

June 1, 1937.

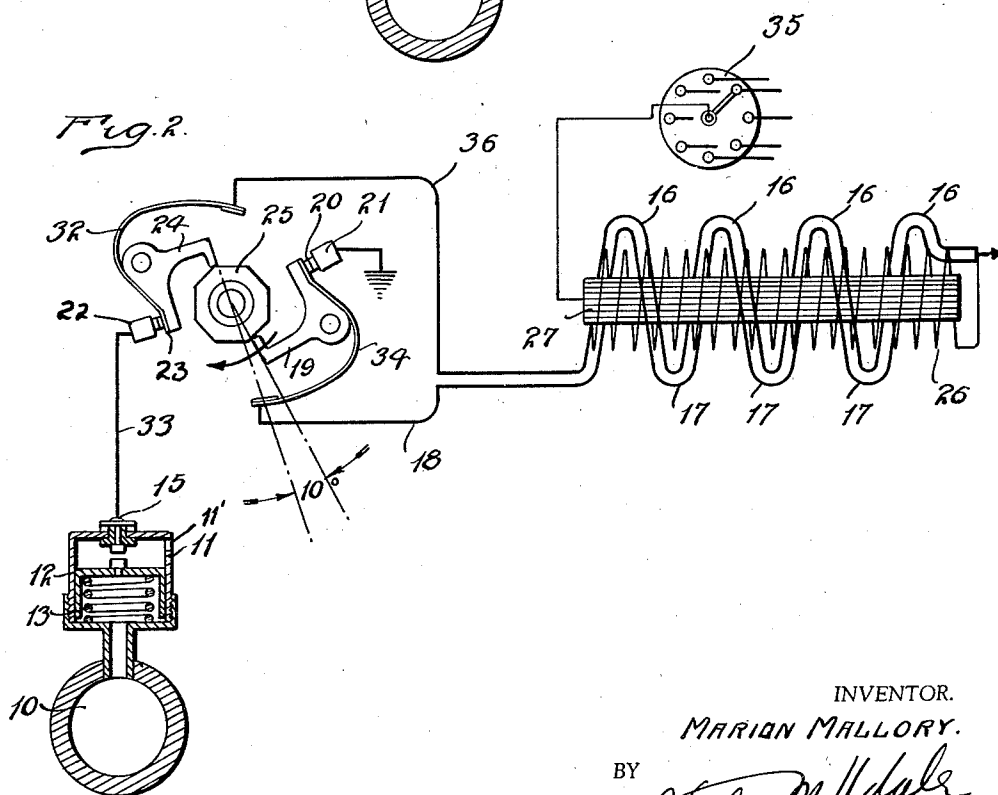
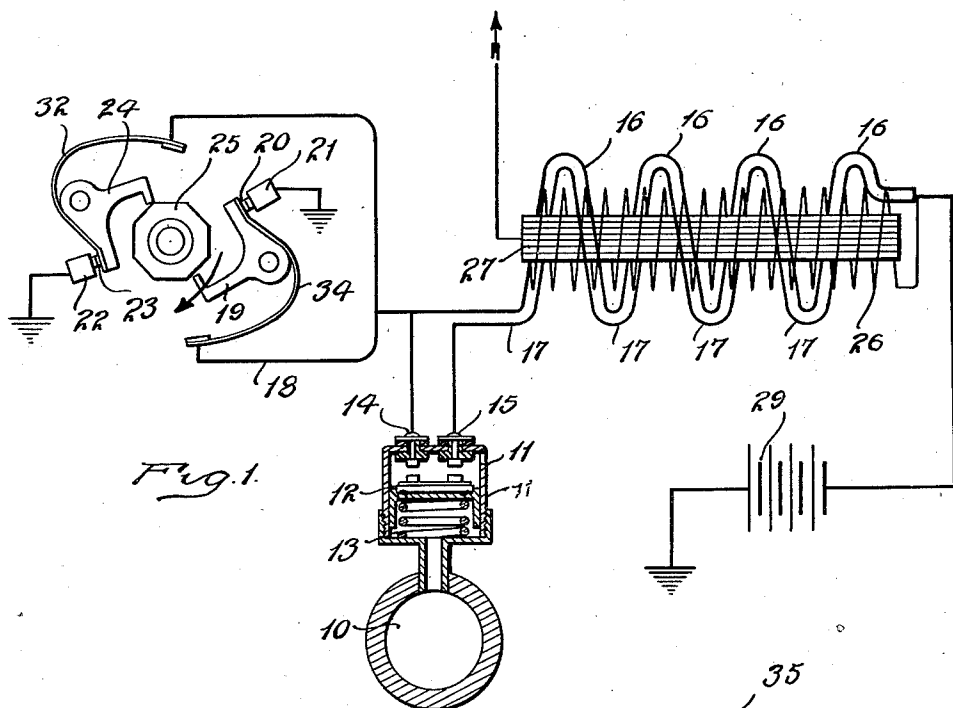
M. MALLORY

2,082,709

IGNITION TIMER AND COIL

Filed Oct. 30, 1933

2 Sheets-Sheet 1



INVENTOR.
MARION MALLORY.
BY *Stanley M. Udall*
ATTORNEY.

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Fig. 3.

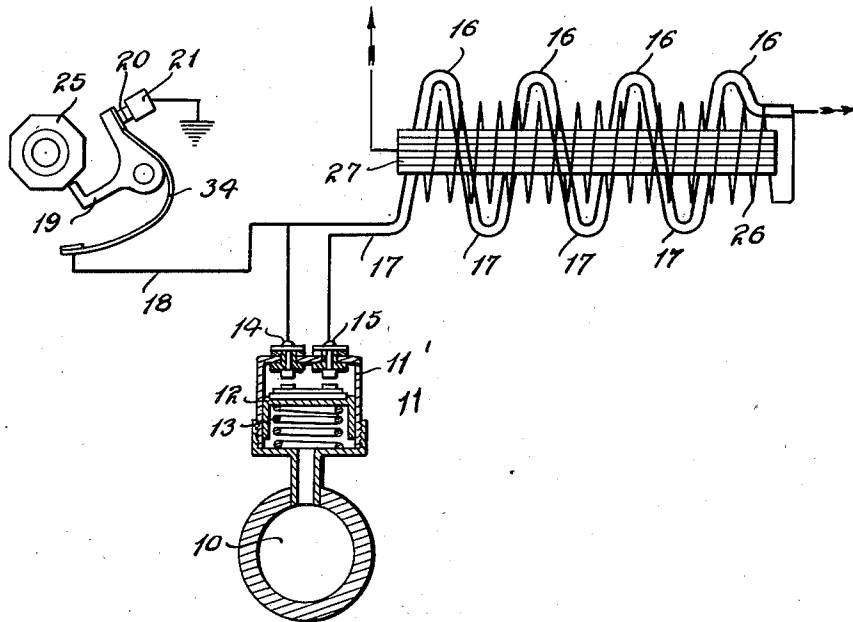
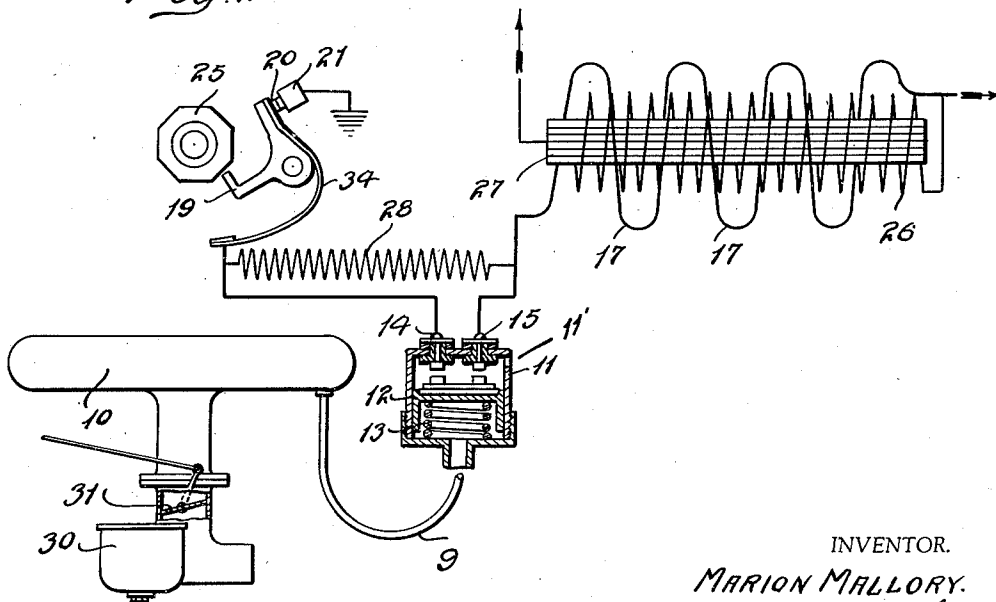


Fig. 4.



INVENTOR.

MARION MALLORY.

BY

BY Stanley M. Udels
ATTORNEY.

ATTORNEY.

UNITED STATES PATENT OFFICE

2,082,709

IGNITION TIMER AND COIL

Marion Mallory, Detroit, Mich., assignor, by
mesne assignments, to The Mallory Research
Company, Detroit, Mich., a corporation of
Michigan

Application October 30, 1933, Serial No. 695,787

10 Claims. (Cl. 123—148)

The objects of this invention are to reduce the consumption of current, to reduce the tendency of the coil to overheat, to ensure that the hottest possible spark is available at high engine speed consistent with an economical construction. An additional object is to simultaneously retard the spark and to increase its intensity whenever the load on the engine increases.

Figure 1 shows one form of my invention applied to an ignition system having two circuit breakers.

Figure 2 shows an alternative form of my ignition system in which the spark is automatically advanced as the speed increases.

Figure 3 shows another form of my invention similar to that shown in Figure 1 applied to a single circuit system having a single circuit breaker.

Figure 4 shows another application of my invention to a single circuit system having a single circuit breaker.

In Figure 1, 10 is the inlet manifold of the engine. Connected to it is an inlet vacuum cylinder 11 in which reciprocates a piston 12 operated by a spring 13. This piston makes contact between 14 and 15; thus acting as a vacuum responsive switch. In the position shown, the circuit is open, and 17, which is a primary circuit surrounding a secondary circuit 26, (in its turn wound around a core 27) is inoperative. 16 is a primary circuit, which is always operative, being connected to 17 at one end and at the other end being connected directly to the two circuit breakers 19 and 24. The two primary circuits 16 and 17 are both directly connected to the storage battery 29. The primary circuit 16 and also the primary circuit 17, when the vacuum switch 14 and 15 is closed, are connected through the wire 18 with the springs 32 and 34, which transmit the current to the contacts 20 and 23, which make and break contact with the fixed contacts 21 and 22, the fixed contacts 21 and 22 being grounded in a well known manner. The circuit breakers 19 and 24 are separated by the rotating cam 25.

In Figure 2, a double circuit breaker is provided and separate connections from the double primary circuits. 17 is connected to the circuit breaker 19 through the wire 18. The primary circuit 16 is connected through the wire 36 to the circuit breaker 24, which has its contact 22 grounded through a vacuum switch 15 by means of the wire 33, which switch is operated by the piston 13, which reciprocates in the vacuum cylinder 12, atmospheric pressure being admitted

through the opening 11 prime. In this figure, the secondary high tension circuit 26 is shown connected to the ordinary distributor 35. It will be noticed that there is a 10° difference between the setting of the circuit breakers 19 and 24.

In Figure 3, a single circuit breaker 19 is used, and both primary windings 16 and 17 are connected therewith through the wire 18. 17 is connected through the vacuum switch 14 and 15 as described above.

In Figure 4, the inlet manifold 10 is shown complete with a carburetor 30 and a throttle valve 31. A pipe 9 is shown connecting the inlet manifold 10 with the inlet vacuum cylinder 11, in which the piston 12 reciprocates. The contacts 14 and 15 are opened by the vacuum acting on the piston 12, atmospheric pressure being admitted through 11 prime. In this construction, only one primary circuit is shown—17. This communicates with the circuit breaker 19 through a resistance 28. This resistance 28 is short-circuited by the closing of the switch contacts 14 and 15 by the piston 12. Circuit breaker 19 is operated in the usual manner by the cam 25 to open and close the contacts 20 and 21.

Operation

In Figure 1, the primary circuit 17 is broken whenever the engine is running under a light load. The amount of current, therefore, is reduced to the amount flowing through the circuit 16. Obviously, in this construction, less current is used and less heating results. The timing, however, is not changed.

In Figure 2, in addition to reducing the current when the circuit breaker 24 is inoperative, the timing is advanced because the cam 25 breaks the circuit 20 and 21 earlier than it breaks the circuit 22 and 23. Hence, the effect of the vacuum in 10 opening the vacuum switch 15 is to both reduce the current by eliminating the primary circuit 16 and too, at the same time, to advance the spark. It is well known that under a light load the spark may be advanced more than under a heavier load, and, of course, it is equally well known that under a light load, a low compression results, which low compression demands less potential to cause an explosion than is required with a high compression; that is, with the throttle wide open.

In Figure 3, a single circuit breaker 19 is shown and the vacuum switch 14 and 15 disconnects the primary circuit 17 from the circuit breaker 19 whenever the vacuum in the inlet manifold exceeds an amount determined by the compression

of the spring 13 inside of the vacuum cylinder 11.

In Figure 4, the carburetor 30 is shown with the throttle 31 in the low speed position. The vacuum thereby created opens the switch 14 and 15.

What I claim is:—

1. In an ignition timing device for an internal combustion engine, having a throttle controlled inlet manifold, an ignition circuit including a circuit breaker, an ignition coil having a secondary circuit and a primary circuit, the latter being adapted to be opened and closed by said circuit breaker, inlet vacuum responsive means and means for varying the strength of the current in said primary circuit adapted to be controlled thereby for the purpose described.

2. In an ignition timing device for an internal combustion engine, an ignition circuit including two circuit breakers, an ignition coil having a secondary circuit and two primary circuits, each of the latter being adapted to be opened and closed by one of said circuit breakers, said circuit breakers being timed so that one breaks after the other, engine load responsive means rendering one of the circuit breakers inoperative whenever the load falls below a predetermined value so that the ignition is automatically advanced under light loads.

3. In an ignition timing device for an internal combustion engine, an ignition circuit including two circuit breakers, an ignition coil having a secondary circuit and two primary circuits, each of the latter being adapted to be opened and closed by one of said circuit breakers, said circuit breakers being timed so that one breaks after the other, inlet vacuum responsive means rendering one of the circuit breakers inoperative whenever the load falls below a predetermined value so that the ignition is automatically advanced under light loads.

4. In an ignition timing device for an internal combustion engine, an ignition circuit including a circuit breaker, a coil having a secondary circuit and a primary circuit, the latter being adapted to be opened and closed by said circuit breaker, and means responsive to a predetermined change in the vacuum of the engine intake to vary the strength of the current in said primary circuit.

5. In an ignition timing device for an internal combustion engine, an ignition circuit including a circuit breaker, a coil having a secondary circuit and a primary circuit, the latter being adapted to be opened and closed by said circuit breaker, a variable resistance in said primary

circuit, and means responsive to a predetermined reduction in the amount of vacuum in the engine intake to reduce said resistance.

6. In an ignition system, a primary circuit having two branches, a circuit breaker in each branch having a movable contact and a relatively stationary contact, the stationary contact of one circuit breaker being permanently grounded, the stationary contact of the other circuit breaker being insulated, and a switch controlled by engine suction and operable when closed to ground said insulated contact.

7. In an ignition system, a primary circuit having two branches, a circuit breaker in each branch having a movable contact and a relatively stationary contact, one circuit breaker being set to open ahead of the other, the stationary contact of the first opening circuit breaker being permanently grounded, the stationary contact of the last opening circuit breaker being insulated, and a switch controlled by engine suction and operable when closed to ground said insulated contact, thereby immediately retarding the timing.

8. A spark controlling mechanism comprising an engine ignition circuit adapted to be set for a spark advance condition or for a spark retard condition, and means responsive to the operation of the engine to which said circuit pertains for selectively setting said circuit in said spark advance condition or said spark retard condition.

9. A spark controlling mechanism comprising an engine ignition circuit, a pair of differently timed circuit interrupters optionally includable in said circuit, and means responsive to the operation of the engine to which the circuit pertains for selectively including said interrupters in said circuit.

10. In an ignition device for an internal combustion engine, an ignition circuit including two circuit breakers adapted to be opened and closed in sequence, a coil having a primary and a secondary winding, the circuit through the primary winding being opened and closed by said circuit breakers, and means responsive to a predetermined increase in the vacuum of the engine intake to render inoperative the circuit through the circuit breaker that is last to open and close, thereby reducing the strength of the secondary current by shortening the time of saturation of the primary circuit, and simultaneously advancing the time of ignition.

MARION MALLORY.