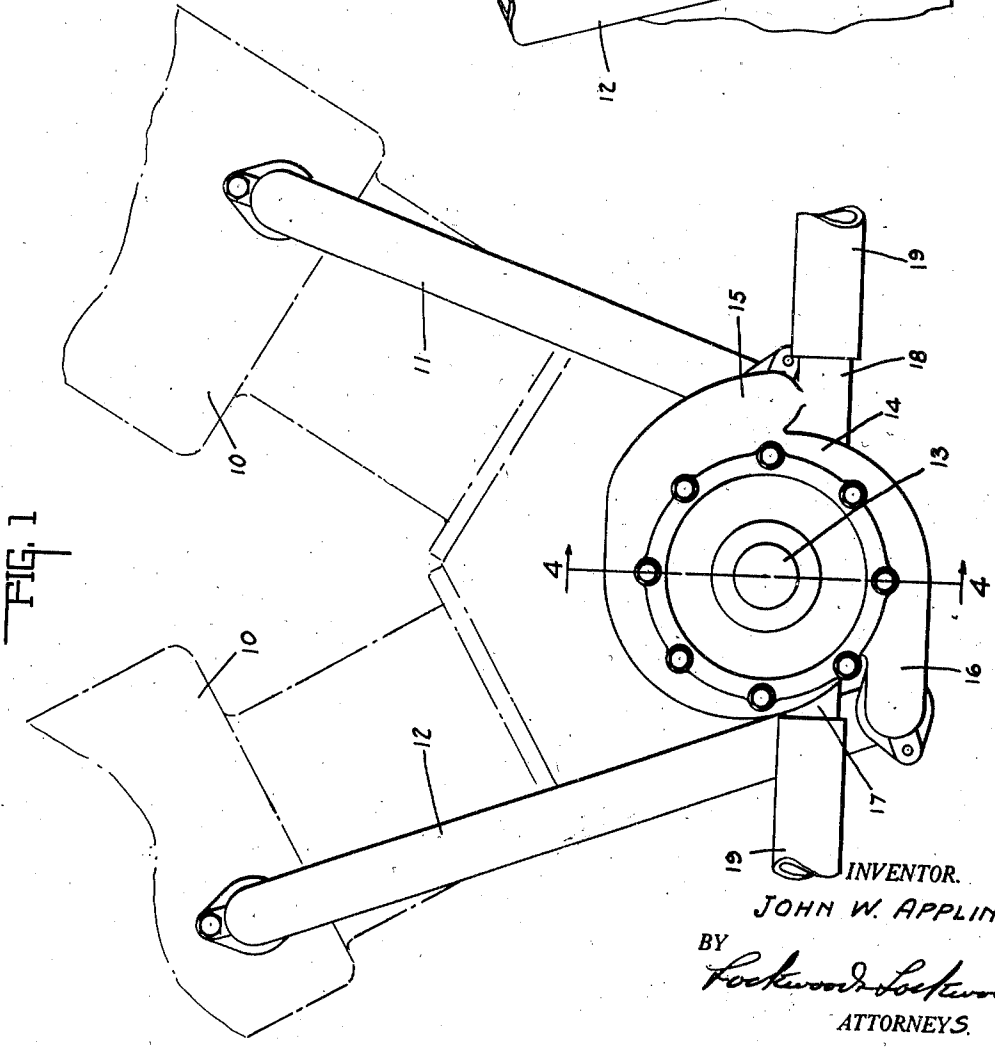
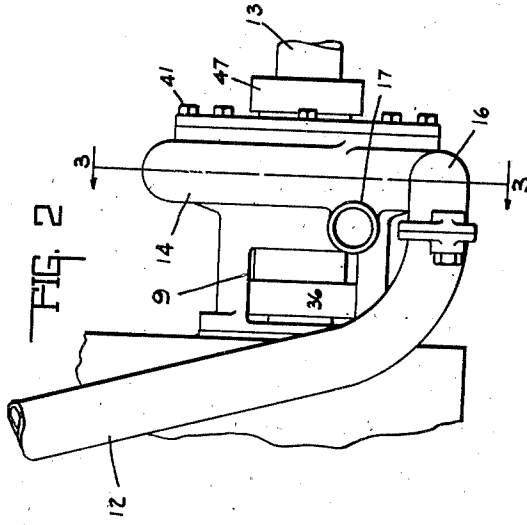
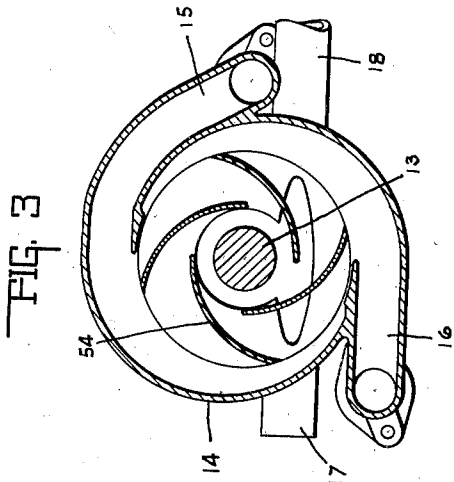


J. W. APPLIN,
WATER PUMP FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED JAN. 10, 1920.

1,366,149.

Patented Jan. 18, 1921
2 SHEETS—SHEET 1.

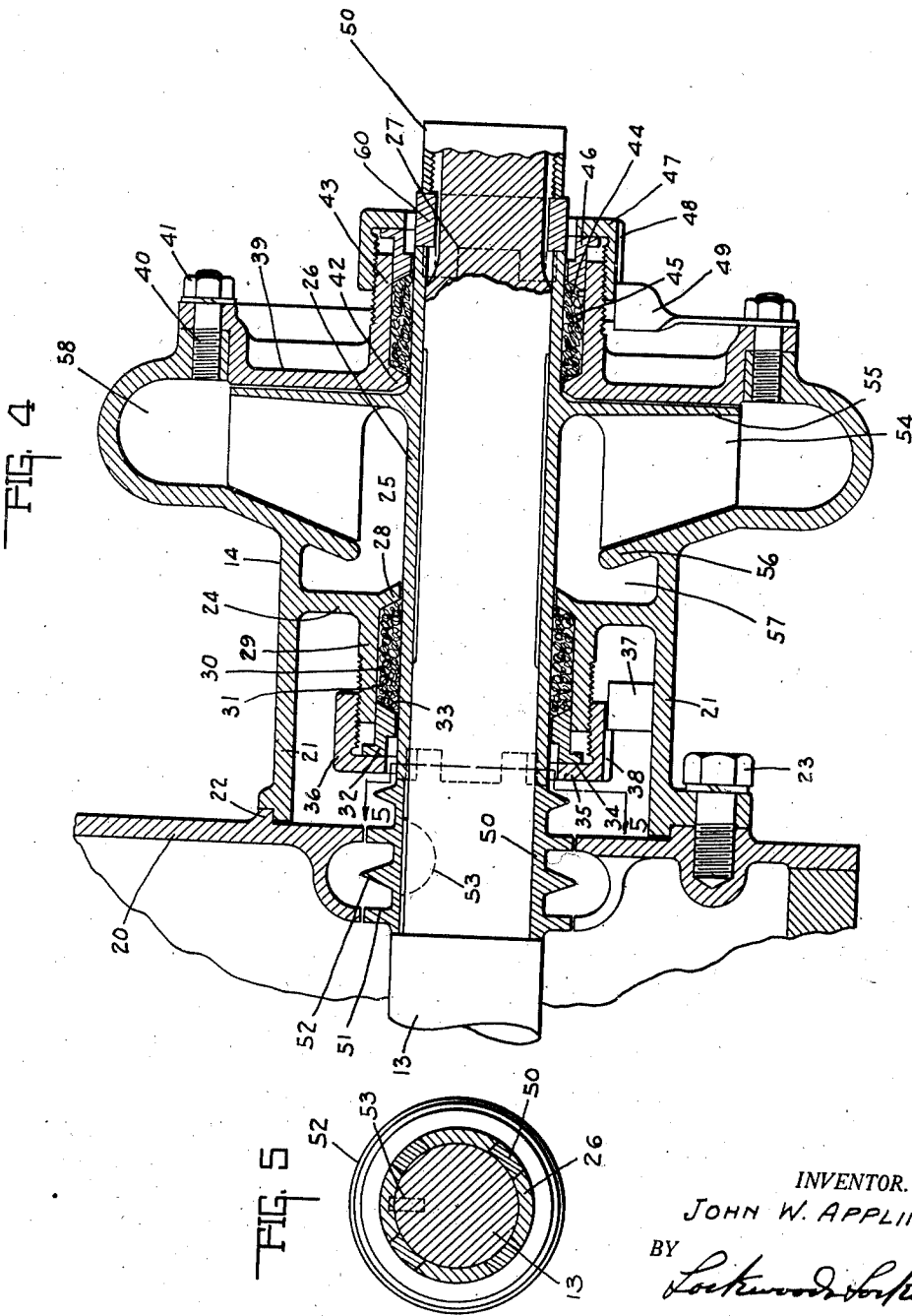


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WATER-PUMP FOR INTERNAL-COMBUSTION ENGINES.

1,366,149.

Specification of Letters Patent. Patented Jan. 18, 1921.

Application filed January 10, 1920. Serial No. 350,515.

To all whom it may concern:

Be it known that I, JOHN W. APPLIN, a citizen of the United States, and a resident of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Water-Pump for Internal-Combustion Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

The chief object of this invention is to provide in an internal combustion engine and the like a novel and improved water pump for cooling the same, and mounting said pump upon the crank shaft of the engine.

One feature of the invention is in providing in an engine of the V-block type a pump for cooling each block of cylinders in the engine, and in providing the same with a combined housing and a combined rotor, the rotor being mounted directly upon the crank shaft of the engine.

A further feature of the invention consists in mounting the pump upon the forward end of the crank shaft, and in utilizing the portion of the crank case of the engine as a portion of the housing for the pump.

The full nature of this invention will be understood from the accompanying drawings and the following description and claims.

In the drawings Figure 1 is an end view of an internal combustion engine of the V-block type, and the novel and improved pump mounted upon the crank shaft of the engine and connected with the water jackets of the engine. Fig. 2 is a side view of the pump shown in Fig. 1. Fig. 3 is a sectional view of the interior of the pump chamber and rotor, and is taken on the line 3—3 of Fig. 2 in the direction of the arrows. Fig. 4 is a central sectional view of the pump showing the mounting thereof upon the crank shaft of the engine and taken on the line 4—4 of Fig. 1. Fig. 5 is a cross sectional view of the pump rotor driving means and taken on the line 5—5 of Fig. 4.

In the drawings 10 indicates the water jacket of an internal combustion engine of the V-block type to which this invention has been applied. 11 and 12 indicate respectively water tubes connecting the pump

with the water jackets. 13 indicates the crank shaft of the engine connected in the usual manner thereto. Upon the forward end of said crank shaft there is mounted a pump housing 14, the same provided with discharge outlets 15 and 16 respectively communicating with the water tubes 11 and 12. The pump is herein shown provided with a plurality of inlet water tubes 17 and 18, the same supplying water to the respective water tubes 11 and 12 by means of a rotor in the pump casing. Suitable conduit means 19 are connected with the inlet tubes 17 and 18 and connect the same to a suitable radiator not shown.

In Fig. 4 the mounting of said pump upon the crank shaft is shown in detail. Said shaft extends through the crank casing 20, and upon the forward end of the shaft there is positioned the housing 14, the same having an annular groove 21 cut in the edge thereof. The crank case has a complementary formed annular rib 22 cooperating with said groove. The housing 14 is secured to the crank casing in any suitable manner, such as by the bolts 23. In said housing there is positioned approximately midway a transverse partition 24, the same forming one wall of the pump chamber 25. A rotor sleeve 26 is secured upon the crank shaft 13 by a forward and a rearward drive member 27 and 27^a respectively so that said sleeve rotates with said shaft and is supported thereby.

The transverse partition 24 extends inwardly until the same forms a retaining guide wall 28 of the pump chamber. Extending rearwardly of said transverse partition is a cylindrical portion 29, the same being concentric with said sleeve and said shaft and spaced therefrom to form an annular packing chamber 30. The packing 31 is secured in said chamber by means of an annular packing ring 32, the same having a conical face 33 for engaging and compressing said packing within said packing chamber. The packing ring is also provided with a rearwardly and outwardly extending annular flange 34 by which the same is adjustably secured within the packing chamber. A cap 35 engages said annular flange and holds the same within said chamber. Said cap is adjusted in position relative to said chamber to compress said packing by means of the interiorly threaded flange 36, 110

the same being secured upon the threaded end of the cylindrical projection 29. The means for securing the cap 35 and holding the same against rotation comprises a locking block or tooth 37, the same engaging a slot 38 formed upon the exterior of the adjustable cap. Access to the cap 35 is obtained through openings 9 in the housing.

The pump housing 14 is open at its forward end and by this means the sleeve 26 may be inserted upon the crank shaft and keyed thereto, as described, the housing being closed by a front cover portion 39 secured to the housing in any suitable manner, as by means of the studs 40 and the nuts 41. Said front portion extends inwardly and forms a retaining wall 42 for packing and the like. Extending forwardly along the sleeve and concentric with the shaft is a cylindrical projection 43 threaded upon its exterior and suitably spaced from said sleeve to form a forward packing chamber 44. In said chamber is secured the packing 45, the latter being secured therein by a ring 46 similar to the ring 34. Said ring is secured in said packing chamber by a packing cap 47 similar to the cap 35, said cap being provided with a slot 48 adapted to be engaged by the tooth 49 for securing said cap against rotation and in the adjusted position. The pump chamber 25 is thus formed within said housing and around said sleeve and is concentric with the crank shaft.

Means for securing the sleeve rotor 26 to the shaft 13 comprises a forward and a rearward driving sleeve 27 and 51 respectively. The rearward driving sleeve 51 is provided with a plurality of throw-off rings 52 and is secured to the shaft 13 by suitable means such as the key 53. The sleeve 26 and the driving sleeve 51 have abutting ends which have suitable complementary tongues and grooves formed thereon as shown in Fig. 5. The abutting ends of the forward driving sleeve 26 are similarly provided with suitable tongue and groove connections as shown by the dotted lines in Fig. 4. The sleeve 27 is secured to the shaft 13 by a plurality of keys 60. The sleeves 26, 27 and 51 are secured against longitudinal movement along the crankshaft 13 by a cap 50 having a threaded connection with the shaft.

The means for forcing the water from the inlet tubes out through the discharge openings and to the conduits 11 and 12 comprises the curvilinear fins or blades 54 suitably secured in the pump chamber 25 to a transverse blade supporting 55 of the sleeve 26, herein shown in dish form. Said blades are preferably of greater width near the center than near the outer end thereof, see Fig. 4, the housing being similarly formed and having an inwardly extending

annular flange 56 separating the inlet portion 57 of said pump chamber from the rotary portion thereof. Said inlet chamber communicates with the rotary portion through the pump chamber 25. The rotor discharges the water or cooling medium into the discharge chamber 58, said discharge chamber being in the form of a substantially involute curve member imposed upon the rotary portion of the pump chamber.

As shown clearly in Figs. 1 and 3 the inlet 17 supplies water to the inlet portion 57 of the pump chamber 25 and the blades of the rotor carry the same to the discharge chamber 58 from whence it is discharged through the outlet 15. Similarly the cooling fluid is supplied to the pump chamber 25 by means of the inlet tube 18 and is discharged therefrom by means of the discharge outlet 16. It will be noted that the pump is thus duplex, although the same is provided with but one housing or casing and one rotor.

It will also be noted that the crank shaft of the engine is the main driving shaft of this duplex pump, and in this manner power usually lost in friction is eliminated.

The housing as shown is so constructed that after the front cover portion 39 has been removed from the housing and the cap 50 likewise removed from the shaft, the rotor may be removed longitudinally of the shaft. If desired the housing may be removed by the shaft, or the housing and the rotor may be removed from the shaft as a unit after the securing means, such as bolts 23, have been removed. With this construction the parts may be readily removed and the same are few in number and compactly arranged.

While the invention has been described in great detail it will be understood that the broader features thereof are not to be limited by the details of the description, as many modifications thereof will suggest themselves to those skilled in the art.

The invention claimed is:

1. In a fluid cooling pump for an internal combustion engine or the like the combination with the crank shaft and the crank case thereof, said crank shaft projecting through said crank case, of a pump housing secured upon said crank case and extending forwardly thereof, and surrounding the free end of said shaft, said shaft extending through the same, and a pump rotor within said housing and non-rotatably secured upon the housing inclosed portion of said shaft.

2. In an internal combustion engine the combination with the crank shaft and crank case extending through and beyond said case, a housing secured upon the forward face of said crank case and extending forwardly thereof to inclose the crank shaft

extension and having a pump chamber therein, said housing having an opening in the forward face thereof, a rotor within said chamber non-rotatably and slidably mounted upon said crank shaft for rotation therewith, a cover for the open face of said housing, and means for securing said cover to said housing, said pump rotor being slidably removable from said housing and said shaft when the cover is removed.

3. In an internal combustion engine the combination with the crank case and crank shaft extending through and beyond said case, a housing secured to and extending forwardly of said crank case and surrounding said crank shaft, said housing being provided with a pump chamber therein, a rotor non-rotatably and slidably mounted upon said shaft and rotatable by the crank shaft in said pump chamber, and means for securing said housing to said crank case, said means being removable for slidably removing said rotor and the housing from said shaft.

4. In an internal combustion engine the combination with a crank case and a crank shaft thereof, a housing removably secured upon said crank case and extending forwardly thereof, said crank shaft extending forwardly through said housing, said housing having a pump chamber therein and an opening in the forward face thereof, a partition in said housing extending transversely of the shaft and providing a packing chamber, a rotor slidably mounted upon said shaft and rotatable therewith and in said chamber, and a cover for the open face and removably secured to the housing, a packing chamber formed in said cover, said rotor being slidably removable from said pump chamber when the cover is removed and said housing and said rotor being slidably re-

movable upon said crank shaft when the housing is detached from said crank case.

5. In a fluid cooling pump for an internal combustion engine or the like the combination with the crank shaft and the crank case thereof, of a pump housing secured to said casing and extending forwardly thereof, a partition in said housing extending transversely of the shaft and forming a packing chamber for the pump, a rotor rotatable in said housing by the shaft, and adjustable means associated with said partition, said housing having an opening between said partition and said crank case to provide access to said adjustable means.

6. In a fluid cooling pump for an internal combustion engine the combination with the crank shaft, of a pump rotor sleeve slidable longitudinally of said shaft, a plurality of sleeves secured to said shaft adjacent said rotor sleeve and cooperating means upon the adjacent ends of said sleeve for driving said rotor sleeve by said shaft.

7. In a fluid cooling pump for an internal combustion engine the combination with the crank shaft, of a pump rotor sleeve slidable longitudinally of said shaft, tongue and groove means upon the ends of said sleeve, complementarily formed driving means upon the crank shaft adjacent the rearward end of said sleeve, a driving sleeve secured to said shaft and slidable thereon, complementarily formed tongue and groove means cooperating with the forward end of said first mentioned sleeve to rotate the same, and means securing said driving sleeve to the shaft to prevent longitudinal movement thereon.

In witness whereof, I have hereunto affixed my signature.

JOHN W. APPLIN.