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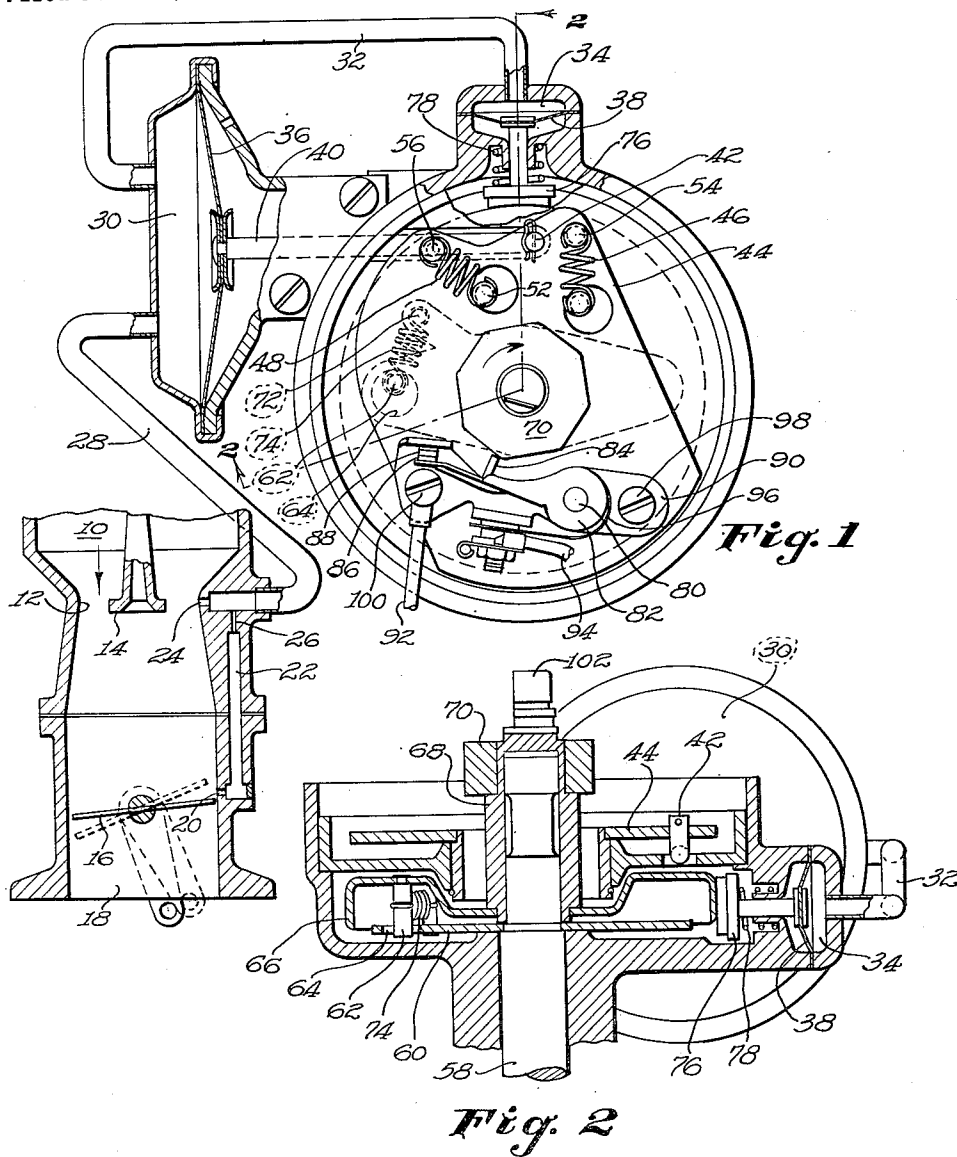
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2,596,840

ELECTRICAL IGNITION CONTROL

Filed Feb. 11, 1950

2 SHEETS—SHEET 1



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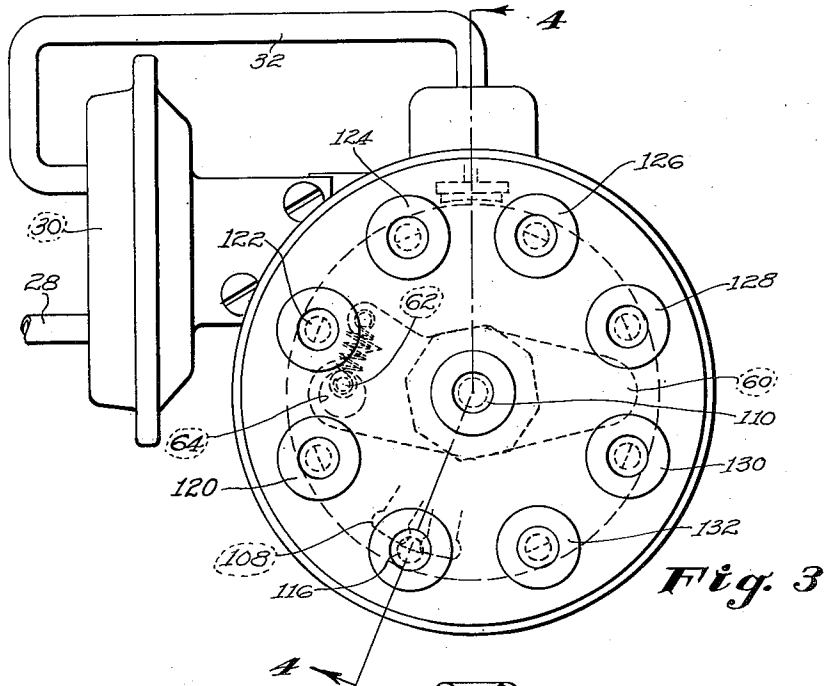
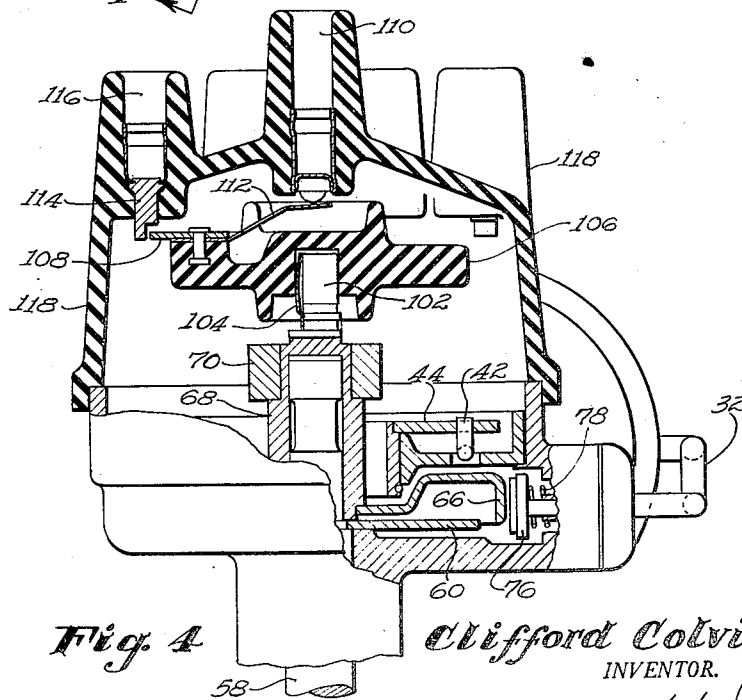


Fig. 4

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2,596,840

ELECTRICAL IGNITION CONTROL

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Application February 11, 1950, Serial No. 143,717

3 Claims. (Cl. 123-117)

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The object of this invention is to improve the range covered by the pressure ignition system of the type shown in the Grant Patent No. 2,465,529 and the Westcott application Serial No. 717,536, filed December 20, 1946, now Patent No. 2,503,645, issued April 11, 1950. The limitation of the device shown therein is that it cannot be applied to an engine with overhead valves. Such an engine has so much spark advance that when the high tension ignition distributor is advanced as far as the cam is advanced, it is advanced so far that the sparks no longer register and the ignition becomes irregular and uncertain. In other words, the high tension distributor is so far from the stationary high tension terminal, when the spark is intended to jump, the spark occasionally jumps the wrong way and the engine fires irregularly. In order to solve this problem it was necessary to advance the cam more than the shaft. This was solved without the use of centrifugal weights by having the cam rotatably mounted on the shaft and by having a definite degree of travel between the cam and the stationary bushing on which the cam is guided. Frictional means, such as shown in the Mallory expired Patents e. g. 1,896,714, are used to vary the timing so that there are two separate spark advance curves, one for wide open throttle and the other for part throttle.

Briefly, the idea of this application is that if you want 40° wide open throttle and 60° part throttle it cannot be obtained with the present distributor. You have to have 60° travel on the plate to do this. With this distributor you make a plate with 40° travel and get the rest by increasing or decreasing the travel that the vacuum brake gives.

Fig. 1 is a diagrammatic representation, partially in section, of the carburetor and the ignition timing device associated therewith.

Fig. 2 is a partial cross-sectional elevation taken on plane 2-2 of Fig. 1.

Fig. 3 is a plan view looking down on the high tension portion of the electrical distributor shown in Fig. 4.

Fig. 4 is a cross-sectional elevation taken on plane 4-4 of Fig. 3.

In the figures, 10 is the air entrance. 12 is the venturi. 14 is the fuel nozzle. 16 is the throttle in the mixture outlet 18. The full lines indicate the position of the throttle when the engine is running idle or when it is not running at all and the broken lines indicate the position for ordinary road load for maximum spark advance. 20 is a restriction located upstream of

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the upstream lip of the butterfly throttle 16 when the throttle 16 is in its idling position. 22 is a vertical passage connecting the restriction 24 with the restriction 22. The restriction 24 being located at the point of highest suction in the venturi 12. A restriction 26 is provided between the passage 22 and the passage 28. Passage 28 connects both the restrictions 20 and 24 with the chamber 30. The vacuum tube 32 connects the vacuum in chamber 30 with the chamber 34. A diaphragm 36 forms the moving wall for the right-hand wall of the chamber 30. Diaphragm 38 forms a lower moving wall in the chamber 34. 40 is a rod which connects through its right-hand end 42 with the circuit plate 44. Two tension springs 46 and 48 anchored to the stationary pins 50 and 52, tend to rotate the plate 44 in a clockwise direction. These springs are the subject matter of Patent No. 2,503,645. It is noted that the spring 48 is slightly loose on the stationary pin 52 so that when the diaphragm 36 moves to the left the spring 46 imposes a load, which load is immediately supplemented by the spring 48, as is set forth in the above copending application. Pins 54 and 56 are mounted on the plate 44 and constitute the movable anchor pins for the springs 46 and 48.

A drive shaft 58, rotating at half engine speed, rotates plate 60 which engages with a pin 62. This pin 62 is free to move in an opening 64 in the plate 60. The pin 62 is anchored to the flange disc 66. This flange 66 carries a shaft 68 at the end of which there is a cam 70 locked thereto.

A pin 72 is mounted on an ear extending from the drive plate 60. The two pins 62 and 72 are connected together by tension spring 74. In the position shown the throttle 16 is in the idling position, no suction is applied to chamber 30 or 34 and the brake element 76 is active. The tension spring 74, in this condition, holds the drive plate 60 and the flanged disc 66 in the relative position in which they are shown but the moment the drive shaft 58 begins to rotate the spring 74 is retarded to the greatest degree possible. The moment the throttle 20 closes the brake 76 is released and the spark advances.

The usual circuit breaker mechanism is shown and forms no part of this invention. Briefly, there is a pin 80, mounted on plate 44. There is a breaker arm 82 which has a fiber block 84 which rides on the cam 70. A stationary tungsten point 86 makes and breaks contact with the moving tungsten point 88. The ignition, of course, is controlled whenever this breaks. The whole

mechanism is mounted on a plate 90 which is bolted to the plate 44. The usual electrical connections 92 and 94 are provided and the breaker arm 82 is held in engagement with the cam 70 by means of a steel spring 96. Lock screws 98 and 100 lock the brake mechanism, just described, onto the plate 44. This constitutes the low tension system which is in universal use today and is no part of this invention.

The shaft 102 acts as a guide for the sleeve 68 which carries an extension or pilot portion 102. This pilot portion 102 carries a flat spring 104 (Fig. 4) which engages the high tension arm 106. This arm 106 carries the high tension distributing point 108. High tension entrance cable enters through an opening 110. A conducting spring 112 conveys the high tension electricity up opening 116 to the high tension cable, not shown. The high tension cap 118 carries nine high tension openings. These are as follows: the high tension entrance 110, the high tension exit 116, and the seven other high tension exits 120, 122, 124, 126, 128, 130, and 132.

The ignition device is shown with the throttle in the idling position but with the engine not running. If the engine were running the spring 74 would be stretched and the pins 62 and 72 would be separated by the amount permitted by the opening 64 in the drive plate 60.

Operation

It will be noticed in Fig. 3 that with an eight cylinder engine each of the high tension outlets 116, 120, 122, 124, 126, 128, 130, and 132 are separated from each other by an angular displacement of 45°.

The distributing point 108 is made of the shape shown in broken lines in Fig. 3. This is shown in two alternative positions and it will be noticed that the full advance of the shaft 58 and the pilot 102 is not large enough to cause the high tension to jump to the wrong set of plugs. By reason of the clearance between the pin 62 and the opening 64 an additional advance is derived from the friction brake 76. Hence, the requirements of an overhead valve engine can be met without disturbing the distribution of high tension electricity.

It will be noticed in Fig. 1 that pin 56 is undercut so that it has to travel $\frac{1}{8}$ inch before it takes up the slack in spring 48.

When running with throttle 16 in position shown in Fig. 1 in broken lines the diaphragm 36 moves over to the left stretching springs 46 and 48 and rotating plate 44 anti-clockwise to advance the spark. At the same time the diaphragm 38 is drawn up releasing the brake 76 from the brake drum 66. The effect of this is that, as shown in Fig. 2, spring 74 advances the cam 70 so that the spark is advanced a second time. The high tension distributor arm 106 is driven by the sleeve 68. When the throttle 16 is opened wide then the suction at port 20 is reduced and the Venturi suction at port 24 takes control. Meantime the brake 76 is applied and the brake drum 66 is rotated stretching the spring 74 and retarding the spark. The net result is that the spark is not as advanced as it was when the throttle was only one-half open.

At and below one-half throttle, the spring 74 contracts and rotates the drum 66 at the same time suction at port 20 increases so that the spark is advanced due to two factors, (1) directly by diaphragm 26 and (2) indirectly by diaphragm 38.

What I claim is:

1. In an ignition system for an internal combustion engine having the usual Venturi air inlet and a throttle downstream of the venturi, the ignition system being of the type in which the circuit breaker mechanism is mounted on a yieldably restrained partially rotatable plate and in which there is a movable wall connected to the plate and responsive to the suction in the venturi when the throttle is wide open and to the suction downstream of the throttle when the throttle is moved from wide open into a partially open position, said wall acting in opposition to the spring to advance the ignition by rotating the plate, the improvement which comprises an ignition drive shaft, a hollow cam rotatably mounted on the ignition drive shaft and engaging with the breaker mechanism, the ignition drive shaft projecting through the cam, a drive plate rigidly locked in the drive shaft, a driven plate rigidly locked to the hollow cam, spring means normally holding the drive plate and driven plate so as to rotate as one, a friction brake engaging with the rotating edge of the driven plate, a vacuum chamber, a second moving wall associated therewith and connected to the friction brake, a spring acting to oppose the vacuum so as to apply the brake whenever the vacuum falls below some predetermined value, a passage leading from this vacuum chamber to a point downstream of the throttle, a high tension distributor arm mounted on and driven by the projecting extension of said ignition drive shaft, and in which the passage from the vacuum chamber terminates at a point on the atmospheric side of the throttle only when the throttle is in the idling position and this passage is immediately transferred to the suction side of the throttle the moment the throttle is moved slightly away from its idling position.

2. In an ignition system for an internal combustion engine having the usual Venturi air inlet and a throttle downstream of the venturi, the ignition system being of the type in which the circuit breaker mechanism is mounted on a yieldably restrained partially rotatable plate and in which there is a movable wall connected to the plate and responsive to the suction in the venturi when the throttle is wide open and to the suction downstream of the throttle when the throttle is moved from wide open into a partially open position, said wall acting in opposition to the spring to advance the ignition by rotating the plate, the improvement which comprises an ignition drive shaft, a hollow cam rotatably mounted on the ignition drive shaft and engaging with the breaker mechanism, the ignition drive shaft projecting through the cam, a drive plate rigidly locked in the drive shaft, a driven plate rigidly locked to the hollow cam, spring means normally holding the drive plate and driven plate so as to rotate as one, a friction brake engaging with the rotating edge of the driven plate, a vacuum chamber, a second moving wall associated therewith and connected to the friction brake, a spring acting to oppose the vacuum so as to apply the brake whenever the vacuum falls below some predetermined value, a passage leading from this vacuum chamber to a point downstream of the throttle, a high tension distributor arm mounted on and driven by the projecting extension of said ignition drive shaft, and in which the passage leading from the second mentioned vacuum chamber is connected both to the venturi suction and to the suction downstream of the throttle

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when the throttle is moved from its wide open position.

3. In an ignition timer for an internal combustion engine, a timer shaft, a circuit breaker cam, rotatably mounted thereon, a spring tending to advance the cam relative to said shaft, a driving plate connected to the shaft, a driven plate connected to the cam, said spring forming the driving connection between the two plates, a friction brake acting on the driven plate so as to retard the cam when the brake is applied, a rotatable circuit breaker plate, a circuit breaker arm thereon engaging said cam, a pair of contacts, one on the arm, the other on the circuit breaker plate, a source of engine produced suction responsive to the velocity of air flow entering said engine and to the static suction in the air entrance to said engine, a first diaphragm

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connected to said circuit breaker plate so as to advance the spark as the said suction increases, a second diaphragm connected so as to release said friction brake as the said suction increases a spring means for opposing each of said diaphragms so as to determine the degree of suction at which the brake is released and the circuit breaker plate is advanced.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
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