July 8, 1924. 1,500,668

H. D. CHURCH

HYDROCARBON MOTOR

Filed April 29, 1918

Fig. 1.

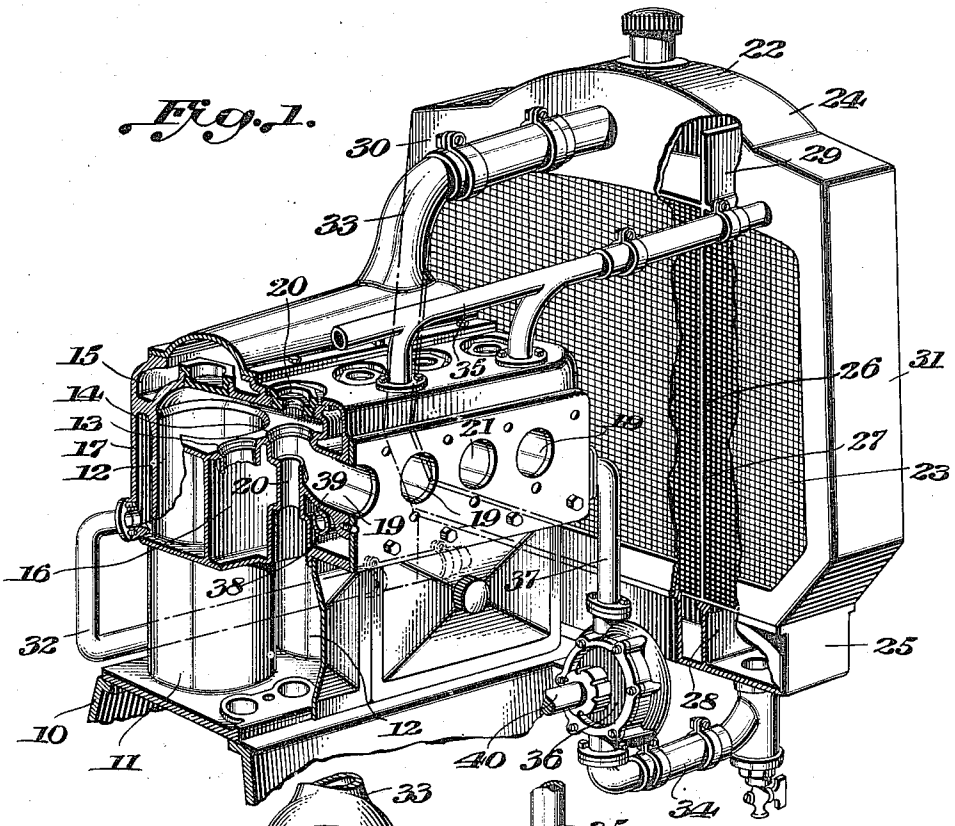
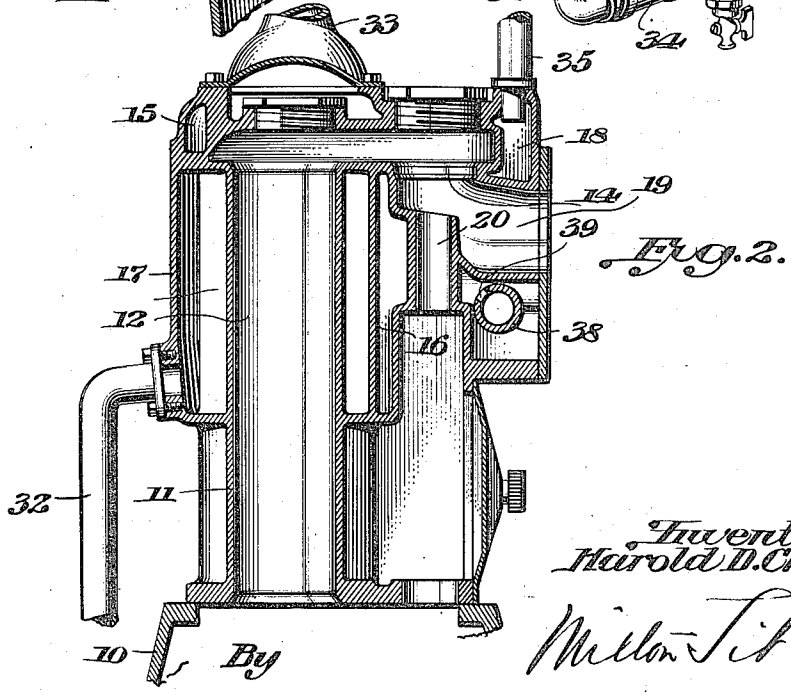


Fig. 2.



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Patented July 8, 1924. 1,500,668

UNITED STATES PATENT OFFICE.

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HYDROCARBON MOTOR.

Application filed April 29, 1918. Serial No. 231,503.

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 cooling means therefor. Heretofore it has been the usual practice in hydrocarbon motors to have a single water jacket surrounding the cylinders and valve seats and feed the cooling water to the lower part of the water jacket and lead it out at the top. The water passes from the jackets to a radiator where it is cooled and a pipe from the bottom of the radiator carries the cooled water back to the water jacket of the motor. In some cases a pump is used to keep the cooling water in circulation, this being called a forced circulation system, and in others no pump is used, the piping being large enough to permit a natural circulation of the water due to the rise in temperature thereof in the cylinder jackets and the lowering of the temperature in the radiator. This latter is called a thermosiphon circulation system.

In a hydrocarbon motor the exhaust valve seats are the most difficult parts to keep cool and it frequently happens that if sufficient cooling is provided for the exhaust valve seats the remainder of the motor is too cool for the best results. In other words, it is desirable that the cylinder barrel and head should be run as hot as possible without causing preignition, and yet if this is done, with most motors, the exhaust valve seats will then run so hot due to the hot gases passing over them, that the valves will be burned or warped. It is one of the objects of the present invention to remedy this condition and provision is made for separate cooling of the valve seats and the cylinder walls.

Another object of the invention is to provide a double cooling system for a motor cylinder block to permit of regulating the cooling of the valve seats and cylinders respectively.

Another object of the invention is to provide two sets of water connections from the motor to the radiator, one of which connections may have a forced circulation and the other a thermosiphon circulation.

Other objects and features 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 perspective view of a hydrocarbon motor embodying the invention, parts of the cylinder block and radiator being cut away to show the construction; and

Fig. 2 is a transverse vertical section through the cylinder block shown in Fig. 1.

Referring to the drawings, 10 represents a motor crank case upon which is mounted a motor cylinder block 11. This block may comprise one or more cylinders and in the present illustrative form of the invention the block is formed to comprise four cylinders in line, three only of which are shown in Fig. 1, the other one being broken away.

The cylinder block may be formed in any of the usual ways, such as by casting as in the form shown, and the motor may have its valves arranged in any of the conventional forms. The motor shown is of the L-head type, there being two valves to each of the cylinders.

The cylinder block comprises cylinder barrels 12, inlet valve seats 13, and exhaust valve seats 14. These cylinder barrels and valve seats are surrounded by a water jacket 15 so that an enclosed space is formed around these various parts to permit the circulation of cooling water therethrough. Said space is divided into two separate parts, as by a partition 16 running lengthwise of the cylinder block, the part indicated at 17 surrounding the cylinder barrels and combustion spaces, and the part 18 surrounding the valve seats and valve stems. This arrangement is particularly well shown in Fig. 1 of the drawings where it will be seen that the exhaust valve seat 14 communicates with a port 19 which passes through the water jacket part 18 and to the exterior of the motor block. Also a valve stem guide 20 leads downwardly from the port 19 towards the crank case where the valve operating parts are mounted. Those parts are not shown in the drawings.

Three of the exhaust ports 19 are shown in Fig. 1 and the block is so formed that a single inlet port 21 is provided for each two cylinders, said port 21 branching to the intake valves of two adjacent cylinders.

The separate water jacket parts or spaces

17 and 18, of the cylinder block, are connected to a radiator 22 to provide circulation of cooling water through the jackets. Said radiator 22 is shown as comprising a core 23, an upper tank 24 and a lower tank 25 and it will be understood that the water from the motor passes into the upper tank of the radiator, then downwardly through the core where it is cooled by the air passing through the core, and then to the tank 25 at the bottom of the radiator, where it is led back to the cylinder block. In the present instance the radiator is divided into two parts as by a partition 26, this partition preferably passing through the core 23 where it is indicated at 27, through the lower tank 25 where it is indicated at 28, and through part of the upper tank 24 where it is indicated at 29. The partition 29 does not extend to the full height of the tank 24 so that in filling the radiator the tank at one side of said partition 29 will first be filled and the water will then flow over the top of the partition 29 into the other part of the radiator.

There are complete connections from each part of the radiator to one part of the motor water jacket so that there is a circulation of water through one part of the motor water jacket and a corresponding part of the radiator entirely independently of the other part of the motor water jacket and its corresponding part of the radiator. The left hand side of the radiator may be designated as 30 and the right hand side as 31. There is a water pipe or connection 32 from the lower portion or tank 25 of the part 30 of the radiator to the part 17 of the water jacket of the cylinder block, and preferably to the lower part thereof, and there is an outlet pipe or connection 33 from the upper portion of said water jacket part 17 to the upper portion or tank 24 of the part 30 of the radiator. There is also a water connection or pipe 34 from the lower portion or tank 25 of the part 31 of the radiator to the part 18 of the motor water jacket, and a water connection or pipe 35 from the upper portion of said jacket part 18 to the upper portion or tank 24 of the part 21 of the radiator.

One of the above described water connections between the cylinder block and radiator is preferably a thermosiphon connection and the other is preferably a forced circulation, and in the form shown the connections with the jacket part 18 are the forced circulation connections. In the pipe 34 therefore a pump 36 is arranged and the pipe 37 which leads to the lower portion of the jacket part 18 of the cylinder block extends into the jacket in the form of a distributing pipe 38 having lateral openings 39 to direct the water issuing from said distributing pipe towards the exhaust valve seats 14, within the jacket, as will be observed by reference to both of the figures of the drawings. It will be understood that the pump 36 is driven from a shaft 40 which may be connected to any suitable driving part of the motor for operating the pump continuously with the motor. Also said pump 36 is preferably of the centrifugal type so that by disconnecting the pipe, or in case the pump is for any reason disabled, the connections from the jacket part 18 to the radiator part 31 may operate with thermosiphon circulation, since with such type of pump there is no interference with the flow of water therethrough when the pump is idle.

From the above it will be seen that the parts 30 and 31 of the radiator may be made of such relative sizes as to produce the best cooling effect in the two separate water jackets of the cylinder block. Thus the part 30 may be made smaller than ordinary so that the cylinder barrels may be run very hot and thus get the most efficient results even with the use of heavy fuel such as kerosene, and the part 31 may be made relatively large so that the exhaust valve seats may be kept cool to thereby greatly lengthen the life of the valves.

Other forms and modifications of the mechanism shown and described herein may be made 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. The combination with a hydrocarbon motor having separated water jackets, of two separate radiator parts, and connections defining separate paths of circulation through each jacket and one of the radiator parts.

2. In a hydrocarbon motor, the combination with a cylinder block having two separate water jackets, of means for feeding water separately to each jacket, one of said means including a pump.

3. In a hydrocarbon motor, the combination with a cylinder block having two separate water jackets, of two separate radiator parts and circulating connections between said jackets and said radiator parts respectively.

4. In a hydrocarbon motor, the combination with a cylinder block having a water jacket for the cylinder part and a separate water jacket for the valve seat part, of means for feeding cooling water to said jackets at different rates.

5. In a hydrocarbon motor, the combination with a cylinder block having a water jacket for the cylinder part and a separate water jacket for the valve seat part, of two radiator parts, and circulating connections

from said water jackets to said radiator parts respectively.

6. In a hydrocarbon motor, the combination with a cylinder block water jacketed around the cylinders and valve seats, said block having a partition dividing the jacket into two parts, of means for feeding water to said two parts independently.

7. In a hydrocarbon motor, the combination with a cylinder block water jacketed around the cylinders and valve seats, said block having a partition dividing the jacket into two parts, of two radiator parts, and connections from the jacket parts to the radiator parts respectively.

8. In a hydrocarbon motor, the combination with a cylinder block comprising a plurality of cylinders and valve seats for the cylinders, said block having water jackets around the cylinders and valve seats and having a partition separating the jackets around the cylinders from those around the valve seats, of means for feeding water to said jackets.

9. In a hydrocarbon motor, the combination with a cylinder block comprising a plurality of cylinders and valve seats for the cylinders, said block having water jackets around the cylinders and valve seats and having a partition separating the jackets around the cylinders from those around the valve seats, of separate water circulation means for each of the separated parts of said jackets.

10. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of thermosiphon means for cooling the cylinder and forced circulation means for cooling the valve seats.

11. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of separate water cooling means for the cylinder and valve seat respectively.

12. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of separate water circulation means for the cylinder and valve seat respectively.

13. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of separate water circulation means for the cylinder and valve seat respectively, one of said means being thermosiphon and the other forced circulation.

14. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of separate water circulation means for the cylinder and valve seat respectively, the cylinder cooling means being thermosiphon and the valve seat cooling means being forced circulation.

15. In a hydrocarbon motor, the combination with a cylinder block comprising water jacketed cylinders and valve seats, of a radiator, and two complete sets of water connections between the cylinder block and radiator, said connections having different rates of circulation.

16. In a hydrocarbon motor, the combination with a cylinder block comprising water jacketed cylinders and valve seats, of a radiator, and two complete sets of water connections between the cylinder block and radiator, one of said sets being thermosiphon and the other forced circulation.

17. In a hydrocarbon motor, the combination with a cylinder block having a water jacket divided into two separate parts, of a radiator divided into two separate parts, thermosiphon circulation connections between one part of said radiator and one part of said water jacket and forced circulation connections between the other part of said radiator and the other part of said water jacket.

18. In a hydrocarbon motor, the combination with a cylinder block having separate water jackets for the cylinder barrels and valve seats respectively, of a radiator divided into two separate parts, forced circulation connections between one of said radiator parts and the water jacket for the valve seats, and thermosiphon circulation connections between the other part of said radiator and the water jacket for the cylinder barrels.

19. In a hydrocarbon motor, the combination with a cylinder block having water jackets around the cylinder barrels and valve seats, of a radiator divided into two parts, connections from one part of the radiator to various points within the water jackets adjacent the valve seats, another water connection from the other part of the radiator to the cylinder jackets, and means connecting the upper part of the cylinder jackets with the last named part of the radiator.

20. The combination with a hydrocarbon motor having water jackets, of a radiator divided into two parts, independent connections from each of said radiator parts to a motor jacket, and means permitting water to flow from one radiator part to the other at the top of the radiator.

21. The combination with a hydrocarbon motor having water jackets, of a radiator comprising a core and upper and lower tanks, said radiator being divided into two parts by a partition passing vertically through the core and lower tank and only partly dividing the upper tank, and connections from both parts of the radiator to the motor jackets.

22. The combination with a hydrocarbon motor having water jackets, of a radiator comprising a core and upper and lower tanks, the lower tank having a transverse partition dividing it into two parts and the upper tank having a transverse partition extended nearly to the top of the tank

and permitting water from one part of the upper tank to flow into the other part when the first said part is nearly full, and connections from said radiator to said motor jackets.

23. In a hydrocarbon motor, the combination with a water jacketed cylinder block, of a radiator, two sets of pipe connections between said radiator and the jackets of said block, and a pump in one set of said connections.

24. In a hydrocarbon motor, the combination with a cylinder block having two separate water jackets, of means for feeding the water to said jackets at different rates.

25. In a hydrocarbon motor, the combination with a cylinder block water jacketed around the cylinders and valve seats, said block having a partition dividing the jacket into two parts, of means for feeding water to said parts at different rates.

26. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of separate water circulation means for the cylinder and valve seat respectively, said means having different rates of circulation.

27. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of separate similar cooling means for the cylinder and the valve seat respectively.

28. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of separate cooling means therefor, the cooling effect of one of said means being determined by motor speed, and the cooling effect of the other said means being determined by motor heat.

29. In a hydrocarbon motor, the combination with a cylinder block having two separate jackets, and separate means for circulating water through said jackets at a rate determined by the motor speed and by the motor heat respectively.

30. In a hydrocarbon motor, the combination with a cylinder and a valve seat, of separate similar cooling means for the cylinder and for the valve seat respectively, one of said means operable in response to engine speed, and the other said means operable in response to engine heat.

In testimony whereof I affix my signature.

HAROLD D. CHURCH.