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PISTON

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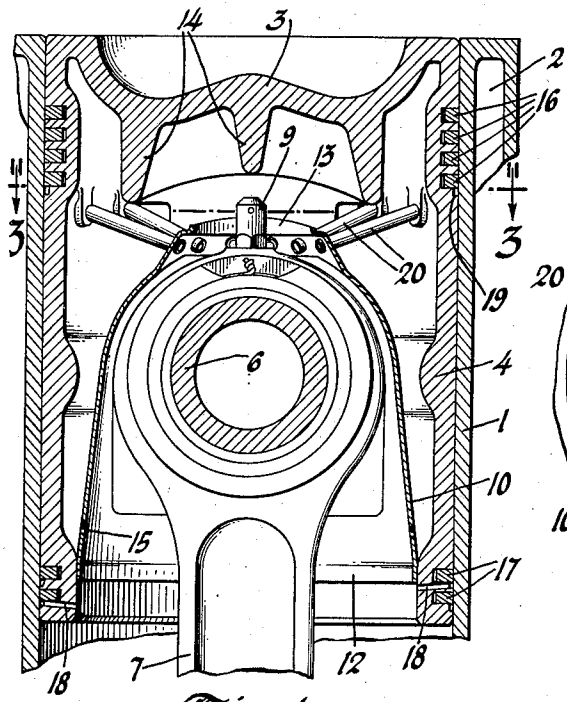


Fig. 1

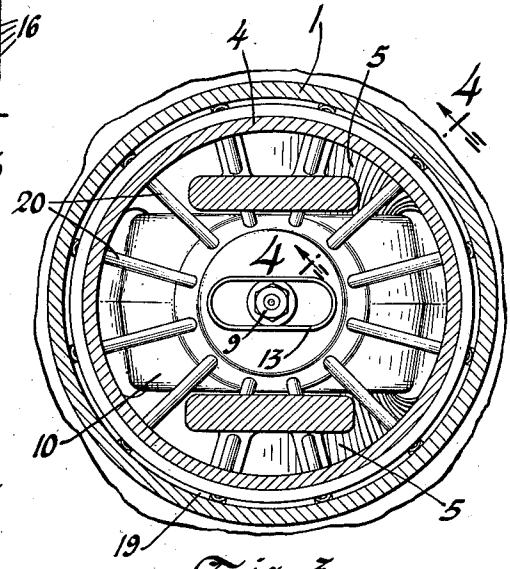


Fig. 3

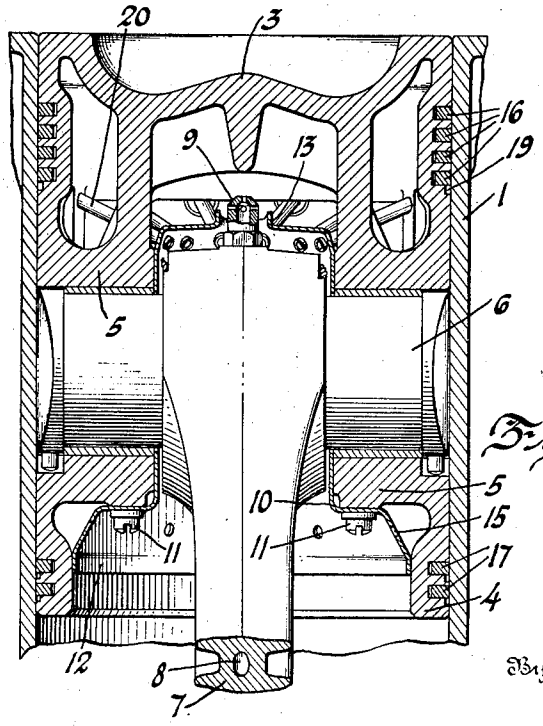


Fig. 2

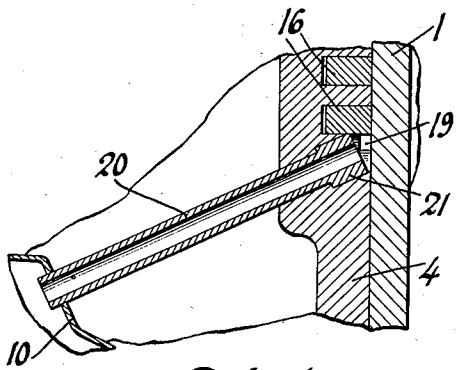


Fig. 4

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UNITED STATES PATENT OFFICE

2,108,194

PISTON

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Application January 9, 1935, Serial No. 947

5 Claims. (Cl. 309—8)

To void the bad effects of heat localization it has been proposed to provide the piston of an internal combustion engine with a splash pocket to contain a body of heat exchanging medium, which in the reciprocation of the piston is thrown against the interior surfaces of the head and skirt and absorbs heat from the normally hot head and passes it into the normally cool skirt for transfer through the cylinder wall and dissipation in the usual engine cooling system. The result is that the head and skirt run at more nearly the same temperature and heat is readily expended.

As a simple and inexpensive expedient a baffle may be added to the ordinary piston for cooperation with the skirt to afford an annular well to catch engine lubricating oil supplied by the pressure lubricating system and discharged thereinto through the connecting rod. Inasmuch as the piston cooling pocket extends throughout substantially the entire length of the skirt some complications enter into the design of a proper drain from the packing carried by the upper or headed end of the piston for the return to the supply sump of excess oil scraped from the cylinder wall.

The present invention has for its object the provision, in a simple and economical fashion, of means to by-pass or bridge the cooling well and convey oil scraped from the cylinder during piston movement for discharge into the engine crankcase. More specifically, the invention involves the provision in a piston with an interior pocket and exterior packing rings, of a series of circumferentially spaced drain tubes extending downwardly and inwardly across the cooling chamber from the piston wall adjacent one of the packing rings, to a point beyond the baffle. Each tube has its opposite ends projected through and supported by the baffle and wall of the piston respectively, and its piston wall end is headed or provided with a peripheral enlargement to seat within a shouldered bore formed in the skirt of the piston in intersecting relation with a packing ring groove, whereby it is held against displacement by the ring within the groove.

The invention will be understood best upon reference to the accompanying drawing, wherein Figures 1 and 2 are vertical sectional views at right angles to each other of a piston embodying the improved drain; Figure 3 is a transverse section taken on line 3—3 of Figure 1, and Figure 4 is a detail section on line 4—4 of Figure 3, of one of the drain tubes on an enlarged scale.

Only so much of an engine as is necessary to illustrate the invention is shown in the drawing. It will be understood that the engine may have a number of cylinders, each with its piston operatively connected with the crankshaft, and that an engine driven pump delivers oil from the crankcase under pressure to the several bearings, including the piston pin bearings which receive their supply through a passageway in the connecting rod.

For convenience, the hollow piston is shown at top dead center position within the cylinder 1, which may be either air or water cooled, a water jacket 2 being illustrated. The piston comprises a head 3 and a skirt 4, together with bosses 5, in which is located the pin 6 for journaling the upper end of a connecting rod 7. A drilled passageway 8 in the rod supplies oil to the journal bearing and also against the interior of the piston through a nozzle 9 carried at the top of the rod.

The oil supplied through the nozzle 9 drops into and is trapped by an annular pocket formed, in cooperation with the skirt 4, by a baffle or domed sleeve 10 of sheet metal, which receives interiorly thereof, the end of the rod 7 and extends throughout substantially the length of the skirt in spaced relation thereto. The baffle may be secured to the piston pin bosses by studs 11 and at its lower end is flared outwardly to form a skirt engaging rim 12. At its upper end the sleeve has an elongated opening defined by upstanding flanges 13, to allow movement of the nozzle 9 during rocking movement of the connecting rod, and which movement causes the oil to be sprayed against various portions of the underside of the head 3. To increase the heat radiating surface, the underside of the head may carry a number of fins 14. The heat absorbed at the head by the body of oil splashed back and forth is transferred into the skirt and through the cylinder wall to the water within the cooling jacket 2. So that there may be a constant change of oil within the pocket, one or more outlet openings 15 may be provided in the baffle 10, the size of which will be predetermined to allow a metered discharge, whereby a given quantity of oil will be maintained within the pocket at all times.

Near opposite ends of the piston skirt there are cut the usual grooves to receive an upper group 16 and a lower group 17 of expansible packing rings, which wipe the cylinder wall and seal against leakage between the engine combustion chamber and the engine crankcase. Each of the grooves receiving the lowermost group of rings is shown in the drawing as having associated therewith an oil collecting pocket immediately be-

low the ring, from which one or more drain openings 18 (see Figure 1) lead inwardly for the return of oil to the engine crankcase. A similar oil collecting pocket adjacent the lowermost groove for the upper set of rings 16 is provided by an annular recess 19 from which leads a series of inclined drain tubes 20 bridging the interior cooling jacket.

As best seen in Figure 4, the inner end of each tube projects through an opening in the baffle and discharges beyond the pocket or interiorly of the hollow baffle or sleeve 10 for the return of oil by free gravity flow to the engine crankcase. The opposite end of the tube 20 has an enlarged head 21 which seats against a shoulder in an opening drilled downwardly and inwardly through the skirt in intersecting relation with the lowermost ring groove of the upper group. Thus when the packing ring is inserted within the groove it extends over the head 21 and prevents outward displacement of the tube.

From the above description it will be apparent that there is thus provided a drain particularly adapted for use with a piston having a cooling pocket, and which is extremely simple in design and easy to manufacture at low cost.

I claim:

1. In a piston of the character described, a skirt having near the headed end thereof a packing ring groove, and a series of shouldered bores extending downwardly and inwardly in intersecting relation with the groove, a series of drain tubes, each having an enlargement seating in said shouldered bore and a packing ring in said groove holding the tubes against displacement.

2. In a piston of the character described, a skirt having a groove for an oil collecting ring and a downwardly and inwardly directed shouldered bore leading from and opening into said ring groove, a headed conduit adapted to be fitted in the bore through said ring groove with its head seated on the shoulder against inward displacement, and a ring received within said groove over the headed conduit to retain the conduit against outward displacement.

3. A piston having a ring groove in the headed end thereof and a conduit projected from the groove and being characterized by a shouldered passage extending downwardly in intersecting relation with the ring groove, an enlargement on the outer end of the conduit seated within said shouldered passage and a packing ring fitting within said groove and closing the outer end of said passage against displacement of said conduit.

4. A piston having an exterior ring groove, a drain conduit having a head at one end adapted to seat within a shouldered bore leading downwardly from and intersecting said ring groove, and a packing ring receivable within said groove in overlapping relation with the headed end of the conduit.

5. In a piston assembly of the character described, a peripheral groove in the wall of the piston, a series of shouldered passages extending diagonally downward from the ring groove in intersecting relation therewith, a removable headed conduit projecting inwardly through each passage and having its headed end seated in the shouldered passage and a piston ring fitted to said peripheral groove in overlapping retaining relation to the headed end of the conduit.

HAROLD D. CHURCH.