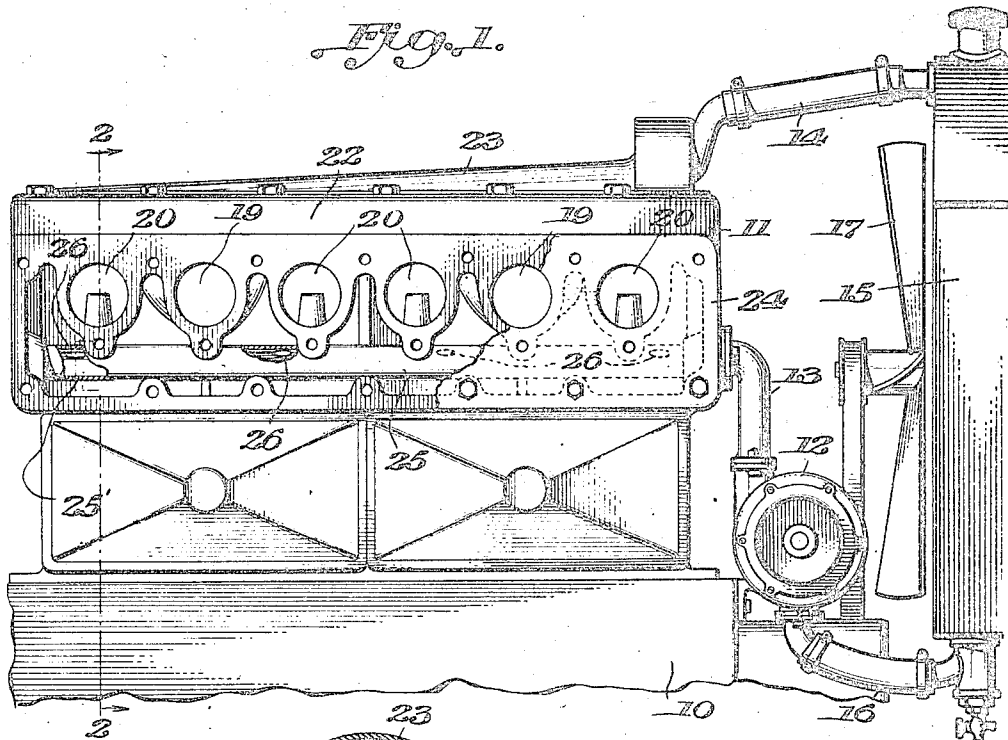
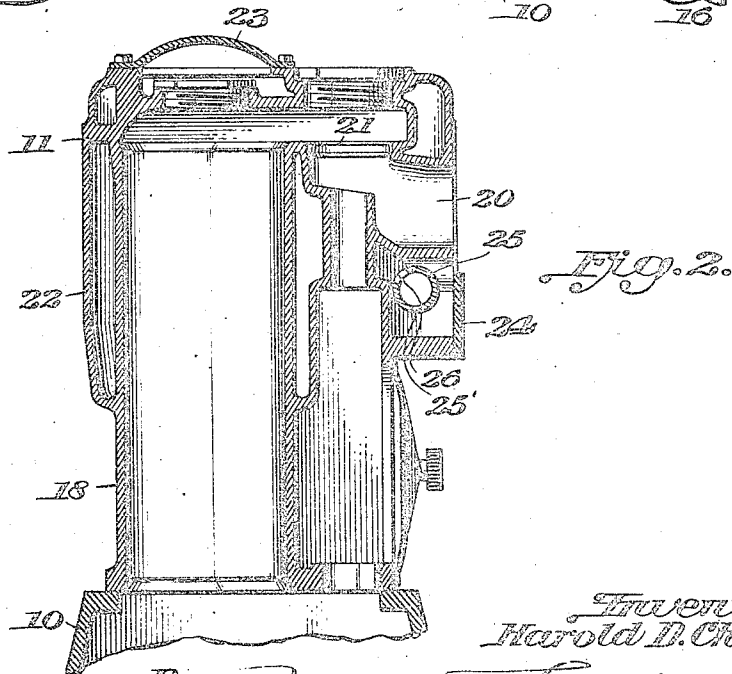


1,422,338.

Fig. 1.



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By *Milton T. Hett* *Att'y*

1,422,338.

2 SHEETS—SHEET 2.



By *William Tibbets*
Atty.

UNITED STATES PATENT OFFICE.

HAROLD D. CHURCH, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON MOTOR.

1,422,338.

Specification of Letters Patent.

Patented July 11, 1922.

Application filed April 27, 1918. Serial No. 231,124.

To all whom it may concern:

Be it known that I, HAROLD D. CHURCH, a citizen of the United States, and resident of Detroit, Wayne County, State of Michigan, have invented certain new and useful Improvements in Hydrocarbon Motors, of which the following is a specification.

This invention relates to hydrocarbon motors and particularly to the cooling of the cylinder blocks.

One of the most difficult parts of a hydrocarbon motor to cool is the valve seats, particularly the exhaust valve seats. It is desirable that the remainder of the motor shall be operated as hot as it can be run without preigniting the charge. With all of the hot gases passing over the exhaust valve seat, the seat, and consequently the valve, if run constantly under heavy load, will sometimes get too hot and cause burning. Because the exhaust valve seat is frequently located very close to the cylinder wall it is difficult to get all of the core sand out and make a clean and uniform water jacket around the seat.

One of the objects of the present invention is to more effectively cool the exhaust valve seats of a hydrocarbon motor, and this and the other objects and advantages of the invention will appear from the following description taken in connection with the drawings which form a part of this specification, and in which:

Fig. 1 is a side elevation of a hydrocarbon motor embodying this invention;

Fig. 2 is a transverse section of the motor shown in Fig. 1, on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section of a hydrocarbon motor illustrating another form of the invention, the right half being in a plane somewhat above that of the left half;

Fig. 4 is a transverse vertical section of the motor shown in Fig. 3, on the line 4—4 of said figure;

Fig. 5 is a side elevation of the upper part of the motor shown in Figs. 3 and 4; and

Fig. 6 is a detail view of one of the water conduits.

Referring to the form of the invention shown in Figs. 1 and 2, 10 represents the crank case of a hydrocarbon motor upon which is mounted the motor cylinder block 11. Water circulation through the cylinder block is caused by a pump 12 which conveys the water to the block through a pipe 13, and a pipe 14 carries the water from the block to a radiator 15, the system of circulation

being completed by a pipe 16 from the bottom of the radiator to the pump 12. A fan 17 may be provided at the rear of the radiator for the purpose of increasing the flow of cooling air therethrough.

The particular cylinder block shown has four cylinders 18 and there is of course an inlet and an exhaust valve for each cylinder. In Fig. 1 two inlet ports 19 are shown and it will be understood that these ports branch within the casting and each of them leads to two of the cylinders of the block. There is, however, an exhaust port 20 for each of the four cylinders and the section shown in Fig. 2 is taken through one of these exhaust ports. Fig. 2 also shows the valve seat 21 which is formed as a part of the cylinder block.

The block 11 is formed with a jacket 22 which may, as shown, be in part an integral portion of the block and in part formed by plates such as 23 and 24 to permit of good core work. At all events, the jacket extends around the upper part of the cylinder and around the valve seats and in this form of the invention the water is taken from the top of the cylinder jackets through the pipe 14 which leads to the radiator.

Instead of feeding the water from the pump 12 to a single point of the water-jacketed block, the present invention contemplates carrying the water into the block by means of a conduit which has several openings directing the water from the conduit towards the seats of the exhaust valves. As shown in said Figs. 1 and 2, the pipe 13 connects with a conduit 25 which is preferably cast into the block when the latter is made and is arranged longitudinally of the block and beneath the valve seats. The position of this pipe is particularly well shown in the figures, the plate 24 being partly cut away in Fig. 1 so that the pipe may be better seen. The pipe 25 has a series of openings 26 which are arranged adjacent the exhaust valve seats so that the water issuing from these openings will be directed toward said seats within the jacket of the block. Of course this water that comes directly from the pump 12 is the coolest water in the system, having just passed through the radiator 15, and the exhaust valve seats therefore are thus favored with the coolest water in the system and their temperature is consequently reduced in spite of the relatively great amount of heat to which they

are subjected. Opening 25' forms a drain for the pipe 25.

In the form of the invention shown in Figs. 3 to 6 inclusive the parts of the cylinder block that are similar to the parts of the other form of the invention have the same reference numerals. In this case the two intake ports 19^a of the block, one of which ports only is shown, extend through the block between two of the cylinders. The exhaust ports 20, however, are arranged similarly to those of the form shown in Fig. 1.

In the plan view shown in Fig. 3 it will be seen that the pipe 13^a which leads from the pump has two branches 27 and 28 which lead respectively to the front and rear parts of the cylinder block, and each of these branches connects with a conduit or pipe 25^a which, like the pipe 25 of the other form of the invention, is preferably cast in the cylinder block. Each of the pipes 25^a is formed with two branches or outlets 29 and 30 which lead to points directly beneath the exhaust valve seats 21 so that the water from the pump is carried directly to the exhaust valve seats. A small opening 25^b is made in the pipe 25^a at its lowest point so that water will drain from the pipe when it is desired to remove all the water from the system.

While in some cases it has been found that good results are obtained by carrying the water directly to the valve seats as hereinabove described, yet in others it has been found that the valve seats are cooled more effectively by, and in fact require the additional cooling properties of, a cooling system which not only supplies the water directly to the exhaust valve seats, but also carries the water away from points above those valve seats. This part of the invention is particularly shown in Figs. 4 and 5 where it is seen that a pipe 31 extends down into the cylinder casting from the top thereof and to a point just above each of the exhaust valve seats, and each of these pipes communicates with branches 32 of a pipe 14^a which leads to the radiator.

In some cases it has been found sufficient and even desirable that the water should be carried to the cylinder block and delivered to the jacket at one point, as in the old systems, when the outlet from the cylinder block is arranged as shown in Fig. 4, that is with the pipes 31 leading to points just above the exhaust valve seats. In others, however, the water is carried to the exhaust valve seats and the pipe 31 is omitted. In still others both the pipe 25 or 25^a and the pipes 31 are used.

It will be understood that by thus directing the greater part of the cooling effect of the water onto the exhaust valve seats, those seats are kept relatively cool and the re-

mainder of the motor is permitted to become much hotter and therefore more efficient than when the cooling water is fed to the lower parts of the cylinder walls.

It will be further understood that other forms than those shown may be used without departing from the spirit or scope of the invention.

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

1. In a hydrocarbon motor, the combination with a jacketed cylinder having an exhaust valve seat, of means for feeding water to the interior of the cylinder jacket directly to a point between the cylinder wall and said seat and withdrawing it from the opposite side of said seat.

2. In a hydrocarbon motor, the combination with a jacketed cylinder having an exhaust valve seat at one side thereof, of means for feeding water to the interior of said jacket directly to a point below and at one side of said seat and withdrawing it from a point above and at the other side of said seat.

3. In a hydrocarbon motor, the combination with a jacketed cylinder having an exhaust valve seat at one side thereof, of means for feeding water to the interior of said jacket directly to a point below and at one side of said seat between the cylinder wall and the seat and withdrawing it from a point above and at the other side of said seat.

4. In a hydrocarbon motor, the combination with a jacketed cylinder block having inlet and exhaust valve seats, of a pipe cast into the block inside of said jacket and extending crosswise of the block between two cylinders, said pipe having branches leading to points beneath exhaust valve seats.

5. In a hydrocarbon motor, a cylinder block having a water pipe cast therein, said pipe having main outlets therein and a drain hole at its lowest point.

6. In a hydrocarbon motor, a cylinder block having a water pipe cast therein, said pipe having main outlets directed upwardly and a drain hole at its lowest point.

7. In a hydrocarbon motor, a cylinder block having a water pipe cast therein, said pipe extending diagonally upward towards its outlet and having a drain hole at its lowest point.

8. In a hydrocarbon motor, the combination with a jacketed cylinder having an exhaust valve seat at one side of the cylinder, of means for feeding water to the interior of the cylinder jacket at a point at one side of said exhaust valve seat, and means forming an outlet for said cylinder jacket arranged at the opposite side of said valve seat.

In testimony whereof I affix my signature.
HAROLD D. CHURCH.