July 8, 1924. 1,500,619

L. C. HILL

HYDROCARBON MOTOR

Filed Jan. 22, 1920

Fig. 1.

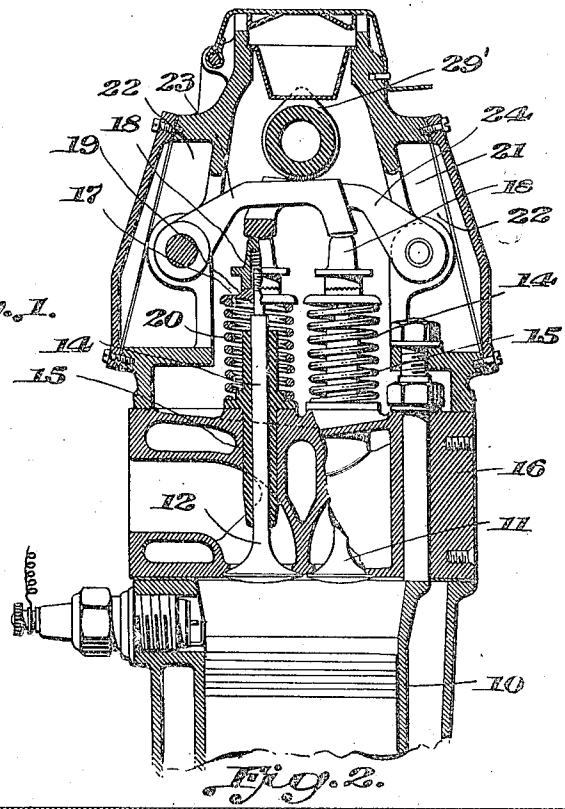
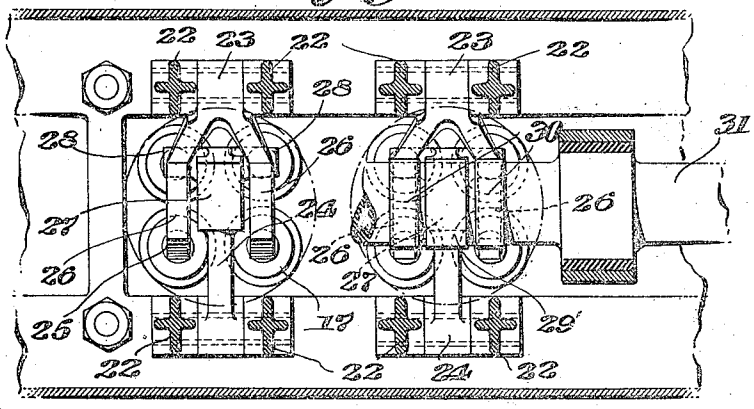


Fig. 2.



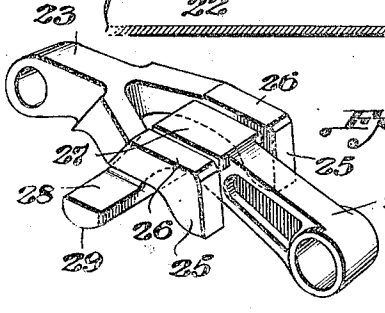


Fig. 3.

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UNITED STATES PATENT OFFICE.

LEWIS C. HILL, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON MOTOR.

Application filed January 22, 1920. Serial No. 353,198.

To all whom it may concern:

Be it known that I, LEWIS C. HILL, 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 overhead valve operating mechanisms for such motors.

One object of the invention is to provide an overhead valve construction in which a direct pressure in approximately a straight line is applied from the operating cams to rocker arms between the cams and the valve stems.

Another object of the invention is to provide a construction of rocker arms capable of being pivoted outside of the valves and with the rocker arms on opposite sides of the valves extending past one another whereby a single cam shaft common to the opposite rocker arms may be employed, and a compact arrangement of valve operating mechanism obtained.

Another object of the invention is to provide a mechanism particularly adapted for constructions in which four valves for each cylinder of the engine are employed.

Other objects of the invention will appear from the following description.

The invention is embodied in preferable form in the construction and arrangement hereinafter described and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a vertical cross section through the upper part of a motor showing the improvements herein described applied thereto,

Figure 2, a horizontal section on the line 2—2 of Figure 1, and

Figure 3, a detail perspective of a pair of rocker arms removed from the motor.

Referring to the drawings, 10 indicates a cylinder for an internal combustion engine. In the particular construction of engine herein illustrated and to which this invention is especially adapted, four valves are employed for each cylinder, namely two exhaust valves 11 and two inlet valves 12. These valves are of the overhead type and the stems 13 and 14 of the exhaust and inlet valves respectively are mounted in suitable guides 15 which are carried by a detachable head 16 above the cylinder block. These stems have threaded portions 17 adapted to be engaged by nuts 18 each pressing against an annulus or cup 19 which receives the upper end of a spiral spring 20, which spring serves to return the valve to closed position.

Above the valve guide head is detachably mounted a skeleton casing 21 which has spaced vertical webs 22 connecting its lower and upper outer walls and in which webs are mounted the outer ends of rocker arms 23 and 24. These respective rocker arms extend inwardly from opposite sides of the casing and the arms 23 are adapted to operate the exhaust valves of the cylinder while the arms 24 are adapted to operate the inlet valves thereof. The valves are mounted between the pivots of the opposing rocker arms and the contact nuts on the heads of the valve stems project up within the central area of the skeleton casing. Each rocker arm 23 is divided into two branch members so that the arm will have a substantially Y-shaped head and at the end of each branch of the Y is a contact member 25, each of which is adapted to bear against one of the contact nuts of a valve stem of one of the exhaust valves. The upper surface of each branch has a flat cam contact face 26 adapted to receive the contact of the cams. The rocker arms 24 which are adapted to operate the inlet valves each have a cam contact surface body 27 which extends between the branches of the opposite arm 23, and T-heads 28 which extend under the branches of the arms 23 and these T-heads are provided with contact parts 29 adapted to bear against the nuts on the upper ends of the valve stems of the inlet valves. Owing to the form, and the overlapping arrangement of the Y and T heads of the opposing rocker arms it will be seen that closely adjacent horizontal surfaces of these respective arms for each cylinder is obtained and on these closely adjoining faces of the arms there is adapted to operate a cam 29′ for the central T-head rocker arm and two cam sections 30 for the branches of the Y-head arm. These cams are mounted upon a single cam shaft 31 extending through the skeleton casing above the rocker arms. By the provision of the cams above the rocker arms and the location of the pivots of the latter outside of the longitudinal lines passing through the valve stems, with the free

ends of the rocker arms extending inwardly above the stems it will be seen that an approximately direct vertical pressure in a straight line is exerted by the cams upon the valve stems, thus tending to avoid binding action of the stems and their guides such as is frequently produced by operating mechanisms the force of which is exerted in a line at an angle to the line of reciprocation of the valve stems.

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

1. In combination in a hydrocarbon motor, two sets of valves, a Y-shaped rocker arm adapted to operate one of the sets of valves, a T-shaped rocker arm adapted to operate the other set of valves, and a cam shaft adapted to operate both said arms, the stem of the T-shaped arm fitting between the branches of the Y-shaped arm.

2. In combination in a hydrocarbon motor, two sets of valves, a forked rocker arm adapted to operate one of the valve sets, a rocker arm adapted to operate the other valve set located in part between the branches of the forked rocker arm, and a cam shaft above the rocker arm having a pair of cams adapted to operate the forked rocker arm and a single cam adapted to operate the other rocker arm.

3. In a hydrocarbon motor, in combination with a cylinder, valves more than two in number to said cylinder, a pair of rocker arms pivoted at the same level on opposite sides of the valves and extending inwardly and disposed in the same plane, one of said arms overlapping the other, and each of said arms having a plurality of contact parts adapted to operate upon said stems, and cam means for operating said rocker arms.

4. In a hydrocarbon motor, in combination with a cylinder, more than two valves to said cylinder, valve stems, springs for said valves, a rocker arm pivoted outside the valves and divided into branches, each having a stem contacting part, and an opposing rocker arm having a central part fitting between said branches in the plane thereof and having a valve stem contact part extending under said first rocker arm.

5. In a hydrocarbon motor, in combination with a cylinder, four valves to said cylinder, a rocker arm pivoted at its outer end and having two contacts for operating two of said valves, a similar rocker arm for the other valves, one of said arms having a Y-head and the other having a part fitting between the branches of the Y-head and having a T-head extending under said branches, cams above said arms, and means for operating said cams.

6. In a hydrocarbon motor, in combination with valves and their stems, springs for said valves, opposite rocker arms pivoted outside of said valves, cams for operating said arms, one of said rocker arms being divided into branches each having a cam contact face and having a plurality of valve stem contact parts and the other arm having a central part fitting between the branches in the plane thereof and having a cam contact face on said part, and having valve stem contact means extending transversely below the branches.

In testimony whereof I affix my signature.

LEWIS C. HILL.