Jan. 8, 1957 E. E. COOK ET AL 2,776,625

ROTARY PUMP ROLLER

Original Filed Jan. 25, 1956

Fig. 1.

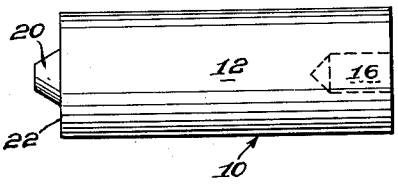


Fig. 2.

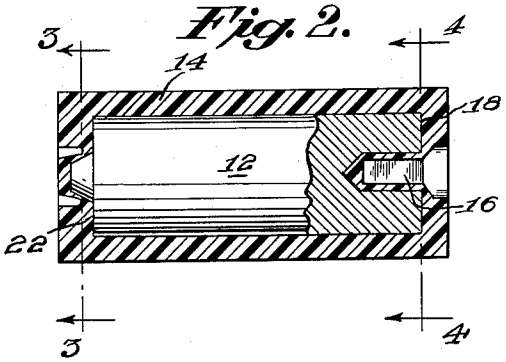


Fig. 3.

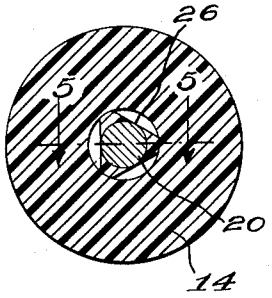


Fig. 4.

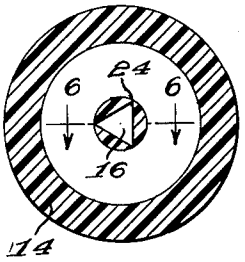


Fig. 5.

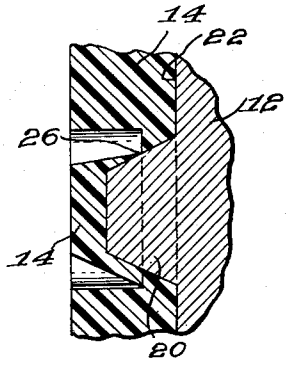
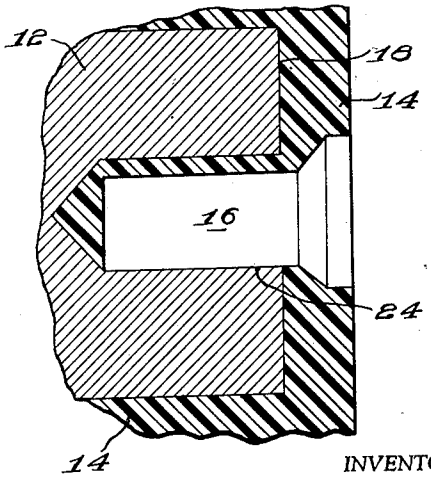


Fig. 6.



INVENTORS

Ernest E. Cook,
Harry J. Sadler.

BY Merchant & Merchant

ATTORNEY

United States Patent Office 2,776,625 Patented Jan. 8, 1957

2,776,625

ROTARY PUMP ROLLER

Ernest E. Cook and Harry J. Sadler, Minneapolis, Minn.

Original application January 25, 1956, Serial No. 561,304. Divided and this application September 24, 1956, Serial No. 611,722

7 Claims. (Cl. 103—136)

Our invention relates generally to rotary pumps and, more particularly, to improvements in the rollers utilized as impeller elements in the rotors of rotary pumps.

More specifically, our invention relates to a pump impeller roller comprising a relatively heavyweight core and a relatively light weight cylindrical nonmetallic jacket.

This is a divisional application of our co-pending application S. N. 561,304, filed January 25, 1956, entitled Rotary Pump Roller and Mold for Producing the Same.

Heretofore, in the pumping of certain liquids containing corrosive and abrasive substances, difficulty has been experienced in the maintenance of pumps because of early failure of impeller rollers made from brass, steel or various other materials due to abrasion or the corrosive action of the liquids delivered by the pump. Undue wear has been further accelerated by engagement of impeller rollers with metallic roller supporting rotors and with the metallic inner wall surfaces of pump housings. Attempts have been made to utilize rollers made from nonmetallic materials, such as corrosion resistant synthetic resins, without much success, inasmuch as most synthetic resins are of insufficiently high specific gravity to make effective sealing contact with the engaged wall of the pump chamber when pumping liquids. Moreover, the use of corrosion resistant metal in such rollers is relatively expensive without solving to any particular degree the problem of excessive wear when pumping liquids containing abrasives.

An important object of our invention is the provision of a pump roller, as set forth, having long wearing qualities as well as a high degree of resistance to corrosion, and which will produce a minimum of wear on the engaged wall of the pump chamber.

Another object of our invention is the provision of a pump roller having a core of relatively high specific gravity and a nonmetallic corrosion resistant jacket of relatively low specific gravity and of relatively long wearing qualities, whereby the core adds sufficient weight to the roller to insure effective sealing engagement therebetween and the engaged pump chamber wall.

Another object of our invention is the provision of a pump roller having a core and a nonmetallic jacket, in which a minimum surface portion of the core is exposed to the corrosive action of liquid being moved through the pump, such exposed area being sufficiently small and so disposed as to render the corrosive action of the liquid thereon substantially ineffective.

The above and still further highly important objects and advantages of our invention will become apparent from the following detailed specification, appended claims and attached drawings:

Referring to the drawings which illustrate the invention, and in which like numerals indicate like parts throughout the several views:

Fig. 1 is a view in side elevation of a core utilized in the impeller roller of our invention;

Fig. 2 is a view partly in axial section of our impeller roller;

Fig. 3 is an enlarged fragmentary transverse section taken on line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary transverse section taken on the line 4—4 of Fig. 2;

Fig. 5 is an enlarged fragmentary section taken substantially on the line 5—5 of Fig. 3; and

Fig. 6 is an enlarged fragmentary section taken substantially on the line 6—6 of Fig. 4.

In the preferred embodiment of our invention illustrated a generally cylindrical impeller roller is indicated in its entirety by the numeral 10 and is shown as comprising a generally cylindrical, preferably metallic, core 12 enclosed within a generally cylindrical, preferably nonmetallic jacket 14. It will be appreciated that the core 12 may be made from any suitable material of a density to provide, with the jacket 14, a roller of sufficiently high specific gravity for smooth and efficient operation in pumping liquids of predetermined densities. For most uses we prefer to use a metallic core, such as made from copper alloys or ferrous metals. The nonmetallic jacket 14 may be made from any one of a number of materials having a high degree of resistance to wear when utilized in connection with liquids containing abrasive particles, and together with a high degree of resistance to corrosive action of acids or other caustic solutions. Such abrasion and corrosive resistant materials are found among the synthetic resins which are relatively easily applied to a suitable core. We have found that nylon, which is a thermoplastic resin, is well adapted as a jacket material because of its long wearing qualities and its extreme resistance to chemical action with a wide variety of liquids.

The core 12 is provided with a generally cylindrical recess 16 which extends axially inwardly from one end wall 18, and a frusto-conical boss 20 extending axially outwardly from the opposite end wall 22 of the core 12. As shown, the recess 16 and boss 20 are preferably coaxial with the core 12, and the recess 16 is of greater axial depth than the axial length of the boss 20.

In the operation of forming the jacket 14 about the core 12, as set forth in the co-pending application, above identified, the recess 16 is lined with the plastic which assumes a polygonal cross section with small axially extending areas 24 of exposed core material being at the vertices of the polygon, as shown in Fig. 4. The boss 20 is at the same time covered with plastic material in a frusto-pyramidal form, also of polygonal cross section, and there is left only the small tangential areas 26 thereof exposed, as shown in Fig. 3. The areas 24 are almost linear, and the areas 26 are very small. This is of small consequence as the areas are more or less protected in the pump when the roller is in use.

As above indicated, the metallic core 12 gives sufficient weight to the roller 10 to enable the same to operate in an efficient manner when put into use in a pump employing such rollers as vanes. The nylon jacket 14 provides excellent wearing qualities and relatively high resistance to abrasion and corrosion. The exposed areas 24 and 26 of the core are sufficiently small to render negligible the problem of corrosion of the core 12 when the roller 10 is utilized in pumps for delivering acids and the like. Also, there is little metal exposed to suffer from abrasion which might be caused by the material being pumped.

While we have shown and described a commercial form of our novel pump roller it will be understood that the same is capable of modification without departure from the spirit and scope of the invention as defined in the claims.

What we claim is:

1. In a rotary pump having a casing defining a generally cylindrical chamber and a rotor having a radially slotted portion eccentrically mounted therein and adapted to have an impeller roller mounted in the slotted portion thereof, the improvement which comprises an impeller

roller including a generally cylindrical core of a high specific gravity material and a cylindrical plastic jacket of a lower specific gravity material enclosing said core, said core having an axial recess at one end and a frusto-conical boss extending axially outwardly of the opposite end, said boss terminating axially inwardly of the plane of the adjacent end of said plastic jacket, said recess and said boss being substantially completely covered as a result of the core having been supported thereby during forming of the jacket on the core.

2. The structure according to claim 1, wherein the jacket lines the recess and covers the boss with a polygonal cross sectional configuration exposing only very small areas thereof.

3. The structure according to claim 1, wherein the recess and the boss are coaxially aligned with the axis of the core.

4. In a rotary pump having a casing defining a generally cylindrical chamber and a rotor having a radially slotted portion eccentrically mounted therein and adapted to have an impeller roller mounted in the slotted portion thereof, the improvement when comprises an impeller roller including a generally cylindrical core of a high specific gravity material and a plastic jacket of a lower specific gravity material enclosing said core, said core having axially aligned portions adjacent each end thereof and integrally formed therewith, said aligned portions each being of a circular cross section and of less cross-sectional area than that of the core and terminating axially inwardly of the planes of the respective ends of the jacket, said jacket having a plastic portion covering at least one of said axially aligned portions, said plastic

portion being polygonal in cross section and substantially completely covering the respective axially aligned portion as a result of said axially aligned portion having been engaged by supporting means clearing the major portion thereof during the forming of the jacket.

5. In a rotary pump having a casing defining a generally cylindrical chamber and a rotor having a radially slotted portion eccentrically mounted therein and adapted to have an impeller roller mounted in the slotted portion thereof, the improvement which comprises an impeller roller including a generally cylindrical core of a high specific gravity material and a plastic jacket of a lower specific gravity material enclosing said core, said core having axially aligned portions adjacent each end thereof and integrally formed therewith, said portions each being of circular cross section and of less cross-sectional area than that of the core and terminating axially inwardly of the planes of the respective ends of the jacket, said jacket including plastic portions on said axially aligned portions, said plastic portions being polygonal in cross section and substantially completely covering the axially aligned portions as a result of said axially aligned portions having been engaged by supporting means clearing the major portion thereof during the forming of the jacket.

6. The structure according to claim 5 wherein at least one of the axially aligned portions is a recess.

7. The structure defined in claim 5 wherein at least one of the axially aligned portions is a boss.

No references cited.