

March 25, 1930.

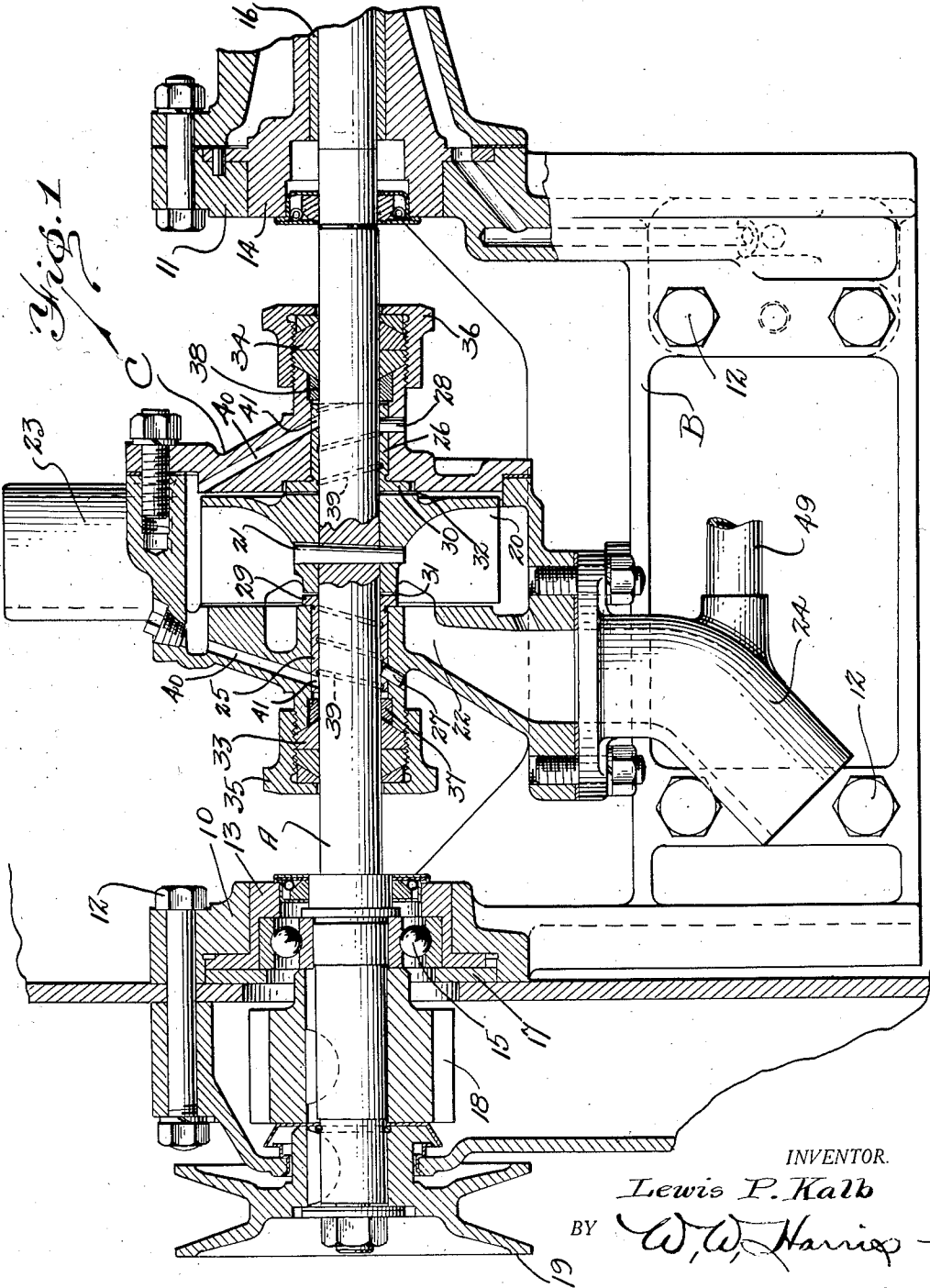
L. P. KALB

1,752,006

PUMP

Filed Oct. 8, 1927

2 Sheets-Sheet 1



INVENTOR.

Lewis P. Kalb

BY

W. W. Harris

ATTORNEY.

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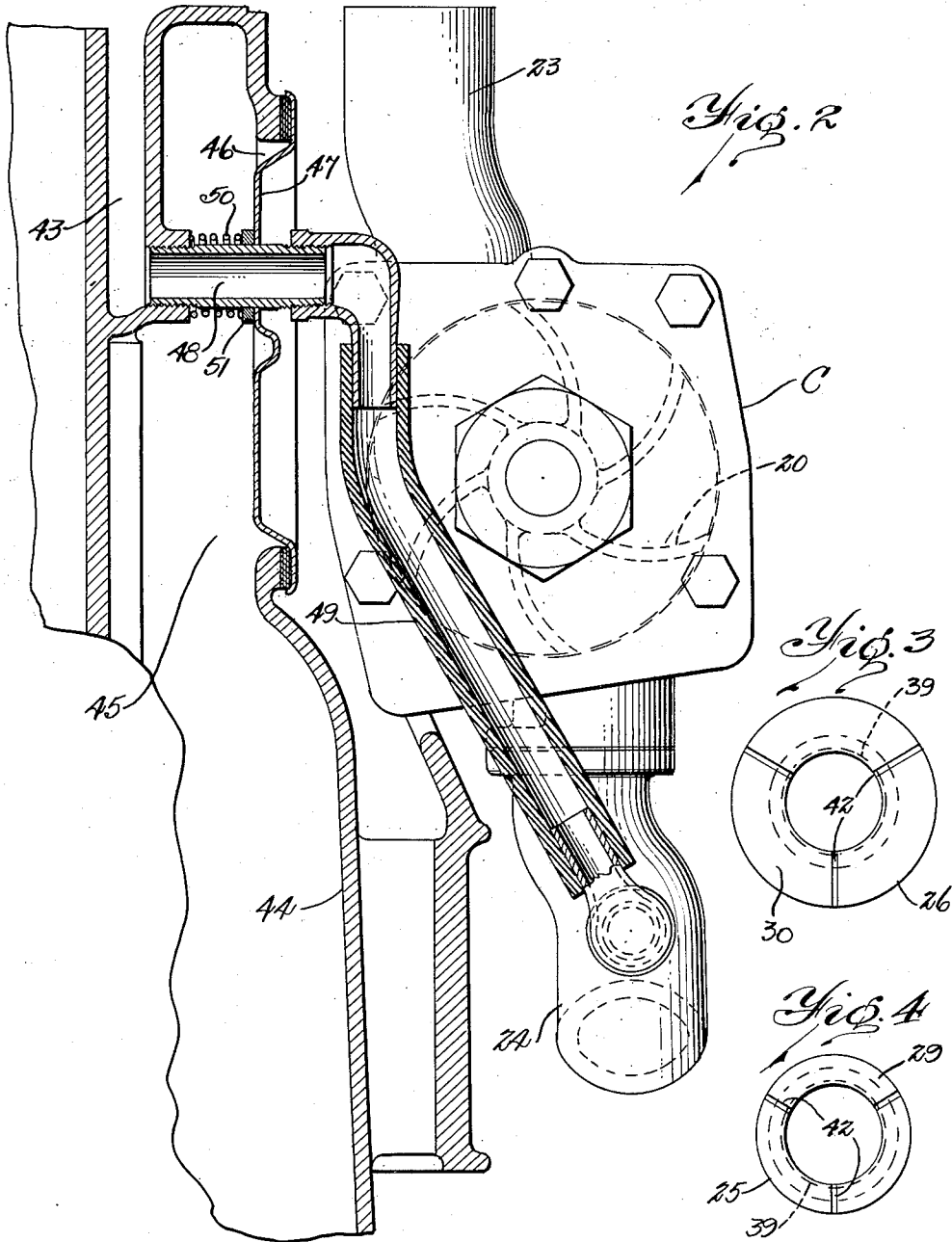
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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PUMP

Application filed October 8, 1927. Serial No. 224,809.

This invention relates to pumps and more particularly to water pumps such as are used in water circulating cooling systems for internal combustion engines.

One object of my invention resides in a pump construction including a pump bushing provided with a water film bearing for the pump shaft for improving the wearing qualities of the contacting surfaces. A further object is to provide a pump construction which will avoid undue pump shaft misalignment, leakage and pump failures.

A still further feature of my invention resides in the provision of an improved cylinder water jacket drain and crank case oil vapor seal.

In carrying out the objects of my invention I have provided among other things, a pump shaft having definitely aligned bearings, together with a pump housing adapted to float relatively to the impeller fixed with the pump shaft. In this manner any pressures from the packing glands tending to unequally load the pump shaft bearings is compensated for by reason of the floating nature of the pump housing.

Additional objects and advantages of my invention will be apparent as the description of my invention progresses.

In the drawings in which like reference characters indicate corresponding parts,

Fig. 1 is a sectional elevation view of my improved pump construction,

Fig. 2 is an elevation view partly in section showing the cylinder water jacket drain,

Fig. 3 is an elevation view of one of the pump shaft water seal bushings, and

Fig. 4 is a similar view of the other pump shaft water seal bushing.

In the drawings reference character A represents the pump shaft rotatably mounted in spaced bearings 10 and 11. These bearings are preferably integrally carried by a frame B supported by studs 12 to the engine structure. The bearings 10 and 11 further are of equal diameter so that they may be conveniently machined in a single operation, assuring accurate alignment of the shaft A. The bearings 10 and 11 respectively carry bushings 13 and 14, the former as illustrated being

provided with the ball bearing structure 15 and the latter with the inner bushing 16. The ball bearing structure 15 is preferably fixed against axial movement by the bushing 13 and an annular plate 17 while the bushing 16 is capable of a limited amount of axial travel to compensate for any ordinary manufacturing differences in shaft and frame lengths. The shaft A may be driven by a gear 18 from the usual crankshaft (not shown) and may further carry the driving fan pulley 19 if desired.

An impeller 20 is fixed to the shaft A as by a pin 21 so as to be driven thereby. Enclosing the impeller is a pump housing C having an impeller inlet conduit 22 and an impeller outlet 23, the former communicating by a pipe 24 with the water outlet of the usual cooling radiator (not shown) and the latter communicating with the engine water jackets. The pump housing C is fixed relative to the shaft A and rotatably receives the shaft A by the pump housing bushings 25 and 26 spaced on opposite sides of the pump housing. The bushings 25 and 26 are respectively fixed to the pump housing by pins 27 and 28. These pump housing bushings preferably have inwardly flanged ends 29 and 30, a small amount of clearance 31 and 32 being provided between the respective flanges 29 and 30 and the adjacent ends of the impeller 20. Thus the pump housing C is capable of a small amount of movement axially of the shaft A with respect to the shaft and impeller, the reasons for which will be presently apparent. The ends of the pump housing are sealed about the shaft A by the packing glands 33 and 34 adapted to receive pressure by the nuts 35 and 36 respectively. If desired bronze bushings 37 and 38 may be introduced between the glands 33, 34 and the bushings 25, 26 respectively.

Heretofore in pump constructions of this general character the pump shaft bearings became unequally loaded owing to shaft distortion caused by unequal pressures on the pump shaft from the packing glands.

In tightening the packing nuts for packing glands it frequently happened that the gland exerted a non-uniform pressure on the

pump shaft and in constructions common heretofore such unequal loading caused shaft distortion leading to bearing wear, pump leakage, and general pump failure. With my invention the shaft bearings are definitely aligned and any tendency toward shaft distortion and unequal bearing loading is compensated for by movement or adjustment of the pump housing relatively to the pump shaft and impeller.

A further feature of my invention resides in the provision of means for forming a film of water between the bushings 25, 26 and the shaft A, whereby the wearing qualities of the contacting surfaces of the shaft and bushings will be materially improved.

To this end these bushings are each spirally grooved to form a water conduit 39 receiving water from the pressure side of the pump through the pump housing passages 40 and registering bushing inlet passages 41. The outlet for the conduits 39 may be constructed as best shown in Figs. 3 and 4, wherein one or a plurality of radial passages 42 are formed in the flanged faces of the respective bushings, the passages 42 communicating with the low pressure region of the impeller. By reason of such a construction a constant film of water is maintained between the bushings 25, 26 and shaft A, serving to preserve the bearing surfaces of the shaft and bushing whereby the life of these parts is materially prolonged.

Referring to Fig. 2 of the drawings, 43 indicates the cylinder water jacket, 44 the engine crankcase, and 45 the usual crankcase chamber ordinarily provided with an opening 46 closed by a side cover 47. Threaded into the jacket 43 at the lower portion thereof is a conduit 48, connected with the piping 49 leading to the pump inlet 24 as shown in Fig. 1. With such a system the cylinder jacket 43 may be conveniently drained through the pipe 24 when the usual radiator drain valve (not shown) is opened as will be readily understood.

Surrounding the conduit 48 is a spring 50 acting against the sealing washer 51 maintaining a seal against the escape of crankcase vapor from the chamber 45 past the conduit 48.

What I claim as my invention is:

1. A pump comprising a drive shaft, spaced aligned bearings rotatably supporting said shaft, an impeller fixed to the drive shaft intermediate said bearings, a pump housing surrounding said impeller, said pump housing being constructed and arranged so as to float on said shaft relative to said shaft bearing.

2. A pump comprising a drive shaft, spaced aligned bearings rotatably supporting said shaft, an impeller fixed to the drive shaft intermediate said bearings, a pump housing surrounding said impeller, said

pump housing being capable of movement axially of the shaft relative to said shaft bearing and independently of the impeller.

3. A pump comprising a drive shaft, spaced aligned bearings rotatably supporting said shaft, an impeller fixed to the drive shaft intermediate said bearings, a pump housing surrounding said impeller, packing means between the shaft and one end of the pump housing, means for applying pressure to the packing means, said pump housing being movable axially of the shaft relative to said shaft bearing and independently of the impeller to relieve the shaft bearings of loading from the packing means.

4. A pump comprising a shaft, bearing means rotatably supporting said shaft, an impeller fixed to the shaft, a pump housing, a pressure packing for the shaft and pump housing, said pump housing being constructed and arranged to yield under action from the pressure packing relative to said bearing means so as to relieve the bearing means of loading from the pressure packing.

5. A pump comprising a drive shaft, spaced aligned bearings rotatably supporting said shaft, an impeller fixed to the drive shaft intermediate said bearings, a pump housing surrounding said impeller, packing glands for said shaft and pump housing on opposite sides of said impeller, and nuts for applying pressure to the packing glands, said housing being spaced slightly from said impeller in the direction of the shaft axis permitting axial movement of the pump housing relative to the impeller and relative to said shaft bearings.

6. A pump comprising a shaft, a frame integrally provided with aligned spaced bearings for the shaft, an impeller fixed to the shaft intermediate the bearings, a pump housing separate from the frame and enclosing the impeller, packing means for the shaft and housing intermediate each bearing and the impeller, and water inlet and outlet means for the impeller.

7. A pump comprising a shaft, a frame integrally provided with spaced aligned bearings jouralling the shaft, an impeller secured to the shaft intermediate the said bearings, a housing enclosing the impeller, said housing being separate from said frame and movable relative thereto axially of the shaft, and packing means intermediate the shaft and housing.

In witness whereof, I hereunto subscribe my name this 4th day of October, A. D. 1927.

LEWIS P. KALB.