United States Patent

Walker

[15] **3,664,313**

[45] **May 23, 1972**

[54] CARBURETOR

[72] Inventor: **Brooks Walker,** 1280 Columbus Avenue, San Francisco, Calif. 94133

[22] Filed: **Feb. 24, 1970**

[21] Appl. No.: **13,550**

[52] **U.S. Cl.** .....**123/119 R,** 123/127, 261/44

[51] **Int. Cl.**.....**F02m 13/04**

[58] **Field of Search**.....123/119 R, 127; 261/44 R

[56] **References Cited**

UNITED STATES PATENTS

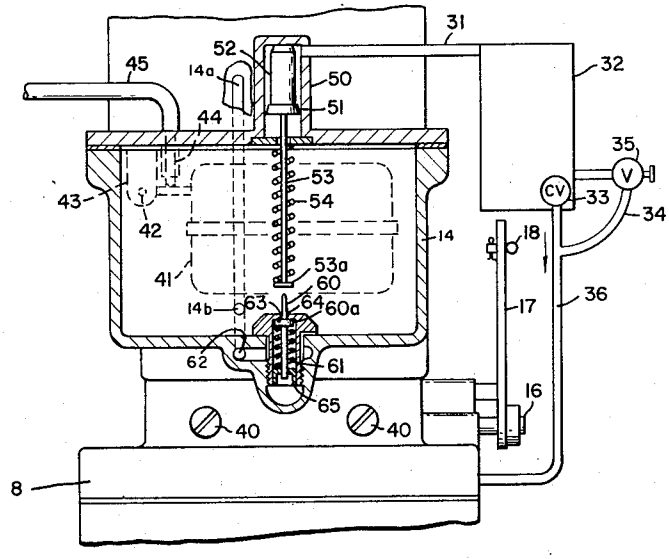
3,366,194 1/1968 Walker et al.....123/127 X

Primary Examiner—Wendell E. Burns

[57] **ABSTRACT**

This invention involves a time delay in the opening of the power valve to cut out some or all of the power valve operation for city driving and still allow the power valve to come in for continued high power operation at power normally requiring a power valve enrichment to keep from over-heating the engine and valves at such continued high power. Such a power valve cut out for city driving with lower peak combustion temperatures for lower NO_x (nitrous oxides) on city driving and lower temperatures of the exhaust valves, etc. over those temperatures that would exist if no power enrichment were used on continued high power operation. The method of timing the delay in power valve come in is by the use of a reservoir between the intake suction and the power valve piston with a check valve to hold suction in the reservoir and a very limited bleed down for delayed reduction of suction to operate the power valve.

12 Claims, 2 Drawing Figures



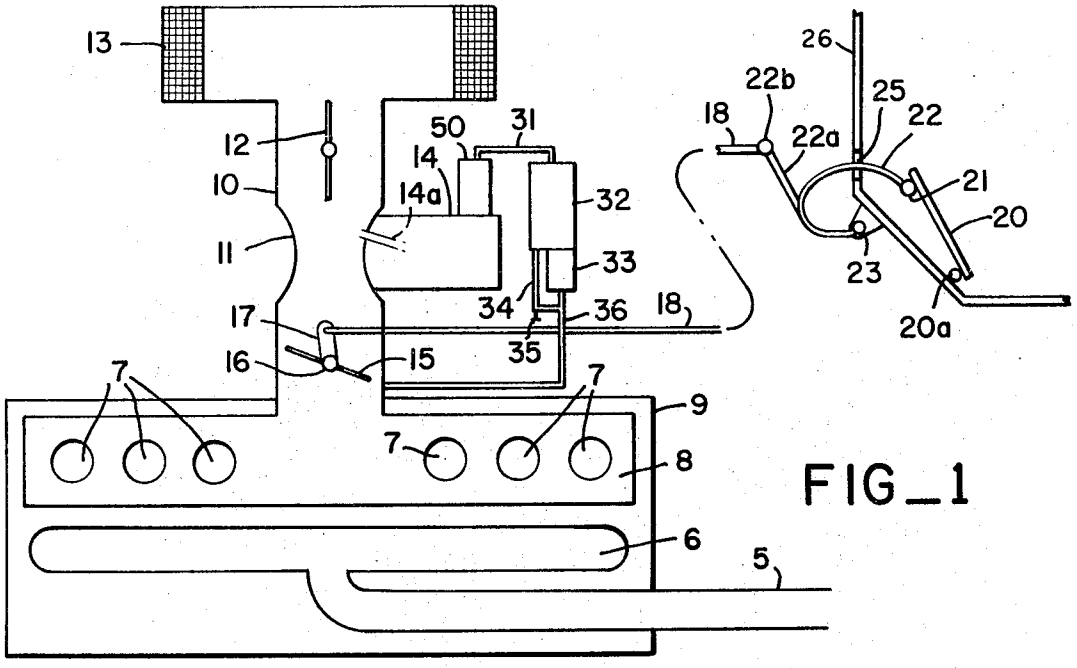


FIG_1

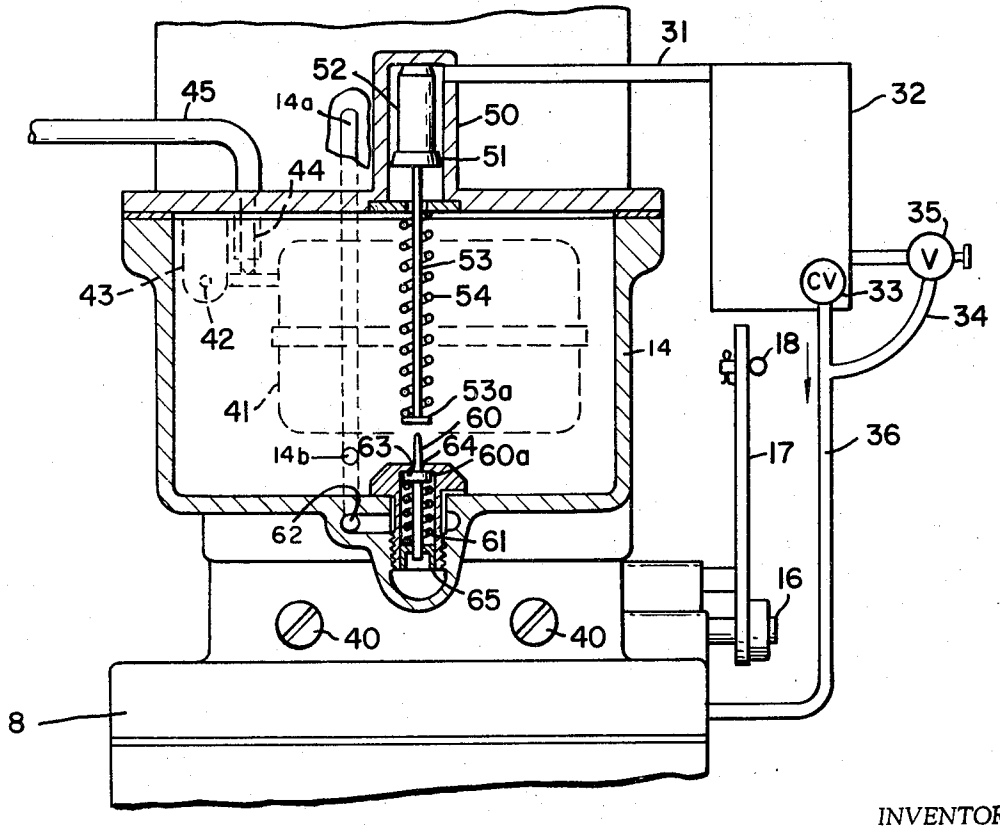


FIG_2

INVENTOR.
BROOKS WALKER

CARBURETOR

An object of the invention is as stated in the above abstract.

Another object is the use of a reservoir to temporarily hold a suction level prevailing in the intake before the sustained power operation at suctions when power valve enrichment is needed to hold exhaust valve temperatures within safe temperature limits. A limited bleed to the intake manifold forms the delay period so that the delayed lower suction in the reservoir (that is connected to the power valve operating piston or movable wall) will act as a delayed timer in the power valve "-come on" operation. Such a delay in power valve "come on" will result in no power valve operation in some or all city driving. A fast get away from a traffic light would be over before the timer would turn on the power valve. Also, as in San Francisco, most hills are only one or two blocks long and on such a hill the leaner mixture without power valve operation will not result in excessive exhaust valve temperatures during such hill climbing, with the leaner mixtures needed for low HC emissions required for smog control. Continued power valve operation at below 7 to 10 inches intake suction (i.e. 10– 0 inch Hg) would bring in the power valve, as in going over the Donner Summit, involving 20 or more miles of continuous grades to 7,000' elevation at 60 – 70 mph at suctions 5 – 0 inch Hg where such operation at a lean mixture might cause engine or valve overheating and higher emissions might be permissible. The fuel mixture should be maintained so as not to cause too lean a mixture, causing stumble and missing with sudden full power operation and all city driving should result in exhaust emissions within the prescribed limits but higher limits might be acceptable on continued mountain climbing out of the city basins, such as Los Angeles, San Jose, etc.

Another object is to provide a timer that does not require electrical circuits near the carburetor or a clock timer but to have such a timer as a part of a carburetor assembly and preferably under the umbrella or below of the air cleaner.

It is well known that exhaust HC emissions are higher when operating on the power valve than when not, and this invention is to automatically effectively cut out power valve operation for most or all normal city driving but still allow power valve enrichment to hold engine temperatures within normal power valve operating limits on continued operation when such enrichment is needed outside city basins.

With some power valve enrichment nitrous oxides are reduced as the peak temperatures of combustion are lower with richer mixtures and a two stage power valve may be desirable wherein some enrichment is provided by a limited stroke operating somewhat below 10 inches Hg suction, maybe 7 – 10inches, and the delay suction for full power valve operation being delayed due to the slow equalizing of suction in the reservoir and the lower suction in the intake manifold.

My invention "Exterior Control of Power Valve of a Carburetor", U.S. Pat. No. 3,301,540, dated Jan. 31, 1967, covers a manual control of a power valve operation and a tapered power valve so any portion of the power valve flow can be manually controlled, i.e. cut out all or part for city driving and cut in for mountain climbing out of the actual area. This invention makes such manual control automatic and may not require an exterior signal, though it could be used if desired by legislation.

I have illustrated my invention by way of example in the accompanying drawings, in which:

FIG. 1 is a side elevation of an engine and foot throttle control as on a vehicle employing one form of the invention.

FIG. 2 is an enlarged side elevation view shown in larger scale of the carburetor, shown in FIG. 1, with portions cut away.

In both figures like numerals of reference refer to corresponding parts.

In FIGS. 1 and 2 I have shown a carburetor **10** mounted on engine **9** attached to intake manifold **8** with intake ports **7** leading to the engine cylinder. Exhaust manifold **6** is connected to exhaust pipe **5** and the usual muffler and tail pipe, not shown.

An air cleaner **13** is mounted on top of the carburetor. A choke valve **12** is provided upstream of the venturi **11** where fuel is admitted through schematic tube **14***a* from float bowl **14**. Throttle blade **15** is mounted on shaft **16** and controlled by arm **17**. Arm **17** is connected to foot throttle **20** by rod **18** and bell crank **22***a* with curved sections **22** approximately on a radius about pivot **23** to pass through a hole **25** in firewall **26** of a vehicle; extension crank **22***a* is attached to control rod **18** at pivot **22***b*. Roller **21** reduces friction on sliding contact with foot pedal **20** in a conventional manner. Fuel under pressure enters the carburetor by line **45**, past float valve **44**, operated by float **41** and support arm which is pivoted at **42** to bracket **43**.

Power valve **60** has a tapered upper portion and a ring portion **60***a*. A spring **61** urges the power valve ring **60***a* against seat **63** surrounding power valve orifice **64**. Spring **61** seats against guide plug **65**. Fuel enters the main jet passage **14***a* and from opening **64** past seat **60***a* through passage **62** from the fuel in the main float bowl past power valve **60**. Main fuel for jet passage **14***a* may be admitted by main jet intake orifice **14***b* leading to passage **14***a* in a conventional manner for some commercial carburetors. A power valve operating cylinder **50** supports a piston plunger **52** which limits the upper stroke, and is attached to a cup or seal **51**. A piston rod **53** is attached to cup **51** and has a head **53***a*. A spring **54** urges cup **51** downward and may be so tensioned along with the tension (in compression) of spring **61** which urges power valve **60** to the closed position that the power valve **60** will only open after a delay and continued operation of the engine at intake suctions for more power than at 10 or 8 inches Hg suction. When the suction on cup **51** is below a desired limit spring **53** overcomes spring **61** and opens fuel flow past valve **60**. The delay in opening valve **60** is accompanied by inserting a reservoir **32** between the engine side of butterfly throttle **15** and the power valve operating cylinder **50** by tube **36** to check valve **33**, with a slow bleed down valve **35** in bypass line **34** from reservoir **32** back to the intake **8**. Tube **31** connects reservoir **32** to power valve operating cylinder **50**.

In operation, when idling or cruising at 17 to 12 inches Hg suction, piston and cup **51** are held up by such suction acting against spring **53** and no power valve fuel flows. Acceleration is accomplished without full power valve enrichment for a short distance as in city driving. The drop in suction in reservoir **32** will be slow through needle valve **35** so the power valve will not open by allowing piston and seal **51** to be pushed down by spring **54** to open power valve **60** against closing spring **61**. The power valve will open on continued full power operation for over 10 seconds or longer wide open operation, as in climbing from the Los Angeles Basin over the mountains to Las Vegas or from Colfax to the Donner Summit of about 7,000'. The shape and taper of the power valve **60** may allow some power valve operation at suction below full power to allow a correct mixture for low HC and NO_x (nitrous oxides) at some wide open city driving but not full power valve flow on nearly all city driving operation.

The limits of suction mentioned where the power valve opens are examples only applicable to some engines and the suction where the power valve opens may vary on other engines.

Other features may be pointed out in the accompany claims.

I have illustrated my inventions in these various forms; however, many other variations may be possible within the scope of this invention.

To those skilled in the art to which this invention relates many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. A carburetor, an engine, an intake manifold to which the carburetor is attached, said carburetor comprising a throttle valve, a power valve including an actuating device, a delay

mechanism for delaying the opening of said power valve after operating at high suctions in the intake manifold and then suddenly operating at or near wide open throttle with low suctions, such mechanism allowing power valve open operation after delaying the opening of said power valve on continued operation at open throttle.

2. A device as defined in claim 1, said power valve being controlled by suction from said intake manifold on the engine side of said throttle valve, the opening of said power valve being delayed by the delay mechanism for more than 2 seconds after changing from said high intake suction operation to wide open throttle operation of said engine.

3. A device as defined in claim 1, in which the actuating device comprises power means to operate said power valve, said delay mechanism controlling said power means for the opening of said power valve after a predetermined time following the change of operation at high suction to operation at or near wide open throttle with low suction.

4. A device as defined in claim 3, in which the power means to open said power valve operates when the suction is less than 7 inches Hg intake suction, said delay occurring after operation at idle and quickly changing the throttle to operate at less than 7 inches Hg suction near wide open throttle operation.

5. A device as defined in claim 4, in which such delay is more than 4 seconds, said time delay mechanism involving a reservoir for suction from said intake manifold, a controlled bleed valve between said intake manifold and said reservoir, a bypass to said intake with a check valve allowing higher suction to flow from said intake to said reservoir freely but not from said reservoir to said intake manifold, said reservoir being connected to said actuating device to control the opening of said power valve when suction in said reservoir is less than a selected limit.

6. A device as defined in claim 1, said mechanism comprising a reservoir inserted between the intake manifold and the power valve actuator, said reservoir being connected to said intake manifold by an unrestricted line with a check valve therein and a greatly restricted flow line from said reservoir to said intake manifold.

7. A carburetor, an engine having an intake manifold to which the carburetor is attached, said carburetor comprising a throttle valve, a power valve and an actuating device for opening said power valve, control means for operating the actuating device in response to low suction in the intake manifold, said control means including a timing mechanism initiated by a sudden operation of the engine at or near wide open throttle with low suction following operation at high suctions, said control means operating the actuating device to open the power valve a predetermined period of time following said sudden decrease in suction, said control means being operative only on continued said operation of the engine at low suction at least for the predetermined period of time.

8. The apparatus defined in claim 7 wherein the timing mechanism includes a fluid reservoir connected by passageways between the intake manifold and the actuating device for operating the power valve, there being a pair of passageways between the manifold and reservoir, one of said pair of passageways being unrestricted to fluid flow in one direction and provided with a check valve, and the other of said pair greatly restricting the fluid flow.

9. The apparatus defined in claim 7 wherein the predetermined time is more than 2 seconds.

10. The apparatus defined in claim 7 wherein the power valve is opened by the control means at suctions below 7 inches of Hg in the manifold.

11. A device as defined in claim 6 in which said greatly restricted flow line includes means accessible exteriorly of the carburetor for adjusting the amount of restriction.

12. The apparatus defined in claim 8 in which the restriction of the fluid flow in the other of said pair of passages is provided by adjustable means accessible exteriorly of the carburetor for varying the amount of restriction.

* * * * *