July 8, 1947. G. R. ERICSON 2,423,589

ENGINE CONTROL DEVICE

Filed Nov. 22, 1943 3 Sheets-Sheet 1

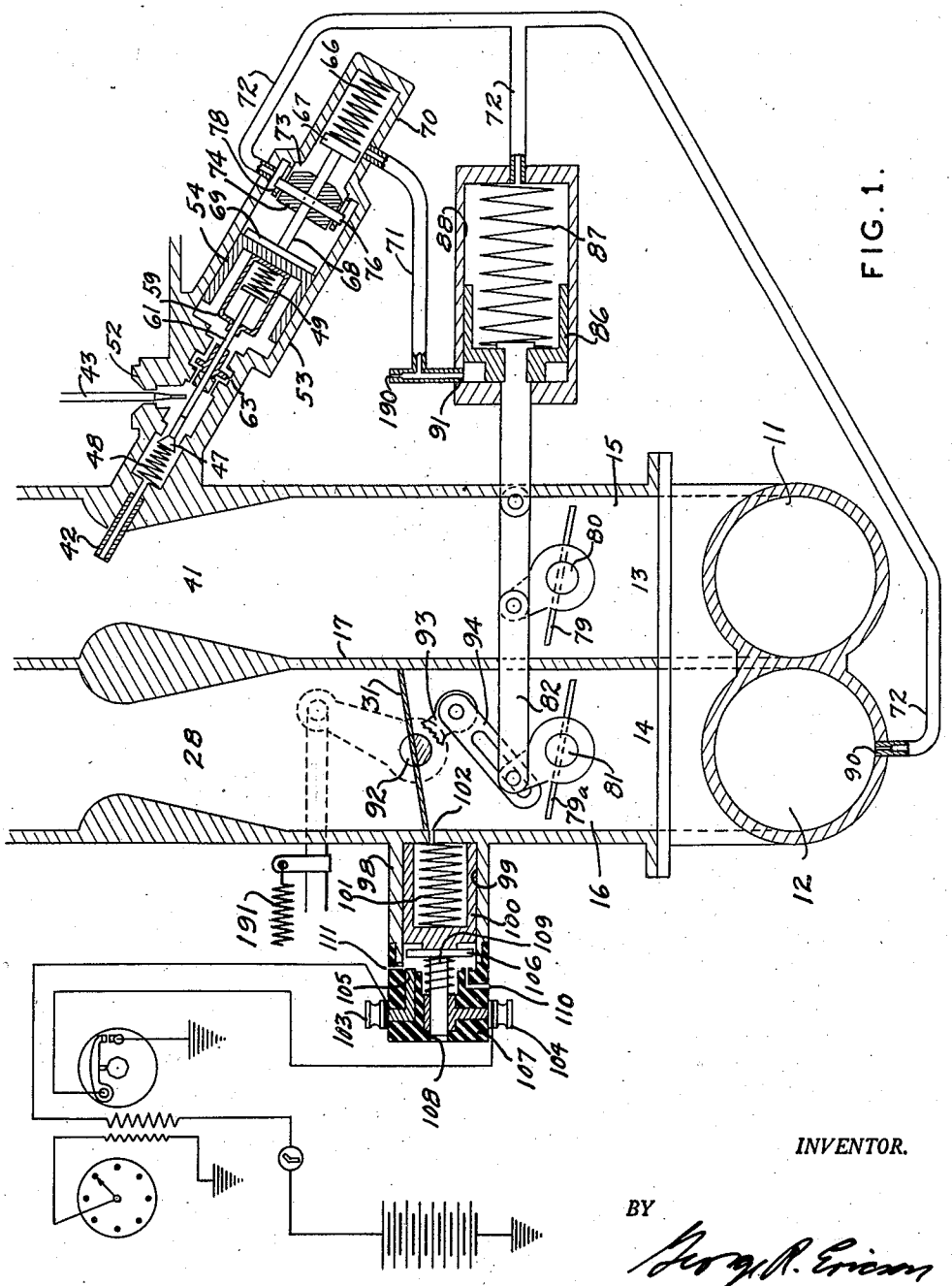


FIG. 1.

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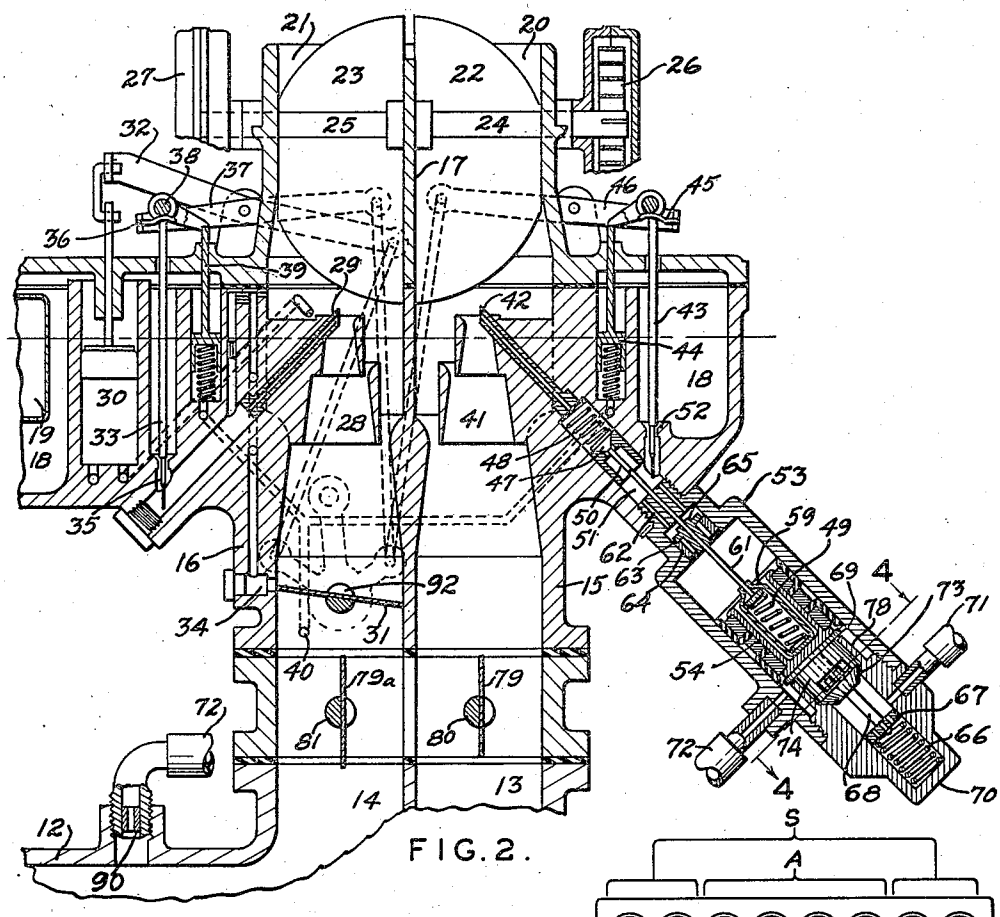


FIG. 2.

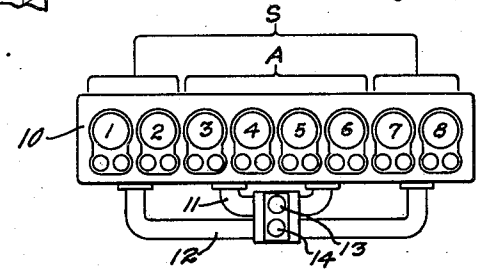


FIG. 3.

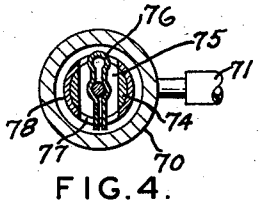


FIG. 4.

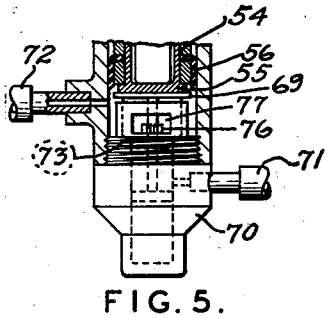


FIG. 5.

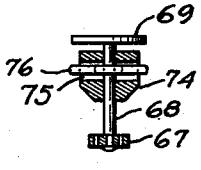


FIG. 10.

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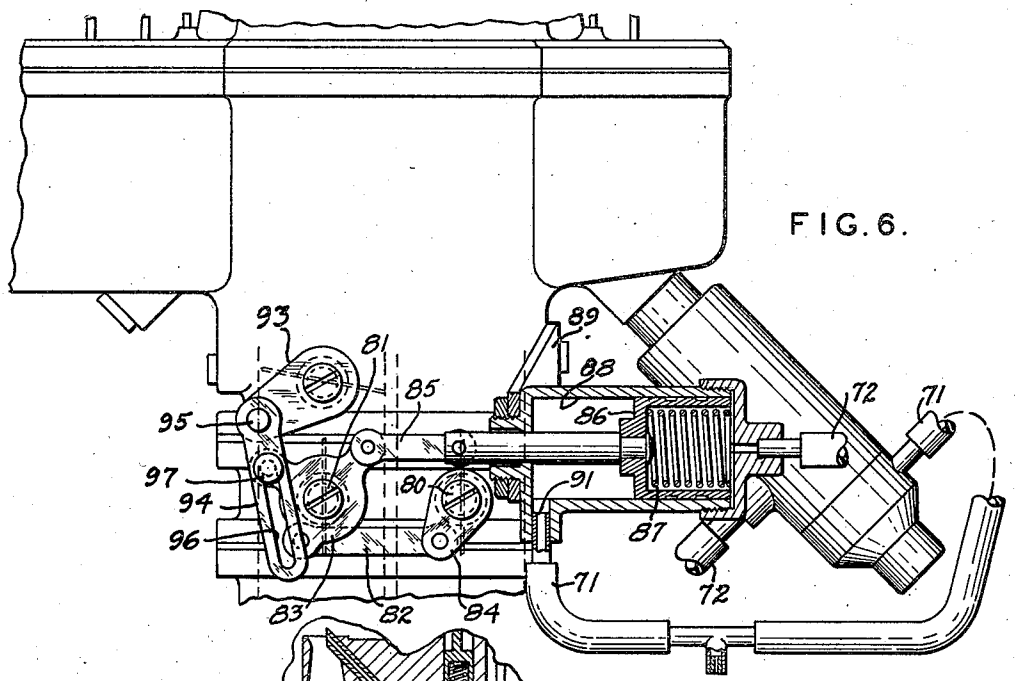


FIG. 6.

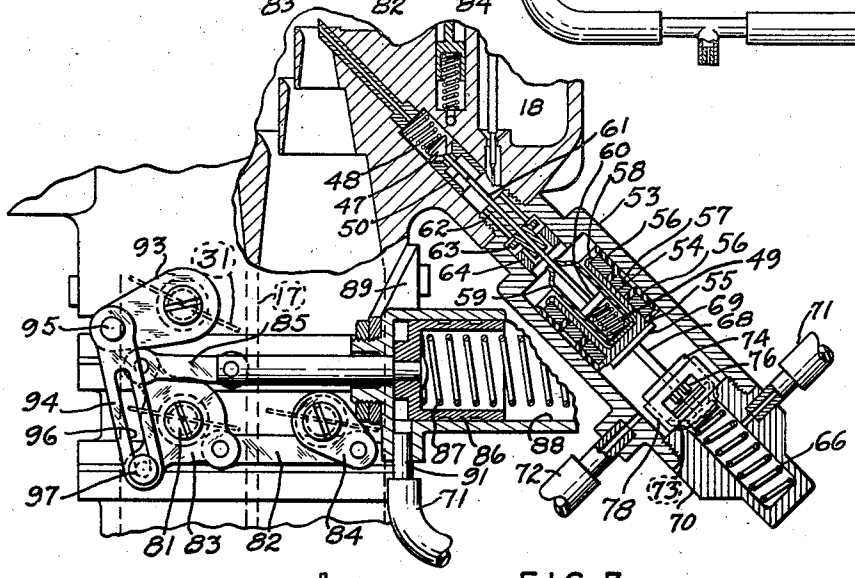


FIG. 7.

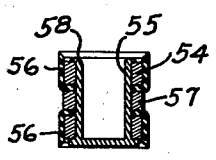


FIG. 8.

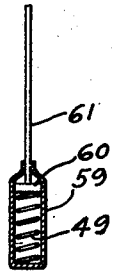


FIG. 9.

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Patented July 8, 1947 2,423,589

UNITED STATES PATENT OFFICE

2,423,589

ENGINE CONTROL DEVICE

George R. Ericson, Kirkwood, Mo.

Application November 22, 1943, Serial No. 511,371

18 Claims. (Cl. 123—127)

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This application relates to engine control devices and more particularly to the type of controls known as half motor cut outs for multi-cylinder engines in which the supply of fuel to the cylinders is discontinued when the engine is running under light load. The device shown herein may be considered to be an improvement on the device shown in my previously filed application, Serial No. 483,795, filed April 20, 1943, for an Engine control device.

One object of the invention is to provide a half motor cut out in which the suction drag is completely eliminated from the cylinders which are not being suplied with fuel.

A further object of the invention is to provide a device of the above described character in which the transfers from half to full motor operation and back to half motor operation are accomplished without sharp changes in engine torque.

Another object of the invention is to provide a half motor cut out having a governing action so that the supply of fuel to the engine will automatically be increased or decreased in accordance with slight changes in torque required by road conditions.

Other objects of the invention will appear from the following specification and accompanying drawings referring to which

Fig. 1 is a diagram of the functioning parts of the device which are pertinent to this invention.

Fig. 2 is a diagrammatic vertical sectional view of a carburetor having the control device applied thereto.

Fig. 3 is a diagram indicating a plan view of an eight-in-line engine having my invention applied thereto.

Fig. 4 is a sectional view taken along the lines 4—4 of Fig. 2 looking in the direction of the arrows.

Fig. 5 is a detail view showing the parts at the lower end of the snatcher pump shown in Fig. 2.

Fig. 6 is a diagrammatic side elevation of parts of the valve mechanism for controlling the damper valves shown in Fig. 2.

Fig. 7 is a detail sectional view showing the parts of the damper valve and the snatcher pump mechanism in a different operating position.

Fig. 8 is an enlarged sectional view of the snatcher pump piston.

Fig. 9 is an enlarged view of the push rod mechanism.

Fig. 10 is an enlarged view of the vacuum control valve.

Referring to the drawings, the reference numeral 10 indicates an internal combustion engine which may be of the eight-cylinder-in-line type as shown. The cylinders are numbered 1 to 8, inclusive, and are supplied by two separate manifolds 11 and 12 of which manifold 11 supplies fuel to the inner group of four cylinders and the manifold 12 supplies fuel to the cylinders numbered 1, 2, 7 and 8. The firing order and crankshaft arrangement are such that one cylinder in each group fires at intervals of 180° of crankshaft movement. The explosions of one cylinder group are equally spaced between the explosions of the other group so that the engine may run steadily on either four or eight cylinders. For convenience, the cylinder groups are designated as A and S, as indicated in Fig. 3, group A being the auxiliary group which is cut in and out of operation and S is the steady running group. The risers or inlets of the two intake manifolds A and S are indicated at 13 and 14, respectively, and the fuel flow to these groups is supplied by carburetors 15 and 16 which are here indicated as combined in a dual carburetor having sufficient partition means 17 to separate the two mixture passages.

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The carburetors may be supplied from a single constant level chamber generally indicated at 18 in which the fuel lever is controlled by conventional float mechanism 19. Air inlets 20 and 21 are controlled by automatic chokes 22 and 23 mounted on shafts 24 and 25 which may be integral or separately operated as desired. Thermostat mechanism has been indicated at 26 and 27 but the control of the choke valves may be manual or automatic as desired. The full details of the choke mechanism are not shown herein, but reference is had to the patent to Coffey #2,325,372 in which the complete mechanism is described. Carburetor 16 for the cylinder group S contains all the mechanism of a modern carburetor including Venturi stack 28, main nozzle 29, accelerating pump 30 operated by throttle valve 31 through rocker arm 32 and suitable connecting linkage, metering rod 33 and idle passage 34. It may be noted that the metering rod has a valve portion 35 which varies or cuts off the supply of fuel to the main nozzle and to the idle passage 34. The metering rod valve may be opened by opening movement of the throttle when the lip 36 on the rocker arm 37 lifts the cross pin 38 which carries the metering rod. The cross pin is connected to the piston 39 which is spring-held in upward position except when drawn downwardly by suction applied through the passage 40.

The auxiliary carburetor 15 has the conventional Venturi stack 41 and main nozzle 42, but does not necessarily have any low speed jet or idle passageway. Control of the fuel supply is by means of a metering rod 43 operated by vacuum piston 44 and by the lip 45 on rocker arm 46 which is operated by the throttle valve 31 of the carburetor 16 which supplies the steady running group of cylinders.

The fuel control for cylinder group A comprises a valve 47 normally biased toward closed position by spring 48 which is comparatively weak with respect to the spring 49 which will hereafter be described. The valve 47 is provided with a stem 50 extending into the Y-shaped passageway 51 which connects the fuel jet 52 with the main nozzle. The outer end of this passageway is provided with screw threads to receive a device which may be called a snatcher pump 53 which contains means for draining and filling the auxiliary main nozzle as well as controlling the valve 47 and supplying extra fuel when the auxiliary cylinders are first supplied with fuel. The snatcher pump also contains means for controlling the operation of the damper valves to smooth out the transfer to and from full motor operation.

The snatcher pump 53 comprises a cylinder receiving a packed piston 54 which includes body member 55, packing leathers 56, and separating rings 57. The body member is riveted over the retaining rings as indicated at 58 to form a compact and leakproof assembly.

The piston 54 is provided with a substantially cylindrical recess to receive a second cylinder 59 which may be termed the "push rod cylinder." This cylinder contains a piston 60 operated by the spring 49 which is strong enough to overcome the spring 48 which normally seats the valve 47. The piston 60 also carries a rod 61 to contact the valve stem 50. Rod 61 is slidably and snugly mounted in a bore in the upper end of the snatcher pump, the passage of fuel being permitted by additional bores 62 laterally spaced but parallel with the rod 61.

A valve 63 is slidably mounted on the rod 61 with a very slight clearance to permit a restricted flow of fuel between the bore of the valve and the rod. Said valve 63 is provided with a valve seat member 64 so as to close after a slight downward movement of the rod 61 or as a result of back flow of fuel through the passage. The valve is prevented from closing in the other direction by a shoulder 65 formed at its upper end.

Piston 54 is normally biased upwardly by spring 66 which is strong enough to overcome spring 48 and compress the spring 49, but weak enough to be overcome by vacuum produced in the manifold 12 when the engine is running under comparatively light load. While the amount of vacuum required to overcome the spring 66 may be varied, I have found that a spring balanced to 7" or 8" of mercury gives satisfactory results. The spring 66 acts against a perforated head 67 connected to rod 68 which is provided with a head 69 at the other end in contact with the piston 54. The snatcher pump is provided with screw threads at its lower end to receive a head 70 provided with a vacuum connection 71 to the inner end of the damper valve cylinder which will hereinafter be described, while the body of the snatcher pump is provided with a vacuum connection 72 from the intake manifold 12. This connection is provided

with a branch which is connected to the damper valve cylinder at 91. The head 70 is provided with a valve seat 73 controlled by valve 74 which is slidably mounted on the rod 68. The valve 74 is provided with a transverse slot 75 which receives a spring friction member 76. This member also extends through a slot 77 in the cylinder extension 78 of the head 70. A small amount of up-and-down play is permitted to permit the flow of air when the valve is opened.

Damper valves 79 and 79a are provided for carburetors 15 and 16, respectively. Valve 79 does not completely close the passageway 13 and may be slightly unbalanced as desired. Valve 79 permits the passage of enough air through the auxiliary carburetor to bring the main nozzle into full operation even when the valve is closed.

Valve 79a is also slightly cut away so as not to completely close passage 14. The amount of flow permitted through passage 14 when the valve 79a is closed is limited to an amount which, added to the amount flowing past valve 79 in closed position, will bring the total torque of the engine up to a point slightly above the maximum torque for half motor operation. In other words, the valves 79 and 79a are closed sufficiently to prevent a sudden increase of torque when the motor is changed from half operation to full operation.

The valves 79 and 79a are mounted on shafts 80 and 81, respectively, which are shown separately but may actually be the same shaft extended. It will be understood that all the drawings are in diagrammatic form for the purpose of clearer illustration. The shafts 80 and 81, as shown herein, are connected by a link 82 attached to levers 83 and 84, respectively, and operated by link 85 connected to the damper valve piston 86. This piston is normally held by the spring 87 in position to close the valves 79 and 79a, but this spring may be overcome by vacuum applied through passage 71 to the cylinder 88 which is rigidly mounted on the body of the carburetor as by the bracket 89.

The inner end of the cylinder 88 is provided with a connection 71—91 which is connected to the base of the snatcher pump. It may be noted that the connections 71 and 72 are connected in series through the valve 74. The common outlet to the inlet manifold is restricted by a plug 90, so that the total suction applied may be calibrated in accordance with the strength of the various springs and other connections. The connection 71 is provided with a restricted air inlet 190 which is slightly smaller than the outlet 90. This difference in size is to insure sufficient overlap action.

The main throttle shaft 92 is provided with the usual main operating means including a closing spring 191 and is also provided with a lever 93 having a link 94 pivoted thereto as indicated at 95. A lost motion slot 96 slidably receives the pin 97 carried by lever 83 in such a manner that a full opening movement of the main throttle valve results in a full opening movement of the damper valve, but no opening movement of the damper valve occurs until the main throttle is approximately one-half open. This result is obtained by providing a longer operating radius for the pin 95 than for the pin 97.

In certain installations having a common exhaust manifold for main and auxiliary cylinders, back-firing in the exhaust may occur when the fuel supply to the auxiliary group is discontinued. This back-firing may be eliminated either by cutting off the ignition to the cylinders, when

the engine is over-running or coasting, or by cutting off the supply of fuel to the main cylinders under the same conditions. In this connection, it should be noted that the back-firing does not occur when the main cylinders are in full operation, nor even when the engine is idling on the main cylinders, but only when, due to the closing of the throttle when the engine is running faster than normal idling speed, some of the charges of mixture are ejected from the main cylinders without being burned. This condition may, obviously, be eliminated by cutting off the supply of fuel to the main cylinders during overrunning or coasting, and any suitable means for that purpose may be employed such, for instance, as shown in my Patent 2,036,205, issued April 7, 1936, but in installations where fuel cut-off cannot be conveniently installed, I have provided a back-fire switch constructed in the following manner, with particular reference to Fig. 1:

The main carburetor 16 is provided with a boss 98 having a cylinder 99 containing piston 100 normally pressed outwardly by the spring 101. The cylinder has a port 102 communicating with the bore of the carburetor at a point adjacent the edge of the throttle when it is in closed position. The exact location of the bore is just on the posterior side of the throttle when it is fully closed, so that the slightest opening movement of the throttle beyond the normal idling position will result in exposure of the port to pressure existing in the carburetor mixing chamber.

Terminals 103 and 104 having contact portions 105 and 106 are provided in a head 107 formed of insulating material and mounted in the end of the cylinder. The terminal 106 is mounted on a rod which is slidably mounted in the bore 108 and biased toward open position by spring 109 which may be overcome by the spring 101 to close the contact at the terminals 105 and 106, except when abnormal suction exists posterior to the throttle, as when coasting. The outer end of the piston 100 is exposed to atmosphere through a passage 110 which is cut off or restricted by the contact terminal 106 which is in the form of a disk and acts as a valve to close against the end of the passage 110. A smaller restricted passageway 111 may be provided to admit a restricted flow of air to the outer end of the cylinder.

It will be understood that the members 103 and 104 are connected into the ignition circuit in such a manner as to cause breaking of the circuit whenever the terminal 106 is moved away from terminal 105.

The location of the port 102 is important, because it may not be desirable to cut off the ignition in driving down a hill which is not quite steep enough to cause coasting of the car at the desired speed. The operator, accordingly opens the throttle slightly to give the desired power and thus produce a suction in the outlet of the carburetor 16 which is beyond the normal idling suction and, therefore, capable of breaking the ignition circuit at the terminals 105—106. By arranging the position of the port 102 as shown with respect to the throttle valve, the slight opening of the throttle by the operator prevents the application of the increased suction to the piston 100 and the resultant breaking of the ignition circuit.

It will be understood that the piston 100 may not form a perfect seal with the cylinder 99 and, accordingly, some air should be allowed to enter the outer end of the cylinder as through the port 111. In order to prevent hunting of the engine

during idling, restricted port 111 and port 110 are capable of supplying more air to the cylinders than can leak through the clearance between the piston and cylinder walls. When the member 106 is in contact with the terminal 105, port 110 is restricted or cut off and thus the air in the outer end of the cylinder is subjected to a slight balancing action due to the fact that passage 111 is of less capacity than the leak between the cylinder wall and the piston. This results in a tendency of the piston 100 to remain in position to close the contacts until a higher suction than that which is necessary to hold it in the other position has been attained, for instance, the contact units 105—106 may not be broken until at least 20" of mercury vacuum has been produced in the carburetor outlet, but a suction of 19" of mercury will hold the piston against the spring 101 to cause the contacts to remain in open position. Stated differently, there is a snap action or an overlapping action which prevents hunting of an engine during idling which permits the operator to readily secure an idling adjustment which will take care of different motor conditions.

It will be understood that the intake manifolds 11 and 12 are kept entirely separate by means of the partition 17 so as to prevent disturbance of the mixture in the main carburetor when the damper valve in the auxiliary carburetor is opened or closed.

In normal operation under comparatively light loads, the main cylinder group S supplied by the manifold 12 and carburetor 16 is capable of producing the necessary power. Under these conditions, the throttle 31 is not fully open, and a substantial degree of manifold vacuum is maintained posterior to the throttle. This vacuum is communicated through the restricted passageway 90 to conduit 72.

For most engines, it is desirable to operate on four cylinders until the vacuum in the No. 1 or main carburetor drops to approximately 7" of mercury. As long as the suction in the intake manifold 12 is at or above 7" of mercury, the suction conveyed through the plug 90 and the branched conduit 72 to the cylinders 88 and 53 is sufficient to hold the pistons 86 and 54 against their respective springs 87 and 66. This position is shown in Figure 2 and corresponding position of the piston 86 is shown in Figure 6.

The damper valves 79 and 79a are held in wide open position, thus preventing any suction drag on the auxiliary cylinder group served by the manifold 11 and allowing the flow of fuel mixture through the manifold 12 to cylinder group S without interference, except by the manual throttle 31. Under these conditions, the spring 48 closes the valve 47 to cut off the flow of fuel to the carburetor 15, and the upper end of the cylinder 53 is filled with gasoline withdrawn from the float chamber 18 and the nozzle 42.

When the manual throttle 31 is opened wider, or when the engine speed is decreased sufficiently to cause a reduction of the intake manifold vacuum below the point at which the spring 66 is calibrated, this spring overcomes the vacuum and starts to move the piston 54 upwardly with respect to Figures 1 and 2. The first upward movement of the piston carries the valve 74 upwardly, first, by reason of the fact that the suction acts against the valve to pull it open, and, secondly, by reason of the fact that the spring member 76 makes a frictional sliding fit between the stem 68 and the valve 74. This opening of the valve causes the admission of some atmos-

pheric air through the calibrated passage 190, which has the effect of partially killing the suction applied through the restricted passageway 99. Thus, the instant the upward movement of the piston 54 is started, the resisting suction is automatically further decreased so that the full stroke of the piston 54 will be completed when it has once been started.

The upward stroke of the piston 54 causes the opening of the valve 47 by the push rod 61 which is actuated by the spring 49, it being noted that while the spring 49 is stronger than spring 48, it is very weak with respect to the spring 66, the latter being precompressed to such an extent as to minimize the change in pressure of the spring during the stroke of the piston 54.

The upward stroke of the piston not only opens the valve 47, but also causes the valve 63 to be lifted from its seat to permit a flow of fuel from the cylinder 53 to initiate the flow through the nozzle 42 and wet the intake manifold 13. This sets the auxiliary group of cylinders in operation.

As soon as the valve 74 is opened, the suction from the passageway 72 is communicated to the conduit 71, so that the pressure on opposite sides of the piston 86 in the cylinder 88 is balanced. As long as the pressure is balanced, the spring 87 is free to move the piston 86 to the position shown in Figure 1, thereby closing the valves 79 and 79*a*, it being noted that these valves do not fully close the passageways, but that the valve 79 permits sufficient air flow to bring the nozzle 42 into operation while the valve 79*a* cuts down the flow through manifold 14 to such an extent that the combined flow through passages 13 and 14 with the valves 79 and 79*a* in the position shown in Figure 1 is about the same as the previous flow through the passage 14 with the valve 79*a* in open position. For this reason, there is no great surge of power due to the setting in operation of the auxiliary cylinder group. It will be understood, of course, that the closing action of the valves 79 and 79*a* may be limited as much as desired by the particular operator.

As is well understood by those skilled in the art, a vacuum of 7" of mercury is not likely to be maintained in the manifold 14 with the valve 31 in not much more than half open position. With this in mind, the lost motion slot 96 connected to the valve 31 does not begin to pick up the valve 79*a* until the valve 31 is half-way open or more. However, if the operator desires full power, he will open the throttle beyond the half open position, thus picking up the valves 79 and 79*a* and carrying them to full open position which they reach at the same time the valve 31 becomes fully opened. This is by reason of the greater operating leverage of lever 93 as compared with lever 83, as well as the more favorable angular position of the pivot 95 with respect to the pivot 97.

With the engine operating on all cylinders and the air bleed 190 acting to partially kill the suction transferred from the manifold 12 to the cylinders 53 and 88, the piston 54 will remain in upward position until the vacuum in manifold 12 reaches 12" or 15" of mercury, according to the desired setting. However, when such vacuum is reached, piston 54 starts to withdraw against the spring 56 and immediately closes the valve 74 against the seat 73, cutting off the suction from the inner end of cylinder 88 so that atmospheric pressure from the vent 190 is effective against the inner end of the piston and the suction immediately shifts the piston 86 to the right with respect to Figure 1, thereby fully opening the valves 79 and 79*a*.

As soon as the valve 74 is closed, the vent 190 ceases to be effective to bleed out the suction applied to the piston 54 so that this is promptly shifted to the right to the position shown in Figure 2. This shift of the piston withdraws the fuel from the nozzle 42 and also draws some extra fuel down through the jet 52. The first part of the flow of this fuel is very fast for the purpose of removing the fuel from the nozzle 42, but as soon as the piston 54 has withdrawn far enough to allow the seating of the 63, the movement is accomplished much more slowly as the valve 47 is still open, and it is desired to return the piston 54 only as fast as fuel can flow down through the jet 52; otherwise, the cylinder 53 of the snatcher pump would merely suck in a little fuel and a lot of air, so that there would not be enough fuel to wet the manifold instantly when the valve 47 is again opened. It will be understood that the piston 54 makes a full stroke in either direction whenever it starts, but that there is a very substantial overlap so that the engine does not continually hunt back and forth between four cylinders and eight.

With respect to the back-fire switch, it will be noted that the terminals 103 and 104 are normally connected by means of the member 106 which is in sliding contact with terminal 104 and held in contact with the member 105 by means of the spring 101, except when excessive suction is developed in cylinder 98 due to the engine being driven at a speed higher than idling while the throttle 31 is in closed position. During normal idling, a part of the suction applied through the opening 102 to the piston 100 is transferred to the other end of the cylinder by reason of the leakage at 99, so that the spring 101 is quite effective in holding the ignition circuit closed during normal idling. However, an excessive increase of suction above the normal idling suction breaks the piston 100 away from the opening 110 which permits atmospheric pressure to enter the outer end of the cylinder, so that the full effect of the suction from the port 102 can act on the spring 101. This may be termed a slight overlap action and makes it much easier to avoid a "ragged edge" adjustment which will hold for steady idling and yet break quick enough to stop the back-fire on deceleration.

The exclusive use of all modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, means forming main and auxiliary mixing conduits for said groups, a throttle valve for said main mixture conduit, and a damper valve and a fuel valve for said auxiliary conduit, means for holding said damper valve in open position when said fuel valve cuts off the fuel supply to said auxiliary mixing conduit.

2. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, means forming main and auxiliary mixing conduits for said groups, a throttle valve for said main mixture conduit, a damper valve and a fuel valve for said auxiliary conduit, means for holding said damper valve in open position when said fuel valve cuts off the fuel supply to said auxiliary mixing conduit, and means for closing said damper valve when said fuel valve is opened.

3. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, means forming main and auxiliary mixing conduits for said groups, a throttle valve for said main mixture conduit, a damper valve and a fuel valve for said auxiliary conduit, means for holding said damper valve in open position when said fuel valve cuts off the fuel supply to said auxiliary mixing conduit, and means for moving said damper valve to open position when the main throttle is moved to fully open position.

4. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, main and auxiliary fuel supply conduits for said groups, a manually operated main throttle for said main conduit, a damper valve and a fuel valve for said auxiliary conduit, means responsive to the opening of said manual throttle for opening said auxiliary fuel valve and closing said damper valve, and means operated by said main throttle for limiting the closing movement of said damper valve.

5. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, main and auxiliary fuel supply conduits for said groups, a manually operated main throttle for said main conduit, a damper valve and a fuel valve for said auxiliary conduit, means responsive to the opening of said manual throttle for opening said auxiliary fuel valve and closing said damper valve, and means operated by said main throttle for limiting the closing movement of said damper valve, said last named means comprising a lost motion connection constructed and arranged to take effect only after said main throttle valve has been opened to a predetermined extent.

6. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, main and auxiliary fuel supply conduits for said groups, a manually operated main throttle for said main conduit, a damper valve and a fuel valve for said auxiliary conduit, means responsive to the opening of said manual throttle for opening said auxiliary fuel valve and closing said damper valve, and means operated by said main throttle for limiting the closing movement of said damper valve, said lost motion connection comprising a comparatively long lever connected to said throttle, a comparatively short lever connected to said damper valve, and a slotted link connecting said levers.

7. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, main and auxiliary mixing conduits for said groups, a main throttle for said main mixing conduit, a fuel valve and a damper valve for said auxiliary mixing conduit, and means tending to close said damper valve and for restricting said main mixing conduit when said fuel valve is opened.

8. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, main and auxiliary mixing conduits for said groups, a main throttle for said main mixing conduit, a fuel valve and a damper valve for said auxiliary mixing conduit, means tending to close said damper valve and for restricting said main mixing conduit when said fuel valve is opened, and means operated by a full opening movement of said main throttle for eliminating said restriction and opening said damper valve.

9. In a carburetor, means forming a mixing conduit, a source of fuel supply, a fuel nozzle receiving fuel from said source and discharging into said mixing conduit, a valve for said nozzle, an expansible chamber having a movable wall responsive to suction, means for limiting the opening and closing movements of said fuel valve, and a lost motion connection between said movable wall and said valve including an operating rod having a resilient end portion for abutting said wall, said end portion being constructed and arranged to permit continued movement of said movable wall after said valve has reached the limits of its movement.

10. In a carburetor, means forming a mixing conduit, a source of fuel supply, a fuel nozzle receiving fuel from said source and discharging into said mixing conduit, a valve for said nozzle, an expansible chamber having a movable wall responsive to suction, means for limiting the opening and closing movements of said fuel valve, and a lost motion connection between said movable wall and said valve including an operating member having a telescoping end portion for abutting said wall and normally urged to extended position and capable of collapsing when the valve has reached the limit of its opening movement.

11. In an internal combustion engine having at least two groups of cylinders and mixture conduits, respectively, supplying said groups, a manual throttle in one of said conduits, and a pressure operated throttle in each of said conduits.

12. In an internal combustion engine having at least two groups of cylinders and mixture conduits, respectively, supplying said groups, a manual throttle in one of said conduits, a pressure operated throttle in each of said conduits, and a lost motion connection between said manual throttle and said pressure throttle to enforce opening of the latter responsive to substantial opening of the former.

13. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, main and auxiliary fuel mixture conduits for said cylinder groups, a manually operated throttle valve for said main mixture conduit, a damper valve for said auxiliary conduit, and means responsive to the opening movement of said throttle valve beyond a predetermined position for closing said damper valve.

14. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups, main and auxiliary fuel mixture conduits for said cylinder groups, a manually operated throttle valve for said main mixture conduit, a damper valve for said auxiliary conduit, means responsive to the opening movement of said throttle valve beyond a predetermined position for closing said damper valve, and means for limiting the closing movement of said damper valve.

15. A control device for internal combustion engines of the type composed of main and auxiliary cylinder groups and main and auxiliary fuel supply conduits for said groups, comprising a manually operated throttle for said main conduit, a fuel valve for said auxiliary conduit, an ignition system connected to said cylinder groups, and means for disconnecting said ignition system when said throttle and fuel valves are closed and the suction posterior to said throttle valve increases a predetermined amount above normal idling suction.

16. A control device for internal combustion engines of the type composed of main and auxiliary cylinder groups and main and auxiliary fuel

supply conduits for said groups, comprising a manually operated throttle for said main conduit, a fuel valve for said auxiliary conduit, an ignition system connected to said cylinder groups, means for disconnecting said ignition system when said throttle and fuel valves are closed and the suction posterior to said throttle valve increases a predetermined amount above normal idling suction, and means for reconnecting said ignition system to said cylinder groups when normal idling suction is restored.

17. In a control device for internal combustion engines of the type having main and auxiliary cylinder groups and fuel mixture conduits for said groups, a manually operated throttle valve for said main mixture conduit, a fuel cut-off valve for said auxiliary conduit, an ignition system for said cylinder groups, and switch means for disconnecting said system from said cylinders when suction in said main conduit posterior to said throttle valve is raised above normal idling suction.

18. In a control device for internal combustion engines of the type composed of main and auxiliary cylinder groups and main and auxiliary fuel mixture conduits for said groups, a manually operated throttle valve for said main mixture conduit, a fuel valve for said auxiliary conduit, an ignition system for said engine, and suction responsive switch means for disconnecting said ignition system during periods of abnormally high suction in said main mixture conduit.

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