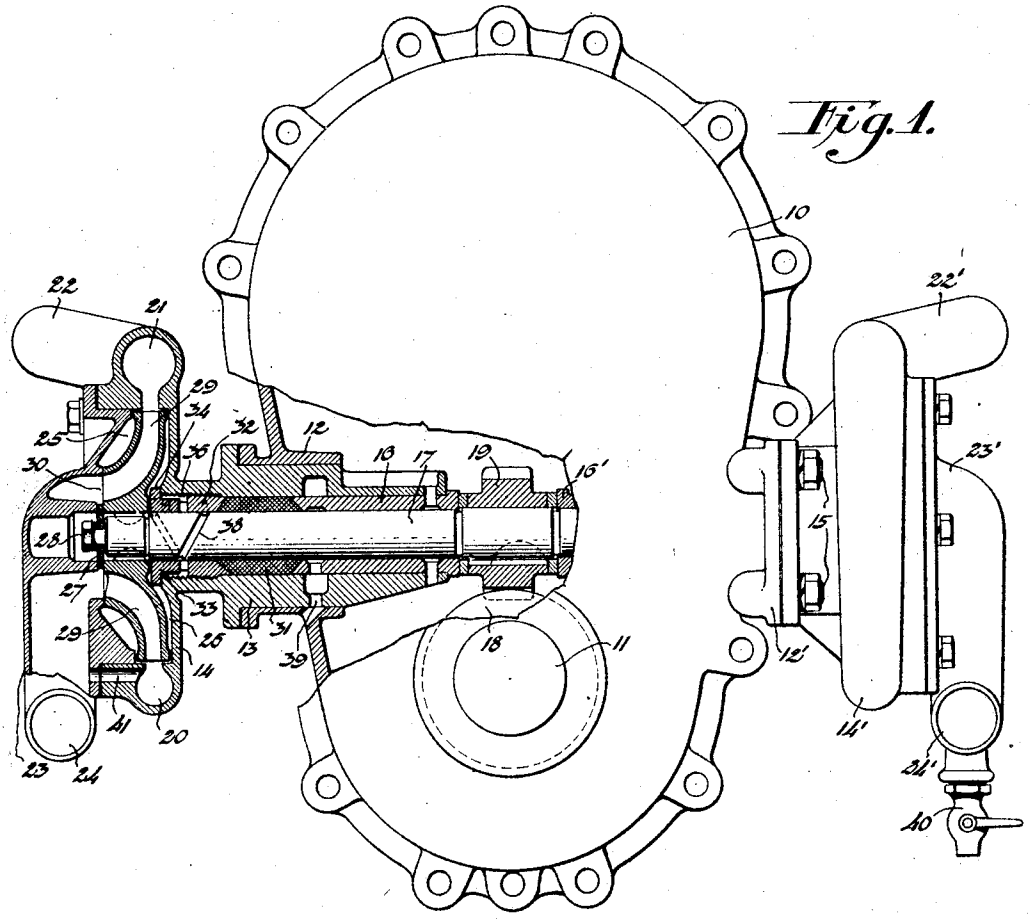
March 12, 1929. R. K. JACK 1,705,016

PUMP CONSTRUCTION

Filed Sept. 2, 1921

Fig. 1.



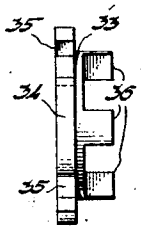


Fig. 2.

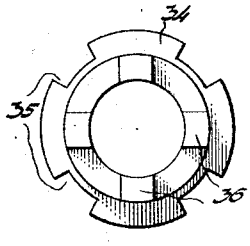


Fig. 3.

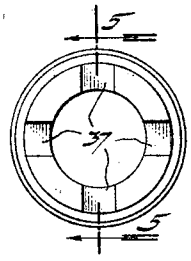


Fig. 4.

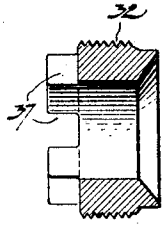


Fig. 5.

Inventor:
Robert K. Jack

Witness:
G. L. Peirce

By his Attorneys:
Blackmore, Spencer & Flint

Patented Mar. 12, 1929. 1,705,016

UNITED STATES PATENT OFFICE.

ROBERT K. JACK, OF LANSING, MICHIGAN, ASSIGNOR TO GENERAL MOTORS CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE.

PUMP CONSTRUCTION.

Application filed September 2, 1921. Serial No. 497,958.

The invention relates to cooling systems for internal combustion engines and is more particularly concerned with the details of construction and mounting of a rotary pump for use in such systems and the packing means therefor.

One of the objects of the invention is to provide an improved pump construction simple and inexpensive in manufacture and assembly and durable and efficient in operation.

A further object is to provide an improved packing of especial utility in connection with a pump shaft or the like and adapted to prevent leakage of liquid along the shaft.

Further objects and advantages will appear from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is an elevation, partly in section, showing one embodiment of the invention;

Figs. 2 and 3 are respectively a side and an end elevation of a spacer or washer employed in connection with the invention;

Fig. 4 is an end elevation of a packing adjusting nut; and

Fig. 5 is a section on line 5—5 of Fig. 4.

Referring to the drawings, 10 indicates a casing or plate member adapted to be attached to form a closure for the front end of a crank casing of an internal combustion engine (not shown), the crank shaft of which may be positioned as indicated at 11. The casing member 10 is formed upon its opposite sides with supporting sleeves 12, 12′, in alignment with each other and adapted to receive extensions from pump casings 14, 14′, one of which extensions is shown at 13, bolts or screws 15 serving to secure the pump casings to the crank case cover 10. Bushings 16, 16′ mounted in the extension sleeves 13 provide bearings for the pump shaft 17 arranged transversely of the engine and driven in any suitable manner as by a gear 18 on the crank shaft meshing with a gear 19 on the pump shaft.

The pump casing members 14, 14′ are formed as is usual in pumps of the centrifugal type, with peripheral channel 20 discharging at 21 through the outlet pipes 22 or 22′ which outlet pipes may lead respectively to the cooling systems of the two blocks of a V-type engine. Pump cover plates 23, 23′ having inlet pipes 24, 24′ leading from a suitable source of liquid supply, as from a radiator, are secured to the outer faces of the pump casings 14, 14′, and enclose, between the cover and casing, pump chambers, as indicated at 25.

Mounted within the chamber 25 is the impeller 26 secured to the end of the shaft 17 to rotate therewith, as by Woodruff keys, and held from endwise movement by a cap or washer 27 fastened to the end of the shaft by set screw 28. Passages 29 within the body of the impeller deliver liquid to the passage 20 at the periphery of the casing, the liquid entering the passages 29 adjacent to the hub of the impeller, as at 30, from the interior of cover 23.

In order to facilitate the manufacture and assembly of the parts, I prefer to provide a slight clearance between the impeller and the parts of the casing and cover, so that no accurate machining or fitting is necessary. This results, of course, in escape of liquid more or less freely around the periphery of the impeller into the chamber 25 and means is provided to prevent discharge of liquid along the shaft and into the interior of the crank casing. This means comprises, in the embodiment shown, packing 31 within the sleeve extension 13 and retained between the end of bushing 16 and an adjusting gland or sleeve nut 32 screw-threaded on its exterior to engage with a screw-threaded interior portion of the extension 13.

In order to provide for the insertion, removal, or adjustment of the sleeve nut 32, I have designed a combined sealing washer, spacer, and adjusting device 33 adapted to be positioned around the shaft 17 at the outer end of the packing chamber in the pump casing. This spacer is formed with a flange 34 which seats on the face of the casing around the packing chamber, being retained against the casing by pressure of water in chamber 25. Notches 35, or equivalent means, may be provided to facilitate engagement with a suitable tool in order to rotate the spacer. Teeth 36 are formed on the inner face of the spacer, which teeth are adapted to fit in slots 37 in the outer end of nut 32, thus providing a connection between the spacer and the nut which permits relative movement of the two axially of the shaft but prevents relative rotation. It will be seen, therefore, that by rotation of the spacer 33 the packing gland or nut 32 may be adjusted in or out at will without changing the position of the spacer axially of the shaft.

The shaft 17 may be provided, if desired,

with a spiral groove 38 arranged to cause movement of liquid outwardly from the packing, and drainage passages may be arranged inward of the packing, as at 39, to trap and remove from the casing any liquid that might pass the packing.

In order to provide for the drainage, when desired, of the pumps and of the entire cooling system of which the pumps form a part, a drain cock may be connected to one of the pump supply conduits, as at 40, the conduit from the radiator to the pump being the lowest point of the system. The drainage of liquid from the lower portion of the pump casing is effected by providing a restricted opening or by-pass 41 from the lower part of the peripheral channel 20 to the intake or supply conduit.

It will be understood that the details of the pump within casing 14' will be counterparts of those shown on the left side of Fig. 1 and herein described. It is deemed unnecessary therefore to describe in detail the construction of the second pump.

Variations in details of construction may be made without departing from the spirit and scope of the invention and therefore I do not wish to be limited to the specific construction shown except as required by the language of the appended claims in view of the prior art.

I claim:

1. In packing devices for rotary pumps the combination with a pump shaft, an impeller mounted thereon and a casing in which said impeller is positioned and into which said shaft extends, of packing surrounding said shaft, a gland adapted by rotation to compress said packing, and a collar rotatably mounted on said shaft between the impeller and the casing to engage the latter and having a portion engaging the gland to rotate the gland.

2. In packing devices for rotary pumps the combination with a pump shaft, an impeller mounted thereon and a casing in which said impeller is positioned and into which said shaft extends, of packing surrounding said shaft, a gland in screw-threaded engagement with said casing and adapted by rotation to compress said packing, and a sealing washer surrounding said shaft and so positioned between said impeller and said casing as to obstruct access of liquid from said casing to said gland, said washer and gland provided with inter-engaging parts whereby rotation of the washer causes rotation of the gland.

3. In packing devices for pump shafts or the like, a casing having a chamber for liquid under pressure, a shaft entering said chamber, a packing space being provided around said shaft and opening into said chamber, packing in said space surrounding said shaft, a gland adapted to compress said packing and a washer surrounding said shaft and positioned to seal the open end of said packing space, means being provided whereby rotation of said washer effects movement of said gland to compress said packing.

In testimony whereof I affix my signature.

ROBERT K. JACK.