

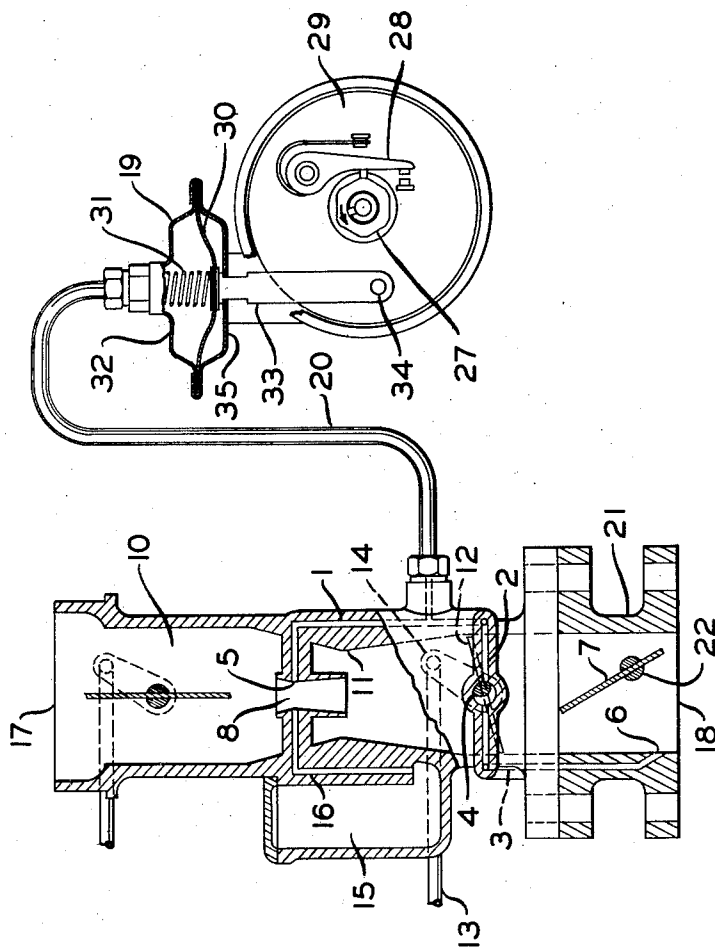
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IGNITION TIMING CONTROL MEANS FOR INTERNAL COMBUSTION ENGINES

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IGNITION TIMING CONTROL MEANS FOR
INTERNAL COMBUSTION ENGINES

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9 Claims. (Cl. 123-117)

This invention relates to ignition timing control means for internal combustion engines.

This invention relates to an ignition timing control device which is particularly adapted for an engine which is controlled by an automatic governor but the device is also useful without an engine governor.

The invention contemplates a suction operated ignition timing device connected into the intake passageway so that it will advance and retard the spark to properly satisfy the spark timing requirements of the engine under all operating conditions.

The drawing shows a vertical section through a carburetor and governor with the ignition timer controlled by a suction device which is connected into the intake passageway.

Referring to the drawing, the carburetor is provided with a passageway 10 including a venturi 11 and the usual butterfly throttle valve 12 mounted on shaft 4 which is journaled into the carburetor housing and actuated by rod 13 which is connected to crank 14 fixed on the shaft 4 externally of the carburetor housing. Fuel is drawn from the float bowl 15 through passageway 16 into the mixing chamber of the carburetor. For purposes of description, passageway 16 is shown terminating in the booster venturi 8 positioned in the main venturi 11. The air inlet end of the carburetor is designated 17 and the fuel mixture outlet into the intake manifold of the engine (not shown) is designated 18.

The timing mechanism is conventional and as shown consists of the usual rotatable cam 27 which operates the electrical circuit breaker 28. Circuit breaker 28 is mounted on plate 29 which can be rotated clockwise to advance the spark and counterclockwise to retard the spark. A suction device 19 is utilized for advancing and retarding the spark. The suction device comprises a flexible diaphragm 30 backed up by a compression coil spring 31. The diaphragm 30 is mounted in the housing 32 which is connected to the carburetor by the conduit 20. The diaphragm is connected to plate 29 by the connecting rod 33, one end of which is pivotally connected at 34 to the plate 29 and the other end of which is fixed to the diaphragm. The wall 35 of the housing is perforated so that the diaphragm is subjected on the outside to atmospheric pressure whereas the inside of the housing 32 communicates through conduit 20, passageway 1 and orifice 5 with the booster venturi 8 and, as described below, under certain conditions with the intake manifold on the engine side of the governor controlled

valve 7 by means of orifice 6, passageway 3 and passageway 2 which communicates with passageway 1. Passageways 1, 2 and 3 are located in the wall of the carburetor housing and the lower part of passageway 3 is formed in the wall of the governor throttle valve housing 21.

The engine governor per se forms no part of the present invention and therefore will not be further described. The governor valve 7 fixed on shaft 22, which is journaled in housing 21, can be a spring loaded unbalanced valve controlled by the velocity of charge passing into the engine or it can be a balanced valve controlled by a centrifugal governor driven by the engine.

When an engine governor is used with this system, the suction device is connected to the manifold vacuum by conduits 20, 2 and 3; conduit 3 terminating at orifice 6 between governor valve 7 and engine at all times. If an engine governor is not used with this system, orifice 6 may terminate at any position below throttle valve 12, i. e., on the engine side of valve 12.

Communication between passageways 2 and 3 is controlled by valve 4 which, for convenience, is shown as the end of the throttle support shaft. As shown, throttle valve 12 is in the idle position and at this time valve 4 closes off passageway 2 from passageway 3. As soon as the throttle valve 4 is opened, even slightly beyond idle position, valve 4 opens passageway 2 to passageway 3. Valve 4 is arranged so that in all positions of the throttle valve 12, other than idle, passageway 2 communicates with passageway 3.

The operation of the device is as follows: When the engine is idling and the throttle valve 12 is in idle position, as shown, conduit 2 is shut off by valve 4 from passageway 3 and the suction device 19 is air bled at orifice 5 through conduits 1 and 20. However, at idle position of throttle 12, the flow of air through the venturi by orifice 5 creates insufficient vacuum to overcome spring 31 and accordingly the spark remains retarded when the engine is idling.

Where a governor is used to control the speed of the engine it is common practice for the driver to place the throttle 12 wide open and leave it there so that the speed of the engine is controlled automatically by the governor valve 7. With the throttle valve wide open, the engine will speed up and the velocity of charge passing by orifice 5 will cause the spark to be advanced. When the engine speed increases to a point that it should be checked by the governor valve 7, governor valve 7 will move towards a closed position, which causes the vacuum to increase at orifice

6 and causes the spark to be advanced still further.

If a governor is not used to control the speed of the engine, the spark will be advanced by the suction created at orifice 5 when the throttle is wide open, and, when the engine speed is checked by closing throttle 12, providing the throttle valve 12 does not close to idle position, the spark will be advanced by the vacuum existing between throttle 12 and the engine.

I claim:

1. In an internal combustion engine the combination of a carburetor including an intake passageway, a throttle valve in said passageway, a governor controlled throttling means in said passageway on the engine side of said throttle valve, a conduit having one end terminating in the intake passageway on the atmosphere side of the throttle valve, a second conduit communicating with the first conduit and communicating with the intake passageway on the engine side of said governor controlled throttling means, and valve means controlling the second conduit whereby the second conduit is placed in communication with the intake passageway on the engine side of the governor controlled throttle means at part and full open throttle and shut off from the intake passageway at idle position of the throttle, and a suction controlled ignition timing device connected to the first mentioned conduit for advancing and retarding the timing of the ignition as the throttle or charge is varied.

2. The combination as claimed in claim 1 wherein the throttle valve is mounted upon a shaft and a connection is provided between the shaft and the valve means whereby the valve means is closed when the throttle is at idling position and is open at all other positions of the throttle valve.

3. The combination as claimed in claim 1 wherein the valve means comprises a shaft for the throttle valve having a portion extending across the second conduit for closing the same when the throttle valve is at idle position, said shaft having a cut away portion which serves to open the second conduit at all open positions of the throttle valve.

4. In an internal combustion engine the combination of an ignition timer and a carburetor having an intake passageway and two orifices located in said passageway, a manually controlled throttle valve in the intake passageway, a governor controlled throttle valve in the intake passageway on the engine side of the manually controlled throttle valve, one of said orifices being positioned on the atmosphere side of the manually controlled throttle valve and the other orifice being positioned on the engine side of the governor controlled throttle valve, a conduit connecting the two orifices together, valve means in said conduit for shutting off the second mentioned orifice from the first mentioned orifice when the manually controlled throttle valve is in idle position, and a single suction device which controls the ignition timer connected to said conduit between the first mentioned orifice and the said valve means whereby the ignition timing is advanced or retarded as the charge or throttle is varied.

5. In an internal combustion engine the combination of an ignition timer and a carburetor having an intake passageway including a venturi and two orifices located in said passageway, a manually controlled throttle valve in the intake passageway, a governor controlled throttle valve

in the intake passageway on the engine side of the manually controlled throttle valve, one of said orifices being positioned in the venturi and the other orifice being positioned on the engine side of the governor controlled throttle valve, a conduit connecting the two orifices together, valve means in said conduit for shutting off the second mentioned orifice from the first mentioned orifice when the manually controlled throttle valve is in idle position, and a single suction device which controls the ignition timer connected to said conduit between the first mentioned orifice and the said valve means whereby the ignition timing is advanced or retarded as the charge or throttle is varied

6. In an internal combustion engine having a manifold a carburetor having a manually operated throttle valve to vary the charge admitted to the manifold, a governor controlled throttle valve on the engine side of the manually operated throttle valve, a conduit having branches, the first branch communicating with the manifold on the engine side of the governor controlled valve, the second branch communicating with the carburetor throat, a suction controlled ignition timing device communicating with a third branch of the conduit, said second and third branches of the conduit being in continuous communication, and valve means in said first branch for controlling the first branch whereby the first branch is placed in communication with the manifold on the engine side of the governor controlled valve when the manually operated throttle is open and shut off from the intake passageway at idle position of the manual throttle, whereby the ignition timing is advanced or retarded as the charge or throttle is varied.

7. The combination as claimed in claim 6 wherein the valve means comprises a shaft upon which the manually operated throttle valve is mounted, said shaft extending across the first branch for closing the same when the manually operated throttle is at idle position, the said shaft having a cut away portion which communicates with the first branch to open the same when the throttle is at part and full open positions.

8. In an internal combustion engine having a manifold, a carburetor including a venturi and having a manually operated throttle valve to vary the charge admitted to the manifold, a governor controlled throttle valve on the engine side of the manually operated throttle valve, a conduit having branches, the first branch communicating with the manifold on the engine side of the governor controlled valve, the second branch communicating with the venturi, a suction controlled ignition timing device communicating with a third branch of the conduit, said second and third branches of the conduit being in continuous communication, and valve means in said first branch for controlling the first branch, and a connection between the valve means and the manually operated throttle valve whereby the first branch is placed in communication with the manifold on the engine side of the governor controlled valve when the manually operated throttle is open and shut off from the intake passageway at idle position of the manual throttle whereby the ignition timing is advanced or retarded as the charge or throttle is varied.

9. In an internal combustion engine the combination of an ignition timer and a carburetor having an intake passageway including a venturi, a throttle valve in said passageway on the engine side of the venturi, a conduit having one

end terminating in the venturi, a second conduit communicating with the first conduit and communicating with the intake passageway on the engine side of said throttle valve, valve means controlling the second conduit whereby the second conduit is placed in communication with the intake passageway on the engine side of the throttle valve at all open positions of the throttle

and shut off from the intake passageway at idle position of the throttle, and a suction device which controls the ignition timer connected to the other end of said first mentioned conduit whereby the ignition timing is advanced or retarded as the charge or throttle is varied.

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