

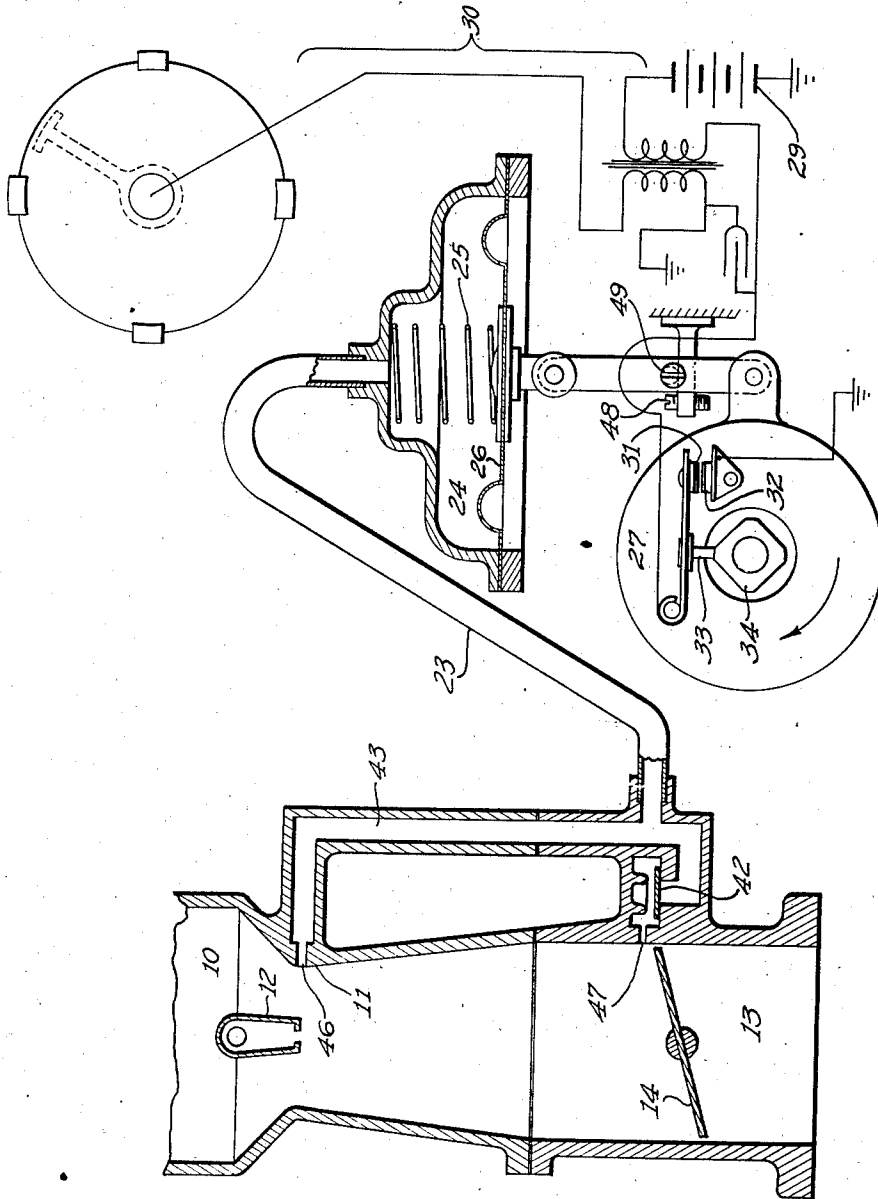
Sept. 11, 1945.

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2,384,693

SPARK ADVANCE DEVICE

Filed Dec. 9, 1944



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2,384,693

SPARK ADVANCE DEVICE

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Application December 9, 1944, Serial No. 567,463

3 Claims. (Cl. 123—117)

The object of this invention is to control the spark advance in response to the speed of the engine and also to the density of the charge.

The figure shows the preferred form of my invention.

In the figure, 10 represents the air entrance, 11 the venturi, and 12 a fuel nozzle discharging therein. 13 is the mixture outlet, 14 a throttle valve therein. A restriction 47 is located in the wall of the mixture outlet 13 and is so located that as the throttle 14 is open, the opening 47 is subjected to the inlet manifold suction. An opening 46, somewhat larger than the opening 47, is provided in the throat of the venturi 11. The two openings 47 and 46 are connected by the passage 43, which in its turn is connected to the pipe 23 to the chamber 24, in which is located a compression spring 25. A diaphragm 26 is arranged to move the circuit breaker 27 between the limits set by the stops 48 and 49. In the position shown, the stop 49 is preventing the further retardation of the ignition. Stop 48 limits the advance.

The circuit breaker 27 consists of the usual movable contact 31, which is moved by the fiber block 33, which engages with the cam 34 and the relatively stationary contact 32, which is carried by the circuit breaker plate 27. A spring arm, which carries the block 33 and contact 31, causes the block 33 to engage with the cam 34 and the contact 31 to engage with the contact 32. Electricity is supplied by the battery 29. The high tension current is produced by the usual coil and the standard distributor 30. A check valve 42 of relatively light weight and limited lift is interposed in the passage 43 between the opening 46 and the restricted opening 47.

Operation

In the position shown, the spark is fully retarded and the engine is idling, throttle 14 is opened slightly, and as it is opened, the opening 47 imposes a suction in the upper surface of the valve 42. The valve 42 is lifted off its seat and air is drawn in through the opening 46. The suction in the mixture outlet 13 reaches a maximum value, just under 21" Hg, but the spark is fully advanced when the vacuum in the chamber 24 reaches 7" Hg.

Hence, there is no advantage in increasing the suction beyond that figure, and there is a positive disadvantage because if the opening 47 was as large as or larger than the opening 46, the

suction in 24 would be greater than that required to rotate the circuit breaker plate 27 so as to engage with the spark advance stop 48. If that were so, when the throttle 14 is thrown wide open, at slow engine speed the suction in 24 would not immediately fall to the atmospheric pressure then existing in venturi 11, but the suction in 24 would taper off gradually. Hence, the spark would not be retarded quickly enough. The result is the engine would knock during the acceleration of the car. Therefore, it is desirable to have the opening 47 as small as possible as compared with the opening 46.

At wide open throttle, the suction in the venturi 46 reaches a maximum of from 4" to 7" Hg, and this suction is sufficient to give all the advance needed at the particular engine speed.

In the absence of check valve 42, the full value of the venturi suction would not be available, and hence, it would be necessary to use a larger diaphragm 26. Hence, the function of the check valve 42 would enable the smallest possible diaphragm 26 to be used.

If the part throttle spark advance is to be greater than the spark advance at maximum speed, then the opening 46 is restricted to increase the suction in chamber 24, but this suction is never equal to one-half the maximum suction in the mixture outlet 13.

What I claim is:

1. A suction responsive spark advance device for an internal combustion engine having an air entrance, a venturi therein, a throttle valve located downstream of the venturi, a relatively unrestricted suction passage leading from the throat of said venturi to said suction responsive spark advance device, a relatively restricted passage located so as to be connected with the downstream side of said throttle when the throttle is first opened and leading to said device, a non-return valve in said second passage preventing flow from the second passage to the first passage when the throttle moves towards its wide open throttle position and permitting flow from first passage to second passage when the throttle is partly open so that the suction applied to said device never exceeds that created by the venturi by more than 50%.

2. A device as set forth in claim 1 in which the non-return valve consists of a thin, flat disc.

3. A device as set forth in claim 1 in which the non-return valve consists of a gravity-seated valve of relatively light weight.

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