

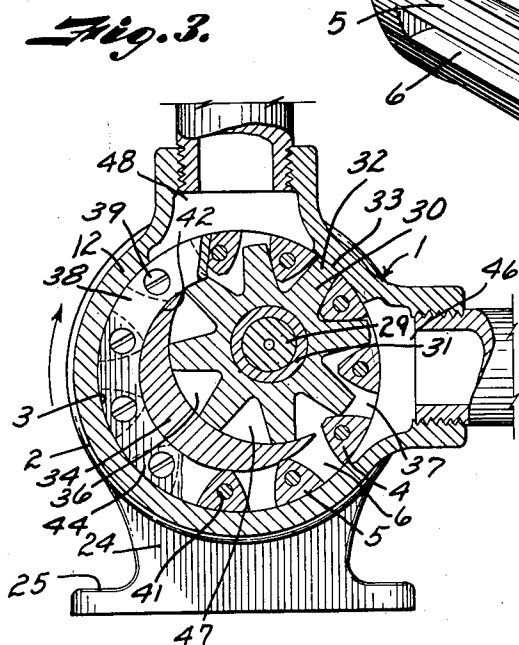
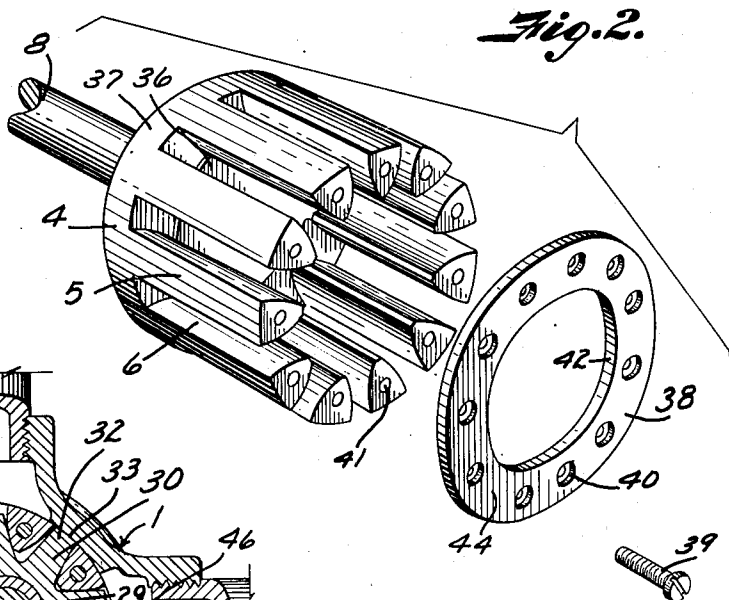
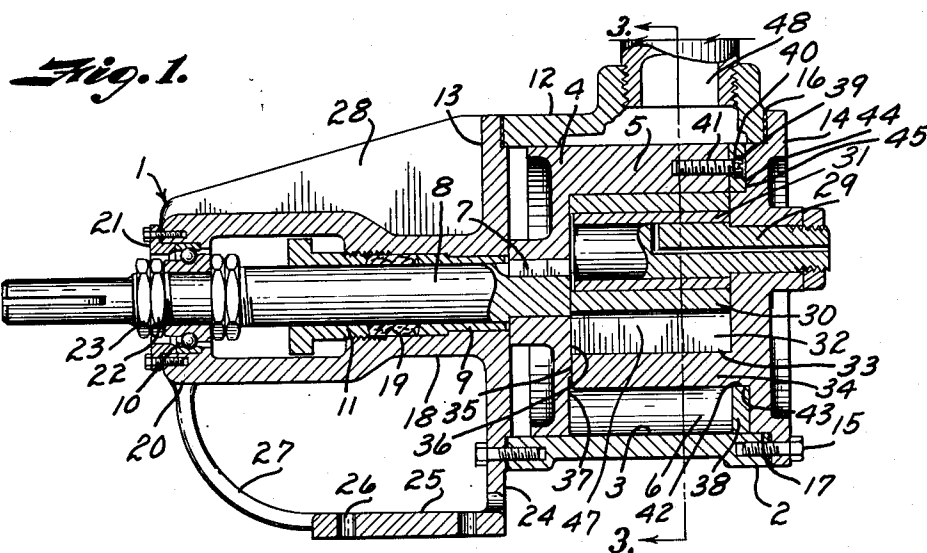
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ROTARY PUMP

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ROTARY PUMP

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1 Claim. (Cl. 103—126)

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This invention relates to rotary pumps and more particularly to rotary pumps of the internal gear or rotor and idler pinion type, and has for its principal object to provide a pump of smaller diameter than other rotary pumps of the same capacity.

Present day rotary pumps of the internal gear type have a rotor which includes a plurality of spaced bars extending from a disk or the like to form a cage-like structure. The bars are free and unsupported at one end which results in a limitation as to the length of the pump so that increased capacity is obtained by making the pumps larger in diameter.

Further objects of the present invention are to provide a rotary pump of the internal gear type with a rotor structure and idler pinion of longer length in a smaller, lighter, more serviceable pump than other such rotary pumps of equal capacity; to provide a pump of the internal gear type in which the bars of the internal gear are supported at each end of the rotor; to provide such a pump with a supporting bearing ring on the free ends of the internal gear or rotor teeth, said supporting ring having bearing contact with cooperating portions of the pump housing; and to provide a pump of this character which is economical to manufacture and assemble, and efficient in operation over long periods of use.

In accomplishing these and other objects of the present invention, I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a longitudinal sectional view of a pump embodying the features of the present invention.

Fig. 2 is a detailed disassembled perspective view of the rotor and supporting bearing ring therefor.

Fig. 3 is a transverse sectional view on the line 3—3, Fig. 1.

Referring more in detail to the drawings:

1 designates a pump comprising a casing 2 having a cylindrical bore 3 which encloses an internal gear or rotor 4 in the form of a cage comprising bars 5 and spaces 6 between the bars 5. The rotor is secured as by a key 7 to a drive shaft 8 connected with any suitable prime mover to drive the rotor. The drive shaft is rotatably mounted in bearings 9 and 10 and passes through a packing gland 11. The casing 2 preferably consists of a shell 12 open at each end, the open ends being closed by end plates 13 and 14 secured

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to the shell by means of fastening devices, such as screws 15. Gaskets 16 are interposed between the end plates and the shell to form a seal and each of said end plates has annular shoulders 17 which extend in and closely engage the bore 3 of the shell for centering the end plates on said shell. The end plate 13 has an axial boss 18 extending outwardly from the casing and suitably bored to receive the bearing 9, packing 19 and packing gland 11. The boss also has an extension 20 spaced from the packing gland 11 and suitably bored to receive the bearing 10 which is preferably of the antifriction adjustable type, the bearing 10 being held in the extension by a suitable bearing retainer 21 and the inner race being adjustable by means of nuts 22 and lock nuts 23 threaded on the shaft 8. The end plate 13 also has a depending portion 24 terminating in a base plate 25 having suitable apertures 26 for receiving fastening devices for securing the pump on any suitable support, a brace 27 connecting the base plate 25 with the boss extension 20 to cooperate with a rib 28 to form a strong, rigid structure.

The end plate 14 carries a stub shaft 29 extending into the casing and upon which is rotatably mounted a toothed idler 30, said idler preferably having a bushing 31 of suitable bearing material which operates on the stub shaft 29. The axis of the stub shaft 29 is offset relative to the axis of the drive shaft 8 so that the maximum diameter of the idler 30 is considerably less than the maximum diameter of the rotor 4, said idler being located whereby the teeth 32 thereof enter the spaces 6 between the bars 5 on one side of the rotor and the peripheries 33 of the teeth engage the inner surface of the shell 12 when said teeth extend their maximum distance into the spaces 6 of the rotor.

A crescent-shaped filler 34 fills the eccentric space between the other side of the idler 30 and inner surface of the bars 5 of the rotor 4, as illustrated in Fig. 3, said crescent-shaped filler being integral with or otherwise suitably fixed to the end plate 14 and extending therefrom into the casing whereby the free end 35 of the crescent-shaped filler has sliding engagement with the adjacent face 36 of a solid, disk-like portion 37 from which the bars 5 of the rotor extend. The periphery of the disk-like portion 37 and bars 5 substantially slidably engage the bore 3 of the shell 12. The toothed idler is preferably of substantially the same length as the bars 5 whereby the ends of the toothed idler slidably engage the face 36 of the disk portion 37 of the

rotor 4 and the inner face 37' of the portion of the end plate 14 which extends into the shell 12.

A ring 38 is secured to the free ends of the bars 5, preferably by fastening devices, such as screws 39, which extend through countersunk apertures 40 in the ring and are threaded into threaded apertures 41 located centrally of the free ends of the bars 5 and aligned with the apertures 40. The outer periphery of the ring 38 is of the same size as the peripheries of the disk-like portion 37 and bars 5 whereby the ring slidably engages the inner surface of the bore 3 in the shell 12. The bore in the ring 38 is of such size whereby the inner surface 42 thereof coincides with the inner surfaces of the bars 5 and slidably engages a shoulder 43 formed by an undercut portion in the inside of the end plate 14, said undercut portion providing an extension on the end plate 14 and forming with the bore 3 an annular recess. The outer surface 44 of said ring also has sliding contact with the inner face 45 of the undercut portion of the end plate whereby the engagement of the ring with the end plate serves as a bearing support for the ends of the bars 5 of the rotor 4. Also the ring connects the free ends of the bars, giving added strength thereto, whereby the rotor may be longer than in conventional pumps to provide increased capacity, or in other words the pump is smaller in diameter than conventional pumps of equal capacity.

When the drive shaft 8 is operated to drive the rotor 4 in the direction of the arrow, Fig. 3, the rotation of the rotor automatically rotates the idler 30 because of the engagement of the teeth 32 on the idler with the bars 5 on the rotor. As the rotor 4 rotates, the teeth 32 are withdrawn from the spaces 6 adjacent the inlet port 46 in the casing. This produces a partial vacuum which draws liquid into the inlet port and fills the spaces 6 in the rotor and also the spaces 47 between the teeth 32 of the idler with the liquid. The liquid in the spaces 6 and 47 is retained therein by the crescent-shaped filler 34 until the spaces 6 and 47 come into the area comprising the outlet port 48. As the teeth 32 move to fit between the bars 5, the liquid in the spaces 6 and 47 is forcibly ejected into the outlet port 48. The pump acts as a force pump whereby liquid going through the pump is forced out of the outlet port under substantial pressure, but the possibility of the high pressures damaging the rotor and bars thereof is greatly reduced due to the bearing supporting ring 38 reinforcing the outer ends of the bars 5 and supporting said bars on the shoulder and undercut portion in the end plate 14.

It is believed obvious that I have provided a rotary pump structure which will operate over long periods of time and is adapted to be made longer than conventional pumps to form a smaller, lighter pump and a more serviceable pump than others of equal capacity.

What I claim and desire to secure by Letters Patent is:

A rotary pump of the character described comprising, a shell having a cylindrical bore and an inlet port and an outlet port communicating with said bore, end plates sealingly secured to the shell and closing the bore at the ends thereof, one of said end plates having a portion extending into the bore concentric thereto and forming an annular recess therewith, a drive shaft rotatably mounted in the other end plate axially of the cylindrical bore, a rotor including a disk portion secured to the shaft adjacent said other end plate and having a plurality of peripherally spaced parallel bars extending from the disk longitudinally of the shell bore and terminating in free ends adjacent said one end plate, said disk and bars having peripheral bearing engagement with the cylindrical bore of the shell, a ring in the annular recess and having bearing engagement with the shell bore and said one end plate, means securing the ring to the free end of each of the rotor bars whereby the ring connects said bars and provides bearing support therefor on said one end plate, a toothed idler member coextensive with the rotor bars, means on said one end plate rotatably mounting the idler member inside of and eccentrically of the rotor whereby the teeth of the idler member mesh with the rotor bars and extend through the spaces therebetween to engage the shell bore between the inlet and outlet ports, and a crescent-shaped member coextensive with the rotor bars and fixed to said extending portion of said one end plate and extending longitudinally of the shell bore between the inner surface of the rotor bars and periphery of the idler teeth and forming a seal therebetween whereby rotation of the drive shaft rotates the rotor and idler member and forcibly delivers liquid from the inlet port to the outlet port.

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