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WATER PUMP PACKING

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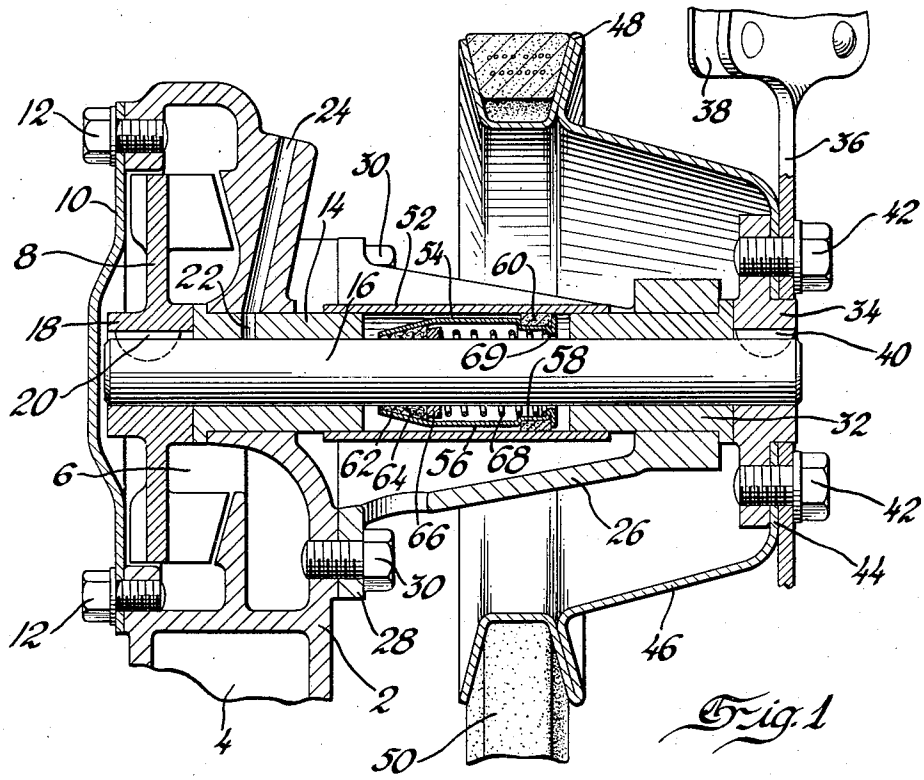


Fig. 1

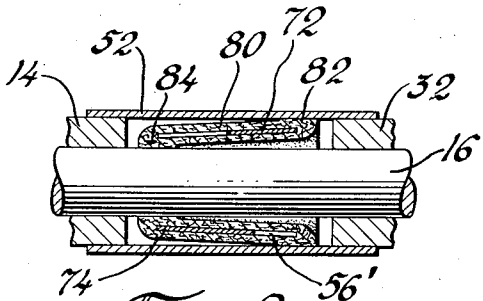


Fig. 2

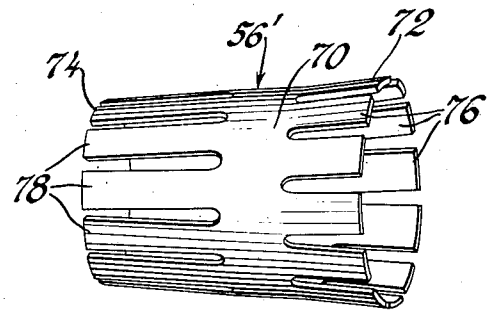


Fig. 3

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WATER PUMP PACKING

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4 Claims. (Cl. 286—5)

This invention relates to water pump packings and particularly to the water pump packings associated with the water pump used in connection with the internal combustion engines of automotive vehicles.

It is the object of the invention to construct an inexpensive, efficient water pump packing which may be inserted on the water pump shaft as a unit and will need no further attention throughout the life of the automobile.

The invention consists essentially of a sleeve which surrounds the water pump shaft and is positioned between the two end bearings on which the shaft rotates. The sleeve has attached thereto at its two ends, packing elements which press inwardly against the shaft and outwardly against a cylinder which connects the two bearings. The seal is so arranged that the packing members thereof are constantly urged against the surfaces with which they form the seal.

Experience has shown that a water pump shaft will not rotate perfectly on its axis in the two bearings but owing to the fact that a small amount of clearance is necessary between all shafts and their bearings, this small amount of clearance or play will enable the shaft to wabble as a whole about a point or center between the two bearings, the limit of the wabble being confined to the clearance between the shaft and bearings. This wabble of the shaft causes excessive wear on the usual type of packing and it is one of the objects of the invention to make a seal which will not be affected by shaft wabble. The seal is so designed that it will move as a whole with the shaft as it wabbles or moves bodily.

On the drawing

Figure 1 is a sectional view through the water pump and water pump drive of an internal combustion engine of an automotive vehicle.

Figure 2 is a sectional view through the water pump seal showing a modified form of the invention.

Figure 3 is an enlarged perspective view of the metallic sleeve of Figure 2.

Referring to the drawing, the numeral 2 indicates the cast water pump housing which has the inlet 4 which may be suitably curved and have an attaching flange (not shown) by means of which it is secured to the engine block of the automotive vehicle. The housing or casting 2 is hollow as indicated at 6 and has the pump rotor 8 mounted therein. The housing is closed by the cover 10 secured in place by the machine bolts 12. The casting has an opening at one side in which there is mounted the bearing 14, in which there is rotatably received the water pump shaft 16. The hub 18 of the rotor 8 is secured to the end of the shaft 16 by means of the key 20. The bearing 14 has the lubricant groove 22 which mates with a lubricant groove 24 in the casting 2. A suitable grease cup (not shown) may be secured to the mouth of the passage 24.

A second casting (or forging) 26 has a flange 28 fitting against the outer side of the casting 2. The casting 26 is secured to the casting 2 by means of the machine bolts 30. The extremity of the member 26 has the bearing 32 mounted therein in which there is rotatably received the other end of the shaft 16. To the end of the shaft 16 there is secured the hub 34 of a fan 36 the blades of which are shown at 38. The hub 34 is secured to the shaft by means of the key 40 and the fan 36 is secured to the hub by means of the machine bolts 42.

Secured between the fan 36 and the hub 34 is the flange 44 of a cup shaped member 46 having a fan belt pulley 48 formed at the end thereof. The fan belt pulley 48 is grooved as shown and the fan belt 50 operates therein. The fan belt 50 is driven from the engine in the usual way.

The two bearings 14 and 32 are spaced and have their adjacent extremities connected by a cylinder 52. The cylinder 52 fits over the ends of the bearings 14 and 32 and may be secured to the bearing 14 in liquid tight relation, but it preferably has a slip fit with both bearings.

Between the ends of the bearings 14 and 32 and inside the cylinder 52 the water pump seal 54 of the engine is applied. The seal includes the sleeve 56 the outer end of which is formed into an annular groove 58 in which there is received the packing 60. The packing 60, when it is in the position shown in Figure 1, is tightly compressed and pushes outwardly against the inside of the cylinder 52.

The other end of the sleeve 56 is tapered or formed into truncated cone shape as shown at 62 with the smaller end of the cone closer to the shaft 16. If desired, the sleeve 54 may be tapered for its entire length. A packing element 64 fits between the shaft in the conical part 62 to form a water tight seal with the shaft 16. A follower 66 is positioned at the end of the packing 64 and is considerably smaller than the sleeve 54. A spring 68 is under compression and held between the follower 66 and a flanged rib 69 formed at the other end of the sleeve 56. The spring constantly urges the follower 66

against the packing 64 to insure a tight fit and prevent the leakage of water.

The operation of the seal is as follows: as the pump draws the water from the inlet and forces it out at the outlet the space 6 in which the rotor 8 operates is full of water and in time a slight leakage may occur between the shaft 16 and the bearing 14. The water will reach the end of the bearing 14 and will be prevented from going any farther because of the water seal formed by the packing 60 with the shaft 16 and the second seal formed by the packing 60 with the inside of the cylinder 52.

Figure 2 shows a different type of seal but accomplishes the same object. Except for the different type of seal, the parts are the same. The sleeve 56' is best shown in perspective in Figure 3 and comprises the center solid cylindrical part 70, the wide end part 72 and the narrow end part 74. The end part 72 is formed into fingers 76 while the end part 74 is formed into fingers 78. The fingers 76 are preferably bent outwardly, while the fingers 78 are bent inwardly. Each of the fingers 76 and 78 has considerable spring tension thereto and will resist bending to light pressures. The element 56' is therefore more or less in the shape of a truncated cone.

Around the element 56' and completely surrounding it there is formed the packing 80. The packing 80 has the flat peripheral outer part 82, and the inner cylindrical part 84, which press against the inside of the cylinder 52, and against the outside of the shaft 16, respectively, to form a water tight seal. The packing or fabric 80 surrounds the element 56' and the water pump shaft and is impermeable to water and because of the spring tension of the fingers 76 and 78 the flat cylindrical part 82 is pressed outwardly against the cylinder 52 and the inner cylindrical part 74 is pressed inwardly against the shaft to form a water tight seal. When the completed packing as shown in Figure 2 is slipped over the shaft, the fingers 78 are spread and their spring tension urges them toward the shaft. On the other hand, the forcing of the fingers 76 and the part 82 in the cylinder 52 compresses the fingers 76 and the packing so that the tendency of the spring fingers 76 to expand will hold the packing tightly against the inside of the cylinder 52.

In the species of Figure 1 the metallic sleeve 56 is capable of following the wabbling or bodily movements of the shaft 16. The packing 60 at the one end may be considered as the pivotal part for the conical end 62. When the shaft 16 wabbles the seal 54 will partake of the wabbling movement. The conical end 62 will describe the shaft's movement and move about the interface contact between the packing 60 and the interior of the cylinder 52 as a fulcrum. In thus enabling the seal as a whole to move bodily with the shaft, no excessive pressure of the packing 64 against the shaft 16 is required. In applying the packing 64, its inside diameter is made the same as or slightly larger than the diameter of the shaft so as not to have a great pressure, for the inherent ability of a packing to accommodate itself within narrow limits to the shape of its confining walls will enable the packing lightly to contact the shaft after a short period of use. The light pressure of the spring 68 on the follower 66 will maintain this light pressure contact between the packing 64 and the shaft 16 and prevent the burning out of the packing due to excessive friction between the shaft and packing.

The species of Figure 2 has the same characterstics. The end at 84 will partake of the wabbling movement of the shaft 16, pivoting or moving about the contact face at 82.

I claim:

1. In a water pump seal, a rotatable shaft, spaced bearings in which the shaft rotates, a cylinder fitting over both bearings, said seal being positioned between said bearings to prevent water from passing beyond one of the bearings, said seal comprising an elongated metal sleeve surrounding the shaft and enclosed by the cylinder, a groove at one end of the sleeve, a packing in the groove bearing against the inside of the cylinder, packing in the sleeve at the other end thereof, and means in the sleeve and retained thereby and wedging said packing between the sleeve and the shaft to form a water tight seal.

2. In a water pump seal, a rotatable shaft, spaced bearings in which the shaft rotates, a cylinder fitting over both bearings, said seal being positioned between said bearings to prevent water from passing beyond one of the bearings, said seal comprising an elongated metal sleeve surrounding the shaft and enclosed by the cylinder, a groove at one end of the sleeve, packing in the groove bearing against the inside of the cylinder, the other end of said sleeve having a conical shape, packing in the cone between the sleeve and the shaft, and a spring in the sleeve and retained thereby and constantly wedging the last named packing between the shaft and the cone to form a water tight seal.

3. In a water pump seal, a rotatable shaft, spaced bearings in which the shaft rotates, a cylinder fitting over the ends of both bearings, said seal being positioned in the cylinder and between the bearings to prevent water from passing beyond one of the bearings and comprising an elongated tapered sleeve, a packing surrounding the sleeve, said sleeve being positioned between the bearings and surrounding the shaft and enclosed by the cylinder, the larger end of said sleeve and packing bearing against the inside of the cylinder, the smaller end of said sleeve and packing bearing against the shaft to form water tight seals, the metal of said sleeve being solid and the ends of said sleeve being formed into fingers to give a spring action thereto to cause the packing to be tightly pressed against the cylinder and shaft.

4. In a water pump seal, a rotatable shaft, spaced bearings in which the shaft rotates, a cylinder fitting over the ends of both bearings, said seal being positioned in the cylinder and between the bearings to prevent water from passing beyond one of the bearings and comprising a sleeve surrounding the shaft and enclosed by the cylinder, the ends of said sleeve being formed into spring fingers, said fingers being outwardly bent at one end and inwardly bent at the other end of the sleeve, a packing surrounding and enclosing the sleeve, the larger end of the packing and sleeve pressing tightly against the inside of the cylinder, the smaller end of the sleeve and packing pressing tightly against the shaft.

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