M. TIBBETTS.

HYDROCARBON MOTOR.

APPLICATION FILED OCT. 7, 1912

1,238,221.

Patented Aug. 28, 1917.

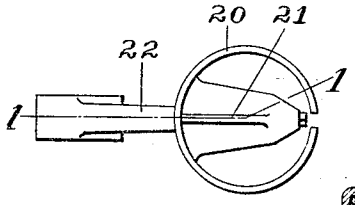


Fig. 5.

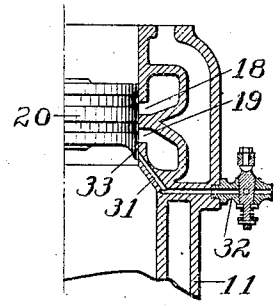


Fig. 3.

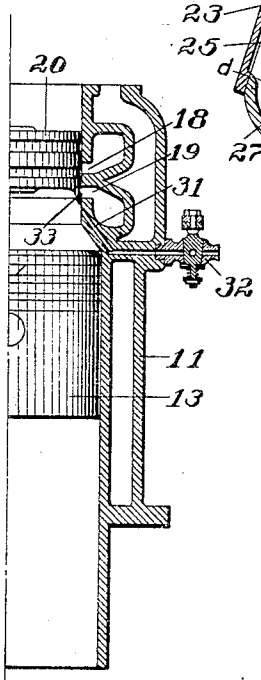


Fig. 4.

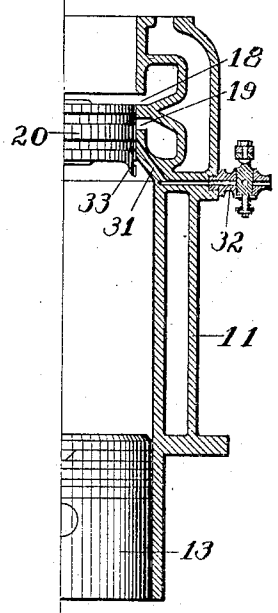


Fig. 2.

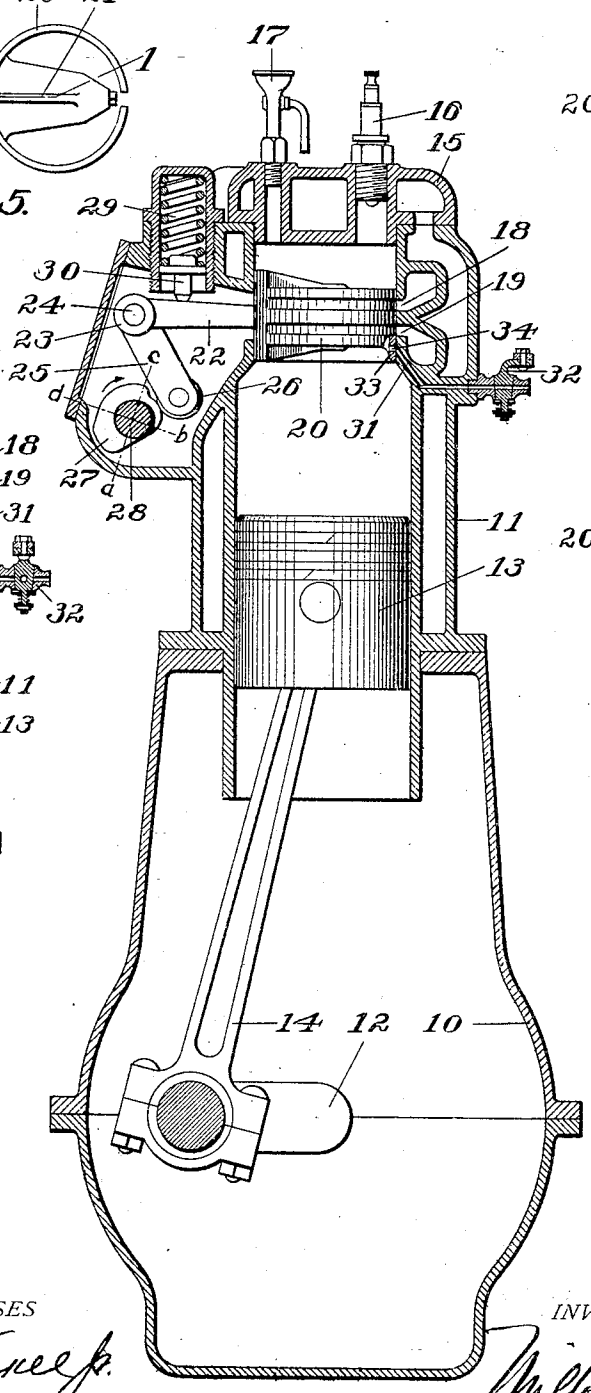


Fig. 1.

WITNESSES

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MILTON TIBBETTS, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON-MOTOR.

1,238,221. Specification of Letters Patent. Patented Aug. 28, 1917.

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To all whom it may concern:

Be it known that I, MILTON TIBBETTS, 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 valve mechanism of four cycle motors.

One of the objects of the invention is to provide a compression relief in a four cycle hydrocarbon motor of the type in which the main intake and exhaust ports are controlled by a split ring valve operating in the upper part of the cylinder.

Other objects 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,

Figure 1 is a transverse sectional view through a four cycle hydrocarbon motor embodying this invention, the valve however being in elevation except at one corner where the section is substantially on the line 1—1 of Fig. 5;

Fig. 2 is a similar section showing the main intake port open;

Fig. 3 is a similar view showing all of the ports closed;

Fig. 4 is a similar view showing the exhaust and relief ports open; and

Fig. 5 is a detail plan view of the split ring valve and the lever that operates it.

Referring to the drawings, 10 indicates the crank case upon which the motor cylinder 11 is supported, and the crank shaft 12 in the crank case operates the piston 13 through the connecting rod 14.

The upper part of the cylinder is shown as of slightly smaller diameter and provided with a head 15 in which is the spark plug 16 and priming cock 17. The upper part of the cylinder is also formed with intake ports 18 and exhaust ports 19 arranged adjacent each other but in different zones. A valve 20 in the form of a split ring is arranged to slide in the contracted part of the cylinder to control the opening and closing of these ports. This valve is formed with a hollow body portion 21, which has an opening at one side thereof for the entrance of an arm 22 of a bell crank lever 23, which lever is pivoted to a suitable projection on the side of the cylinder, as at 24. The end of the arm 22 has a suitable sliding connection with the interior of the part 21, so that the oscillation of the arm will cause the valve to reciprocate in the cylinder.

The other arm 25 of the bell crank lever has a roller 26 mounted at its free end, which roller is arranged in the path of a cam 27 on a shaft 28, which may be operated through any suitable mechanism (not shown) from the crank shaft 12 at the ratio of one revolution of the cam shaft to two revolutions of the crank shaft.

In Fig. 1 the cam shaft is diagrammatically shown as divided into four segments, and it will be observed that when the roller 26 is operated by that part of the cam indicated by segment *a*—*b*, the valve 20 is in its lowest position or that shown in Fig. 2, which corresponds to the intake stroke of the piston, the intake port 18 being wide open. When the roller 26 is operating on segment *b*—*c* of the cam, the valve 20 is in the position shown in Fig. 1, wherein both the intake and exhaust ports are closed, this corresponding to the compression stroke of the piston. When the roller 26 is operating on the segment *c*—*d*, the valve 20 is in the position shown in Fig. 3, and both the intake and exhaust ports are closed, this corresponding to the firing stroke of the piston. When the roller 26 is on the segment *d*—*a*, the valve 20 is in the position shown in Fig. 4, and the intake port 18 is closed and the exhaust port wide open, this corresponding to the exhaust stroke of the piston.

It will be understood that the roller 26 is kept in contact with the cam 27 by the spring 29 and plunger 30, which is constantly pressing on the arm 22. Also it will be understood that all of these operating parts may be properly lubricated by any well known means.

As shown in the drawings, the cylinder 11 is drilled to form a port or passage 31 which may be termed a relief port, and the outlet of this port is controlled manually by a petcock 32. The ring valve 20 is shown as provided with a downward extension 33 adjacent the port 31. This extension is provided wih a port 34 which is adapted to register with the port 31 at predetermined points in the operation of the valve 20. As shown in the various views, the ports 31 and 34 register on the compression stroke, as shown in Fig. 1, and in Fig. 4, the valve has

been moved so far upwardly that the extension is above the port 31, so that said port is again open to the cylinder, but as this is on the exhaust stroke it is immaterial, so far as the operation of the motor is concerned. During the intake and firing strokes, the port 31 is closed by the valve 20, as shown in Figs. 2 and 3 respectively.

So far as the actual operation of the motor is concerned, it is not very material whether the relief port is open on the firing and exhaust strokes, but it is important that the port should be closed on the intake stroke. as the hydrocarbon mixture is very much interfered with and it is very difficult to get a good firing mixture if this port remains open. Hence by the present invention one of the principal objects has been to arrange the valve mechanism so that the relief port is closed on the intake stroke and open on part or all of the compression stroke. The cam 27 is shown as having somewhat more rise on the segment *c*—*d* than on the segment *b*—*c*, but the rises of these two segments may be the same if it is not desirable to close the relief port on the firing stroke.

Many modifications of the invention may be made without departing from the spirit or scope of the invention, and the claims are intended to cover all such modifications.

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

1. In a four cycle hydrocarbon motor, the combination with a cylinder having a relief port in its wall, of a split ring valve in said cylinder for closing said relief port on the intake and firing strokes and for opening said port on the compression and exhaust strokes.

2. In a four cycle hydrocarbon motor, the combination with a cylinder having main intake and exhaust ports and a relief port, all in different zones and above the travel of the piston, of a split ring valve in the cylinder controlling said ports, and cam actuated mechanism for operating said valve to move it downwardly to open the intake valve while closing the exhaust and relief ports on the intake stroke, to move it upwardly to intermediate position to close the intake and exhaust ports and open the relief port on the compression and firing strokes, and to move it farther upwardly to open the exhaust and relief ports while closing the intake port on the exhaust stroke.

3. In a four cycle hydrocarbon motor, the combination with a cylinder having main intake and exhaust ports and a relief port all in different zones and above the travel of the piston, of a split ring valve in the cylinder controlling said ports, and cam actuated mechanism for operating said valve to move it downwardly to open the intake valve while closing the exhaust and relief ports on the intake stroke, to move it upwardly sufficiently to close the intake port, and open the relief port while maintaining the exhaust port closed on the compression stroke, to move it upwardly sufficiently to close the relief port while maintaining the intake and exhaust ports closed on the firing stroke, and to move it farther upwardly to open the exhaust port while maintaining the intake port closed on the exhaust stroke.

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

MILTON TIBBETTS.

Witnesses:
MILO L. BAILEY,
E. GROAT.