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A. GIRZ

2,471,149

ROTARY GEAR PUMP

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FIG. 1

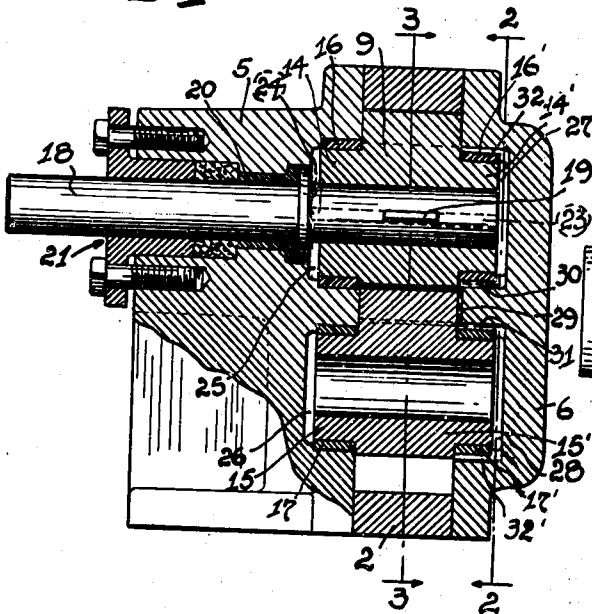


FIG. 2

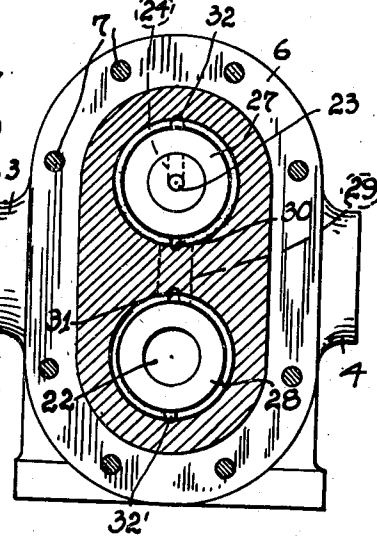


FIG. 3

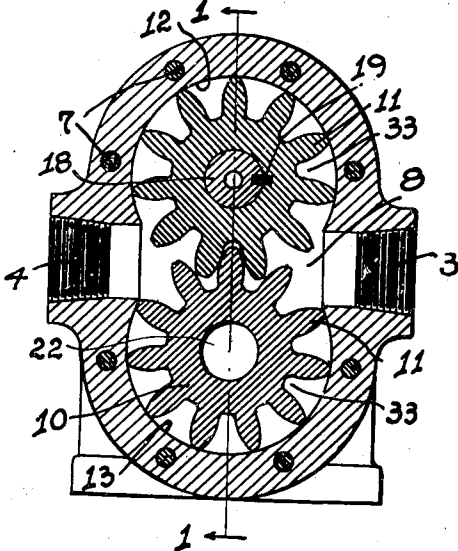
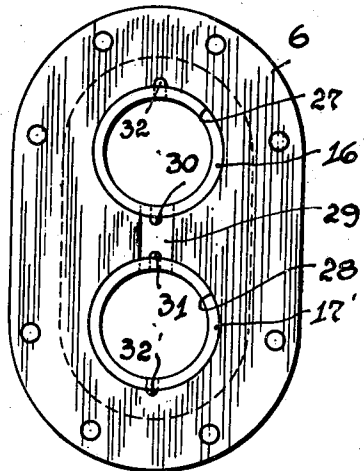


FIG. 4



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ROTARY GEAR PUMP

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2 Claims. (Cl. 103—126)

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This invention relates to new and useful improvements in pumps and, more particularly, to improvements in rotary gear pumps such as commonly used for pumping liquids.

The primary object of the invention is the provision of a rotary gear pump with means adapted to balance end thrust on the liquid propelling gears of the pumps so as to effect equalizing of the pressures acting on opposite ends of the gears.

Another object of the invention is the provision of a rotary gear pump with means adapted to balance end thrust on the liquid propelling gears of the pump and reduce such end thrust by carrying leakage-liquid (seeped between the end faces of the gears and the housing) by means of the gears to the pressure side of the pump.

A further object of the invention is the provision of a rotary reversible gear pump with means adapted to balance end thrust on the liquid propelling gears of the pump, reduce such end thrust by carrying leakage-liquid (seeped between the end faces of the gears and the housing) by means of the gears to the pressure side of the pump and prevent knocking of the pump by additionally carrying liquid trapped between said gears during their intermeshing to the pressure side of the pump.

With the above and incidental objects in view, the invention consists in certain other novel features of construction and combination of parts, the essential elements of which are set forth in the appended claims; and a preferred form of embodiment of the invention is hereinafter shown with reference to the drawings accompanying and forming part of this specification.

In the drawings:

Fig. 1 is a longitudinal sectional view, partly in elevation, through a rotary gear pump constructed in accordance with the invention, the section being taken on line 1—1 of Fig. 3.

Fig. 2 is a cross-sectional view through the gear pump shown in Fig. 1, the section being taken on line 2—2 of Fig. 1.

Fig. 3 is another cross-sectional view through the gear pump, the section being taken on line 3—3 of Fig. 1; and

Fig. 4 is an inside view of the cover member showing the recesses and communicating passages necessary for balancing and reduction of the end thrust on the gears.

Referring now more particularly to the drawing which shows a gear pump embodying the invention, numeral 2 denotes the ring-shaped body of a pump housing having oppositely ar-

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anged inlet and outlet passages 3 and 4. Body 2, which is closed at its opposite ends by front and rear cover members 5 and 6, securely clamped to the body by bolts 7, forms a working chamber 8 for rotatably mounted cooperating spur gears 9 and 10. These spur gears have their teeth 11 engaged with the curved end wall portions 12 and 13 of body 2 and engage with each other opposite inlet and outlet passages 3 and 4. Spur gears 9 and 10 have integrally extended from their end faces short stud shafts 14, 14' and 15, 15' respectively, which are mounted in bearing sleeves 16, 16' and 17, 17' respectively, pressed into recesses of the front and rear cover members 5 and 6. Spur gear 9 is additionally mounted on an elongated drive shaft 18, secured to said gear by a key member 19 and extended outside of the pump housing through a bearing sleeve 20 in front cover member 5. Shaft 18 is fluid-tightly sealed by a packing gland and nut arrangement 21 in front cover member 5.

The thus constructed pump is provided with means adapted to balance end thrust on the liquid propelling gears caused by leakage of liquid under pressure into the spaces between the walls of body 2 and the end faces of the gears. For such purpose, spur gear 10 includes an axial bore 22 and shaft 18 is axially and laterally bored at 23 and 24 for open communication of recesses 25 and 27 and recesses 26 and 28 in cover members 5 and 6. To balance the end thrusts on gear 9, stud shaft 14 is of larger cross section than stud shaft 14' so as to compensate for the cross section of drive shaft 18, extended outwardly of the pump housing.

The end thrust on gears 9 and 10 is equalized by an elongated, shallow recess 29, connected by passages 30, 31 with recesses 27 and 28 in rear cover member 6 to effect open communication between all the recesses at the end faces of gears 9 and 10. This shallow recess is positioned opposite the enmeshment area of gears 9 and 10 and permits escape of liquid trapped between engaged teeth and grooves of the gears into recesses 27 and 28.

End thrust on gears 9 and 10 is reduced and excess liquid from recesses 27 and 28 is discharged by channeled passages 32 and 32' in rear cover member 6 which are positioned to successively align with the gaps 33 of spur gears 9 and 10 when such gears are rotated during pumping operations. This arrangement permits direct discharge of liquid from recesses 27 and 28 into these gaps and automatically releases any excessive pressure in said recesses. Liquid thus discharged

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into gaps 33 is carried to the pressure side of the pump structure to eliminate any leakage loss of pumped liquid and effect highest efficiency of the pump structure. Preferably, as shown, channeled passages 32 and 32' are positioned to approximately align with the roots of the gear teeth of spur gears 9 and 10.

A thus constructed pump builds up uniform pressure on the ends of the gears and maintains balanced pressure under all conditions, so that end wear on gears 9 and 10 is negligible. A pump of the described type can readily be reversed, as shallow recess 29 is arranged opposite and symmetrical with respect to the area of enmeshment of gears 9 and 10 and permits proper discharge of liquid trapped between engaged teeth and grooves of the gears in forward and reverse rotation of gears 9 and 10.

Having thus described my invention what I claim is:

1. In a pump, a chambered housing, pairs of oppositely arranged, circular recesses in said housing, bearing sleeves in said recesses extended thereinto in spaced relation with respect to the bottom walls thereof, complementary pump gears with shaft portions journaled in said bearing sleeves, communicating passages extended axially through said gears for communication of the circular recesses of each pair of recesses with each other, and symmetrically arranged recessed channels in the wall of said housing in open communication with a circular recess of each of said

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pairs of said recesses, said recessed channels being symmetrically arranged with respect to said gears, intersecting the enmeshing area of said gears and extending diametrically opposite to the enmeshing area thereof to permit in forward and reverse rotation of said pump continuous, simultaneous withdrawal of excess and trapped liquid from said recesses and said enmeshing area and discharge of such liquid into neutral areas of said pump.

2. A pump as described in claim 1, wherein said recessed channels extend in areas opposite the roots of the teeth of said gears to effect during rotation of the pump consecutive communication of said recessed channels with the bottom of the liquid carrying pockets formed between the teeth of said gears and the wall of said housing.

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