April 7, 1925. 1,532,292

L. M. WOOLSON

HYDROCARBON MOTOR

Filed March 3, 1921

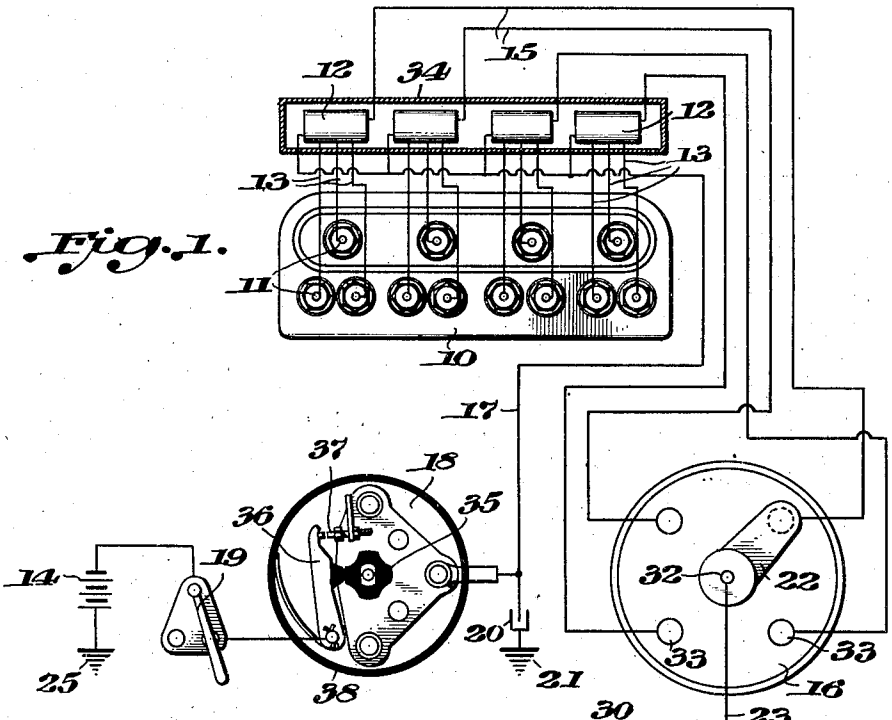


Fig. 1.

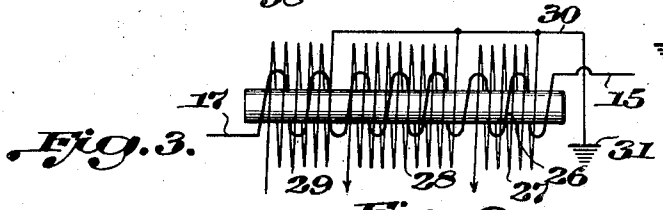
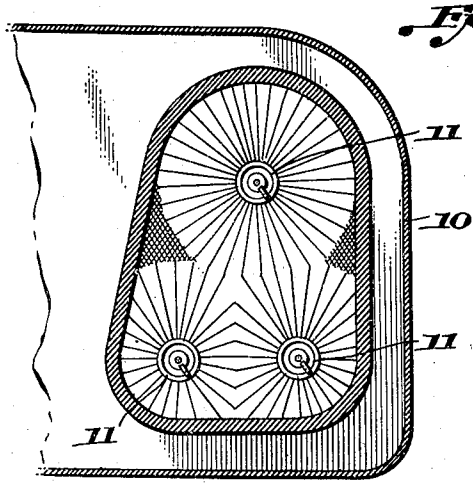


Fig. 3.

Fig. 2.



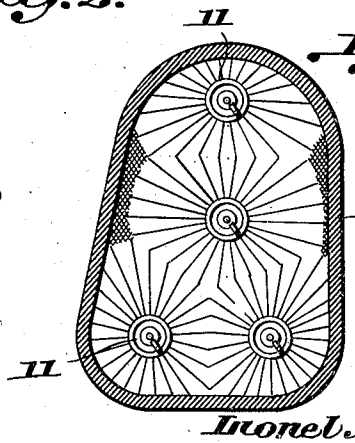


Fig. 4.

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UNITED STATES PATENT OFFICE

LIONEL M. WOOLSON, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON MOTOR.

Application filed March 3, 1921. Serial No. 449,341.

To all whom it may concern:

Be it known that I, LIONEL M. WOOLSON, 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 ignition thereof.

One of the objects of the invention is to provide a novel and simple ignition mechanism for producing several synchronized sparks in the cylinder of a hydrocarbon motor.

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:

Fig. 1 is a diagrammatic view of a motor and ignition mechanism embodying the invention;

Fig. 2 is a diagrammatic view of a spark coil embodying the invention;

Fig. 3 is a fragmentary horizontal section thru the combustion chamber and water jacket of a motor cylinder block, illustrating diagrammatically the flame propagation from three sparkplugs; and

Fig. 4 is a section thru the combustion space of a cylinder similar to Fig. 3, illustrating diagrammatically the flame propagation from four sparkplugs.

Referring to the drawings, 10 represents a motor cylinder block, in this instance four cylinders comprising the block. In Fig. 1 there are three sparkplugs 11, for each of the cylinders. Fig. 1 also shows, diagrammatically, a spark coil 12, for each of the cylinders, and there are three high-tension lead wires 13 from each of these coils to the respective sparkplugs. Also, the primary windings of the coils 12 are connected with a source of current such as a battery 14 thru wires 15, a distributor 16, a wire 17, a circuit breaker 18, and a hand-switch 19. A condenser 20 is connected between the wire 17 and the ground at 21. The distributor 16 has its rotating arm 22 connected thru a wire 23 with the ground as at 24. One of the poles of the battery 14 is also connected with the ground as at 25.

Now the coils 12 above referred to are more fully illustrated in Fig. 2 where the primary winding is indicated at 26 and where three secondary windings are indicated at 27, 28 and 29 respectively. A single wire 30 may connect one side of these secondary windings with the ground as at 31 and the other ends are connected by the wires 13 above referred to with the respective sparkplugs.

By this arrangement of several secondaries in a single coil it is evident that the sparks in the cylinder will be made simultaneously, that is that they will be synchronized, which is essential if the plurality of sparks is to have any advantage in reducing or eliminating detonation. The flame propagation in the cylinder, when the three sparks are thus fired simultaneously, is diagrammatically illustrated in Fig. 3 where it will be seen that the three circles of flame cause almost instant firing of the charge thruout the combustion chamber.

In order that one of the sparks at least may be exceptionally strong for starting purposes when the motor is cold, one of the secondary windings of the coil if made longer than the others, thus in Fig. 2 the winding 28 is increased in size over the windings 27 and 29. In this way a strong spark will be produced by the winding 28 and yet the sparks produced by the windings 27 and 29 will be amply strong for ordinary running.

In Fig. 4 is illustrated an arrangement of sparkplugs where four plugs are used thus causing an even greater over-lapping of circles of flame starting from the respective sparkplugs. With the use of four sparkplugs there would of course be four secondary windings on each of the coils.

Looking at the ignition apparatus somewhat more in detail it will be understood that the distributor 16 is so connected with the motor that the axis 32 of the arm 22 is connected to the motor so that it will rotate at one half engine speed, and this arm 22 will thereby successively connect the wires 15 thru contacts 33 with the ground 24, thereby forming a connecting link for the primary circuit from the battery.

The four coils 12 are preferably mounted in a tube or housing 34 which is supported upon or adjacent the cylinder heads in proximity to the sparkplugs 11 so that the high-tension lead wires 13 may be as short as possible.

The circuit breaker 18 comprises a circuit-

breaking cam 35 which is also operated by the motor, and this cam actuates a rock-arm 36 which thereby makes and breaks the circuit from the battery 14 to the wire 17, thru the contact points 37. The entire circuit breaker is preferably enclosed in a housing 38 of insulating material.

It will be evident that the details of construction above described may not necessarily be followed in constructing and operating the invention, and the application is intended to and does cover all modifications which may be made within the scope of the claims.

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 plurality of spark plugs, of means for operating said spark plugs comprising a coil having a primary winding connected to a current source and having a secondary winding for each of said spark plugs, one of said secondary windings being arranged to produce a stronger spark than the other.

2. In a hydrocarbon motor, the combination with a motor cylinder having a plurality of sparkplugs, of means for synchronously operating said sparkplugs comprising a coil having a primary winding connected to a current source and having a plurality of secondary windings connected to the respective sparkplugs one of said secondary windings being formed to produce a stronger spark than the other.

3. In a hydrocarbon motor, the combination with a plurality of spark plugs, of means for simultaneously operating said plugs comprising a coil having a primary winding, and inductively associated secondary windings of different strengths connected to said spark plugs.

4. An ignition coil having a single primary winding and two secondary ignition windings, one of said secondary windings having more turns than the others.

5. An ignition coil having a single primary winding and three secondary ignition windings two of which secondary windings are substantially the same and the third of which has more turns than either of the others.

6. In a hydrocarbon motor, the combination with a plurality of sparkplugs in each cylinder of the motor, a source of current, a circuit breaker, a low-tension distributor, a coil for each motor cylinder having its primary winding connected thru said distributor and circuit breaker to said source of current, and said coil having a secondary winding for and connected to each of said sparkplugs.

7. In a hydrocarbon motor, the combination with a plurality of sparkplugs in each cylinder of the motor, a source of current, a circuit breaker, a low-tension distributor, a coil for each motor cylinder having its primary winding connected thru said distributor and circuit breaker to said source of current, and said coil having a secondary winding for and connected to each of said sparkplugs, one of said secondary windings having more turns than the other for the purpose described.

8. In a hydrocarbon motor, the combination with a plurality of sparkplugs in each cylinder of the motor, a source of current, a circuit breaker, a low-tension distributor, a coil for each motor cylinder having its primary winding connected thru said distributor and circuit breaker to said source of current, and said coil having a plurality of secondary windings one of which has more turns than the other or others, and the secondary windings of each coil being respectively connected to the sparkplugs of a cylinder.

In testimony whereof I affix my signature.

LIONEL M. WOOLSON.