July 3, 1962 K. P. KING 3,042,387

FUEL SHUT OFF DEVICE OR DEGASSER

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Fig. 1.

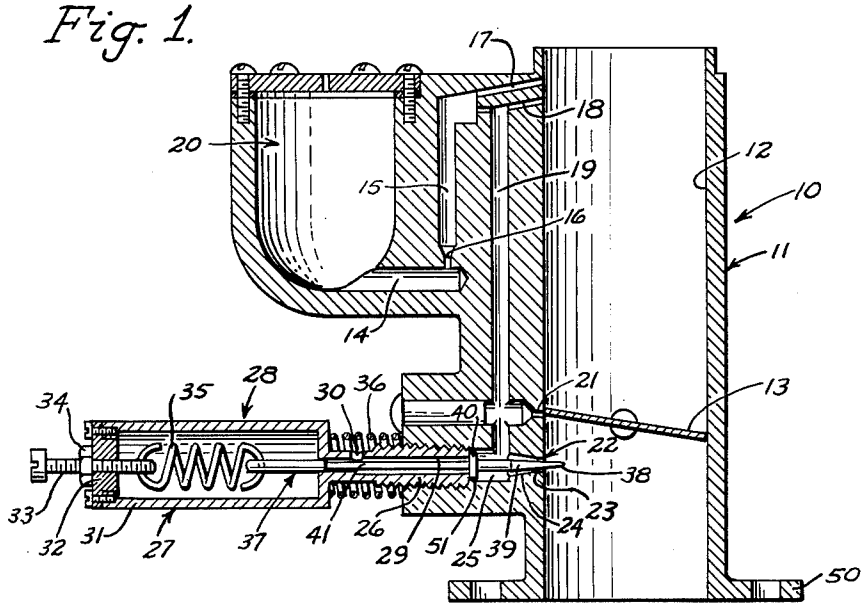


Fig. 2.

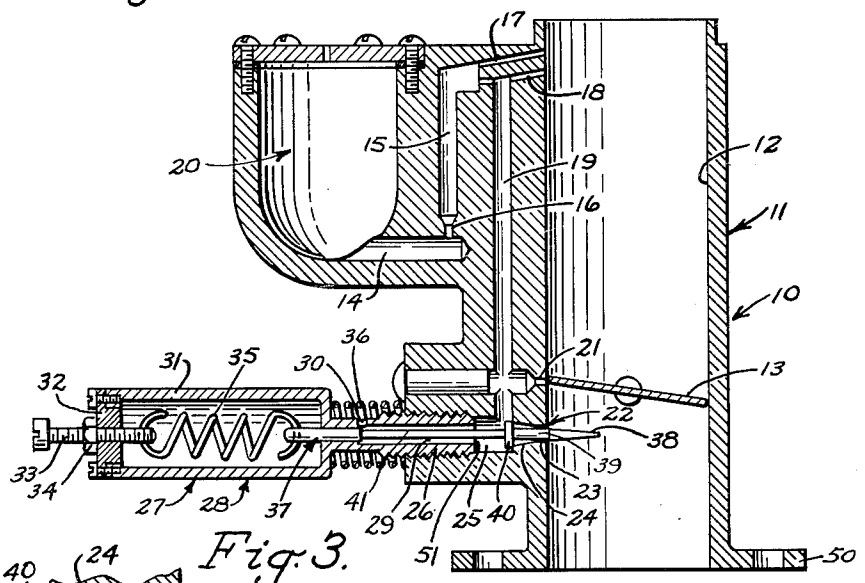
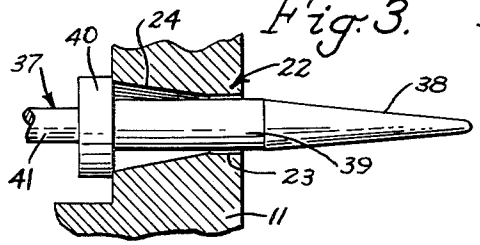


Fig. 3.



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Fig. 5.

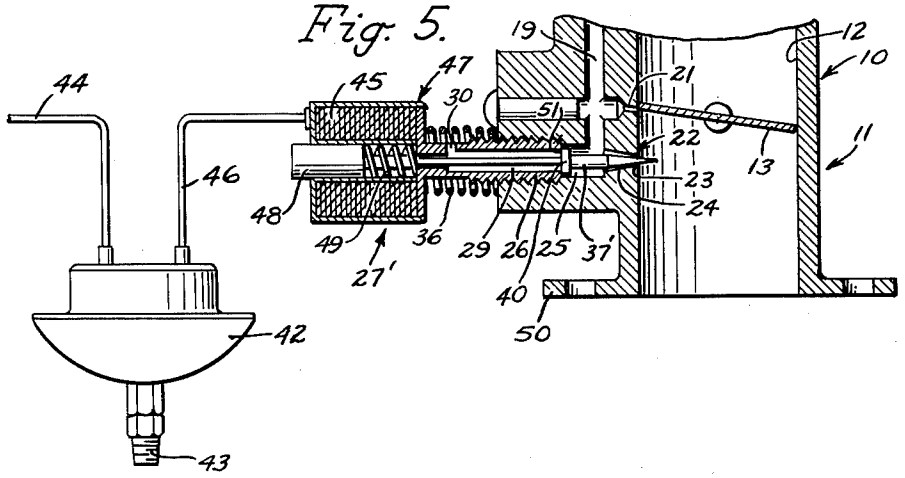
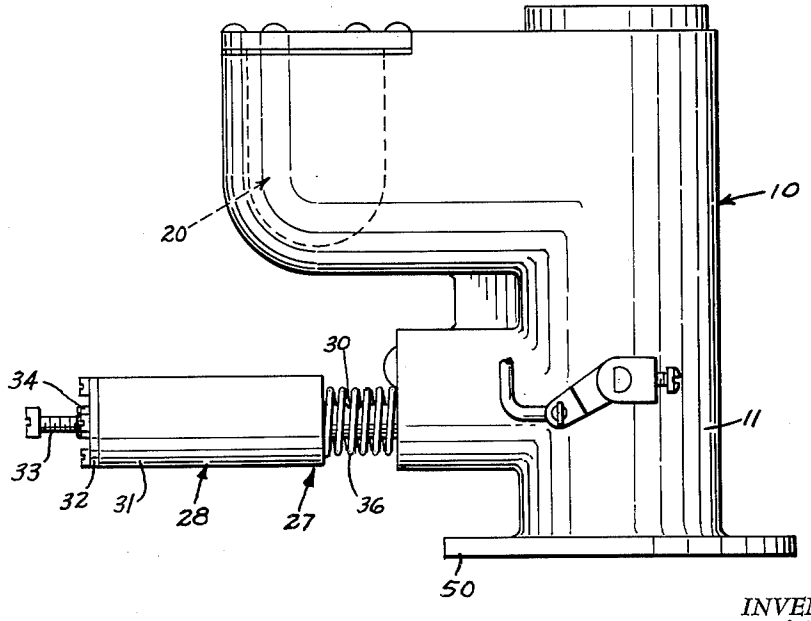


Fig. 4.



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FUEL SHUT OFF DEVICE OR DEGASSER

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1 Claim. (Cl. 261—41)

This invention relates to a carburetor for an internal combustion engine, and more particularly to a fuel shut-off device for such a carburetor.

The object of the invention is to provide a fuel shut off device which is self contained and ruggedly constructed and which has a minimum number of moving parts so that the same can be used with a minimum amount of maintenance.

Another object of the invention is to provide a fuel shut off device for use on carburetors on motor vehicles wherein there is provided an automatic means of effectively terminating the discharge of gasoline from a carburetor at such times that the engine is acting as a brake, and wherein the fuel cut off device of the present invention will help reduce pollution of the atmosphere by eliminating contaminants which are usually discharged from the tail pipes of motor vehicles when the engines of such vehicles are acting as a brake.

A still further object of the invention is to provide a carburetor fuel cut off or shut off device which will function to insure that there will be less accumulation of carbon in an engine and muffler, and wherein the engine will act as a more efficient brake and wherein there will also be better fuel economy as well as improved cylinder wall lubrication, during deceleration.

A further object of the invention is to provide a fuel shut off device or degasser which is extremely simple and inexpensive to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are used to designate like parts throughout the same:

FIGURE 1 is a vertical sectional view illustrating the present invention, and showing the pin in open position with respect to its port.

FIGURE 2 is a view similar to FIGURE 1 but showing the pin in closed position with respect to the port.

FIGURE 3 is an enlarged fragmentary sectional view showing the pin in closed position in the port and corresponding to the position of the parts in FIGURE 2.

FIGURE 4 is an elevational view illustrating the present invention.

FIGURE 5 is a fragmentary sectional view of a modification.

Referring in detail to the drawings, and more particularly to the FIGURES 1 through 4 of the drawings, the numeral **10** indicates a portion of a carburetor which includes a main body portion **11** that has a vertically disposed bore **12** therein, and the numeral **13** indicates a throttle valve in the bore **12**.

There is further provided the usual feed bowl **20**, and the numeral **14** indicates a horizontally disposed first passageway which communicates with the lower end of the bowl **20**, FIGURE 1. There is also provided a vertically disposed second passageway **15** which has its lower end communicating with the passageway **14** through the medium of a jet **16**. The numerals **17** and **18** indicate first and second spaced apart air bleeds which establish communication between the upper end of the passageway **15** and the bore **12**, FIGURES 1 and 2. The numeral **19** indicates a vertically disposed third passageway which has its upper end communicating with the air bleed **18**.

As shown in the drawings there is provided a transfer hole **21** which establishes communication between the

third passageway **19** and the bore **12**. The numeral **22** indicates an idle fuel discharge port positioned below the hole **21**, and the port **22** includes a cylindrical portion **23** which is contiguous to the bore **12**, and the port **22** further includes a tapered flaring portion **24**. The numeral **25** indicates a horizontally disposed fourth passageway which is arranged at right angles with respect to the lower end of the passageway **19** and which communicates therewith and which also communicates with the port **22**.

The numeral **27** indicates the accessory of the present invention which is shown to comprise a support member **28** that includes a shank **26** that threadedly engages a threaded portion of the passageway **25**. The support member **28** further includes a hollow casing or sleeve **31** and the numeral **30** indicates atmospheric vent which communicates with the hollow interior **29** of the shank **26**. A closure **32** is mounted in an end of the casing **31**, and the numeral **33** indicates a securing element or screw member which extends through the closure **32**, there being a lock nut **34** arranged in threaded engagement with the screw member **33**. The numeral **35** indicates a spring member which has one end connected to the inner end of the screw member **33**, while the other end of the spring member **35** is connected to an adjustable pin **37**. The numeral **36** indicates a coil spring which is circumposed on the shank **26**, and the coil spring **36** is interposed between the casing **31** and the adjacent portion of the carburetor.

The pin **37** is shaped to include a tapered outer end **38** as well as a cylindrical section **39**, and there is provided a circular flange or shoulder **40** contiguous to the section **39**, and the pin also includes an elongated cylindrical section **41**.

Referring now to FIGURE 5 of the drawings, there is illustrated a modification wherein the numeral **27'** indicates the accessory which functions in the same manner generally as the previously described device **27**, and the numeral **37'** indicates a pin which is adapted to be used in lieu of or instead of the pin **37**. The numeral **42** indicates an adjustable type vacuum responsive switch which has a fitting **43** that is adapted to be connected to the intake manifold of the vehicle, and the switch **42** is adapted to be connected to the vehicle battery as at **44**. The numeral **47** indicates a solenoid type actuator which includes a winding **45** that is adapted to be connected to the switch **42** as at **46**. An iron core **48** is mounted on the end of the pin **37'**, and there is also provided a return spring **49** contiguous to the core **48**, and the numeral **50** indicates a mounting flange for the carburetor.

From the foregoing, it is apparent that there has been provided a fuel shut off device or degasser which is especially suitable for use with the carburetor of an internal combustion engine such as a vehicle.

The pin **37** is shown in open position with respect to the port **22**, while in FIGURE 2 the pin is shown in closed position with respect to the port **22**, and in FIGURE 3 the pin is also shown in the same position as that of FIGURE 2.

The parts can be made of any suitable material and in different shapes or sizes.

FIGURE 1 shows the fuel cut off device of the present invention mounted on the carburetor with the idle fuel system functioning in a normal manner, while FIGURE 2 shows the fuel cut off device mounted on the carburetor with the idle fuel shut off and with the fuel air passageway **19** vented to the atmosphere through the opening **30**.

Thus, it will be seen that according to the present invention there has been provided a fuel cutoff device for use on carburetors of motor vehicles and wherein the accessory device can be installed on the carburetor by screwing it into the existing threaded hole **25** which nor-

mally accommodates the idle mixture adjusting screw. The fuel cut off device provides an automatic means of effectively terminating the discharge of gasoline from a carburetor at such time as the engine may be acting as a brake. Normally a motor vehicle engine acts as a brake during deceleration and when descending hills. The primary function of the fuel cut off device is to reduce pollution of the atmosphere by eliminating contaminants that are usually discharged from the tail pipes of motor vehicles when the engines of such vehicles are acting as a brake and some of the advantages of the present invention are that there will be less accumulation of carbon in the engine and muffler and wherein the engine will act as a better brake and there will be better fuel economy as well as improved cylinder wall lubricating during deceleration.

The principle of operation is as follows. Immediately after the engine becomes a brake, the increased vacuum (below the closed throttle valve **13**) will draw the tapered fuel cut off pin **37** fully into the fuel discharge orifice or port **22**. The full diameter of the pin is slightly smaller than the orifice diameter but almost completely occupies the hole. This action effectively blocks the discharge of fuel from the orifice. Simultaneously the stop **40** (which also acts as a poppet valve) moves off its seat **51**. This action vents the fuel passageway **19** to the atmosphere and causes the vacuum in the passageway to be instantly dispelled. The flow of fuel through the metering jet **16** will immediately cease due to the nonexistence of vacuum in the passageway **19** and thus discharge the fuel from the carburetor will be effectively stopped.

When the decelerating vehicle has slowed its speed to about six or seven miles per hour, the strength of the vacuum below the closed throttle valve **13** will have been weakened and the return spring **35** will now bear the greater influence on the cut off pin **37**. This will cause the return spring to pull the pin **37** away from the discharge orifice **22** so as to unblock the discharge of fuel from it. At the same time, the stop **40** will have come to rest on its seat **51** so as to close off the vent passage to the atmosphere which will allow the vacuum in the passageway **19** to be instantly restored. Fuel will again flow through the jet **16** and thus fuel restoration will have been accomplished slightly before the vehicle has come to a stop. The adjusting screw **33** which alters the tension of the return spring provides a means of timing the restoration of fuel discharge in respect to miles per hour.

The present invention combines several principles of idle fuel control in one simple device. The movable metering pin **37** is directly vacuum responsive whereas other devices generally employ some indirect method such as vacuum responsive switches, solenoids, diaphragms or cylinder and piston arrangement which in turn transmit motion to the control valve or pin.

As shown in FIGURE 3 the pin has a small annular clearance with the port or orifice **22** so as to eliminate friction. In FIGURE 3 all of the tapered portion **38** is in the carburetor throat. The numeral **29** indicates the annular space around the pin **37** and this space is the air bleed passage. Some of the important aspects of the present invention are that it simultaneously air bleeds the idle fuel passage and blocks off the idle fuel discharge port. Furthermore, the device has a self acting shut off pin while other devices usually use some sort of an actuator which may be electric or pneumatic to effect movement of the pin, but the pin of the present invention is entirely self acting and needs no actuators to effect its movement. In actual practice there may be approximately .001 inch of annular clearance around the pin **37** at the port **22** so as to prevent binding. As shown in the drawings the major portion of the hole **21** is below the edge of the closed throttle valve **13**.

The fuel metering pin **37** also serves as a control valve for equalizing internal pressures within the carburetor.

The body which is a part of the valve, is configured so that it will fit into the threaded hole **25** which normally accommodates the original idle mixture adjusting screw and the pressure which is equalized is the pressure in the idle fuel system with the pressure acting on the surface of the fuel in the carburetor feed bowl **20**. The purpose of the pressure equalizing valve is to stop the flow of fuel through the idle fuel jets of the carburetor at such times when continual flow is not desirable. Control of the flow of fuel through the jet **16** is obtained by controlling the operating pressure in the carburetor idle system. Stop flow is by equalizing the unbalanced pressures that caused it to flow, and restore flow is by restoring the unbalanced pressures that cause it to flow. In balancing the pressure stop flow, there is simultaneous air bleeding idle system passage to atmosphere pressure, and blocking off of the idle fuel discharge port **22**. Fuel is caused to flow through jet **16** and into the passageway **15** and then in turn through the port **22** into the throat or bore **12** because the atmospheric pressure which is acting on the surface of the fuel in the fuel feed bowl **20** is much greater than the pressure in the passage **15** (a slight vacuum exists in the passage **15**). This fuel is pushed through the jet **16** by atmospheric pressure and it will flow into the passage **19** and in turn through ports **22** into the throat because each new passage it flows into is at less pressure than the last. In order to stop the flow of fuel through the jet **16**, full atmospheric pressure must be introduced into passage **15** to prevent fuel from flowing through the jet **16**.

FIGURES 1 and 2 illustrate the present invention on a carburetor, and in FIGURE 1 the metering pin **37** is positioned to meter fuel as would an ordinary idle mixture adjusting screw. FIGURE 2 shows the metering pin after having been moved to the right and in this position the fuel will cease to flow through the jet **16** because the vacuum in the air fuel passage **19** has been dispelled by the air bleeding and blocking action of the metering pin **37** so that passage **15** is at atmospheric pressure. FIGURES 2 and 3 show the pin in blocking position wherein the idle fuel discharge port **22** is almost completely closed off by the full diameter **39** of the metering pin so as to effectively stop passage **19** from being in communication with the higher vacuum in the carburetor throat. As to air bleeding, the mechanical stop **40** which also acts as a valve, is away from its seat **51** in FIGURE 2 allowing passage **19** to be in communication with the atmosphere through passage **29**. The area of the transfer hole **21** which is in communication with the high vacuum in the throat is much less than the combined areas of the air bleed passages **29** and **18** and as a result the entire idle fuel system is at atmospheric pressure and fuel flow through the jet **16** and the balance of the idle system is practically impossible.

The self contained fuel shut off device **27** is entirely self contained and requires no external controls in order to effect its operation. The metering pin movement is directly responsive to the high vacuum in the carburetor throat and requires no indirect actuator such as solenoids or pneumatic cylinders or the like to effect its operation. It is to be noted that the shut off device uses the triple purpose metering pin and body to provide a means for adjusting the idle fuel mixture as well as to provide an air bleed control to the idle fuel system and to provide a blocking control of the idle fuel discharge port.

Heretofore workers in the field have indicated that a primary object of their devices in blocking the port is to obstruct the flow of fuel but it is believed that the present invention is a true 100% air bleed type of shut off device and the primary object of the present invention in blocking the port is to shut off the major vacuum supply to the idle system which reduces the amount of air bleeding required making it possible to completely air bleed the fuel passages without requiring

extremely large air bleed passages. The present invention utilizes the principle of pressure equalization. The important features of the present invention are the metering pin and body configuration therefor.

Although automatic air bleed types of shut off devices have heretofore been developed, none of them use a modified metering pin method as does the present invention nor do they combine their action with blocking off the idle fuel discharge port as is done in the present invention and this combination feature is believed to be unique. Thus, there is provided an automatic air bleeding provision which will completely shut off fuel. The movement of the pin is directly responsive to the high vacuum in the throat of the carburetor and does not require an actuator to effect its movement.

In FIGURE 5 the triple purpose metering pin **37'** is equipped with an electric actuator to effect its movement. The pin in both cases is supported in a friction free manner due to the clearances provided and the device can be several degrees out of true 90° alignment with the carburetor and still work properly.

As stated previously the primary object of the present invention is to shut off the major vacuum supply to the idle fuel system so as to allow the air bleeding to be completely effective so that the present invention is a 100% air bleed type of control.

In the electrically actuated fuel cut off device mounted on the carburetor as shown in FIGURE 5, the adjustable type vacuum responsive switch **42** is electrically connected to the winding **45** of the solenoid type actuator **47** and there is provided the atmospheric vent passage **29** around the pin as well as the other parts which are described in connection with the assembly of FIGURES 1 through 4.

Minor changes in shape, size and rearrangement of details coming within the field of invention claimed may be resorted to in actual practice, if desired.

What is claimed is:

In a device of the character described, a carburetor including a main body portion provided with a vertically disposed bore, a throttle valve in said bore, a feed bowl having a horizontally disposed first passageway communicating with its lower end, a vertically disposed second passageway having its lower end communicating with said first passageway through a restricted jet, there being a first and second spaced apart air bleed establishing communication between the upper portion of said second passageway and said bore, a vertically disposed third passageway having its upper end communicating with said second air bleed, there being a transfer hole establishing communication between said third passageway and said bore, there being an idle fuel discharge port below said transfer hole, said port establishing communication between said third passageway and said bore, said port including a cylindrical portion contiguous to said bore and a tapered flaring portion contiguous to said third passageway; there being a fourth passageway arranged at right angles with respect to the lower end of said third passageway; a support member including a shank threadedly engaging said fourth passageway, the outer end of the shank being open and the interior of the shank being hollow, there being an atmospheric vent in said shank communicating with the interior of the shank, said atmospheric vent adapted to selectively dispel the vacuum in said third passageway, said support member further including an enlarged hollow casing having a closure on its outer end, an adjustable screw member extending through said closure, a spring member positioned in said casing and having one end connected to said screw member, an adjustable pin having one end connected to the other end of said spring, the other end of said pin being tapered, a cylindrical section contiguous to said tapered end, the tapered end and cylindrical section of said pin being mounted for coaction with and movement through the cylindrical portion and tapered flaring portion of the bore, a circular flange contiguous to said cylindrical section, said spring member biasing said pin to the position in which said flange abuts the adjacent end of said shank and serves as the stop member for said pin, said pin being movable responsive to vacuum in said carburetor bore and against the action of said spring member to a position in which said flange closes said port, and a coil spring circumposed about said shank.

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