J. W. PACKARD.

WATER COOLING SYSTEM FOR HYDROCARBON ENGINES.

APPLICATION FILED OCT. 23, 1906.

1,034,728.

Patented Aug. 6, 1912.

2 SHEETS—SHEET 1.

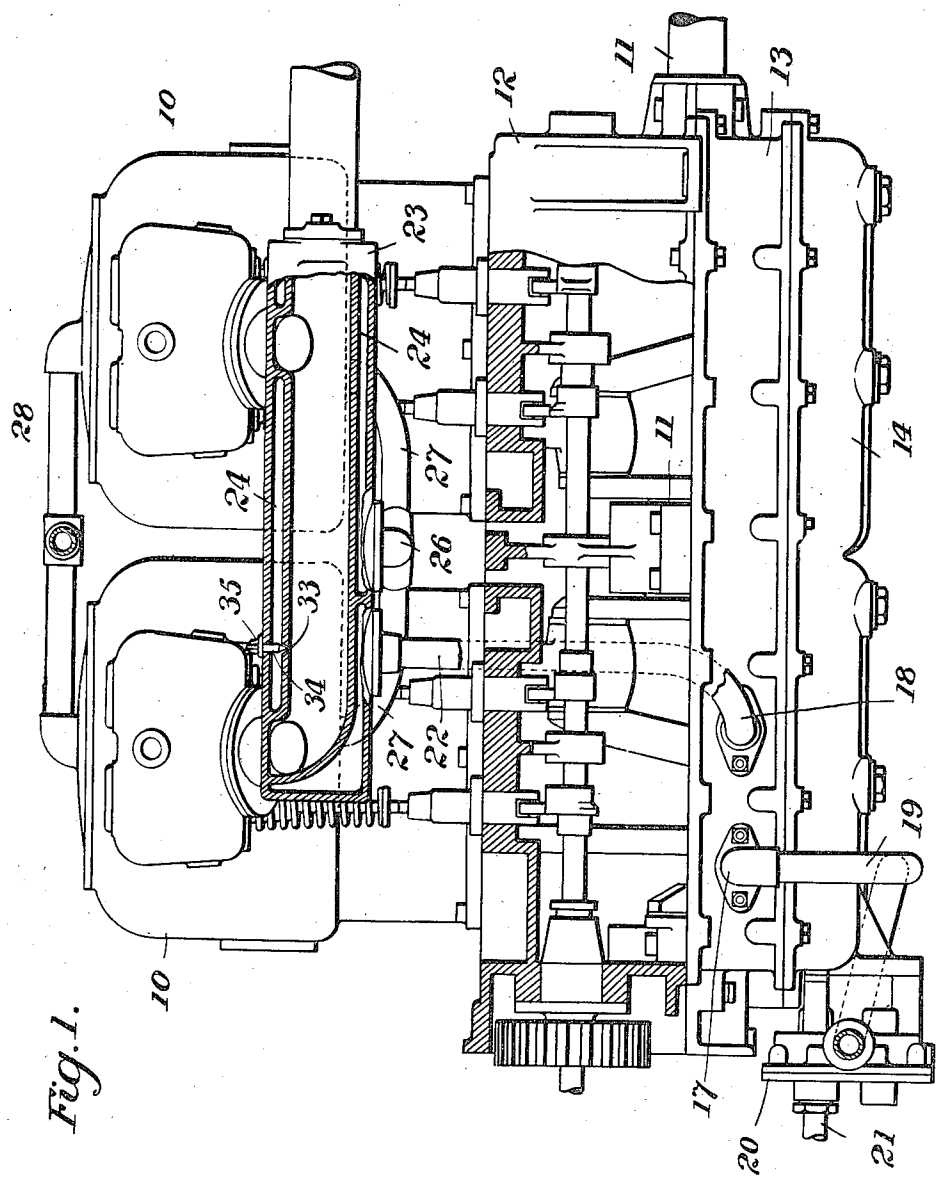

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 3

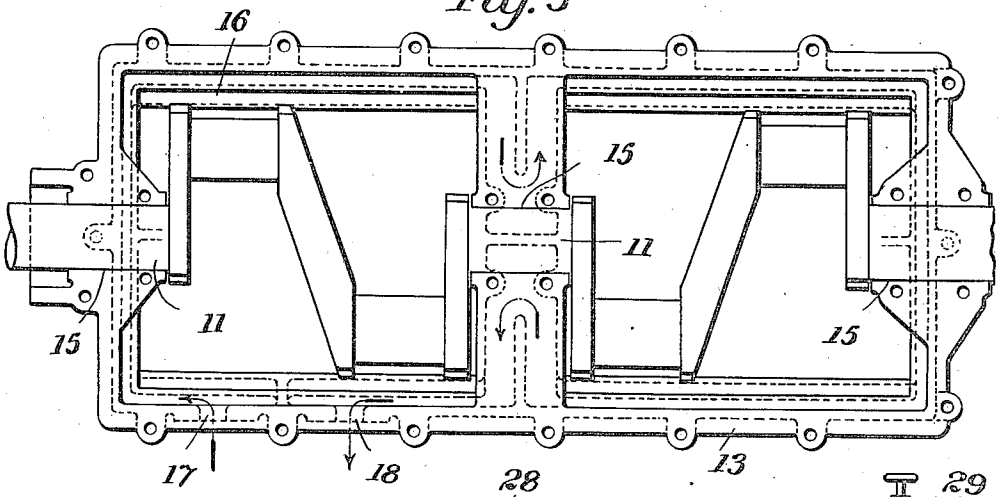
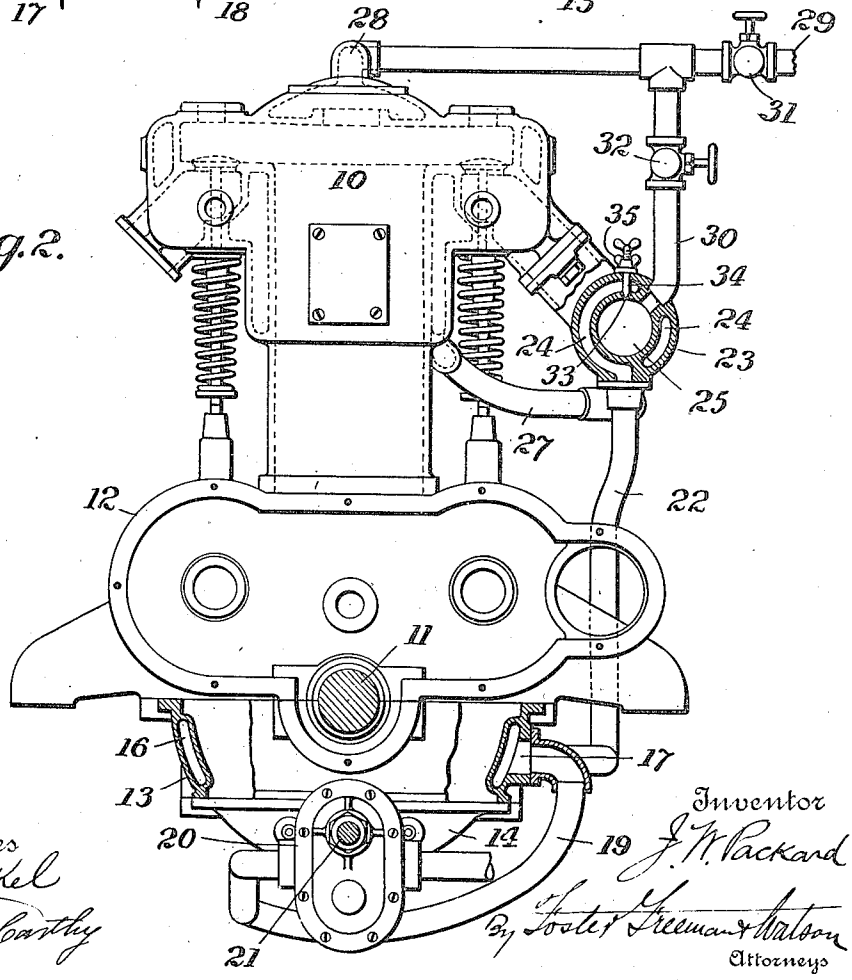


Fig. 2.



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UNITED STATES PATENT OFFICE.

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WATER-COOLING SYSTEM FOR HYDROCARBON-ENGINES.

1,034,728. Specification of Letters Patent. Patented Aug. 6, 1912.

Application filed October 23, 1906. Serial No. 340,238.

To all whom it may concern:

Be it known that I, JAMES W. PACKARD, a citizen of the United States, residing at Lakewood, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Water-Cooling Systems for Hydrocarbon-Engines, of which the following is a specification.

The present invention relates to means for cooling the various working parts of a hydrocarbon engine and also for cooling the exhaust to assist in condensing and muffling the same.

The invention will be described in connection with the accompanying drawings in which,

Figure 1 is a side elevation partly in section of a four-cylinder hydrocarbon engine embodying the invention; Fig. 2 is an end view of the same, partly in section; and Fig. 3 is a plan view of the lower half of the casing showing the water circulating conduits in dotted lines.

The accompanying drawing illustrates a hydrocarbon engine having four cylinders arranged in line and in pairs, each pair being inclosed within a casing 10. The engine may be of any approved construction and its details will not be described herein as they form no part of the present invention. The crank shaft 11, as shown, is mounted in bearings 15 in a sectional crank casing comprising an upper section 12, a middle section 13 and a bottom section 14. The crank shaft bearings are formed in the upper face of the middle section and the lower face of the upper section so that by separating these sections the crank shaft may be removed. The lower half of the crank case may, so far as the present invention is concerned, be formed in a single piece instead of the two parts 13, 14. The particular construction of the crank case is not an essential feature of the present invention except in so far as the water cooling system is concerned. The crank case is partially filled with oil into which the several cranks dip as the crank shaft rotates and the splashing of the oil lubricates the cylinders, crank pins, crank shaft bearings and other parts exposed to the interior of the crank case.

I have found it advisable to partially heat the cooling water for the engine cylinders before introducing it into the cylinder casings, especially in the case of marine motors taking constantly a fresh supply of cold water, to prevent local contraction of the cylinder walls near the inlets, and in the present invention I also utilize the water, before introducing it into the cylinder casings, to cool the oil in the crank case and the crank shaft bearings. I thus obtain the double result of keeping the oil and the crank bearings cool and warming the water before utilizing it to cool the cylinders. I also preferably pass the water through the casing of the exhaust passage as it flows from the crank case to the cylinder casings for the double purpose of condensing the exhaust and thereby muffling the same and raising the water to a still higher temperature. From the exhaust casing the water flows to and through the cylinder casings and from the cylinder casings it may be discharged, although in some instances I lead the water from the cylinder casings into the exhaust pipe to further cool and condense the exhaust.

The invention is particularly applicable to marine motors as such motors are not exposed to the cooling effect of the atmosphere as are motors used in motor vehicles, and stationary motors. The invention is however applicable to hydrocarbon motors regardless of the particular use to which they may be applied.

The section 13 of the crank case is cored out to form a continuous channel 16 from an inlet 17 to an outlet 18, as shown in dotted lines in Fig. 3. The channel 16 runs completely around the casing under the end bearings thereof and it is offset inward at each side opposite the middle bearing, as shown in the drawing. All of the bearings, and the oil in the casing, are thus kept cool. The water may be supplied to the inlet 17 in any suitable way. As shown, it is pumped through a pipe 19 by means of a rotary pump 20, the shaft 21 of which is driven in some suitable way by the engine. The pipe 19 conducts the water to the inlet 17 and from said inlet the water flows in the direction of the arrows, Fig. 3, to the outlet 18. From the outlet 18 the water flows through a pipe 22 to the exhaust casing 23. This casing is suitably cored to produce in-

ternal channels 24 extending lengthwise of the casing and nearly surrounding the exhaust passage 25. The channels 24 conduct the water to an outlet pipe 26 having two branches 27 which conduct the water to the lower parts of the cylinder casings 10. The water is suitably circulated through these casings and discharged through piping 28 at their upper ends. The water leaving the cylinder casings may be discharged finally as through a pipe 29 or it may be directed into the exhaust passage 25, as through the pipe 30. The pipes 29, 30, may be provided with valves 31, 32, to direct the water as desired.

In cases where it is not desirable to permit all of the cooling water to enter the exhaust, I provide an opening 33 between the channel 24 and the exhaust passage 25 to admit a relatively small quantity of the cooling water to the exhaust passage to cool and condense the hot gases, for the purpose of lessening and muffling the exhaust and also to cool the exhaust pipe to a temperature at which it will not burn an attendant or other person touching it. I also provide a valve 34 for the opening 33 and means for locking the valve in any desired position. In the drawing I have illustrated an ordinary needle valve provided with means for setting it and a lock nut 35 for holding it in any desired adjustment.

It will be understood that the particular shape and course of the channels in the various parts of the motor may be varied and the arrangement of pipes and conduits may be varied without departing from the spirit and scope of the invention. Furthermore the crank case may be made in two parts separated along a plane passing through the shaft bearings instead of three parts as shown. The invention is furthermore applicable to engines having more or less cylinders than the number shown in the drawing.

As previously stated the invention is particularly desirable in and applicable to hydrocarbon engines for marine purposes, such as motor boats.

Having described my invention what I claim and desire to secure by Letters Patent is,

1. In a hydrocarbon engine, the combination with a cylinder having a water jacket and with a crank case comprising bearings for the crank shaft, of a channel in said crank case having transverse portions extending to the crank shaft bearings, means for circulating water through said channel whereby the bearings are kept cool and the water partially warmed, and means for conducting the water from the crank case to and through the said cylinder water jacket.

2. In a hydrocarbon engine, a crank case having a water jacket or conduit, an exhaust passage having a water jacket, and an engine cylinder having a water jacket, and means for forcing the same water successively through said water jackets in the order mentioned.

3. In a hydrocarbon engine, the combination with a cylinder having a water jacket, an exhaust casing having a water jacket and a connection between said water jackets, of means for forcing the water first through the exhaust jacket and then through the cylinder jacket, and means for diverting a part of the water in the exhaust jacket directly into the exhaust passage.

4. In a hydrocarbon engine, the combination with a cylinder having a water jacket, an exhaust casing having a water jacket, and a connection between said water jackets, of means for forcing the water successively through the exhaust jacket, and the cylinder jacket, means for conducting a part of the water from the cylinder jacket to the exhaust passage, and means for conducting a portion of the water from the exhaust jacket directly into the exhaust passage.

5. In a hydrocarbon engine, the combination with a cylinder having a water jacket, an exhaust casing having a water jacket, and a connection between said water jackets, of means for forcing the water successively through the exhaust jacket and the cylinder jacket, valve controlled means for conducting a part of the water from the cylinder jacket to the exhaust passage and valve controlled means for conducting a portion of the water from the exhaust jacket directly into the exhaust passage.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES WARD PACKARD.

Witnesses:
L. W. MAXSON,
R. H. MAXSON.