



# UNITED STATES PATENT OFFICE

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## GEAR-TOOTH ROTARY PUMP

William Wilson Hamill, Little Aston, England

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1 Claim. (Cl. 103—126)

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This invention relates to rotary pumps of the gear tooth type and more particularly to those intended to deal with liquid carrying or contaminated with foreign substances such as sand, grit, earth, etc. which in pumps of conventional design, quickly wear out the meshing parts.

The object of the present invention is a gear-tooth pump which reduces abrasive action on the meshing surfaces; which therefore increases the effective life of such surfaces; in which the high pressure zone is more effectively isolated from the low pressure zone; and which better accommodates foreign bodies present in the liquid.

Reference may be had to the accompanying drawings in which Figure 1 is a sectional elevation, and Figure 2 a sectional end elevation at right angles to Figure 1, of a pump according to the invention.

Figure 3 is a fragmentary view of a modification.

In the drawings there is shown a pump having one set of gears for transmission of rotary motion, and a second set of gears driven thereby adapted for pumping action. Conveniently the pump housing 1 includes two chambers 2, 3 separated by a partition, one chamber containing the driving gears or wheels 4 of normal tooth type and the other the pumping gears or wheels 5.

Either or both the pumping wheels may include elastic provision adapted to effect a sealing action at the roots and tops of the pumping teeth in their traverse of the meshing zone, which provision preferably takes the form of tooth forms either hollow or solid made of rubber or material having like properties or characteristics. The flank contour has not the importance of conventional tooth pumps since there is not or need not be substantial pressure between meshing flanks, light contact or follow-up pressure being sufficient to provide the seal between contacting flanks. To provide sealing action at the tooth tops and the roots of the tooth spaces, the radial length of a tooth exceeds the radial length or depth of a tooth space by a suitable amount so that when the teeth are fully meshed and to a limited angular dimension each side thereof, there results a displacement or deformation of the rubber in the region of the tooth tops and bottoms of the tooth spaces with consequential radial pressure in addition which produces an effective seal against passage or escape of liquid from the high pressure side to the low pressure side, excess rubber volume being dis-

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placed into the parts of the tooth spaces not occupied by the co-acting teeth.

The yielding character of the teeth allows foreign substances to be carried through the meshing zone without damage to the teeth. The two pumping wheels act solely as followers since driving torque is confined to the driving wheels.

Special shapes of teeth are often adopted with the object of avoiding undesirably high stresses by virtually incompressible liquids being trapped in closed contracting spaces, such shapes being themselves undesirable for other considerations. By the present invention, the tooth forms may be such as to avoid the concomitant restrictions and drawbacks of both said contours.

The pumping wheels may be wholly of rubber including the hub and the teeth but the preferred form is illustrated in the drawings wherein the elastic or resilient material is embodied in the form of an envelope 6 for each wheel as depicted in Figures 1 and 2 or for one wheel only as shown in Figure 3, shaped to follow the contour or cross-section of the teeth and held in place by engagement with tooth stubs 7 extending outwards spoke-wise from the wheel hub; in Figure 3 each stub has a head or enlargement 8 at the end remote from the wheel axis to provide a positive retaining means in co-operation with a correspondingly enlarged cavity in the envelope. The envelope is readily assembled on the wheel which is fabricated of relatively rigid material e. g. metal, plastics by endwise sliding on to the tooth stubs.

At their lateral ends, the teeth of the envelope abut against end discs 9 which take the wear from contact with the adjacent end faces of the housing and are preferably of harder material. Such discs may be provided with sealing grooves 10 in their end faces.

To ensure correct meshing of the pumping teeth and spaces and proper relation to the driving wheels, it is preferred to manufacture the pumping wheels with splines, keys, or other registering devices formed in the wheel bores and shafts for co-engagement, the teeth being in proper angular relationship with the registering devices. Assembly and replacement are thereby facilitated since the parts are arranged so that there is only one angular position for each wheel in which it can be mounted.

Where abrasive substances are present in the liquid, it is preferred to provide both wheels with the elastic or resilient provision to avoid a possible lapping action, but in suitable application, one wheel only may be so constructed.

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Having thus described my invention, what I claim is:

A gear tooth rotary pump comprising a pump chamber having an inlet and an outlet, meshing pump gears in said chamber, means for driving said gears, and an elastic covering on the teeth of at least one of said gears, said gear teeth having reduced shank portions and enlarged end portions and the respective covers therefor each having a socket to cooperate with the shape of its respective tooth to retain said covering in position.

WILLIAM WILSON HAMILL.

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