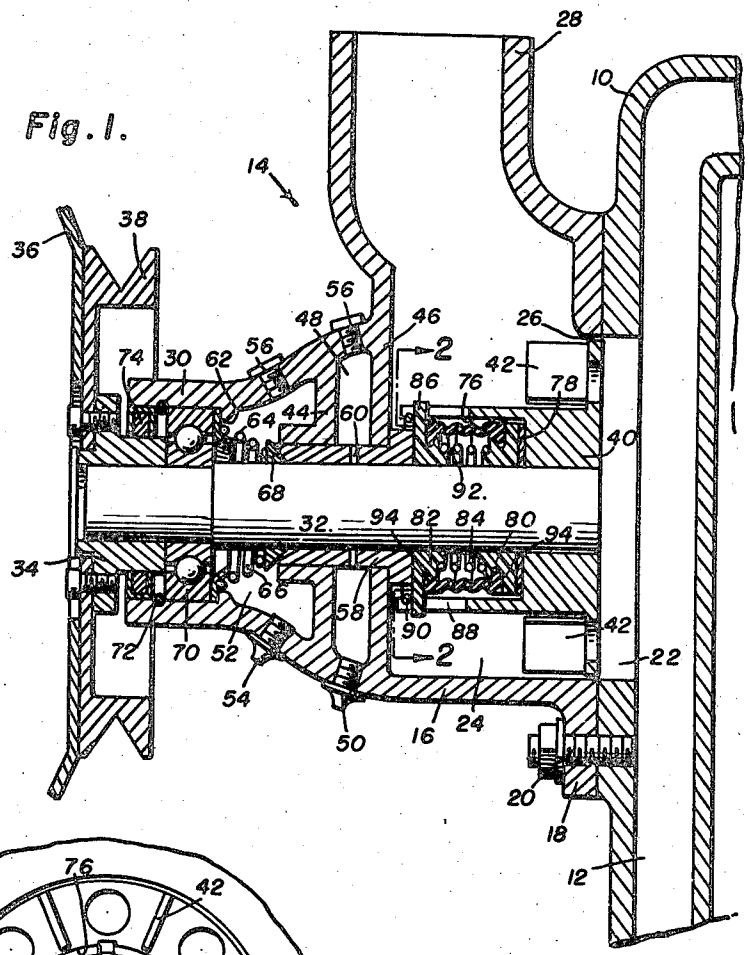
Oct. 26, 1948. J. H. ROBERTS 2,452,261

PUMP PACKING MEANS

Filed May 9, 1947

Fig. 1.



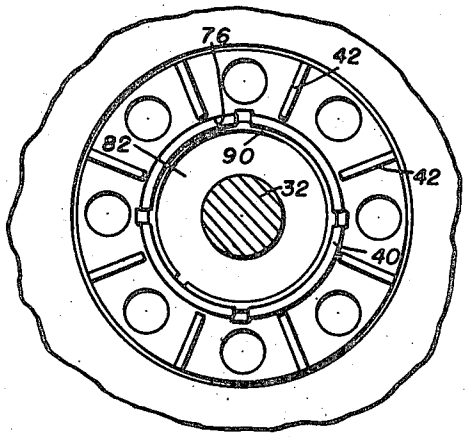


Fig. 2.

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PUMP PACKING MEANS

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4 Claims. (Cl. 103—103)

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This invention consists of novel and useful improvements in a pump packing means and more specifically pertains to a seal and packing means for pumps such as the cooling water pumps of internal combustion engine cooling systems.

The principal object of this invention is to provide an improved and highly efficient fluid-tight sealing means for the impeller shafts of water pumps.

An important purpose of the invention is to provide an impeller shaft sealing means which is carried by and housed within the hub of a pump impeller.

Yet another purpose of the invention is to provide a sealing means wherein ample provision is made for allowing expansion of the seal to maintain effectively its intended function despite wear of the associated parts.

And a final object of the invention to be specifically enumerated herein, resides in providing a pump sealing and packing construction which shall be of light weight, compact, and highly efficient for the purposes intended.

These, together with various ancillary objects of the invention which will later become apparent as the following description proceeds, are attained by this device, a preferred embodiment of which has been illustrated, by way of example only, in the accompanying drawings; wherein:

Figure 1 is a vertical sectional view through the improved pump construction showing the mounting of the same upon a portion of an internal combustion engine cooling system; and,

Figure 2 is a fragmentary enlarged detail view taken in vertical transverse section substantially upon the plane of the section line 2—2 of Figure 1.

Referring now more specifically to the accompanying drawings, wherein like numerals indicate similar parts throughout the various views, there is disclosed generally at 10 a portion of an engine cooling system which may for example, include the water jacket cooling passages 12 of a cylinder block, to which the instant invention, designated generally at 14 is detachably engaged.

As in my prior patent, No. 2,129,069, patented on September 6, 1938, this invention is illustrated in the construction of a conventional type of water pump having a pump casing 16 whose flanged portion 18 is detachably connected as by fastening means 20 to a suitable seat adjacent the aperture 22 of the passage 12 of a water cooling system of an internal combustion engine. The casting 16 is provided with a pump impeller chamber 24 which communicates with the above mentioned aperture 22 of the engine cooling jacket through an opening 26, and which is provided with an outlet 28 intended to receive the conventional cooling hose, not shown, connecting the pump with the radiator, or other associated part of the internal combustion engine or other cooling system.

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At its outer extremity, the casing 16 is tapered into a cylindrical end portion 30. Suitably journalled in the casing 16 in a manner to be subsequently set forth, is a pump impeller shaft 32 upon whose reduced outer extremity is suitably secured the hub 34 carrying a conventional engine cooling fan a portion of which is indicated at 36, and a driving pulley 38 of known design.

At its inner extremity, the impeller shaft 32 has rigidly attached thereto in any conventional manner, the hub 40 of a pump impeller having vanes or blades 42, and whose outer surface terminates substantially flush with the mating surfaces of the flange 18 and the engine cooling jacket 10.

Intermediate the ends of the casing 16, there are provided a pair of transverse partitions 44 and 46, longitudinally spaced from each other to provide a chamber 48 to which lubricant is supplied as by a fitting 50. Within the casing 16, between the reduced terminal portion 30 and the partition 44, is a second lubricant retaining chamber 52, having a lubricating inlet means 54. Suitable safety valves 56 are provided in each of the chambers 52 and 48 to release excess pressure therefrom.

A suitable journal bushing 58, preferably of bronze, is inserted into the partitions 44 and 46 from the chamber 24, for journalling the impeller shaft 32 intermediate its extremities, and this bushing is provided with a plurality of bores 60 whereby lubricant of the chamber 48 may be conducted to the surface of the impeller shaft 32. The reduced portion 30 of the casing 16 is provided at its extremity with a tubular bore terminating in an annular shoulder 62, against which is seated a flanged spring retainer 64 constituting a seat for one end of a spring 66 whose other extremity urges a conical shaped packing 68 into a packing seat recess in the outer end of the bushing 58.

Abutting against the spring seat 64, is a ball bearing assembly 70 which journals the outer reduced extremity of the impeller shaft 32, which bearing assembly is retained as by a locking ring 72 of known construction. A sealing ring or

means 74 is inserted in the bore of the reduced portion of the casing 30 at the outer extremity thereof for excluding the ingress of dirt or other matter into the ball bearing assembly, and preventing the escape of lubricant therefrom.

The hub 40 of the impeller is provided with a bore 76 within which is seated a sealing means 78 of soft deformable material such as rubber or the like. This deformable sealing means is intended to tightly and snugly engage the impeller shaft 32 and the impeller hub 40, to form an effective sealing means at this point. A pair of thrust bearings preferably of Bakelite or other similar material are provided at 80 and 82, the former abutting and pressing against the deformable sealing washer 78 and the latter preferably abutting against the bushing 58. A spring means 84 is interposed between these thrust bushings and is seated by its annular end convolutions upon annular grooves in reduced shoulders upon adjacent surfaces thereof, this spring serving to retain the bushings or collars as a unitary assembly, to press the thrust bushing 82 in tight sealing engagement with the bushing 58, and also urging the thrust bushing 80 into engagement with washer 78, thereby deforming the latter into tight sealing engagement as above mentioned.

The thrust bushing 80 is completely housed within the bore 76, while the bushing 82 has laterally extending arms 86 which are received within and are slidably guided in diametrically disposed longitudinally extended slots 88 in the hub 40. A locking ring 90 of known construction is detachably engaged in a groove in the bore 76 at its outer extremity, to engage the arms 86 and thereby retain the packing assembly comprising the thrust bushings 80, 82 and the spring means 84 as a unitary assembly within the hollow interior of the pump impeller 40.

In order to protect the above mentioned sealing parts, from damage by water or other coolant employed in the cooling system, a flexible bellows-type sealing member of rubber or other material indicated at 92 is provided with a retaining means 94 which as shown consists of annular flanges, inturned at the outer extremities thereof for sealing and seating engagement in corresponding external grooves formed in the sealing members 80 and 82.

The sealing arrangement is such that the spring means 84 urges the Bakelite thrust washers 80 and 82 into endwise sealing engagement with the impeller hub and the bushing 58 respectively, while the flexible cover means 92 encloses and protects the same, while permitting relative longitudinal movement of the parts to compensate for wear as abrasion or erosion occurs.

From the foregoing, it is believed that the construction of the device will be readily understood. In operation, this construction provides a pair of spaced bearings for an impeller shaft of a pump, and further provides an anti-friction means at the driving end of the impeller shaft to accommodate and withstand the vibrations and bending movements occasioned by the driving pulley 38 and the fan 36 mounted thereon. In addition to the sealing means 74 at the outer extremity of the pump shaft assembly, there has been provided a second packing means 68 between the anti-friction bearings 70 and the journal bearings 58, while a third packing means assembly is provided between the pump impeller, the impeller shaft and the bearing 58, within the pump chamber 52.

It will thus be readily seen that any danger of leakage of the coolant from the pump assembly has been greatly minimized, that adequate lubricating means has been provided in a compact manner for the impeller shaft and that a double seal has been established between the impeller, and the bearing 58 which sealing means is protected and encased in a waterproof covering.

Since numerous modifications will be readily apparent to those skilled in the art after a consideration of the foregoing specification and attached drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications may be resorted to falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. In a pump assembly having a casing, a pump chamber in said casing, an impeller shaft journaled in said casing and an impeller hub carried by said shaft in said chamber, the combination of the walls of an open ended recess in said hub, a journal for said shaft extending into said recess, a packing assembly in said recess and surrounding said shaft, said packing assembly including spaced collars surrounding said shaft, radially and axially extensible means connecting said collars for retaining them in a unitary expansible assembly, said collars having shoulders extending towards each other, grooves on said shoulders, said extensible means having annular portions yieldingly engaged in said grooves.

2. The combination of claim 1 wherein said extensible means comprises a coil spring having its end convolutions comprising said annular portions.

3. The combination of claim 2 including a radially and axially flexible housing surrounding said spring, the ends of said housing having internal flanges, a second groove in each shoulder, said flanges resiliently seating in said second groove.

4. The combination of claim 1 wherein said extensible means includes a flexible housing having internal flanges at its ends, said flanges resiliently seating in said grooves.

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