

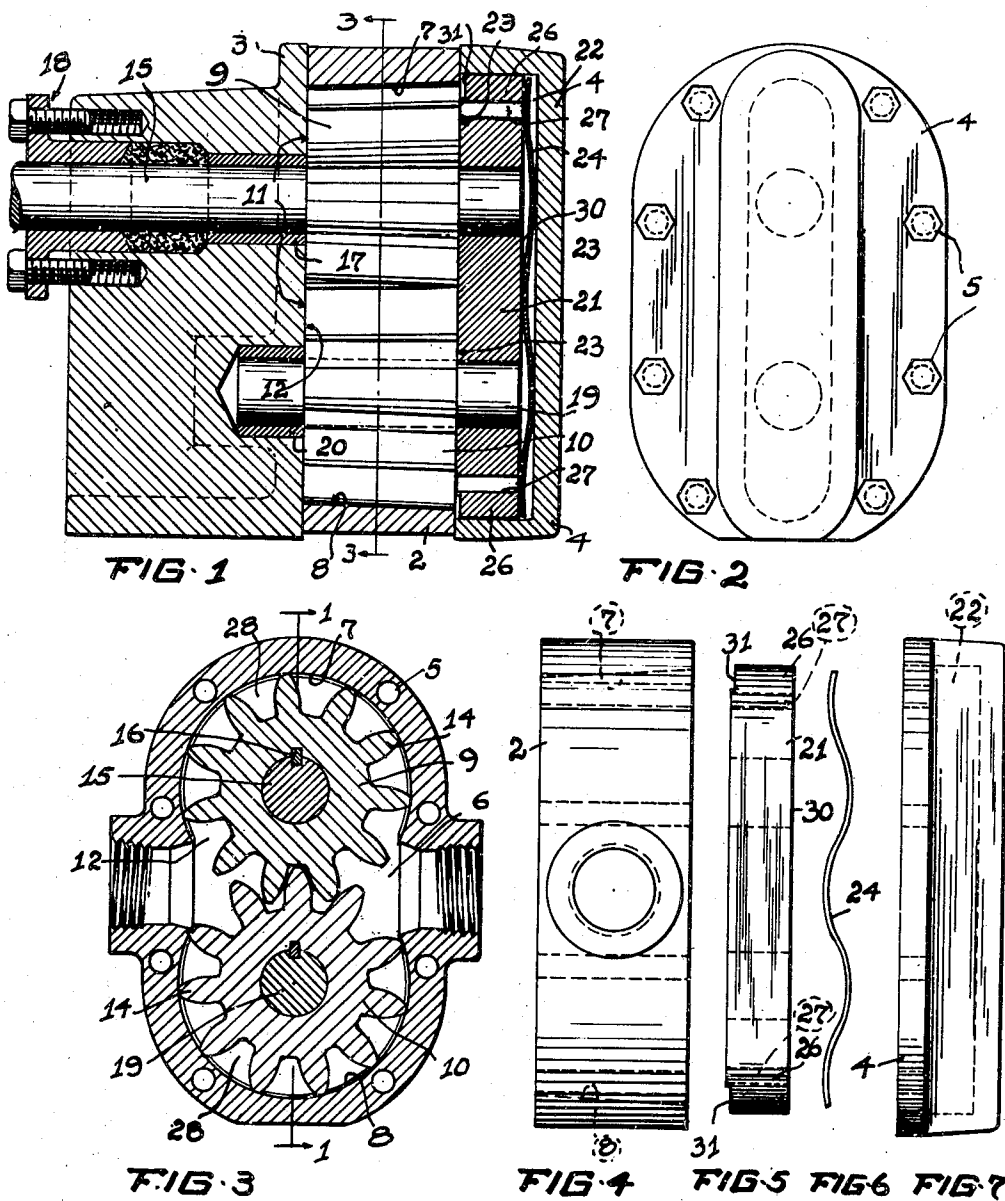
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GEAR PUMP WITH WEAR COMPENSATING MEANS

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GEAR PUMP WITH WEAR COMPENSATING MEANS

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This invention relates in general to gear pumps designed for automatically compensating wear and deterioration and, more particularly, to gear pumps of the type described in Patent No. 2,134,153. Pumps of this type embody a working chamber with inclined wall portions having arranged therein rotatably mounted, intermeshing spur gears with teeth machined to conical or tapered form for close contact with the inclined wall portions of the working chamber. The opposite faces of the gears contact with one end wall of the working chamber and a shiftable end plate yieldingly forced against the larger radial surfaces of the gears, which plate is constructed to closely fit the working chamber so as to seal its open end.

Pumps of this type develop leakage between the shiftable end plate, the gears and the walls of the housing and tend to build up substantial pressure behind the end plate, which pressure shifts said plate against the gears and the gears against the end wall of the working chamber with cutting effect of the gears on the end wall and corresponding rapid wear and deterioration of the pump.

The general object of the present invention is the provision of a gear pump of the type described with an elongated narrow end plate reduced in surface area to decrease the forces shifting the plate and gears toward the end wall of the working chamber, and thus prevent excessive wear and deterioration of the pump.

This general object of the invention is attained by providing a gear pump of the type described with an elongated narrow end plate, the width of which is substantially less than the width of the working chamber, and mounting this end plate shiftable in a recess of the pump housing so that the longer axis of this plate intersects the axes of the pump gears.

Another object of the invention therefore is the provision of a gear pump of the type described with an elongated narrow end plate having a width substantially less than the width of the working chamber of the pump and shiftable mounted in a recess of the pump housing so that the longer axis of the end plate intersects the axes of the pump gears.

A further object of the invention is the provision of a gear pump of the type described with an elongated narrow end plate having a width substantially less than the width of the working chamber of the pump, which plate provides bearings for the pump gears and is shiftable mounted in a recess of the pump housing so

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that the longer axis of the plate intersects the axes of the pump gears.

Still another object of the invention is the provision of a gear pump of the type described with an elongated narrow end plate having a width substantially less than the width of the working chamber of the pump, the plate being shiftable mounted in a recess of the housing so that the longer axis of the plate intersects the axes of the pump gears and including at its end portions through-passage means aligned with the teeth of the pump gears for consecutive communication of the tooth gaps with the recess of the housing to prevent excessive pressures on the rear face of the end plate when the gear pump is actuated.

Additional objects and novel features of construction, combination and relations of parts by which the objects in view have been attained will appear and are set forth in detail in the course of the following specification.

The drawing accompanying and forming part of the specification illustrates a certain practical embodiment of the invention, but it will be apparent as the specification proceeds that the pump structure shown and described may be modified and changed in various ways without departure from the true spirit and broad scope of the invention.

In the drawing:

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

Fig. 2 is a rear view of the pump shown in Fig. 1; and

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

Fig. 4 is a side elevation of the central housing forming the working chamber of the pump;

Fig. 5 is a side elevation of the end and bearing plate;

Fig. 6 is a side elevation of the spring member; and

Fig. 7 is a side elevation of the recessed rear cover member of the pump.

Referring now more particularly to the drawing, which shows a gear pump embodying the invention, numeral 2 denotes a ring-shaped housing with inlet and outlet passages, which housing is closed at its opposite ends by a front cover member 3 and a rear cover member 4, bolts 5 being used to securely clamp the cover members to housing 2. The thus closed housing

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forms a working chamber 6 having inclined curved wall portions 7 and 8 which are inclined outwardly toward rear cover member 4. Working chamber 6 has rotatably mounted therein co-operating spur gears 9 and 10, the inner faces 11 of which contact the inner face 12 of front cover member 3, and the teeth 14 of which contact the inclined curved wall portions 7 and 8 of chamber 6, as the outer portions of said teeth are shaped to fit the inclination of curved wall portions 7 and 8. Spur gear 9 is mounted on an elongated drive shaft 15 by means of a key member 16, which shaft extends outside of the housing through a bearing 17 in front cover member 3 and is fluid-tightly sealed by a packing gland and nut arrangement 18 in cover member 3, and spur gear 10 is mounted on a short shaft 19 rotatably supported at its front end in a bearing 20 in front cover member 3. The rear ends of shafts 15 and 19 are pivotally supported in an elongated bearing and end plate 21 of suitable material which is shiftably supported in an elongated chamber or recess 22 in rear cover member 4 and yieldingly forced into contact with the larger rear faces 23 of gears 9 and 10 by a leaf spring 24.

Bearing and end plate 21 has a width substantially less than the width of working chamber 6 and forms a bearing means for shafts 15 and 19. This plate automatically compensates for wear and deterioration between the peripheral surfaces of the gears and their continuous chamber walls by shifting the inner faces 11 of gears 9 and 10 into contact with the inner face of front cover member 3 and permitting the teeth of these gears to shave said inner face and peripheral surfaces, thereby effecting an increase in life and efficiency of the pump structure. The width of the surface of the bearing and end plate 21 is smaller than the width of the working chamber to prevent excessive pressure of end plate 21 on the larger end faces 23 of the gears. To control this pressure to approximately the pressure of leaf spring 24, bearing and end plate 21 has arranged in its end portions 26 through-passages 27 adapted to successively align with the gaps 28 of spur gears 9 and 10, when such gears are rotated during pumping operations, an arrangement permitting discharge of liquid under pressure from recess or chamber 22 into these gaps and effecting automatic release of excessive pressure in said chamber and on the rear face 33 of bearing and end plate 21.

Complete control of excessive pressure on end plate 21 is effected by arranging through-passages 27 in alignment with the roots of the gear teeth of spur gears 9 and 10.

The bearing and end plate 21 has its end portions 26 provided with offset portions 31 which permit wear compensating movements of said plate.

Having thus described our invention, what we claim is:

1. In a gear pump a chambered housing having a working chamber, gears rotatably mounted in said working chamber, parallel shafts for said gears extended through said working chamber having their one ends rotatably mounted in said housing, and elongated spring-pressed plate and bearing means having smaller width than the diameter of said gears, said plate and bearing

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means mounting the other ends of said shafts and being shiftably arranged in a recess of said housing adjacent to said gears and yieldingly forced into contact with the rear faces thereof, and said plate means including in symmetrically arranged areas of its opposite end portions through-passages adapted to effect consecutive communication of said recess with the liquid carrying pockets between adjacent teeth of said gears and the wall of said working chamber when the pump is operating.

2. In a gear pump a chambered housing including an elongated working chamber, gears rotatably mounted in said working chamber, parallel shafts for said gears extended through said working chamber having their one ends rotatably mounted in said housing, elongated, spring-pressed plate means of smaller width than the diameter of said gears having bearings for the other ends of said shafts, and a recess in said housing adjacent to said working chamber shiftably mounting said plate means for yielding contact with the end faces of said gears, said end plate means including in symmetrically arranged areas of its end portions through-passages aligned with the roots of the teeth of the gears and adapted to effect consecutive communication of the recess portion behind said end plate with the liquid carrying pockets between adjacent teeth of said gears and the wall of said working chamber when the pump is operating.

3. In a gear pump a chambered housing having a working chamber with inclined circular wall portions, gears with inclined teeth surfaces fitting the inclined circular wall portions of said working chamber, parallel shafts for said gears extended through said working chamber having their one ends mounted in said housing, and elongated, spring-pressed, end plate means of smaller width than the diameter of said gears shiftably mounted in said housing in a recess adjacent to said working chamber, said end plate means being yieldingly forced into contact with the rear faces of said gears and including in symmetrically arranged areas of its end portions, through-passages arranged in alignment with the roots of the gear teeth of said gears and adapted to effect consecutive communication of the recess in said housing with the liquid carrying pockets between adjacent teeth of said gears and the circular wall portions of said working chamber when the pump is operating.

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