 36 by eliminating direct contact of the rollers 36 on the tubing. In addition, the flap prevents undue friction and wear between the tubing and the rollers to assist in maintaining the tubing against travel with the rollers. The plastic flap also assists in maintaining a steady pressure on the liquid being pumped. As shown in Fig. 3, the flap enlarges the collapsed area of the hose then reduces variations in the pressure caused when one roller leaves the hose at one side of the plate and the other roller engages it at the other side of the plate. In smaller pumps, it has been found that the fastening elements 42, 42 are unnecessary and the flap may be held in position by the downward pressure of the rollers 36, 36 and the engagement of the aperture 43 with the enlarged portion 38 of the bushing 17.

3

In such a case, the flap may travel slightly with the rollers, and to this end the flap may be circular in form instead of in the square form shown in Fig. 2.

In the operation of the pump, the liquid in the tubing 25 is advanced by the traverse of the rollers 36 over the arcuate portion of the tubing. As the shaft 15 is rotated, the rollers 36 travel alternately on the arcuately disposed portion of the hose and provide continuous pressure to force the liquid therethrough.

It will be apparent that the present invention affords a novel pump which is comparatively simplified and inexpensive construction, yet is fully effective in operation and use. The liquid being pumped is confined to the tubular member 25 so that there is no possibility of foreign matter in the liquid interfering with the moving parts and clogging the working mechanism of the pump. In this way, it is possible to pump liquids having a high solid content without adversely affecting the pump mechanism.

While a particular embodiment of the present invention has been herein illustrated and described, it is not intended to limit the invention to such disclosure, and changes and modifications may be made therein and thereto without departure from the invention, as defined in the following claims.

I claim:

1. A pump for liquids and the like comprising a rotary shaft, a conduit including a resilient compressible tubular portion disposed in a semi-circular arc coaxial with said shaft, a support for said tubular portion including a cylindrical member coaxial with said shaft about which said tubular portion is disposed and a flat plate portion disposed radial to said tubular cylindrical member disposed at one side of said tubular portion of the conduit, a flexible flap mounted on said cylindrical mem-

4

ber substantially parallel to said plate portion at the other side of said tubular portion, and roller means carried by said shaft positioned to engage said flap and displace it toward said plate portion to compress said tubular portion, said roller means actuatable by rotation of the shaft to longitudinally traverse said conduit and pump liquid therein.

2. A pump according to claim 1 wherein said cylindrical member of support forms a bushing which journals the said shaft in said support.

3. A pump according to claim 1 wherein said plate portion of the support is provided with a pair of apertures through which said conduit passes, said apertures closely embracing said conduit, to anchor the same between said plate portion and said flap.

4. A pump according to claim 1 wherein said cylindrical portion of the support has a height greater than the thickness of said tubular portion, and wherein further said flap has a central aperture corresponding in diameter to said cylindrical portion whereby said flap telescopically engages the upper terminal part of said cylindrical portion.

5. A pump according to claim 1 including bolts and spacer elements corresponding in height to the thickness of said tubular portion securing said flaps to the plate portion of said support.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,925,045

February 16, 1960

Anthony Mascaro

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 19, after "central" insert -- circular --.

Signed and sealed this 6th day of September 1960.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents