C. R. SHORT.

HYDROCARBON MOTOR.

APPLICATION FILED MAY 28, 1917.

1,335,990. **Patented Apr. 6, 1920.**

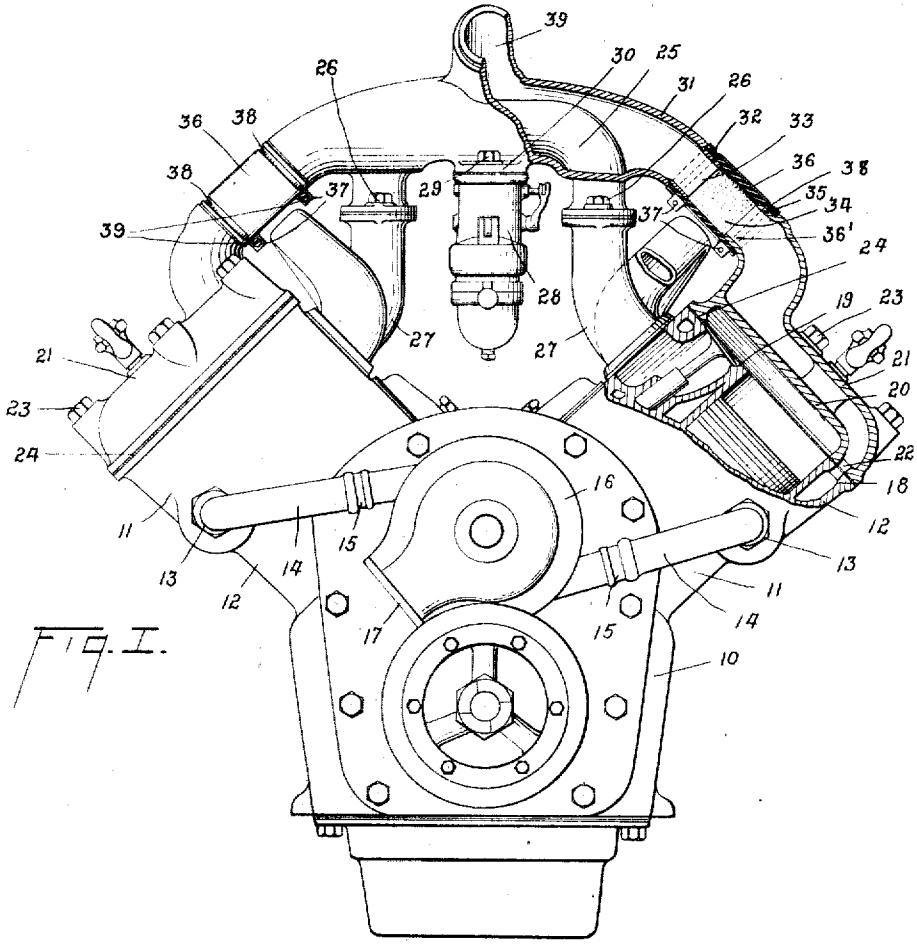

FIG. I.

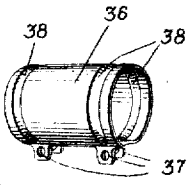

FIG. III.

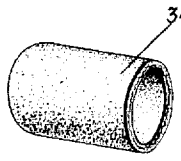

FIG. II.

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HYDROCARBON-MOTOR.

1,335,990. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed May 28, 1917. Serial No. 171,495.

To all whom it may concern:

Be it known that I, CHARLES R. SHORT, a subject of the King of Great Britain, 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 more particularly to an improved arrangement and disposition of the cooling and gas distribution passages.

One of the objects of this invention is to provide a motor having a detachable cylinder head and a jacketed gas intake conduit, with improved means for assembling and connecting these various parts.

Another object of this invention is to provide an improved arrangement for cooling the cylinder and its head, and then heating the gas induction pipe with the same circulating medium.

Another object of this invention is to provide a hydrocarbon motor with improved means for carrying the cooling medium from the cylinder jacket, through its jacketed head, and over the gas induction pipe and finally discharging it to a cooling device such as a radiator.

These, and various other objects, will more clearly appear from the following description, taken in connection with the accompanying drawings, which form a part of this specification, and in which:

Figure 1 is a front end elevation, with portions broken away, of a V-type hydrocarbon motor, embodying a preferred form of my invention;

Fig. 2 is a perspective view of a flexible sleeve for connecting the head jacket and the gas intake conduit jacket; and

Fig. 3 is a perspective view of a combined inclosing and clamping sleeve for the connection illustrated in Fig. 2.

Referring to the drawings, 10 illustrates a motor base or crank case on which are arranged in V relation a pair of cylinder blocks 11.

Each of the blocks is provided with a cooling jacket 12 having an intake port 13 preferably connected by flexible conduits 14 with the discharge ports 15 of a centrifugal type circulating pump 16, which in turn is provided with an inlet port 17. The cylinder jackets 12 are provided with outlet ports 18 and the cylinders are provided with valve controlled gas intake ports 19.

Heads 20 provided with cooling jackets 21 are arranged with their intake ports 22 in register with the cylinder jacket outlet ports 18 and are then adjustably connected as by bolts 23 to the cylinder blocks 11 with a yielding packing gasket 24 therebetween.

A gas induction pipe 25 of inverted U form may be arranged between the cylinder blocks detachably connected as by bolts 26 and pipes 27 in position with the ports at the outer end of each of its branches in register with the cylinder gas intake ports 19. A carbureter 28 may be detachably connected as by bolts 29 in position over the gas induction pipe intake port 30.

It will be noted that the induction pipe is provided with a jacket 31 having laterally extending arms in the end of each of which is formed a nipple 32 and inlet ports 33 which are adapted to be joined by a flexible sleeve 34, preferably of rubber to a nipple 35 and outlet port 36′ of the head jacket 21.

The rubber connections may then be concealed, and its opposite ends tightly clamped into position by means of a split metallic sleeve 36 which is arranged over the connector 34 with its lugs 37 drawn together in any well known manner as by bolts 39. It will be noted that formed adjacent each end of the sleeve 36 are circumferentially extending inturned depressions 38 which will tend to bind the opposite ends of the connecting sleeve 34 on the adjacent nipples 33 and 35.

With the described arrangement it will be noted that the cooling medium will be led into the cylinder jacket 12 of each of the blocks through the intake ports 13 and after circulating through these jackets, will be conducted through the head jacket 21, discharged therefrom through the flexible connections 34 to each of the branches of the conduit jacket, and after passing over the conduit and heating the same, it will be discharged through the outlet port 39 from which it may be carried in any well known manner to a cooling device not shown, such as the usual radiator.

It will be also noted that I may easily connect the gas induction pipe to the cylinder proper, and also join the jacket for the

induction pipe to the cylinder jacket through the detachable head, under wide variations of manufacture. This I am enabled to do by means of the flexible and adjustable connections which are provided.

While I have described and will specifically claim what I deem to be a preferred embodiment of my invention, it will be obvious to those skilled in the art that various modifications and changes may be made without departing from the spirit and scope hereof.

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

1. In an internal combustion engine, the combination with a cylinder having a gas intake opening and a detachable head having a water outlet opening, of a combination gas and water conduit having rigid connection with one of said openings and a flexible connection with the other of said openings.

2. In an internal combustion engine, the combination with a cylinder having a gas intake opening and a detachable head having a water outlet opening, of a combination gas and water conduit having connections with said openings and one of which connections is flexible.

3. In an internal combustion engine, the combination with a jacketed cylinder having a gas intake opening and a jacket outlet opening, of a combination gas and water conduit having a rigid connection with one of said openings and a flexible connection with the other of said openings.

4. In an internal combustion engine, the combination with a cylinder having a gas inlet port, and a cooling jacket having a water outlet port, of a combination gas and water conduit detachably connected with said water outlet and gas intake ports, one of the connections aforesaid being flexible.

5. In an internal combustion engine, the combination with a cylinder having a gas inlet port, and a cooling jacket having a water outlet port, of a combination gas and water conduit detachably connected with said water outlet and gas intake ports, one of the connections aforesaid being flexible and the other rigid.

6. In an internal combustion engine, the combination with two cylinders arranged adjacent one another, and each of which is provided with a gas intake port, and with a cooling jacket having a water outlet port, of a combination gas and water conduit detachably connected with the water outlet ports of both said cylinders, and also with the gas intake ports of both said cylinders, one of the connections aforesaid between said conduit and each of said cylinders being flexible.

7. In an internal combustion engine, the combination with a cylinder having an intake port, of a combination gas intake and water outlet conduit non-adjustably connected therewith, a detachable jacketed cylinder head, and flexible means for connecting said head and said conduit.

8. In an internal combustion engine, the combination with a cylinder having an intake port, a combination gas intake and water outlet conduit, a connection between said conduit and said intake port, a jacketed head connected with said cylinder, and a detachable connection between said head jacket and said conduit jacket, one of said conduit connections being flexible.

9. In an internal combustion engine, the combination with a cylinder provided with a jacket having an intake port and an outlet port, said cylinder also being provided with a gas intake port, a head adjustably connected to said cylinder, said head being provided with a jacket having an intake port adapted to register with said jacket outlet port, of a gas intake conduit detachably connected with said gas intake port and having a jacket flexibly connected with said head jacket, whereby a cooling medium will be circulated through said cylinder jacket, head jacket and conduit jacket *seriatim*.

10. In an internal combustion engine, the combination with a pair of cylinder blocks arranged in V relation, each cylinder being provided with a gas intake port and with a cooling jacket, of a jacketed head detachably secured to each of said blocks, a combination gas and water conduit having a port connected with each of said gas intake ports, and flexible connections between each of said head jackets and said conduit.

11. In an internal combustion engine, the combination with a pair of cylinder blocks arranged in V relation and each provided with a gas intake port and a cooling jacket, a jacketed head detachably secured to each of said blocks and having a water outlet port, of a U shaped jacketed gas intake conduit having a pair of ports connected with said intake port, and flexible connections between said conduit jacket and each water outlet part of said head jackets.

12. In an internal combustion engine, the combination with a pair of cylinders arranged in V relation, each provided with a gas intake port and a cooling jacket, and a jacketed head adjustably connected to each of said cylinders, of a jacketed gas intake conduit having a pair of ports adapted to be connected to said gas intake ports, flexible connections between each of said jackets and said conduit jackets, and metallic sleeves detachably arranged over said flexible connections.

13. In an internal combustion engine, the combination with a pair of cylinders arranged in V relation, each provided with a

gas intake port and a cooling jacket, and a jacketed head adjustably connected to each of said cylinders, of a jacketed gas intake conduit having a pair of ports adapted to be connected to said gas intake ports, flexible connections between each of said head jackets and said conduit jacket, and split housing sleeves arranged over said flexible connections.

14. In an internal combustion engine, the combination with a pair of cylinders arranged in V relation, each provided with a gas intake port and a cooling jacket, and a jacketed head adjustably connected to each of said cylinders, of a jacketed gas intake conduit having a pair of ports adapted to be connected to said gas intake ports, flexible connections between each of said head jackets and said conduit jackets, and split metallic sleeves adapted to inclose said flexible connections and to clamp their opposite ends to said head jackets and said conduit jacket respectively.

In testimony whereof I affix my signature.

CHARLES R. SHORT.