

July 22, 1941.

C. S. BAILEY ET AL

2,249,930

WATER PUMP SEAL

Filed April 18, 1939

2 Sheets-Sheet 1

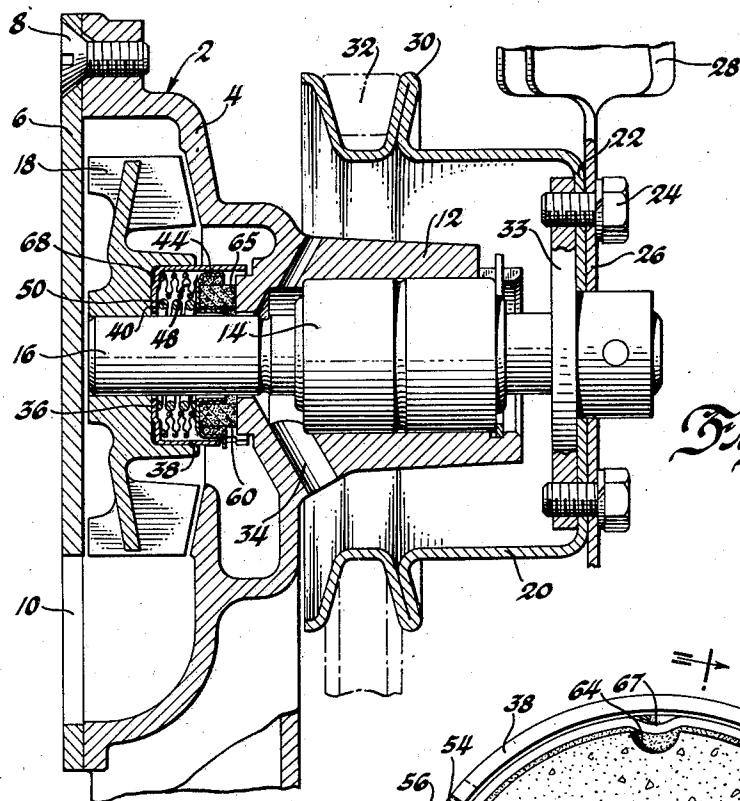


Fig. 1

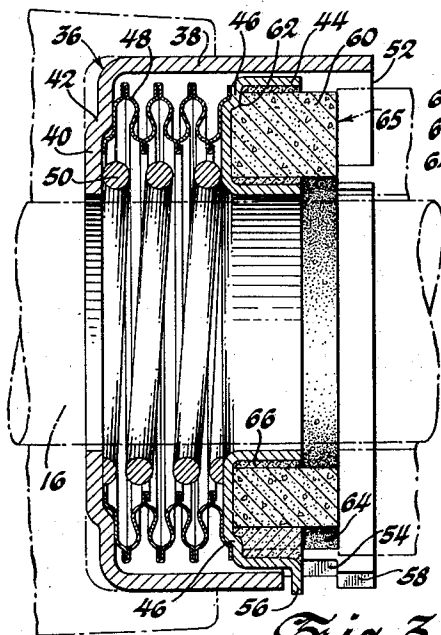


Fig. 3

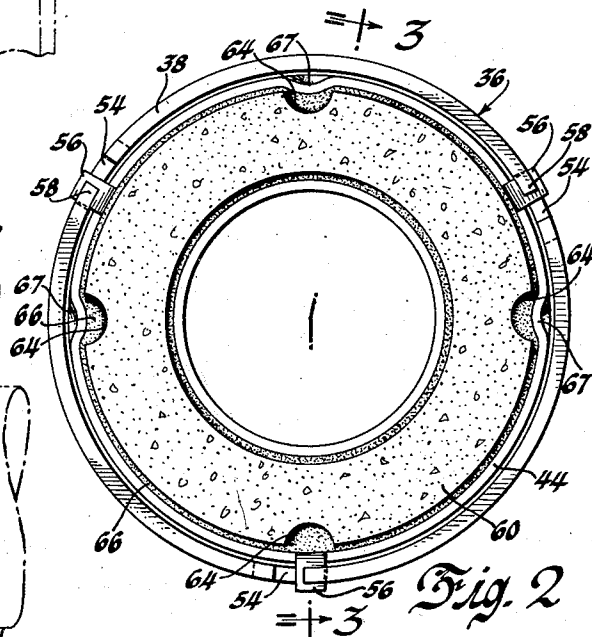


Fig. 2

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2 Sheets-Sheet 2

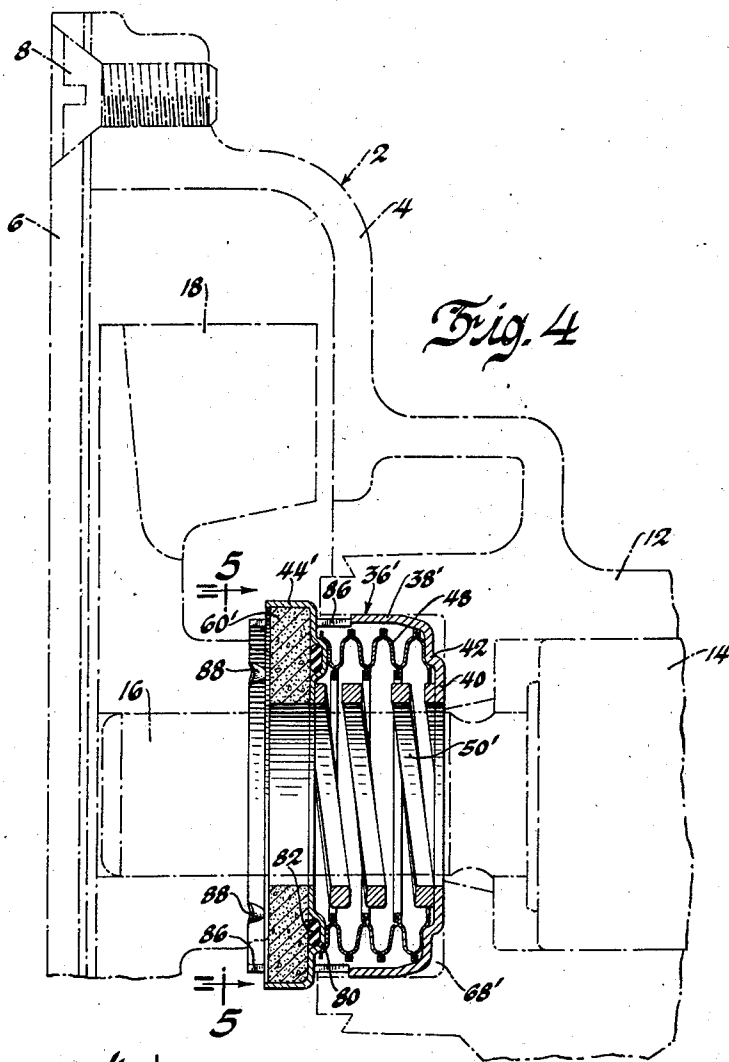


Fig. 4

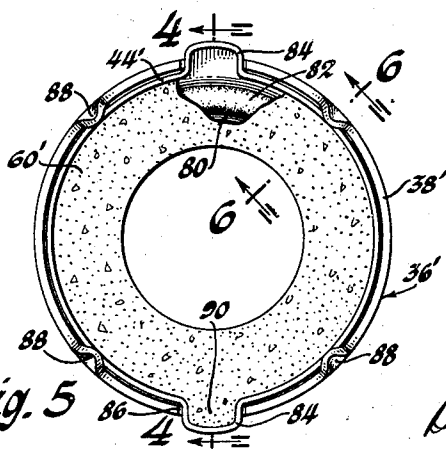


Fig. 5

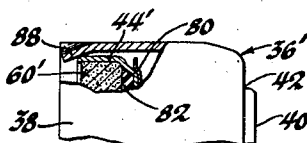


Fig. 6

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UNITED STATES PATENT OFFICE

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WATER PUMP SEAL

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4 Claims. (Cl. 286—11)

This invention relates to water pump seals as applied to the water pumps used on the internal combustion engines of automotive vehicles.

The object of the invention is to construct a seal which will have a long bearing life and which will form a very tight connection between the impeller of the water pump and its shaft to prevent any water from reaching the shaft bearings.

In one species of the invention the principal feature of the seal is the securing of the sealing member itself in a trough-shaped cup by means of a lead or solder filler between the cup and the sealing member.

In a second species the lead filler is omitted and the sealing member substantially fills the cup in which it is mounted. Lateral projections on the cup hold it in place and bent-in portions on the cup edge hold the sealing member in the cup.

On the drawings

Figure 1 is a sectional view through a water pump of an automotive vehicle showing one species of the invention applied.

Figure 2 is a view looking into the seal from the right of Figure 3 but with the shaft removed.

Figure 3 is an enlarged sectional detailed view of the seal taken on the line 3—3 of Figure 2.

Figures 4 and 5 are views similar to Figures 1 and 2 of a modification, the water pump being shown in dotted lines.

Figure 6 is a sectional detail of the species of Figures 4 and 5.

Referring to the drawings, the numeral 2 indicates as a whole the water pump of an internal combustion engine as used on automotive vehicles. The casing 4 of the pump is closed at one side by the plate 6 secured to the casing by means of the machine screws 8. This plate has an opening 10 for the exit of the water. An extension 12 in the casing projects rearwardly from the pump and receives a ball bearing 14 in which the shaft 16 rotates. The shaft 16 is driven from the engine in a known way and has the impeller 18 secured thereto, the impeller being confined in the housing 4.

The usual hub 20 for the fan belt is shown as secured by means of the flange 22 and the machine screws 24 to the hub 26 of the fan 28. The drum 20 has the grooved pulley 30 formed on the end thereof and in the pulley the fan belt 32 is received and drives the drum 20 from the usual fan pulley (not shown) driven from the usual crankshaft of the engine. The flange 22 and hub

20 are secured to the flange 33, which in turn is secured to the shaft 16.

The extension 12 of the housing 4 has the passage 34 at its bottom to allow the drainage of any water which may pass the seal indicated as a whole at 36.

The parts so far described are conventional and per se form no part of the invention.

The novel seal 36 of the invention comprises the outer shell 38, the bottom annular flange 40 of which has a central opening to receive the shaft 16. This bottom flange 40 is slightly offset between the edge of the shell and the opening as indicated at 42 in Figure 3. Inside the shell 38 there is positioned the annular cup 44 which is channel or trough-shaped in cross section. This cup 44 likewise has an offset part as indicated at 46. Between the bottom of the flange 40 and the bottom of the cup 44 a conventional metallic bellows 48 is positioned. The end wings of this bellows seat on the shoulders formed by the offsets 42 and 46 and are secured to the flange 40 and the bottom of the cup 44 in liquid tight relation. A coil spring 50 surrounds the shaft and is positioned between the bottom flange 40 of the shell 38 and the underside of the cup 44 and constantly urges the cup outwardly toward the mouth 52 of the shell 38.

By referring to Figure 2 it will be noted that the shell 38 has the bayonet slots 54 spaced 120° apart while the edge of the cup 44 has the outwardly projecting ears 56 which are adapted to be received in the slots 54, and by turning the cup the ears 56 will be received under the fingers 58 at the bayonet slots.

In the cup 44 there is positioned the thrust washer or sealing member 60 which may be made of carbon, Bakelite, fabric, or other suitable material. This sealing member 60 has its lower outer edge shaped to a rounded form as indicated at 62 to conform to the offset part 46 of the cup 44, and at points 90° apart the sealing member 60 is provided with the recesses 64. The sealing member is of ring shape and of course surrounds the shaft 16 and presses against the flat shoulder 66 formed on the housing 4. The sealing member is smaller than the cup and in order to hold it in the cup and fill the space between the cup and the sealing member a filler of metal 68 is poured or cast into the cup. The metal preferred is either lead or solder and this lead or solder will, of course, enter the recesses 64 as shown in Figure 2 and prevent the rotation of the seal with reference to the solder.

In order to hold the seal and solder tightly in

the cup 44 the edge of the cup at the recesses 64 is preferably inwardly pressed either entirely along its length or at the edge periphery of the cup only as shown at 67. This will cause the metal of the cup to press the lead inwardly and tightly against the side wall of the sealing element 60 rigidly to hold it in place.

In the operation of the pump the shaft 16 will rotate the impeller and from Figure 1 it will be noted that the impeller has a recess 68 in its hub part and in this recess the seal is received, the recess being of a size conveniently and tightly to hold the shell 38. As the impeller rotates it will move the seal therewith and the spring 50 pressing against the bottom of the cup 44 will hold the sealing element 60 tightly against the shoulder 65 to obtain a water tight connection. The soldered connection between the ends of the bellows 48 and the flange 40 and bottom of the cup 44 will prevent the water from passing the seal.

In the species of Sheet 2, Figures 4-6 inclusive, corresponding parts have been given the same numeral. In this species, however, the recess 68 is not in the impeller but in the pump housing 4. The seal 36' comprises the shell 38' having the bottom 40 and the shoulder 42. In the shell 38' there is the bellows 48 and the spring 50' and the spring and the bellows are in contact with the underside of the cup 44' which holds the sealing element 60'.

The cup 44' has the downwardly pressed channel ring 80 in which there is seated the rubber ring 82. The sealing element 60' compresses the ring 82 into flattened form as shown in Figure 4 when the seal is in position.

The cup 44' has the lateral projections or extensions 84 which project into cut-out parts 86 formed in the side of the shell 38'. The inter-engagement of the extensions 84 and the cut-out parts 86 prevent the cup from rotating relative to the shell. The sealing member 60' has the projections 90 which fit into the extensions 84 on the cup 44' and prevent the rotation of the sealing element relative to the cup.

The cup 44' and sealing element 60' are held in the shell 38' by means of the bent-in edge parts 88 as shown in Figure 6. Four of these bent-in parts are used.

In this second species the cup is not trough-shaped in cross section, but angle-shaped as is shown in Figure 4.

We claim:

1. In a seal for the water pump of the internal

combustion engine of an automotive vehicle, a shell, a cup in the shell, sealing means inter-connecting the cup and the shell, a circular groove in the bottom of the cup, a distortable ring positioned in the groove, and a sealing member mounted in the cup outside the groove and extending on both sides thereof and adapted to distort the ring when pressure is applied to the sealing members.

2. In a seal for the water pump of the internal combustion engine of an automotive vehicle, a shell, a cup in the shell, sealing means inter-connecting the cup and the shell, said shell having cut-out parts, projections on the cup received in the cut-out parts to prevent the cup from rotating with reference to the shell, a circular groove in the bottom of the cup, a distortable ring positioned in the groove, and a sealing member mounted in the cup outside the groove and extending on both sides thereof and adapted to distort the ring when pressure is applied to the sealing member.

3. In a seal for the water pump of the internal combustion engine of an automotive vehicle, a shell, a cup in the shell, sealing means inter-connecting the cup and the shell, said shell having cut-out parts, hollow projections on the cup received in the cut-out parts to prevent the cup from rotating with reference to the shell, a circular groove in the bottom of the cup, a distortable ring positioned in the groove, a sealing member mounted on the cup outside the groove and extending on both sides thereof and adapted to distort the ring when pressure is applied to the sealing member, and projections on the sealing member extending into the hollow of the projections on the cup to prevent the rotation of the seal relative to the cup.

4. In a seal for the water pump of the internal combustion engine of an automotive vehicle, a shell, a cup in the shell, sealing means inter-connecting the cup and the shell, a circular groove in the bottom of the cup, a distortable ring positioned in the groove, a sealing member mounted in the cup outside the groove and extending on both sides thereof and adapted to distort the ring when pressure is applied to the sealing member, and bent-in edges on the shell to retain the cup and its sealing member in the shell.

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