

June 21, 1955

D. T. ROBERTS

2,711,162

IGNITION CONTROL

Filed Jan. 8, 1953

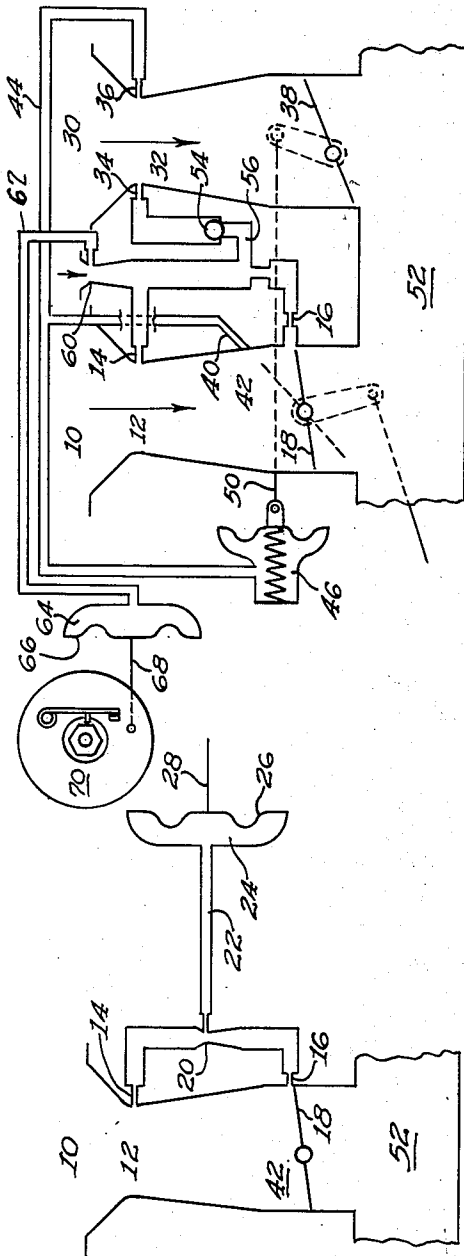


Fig. 1

Fig. 2

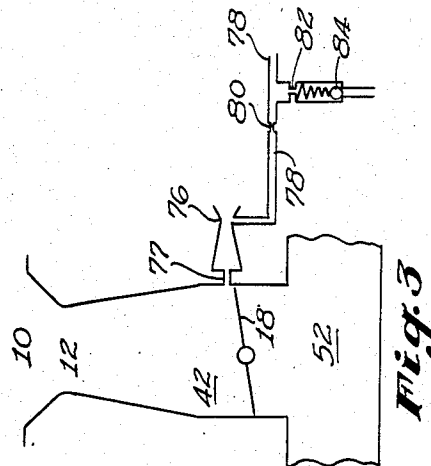


Fig. 3

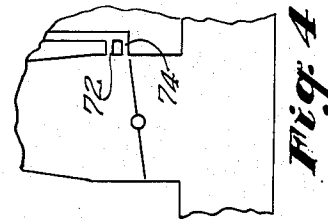


Fig. 4

David T. Roberts

INVENTOR.

1

2,711,162

IGNITION CONTROL

David T. Roberts, Oak Park, Mich., assignor to Holley Carburetor Company, Detroit, Mich., a corporation of Michigan

Application January 8, 1953, Serial No. 330,340

3 Claims. (Cl. 123—117)

The object of this invention is to advance the ignition of an internal combustion engine with: (a) the air flow through the venturi; (b) the air pressure at the upstream lip of the butterfly throttle. By this means the centrifugal weights are not needed. One problem has arisen due to the re-introduction of the two-stage carburetor. When the second stage becomes operative, the spark must not become unduly retarded, because the secondary venturi robs air from the primary venturi.

In the figures:

Figure 1 shows diagrammatically the preferred form of my invention where only a one-stage carburetor is involved.

Figure 2 is also a diagrammatic representation of a two-stage carburetor incorporating my invention.

Figure 3 shows an alternative construction for a one-stage carburetor.

Figure 4 shows a modification applicable specifically to the first stage of the two-stage carburetor shown in Figure 2.

In Figure 1:

10 is the air entrance.

12 is the venturi.

14 is a restriction in the wall of the throat.

16 is a restriction in the walls of the mixture outlet 42 just a little upstream of the upstream lip of throttle 18 when throttle 18 is closed to its idling position.

20 is the throat of a small booster venturi subjected to the flow of air from restriction 14 to restriction 16, and vice-versa.

22 is the pipe leading from venturi 20 to 24 which is an air chamber.

26 is a diaphragm connected to 28 a link which advances the throttle.

In Figure 2:

10 is again the primary air entrance.

12 is the primary venturi.

14 is the restricted opening in the wall of the throat of 12.

18 is the primary throttle (manual).

16 is a restricted opening just upstream of the upstream lip of the throttle 18 when in its idling position.

30 is the secondary air entrance.

32 is the secondary venturi.

34 is a restriction in the wall of the throat of 32.

36 is a second restricted opening in the wall of 32 and is used to keep the secondary throttle 38 opening at the right moment after it has started to open.

Throttle 38 is slightly offset so that manifold suction keeps the secondary throttle 38 shut until it is time for it to open.

40 is a restricted opening in the wall of the mixture outlet 42 of the primary stage of the carburetor, and becomes operative when the throttle is somewhere between 40° and 70°, preferably 55° to the horizontal.

44 is a common passage from restriction 36 and 40 and leading to an air chamber 46.

48 is a diaphragm connected to a link 50 which opens

2

the secondary throttle 38 when the suction in air chamber 46 is powerful enough to overcome the manifold suction in manifold 52, which tends to hold the secondary throttle 38 shut.

5 This is the subject of a co-pending patent application Serial No. 330,328, filed January 8, 1953 by Marion L. Smitley and Melvin F. Sterner jointly.

Resuming the description of my own invention:

54 is a check valve raised by the suction in the opening 34.

Below the valve 54 is a passage 56 connected to the restricted passage 16.

60 is a booster venturi corresponding to booster venturi 20 of Figure 1.

62 is a passage from the throat of this booster venturi 60 to an air chamber 64 which has a diaphragm 66 connected to a link 68 which advances a circuit breaker 70 in a well-known manner.

In Figure 3 (the single stage):

10 is the air entrance.

18 is the throttle.

The restriction in the walls of the mixture outlet 42 is at 77 just a little upstream of the upstream lip of the butterfly throttle 18.

A booster venturi 76 (#68=0.031" diam.)

78 is a passage leading from the throat.

80 is a restriction (#74=0.0225" diam.)

77 is a restriction (#38=0.1015" diam.)

A second restriction 82 (#56=0.0465" diam.) bleeds air from the atmosphere past spring loaded check valve 84.

Passage 78 leads to a diaphragm chamber and the suction in 78 advances the spark.

In Figure 4:

35 In place of one opening 16, I substitute two openings 72 and 74. Otherwise, everything is the same as in Figure 2.

Figures 2 and 4:

Combining Figure 4 with Figure 2, the following dimensions have been found to be satisfactory:

72=#65 (0.035" diam.)

74=#46 (0.081" diam.)

14=#51 (0.067" diam.)

60=venturi throat=#47 (0.0785" diam.)

54=1/8" nylon ball

34=#20 (0.161" diam.)

OPERATION

Figure 1

50 By varying the three restrictions 14, 16 and 20, the spark advance characteristics can be varied to meet the customer's most exacting demands. At top speeds either an increase, a decrease or a uniform spark advance can be obtained from part throttle advance which advances the spark to a more or less constant degree over a wide range of air flows.

Figure 2

Immediately after the primary carburetor throttle 60 18 has been manually opened the flow through restriction 16 and venturi 60 at first advances the spark by the effect of the depression created in the venturi 60 which is transferred through the passage 62 to the chamber 64. When the opening reaches the one-half throttle position the passage 40 becomes operative so that throttle 38 thereupon opens due to the suction in the chamber 46 which is derived from the passage 44 and is transferred to the chamber 46. The opening of throttle 38 which thus takes place reduces the flow through the first venturi 12 and transfers some of the flow to the secondary venturi 32. The suction at the opening 16 thereupon falls but meanwhile the suction at opening 34 increases, the ball

3

54 rises and the flow through small venturi 60 is restored and the spark is either not changed or it is not unduly retarded. At wide open throttle high engine speed with throttle 18 and throttle 38 also opened up wide then the depressions in both main venturis 12 and 32 act on the small venturi 60 and the spark eventually is fully advanced. The pipe 44 transmits sufficient depression through the restriction 36 to chamber 46 to hold the throttle 38 wide open.

Figure 3

The throttle 18 causes a great advance at part throttle limited only by the check valve 84 and spring loading this valve. The net result is that the venturi 76 replaces the two restrictions 14 and 16 of Figure 1 and its venturi 20.

Figure 4

The two restrictions 72 and 74 are substituted for one restriction 16 of Figure 2. The advance of the spark is thus made gradually so that a fast idle for example, will not call for an unduly high spark. The sudden advances in ignition inherent in constructions shown in Figures 1, 2 and 3 are not always desirable during the period when first opening the primary throttle from its idle position.

What I claim is:

1. An ignition control system for an internal combustion engine having a carburetor having an air entrance, a mixture outlet and a butterfly throttle in said mixture outlet, and a restriction in the wall of said outlet so located as to be subjected to the suction downstream of the upstream lip of said butterfly throttle the moment it is moved away from its idle position, a passage leading to said restriction from the atmosphere, a booster venturi in said passage, an air chamber, a moving wall therein, a connection from said moving wall to advance the spark of said engine, a connection from said chamber to the throat of said booster venturi.

2. In a device as set forth in claim 1 in which there

4

is a venturi in the air entrance to the carburetor, a restriction in the wall of the venturi throat, a connection from said restriction to said booster venturi so that the booster venturi is connected on one side with the mixture outlet and on the other with the throat of said carburetor, which is its connection with the atmosphere.

3. An ignition control system for an internal combustion engine having a two-stage carburetor comprising a first stage, which is normally in operation, and a second stage which is automatically activated after the first throttle has been opened at least one-half way, comprising a venturi air entrance to each stage, a butterfly throttle in the mixture outlet from the first stage, a restriction in the wall of the primary mixture outlet located so as to be subjected to the suction downstream of the upstream lip of said primary throttle the moment it is opened from its idling position, a venturi in the air entrance to the first stage, a restriction in the wall of the venturi, a common passage connecting the two restrictions together, an air entrance to this common passage, a booster venturi therein, a second venturi in the air entrance to the second stage carburetor, a restriction in the wall of the throat of said second stage venturi, a passage connecting said restriction and said common passage, a check valve in said passage so that the suction in the second stage venturi only becomes active when the suction in the second stage venturi is greater than the suction in the common passage, an air chamber, a moving wall, a mechanical connection from said moving wall to advance the time of the ignition, a pipe connecting the air chamber with the throat of said booster venturi.

References Cited in the file of this patent

UNITED STATES PATENTS

2,093,524	Meade	Sept. 21, 1937
2,317,885	Colvin	Apr. 27, 1943
2,361,271	Colvin	Oct. 24, 1944
2,450,834	Lee	Oct. 5, 1948
2,621,482	Meade	Dec. 16, 1952