July 30, 1929. G. A. GILLEN 1,722,791

FUEL FEEDING DEVICE FOR INTERNAL COMBUSTION ENGINES

Filed Oct. 18, 1926 2 Sheets-Sheet 1

Fig. 1

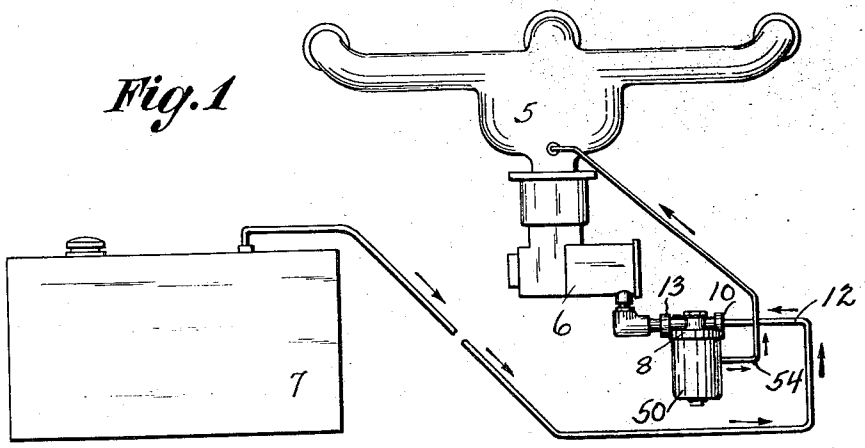


Fig. 4

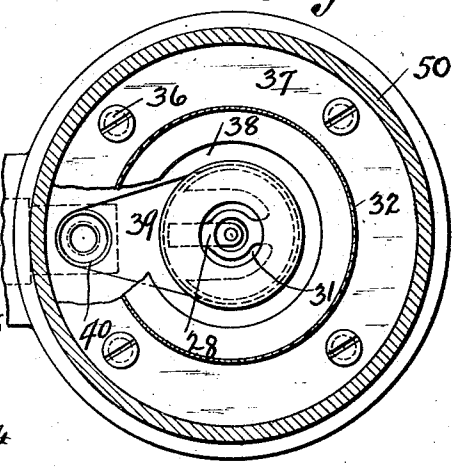


Fig. 3

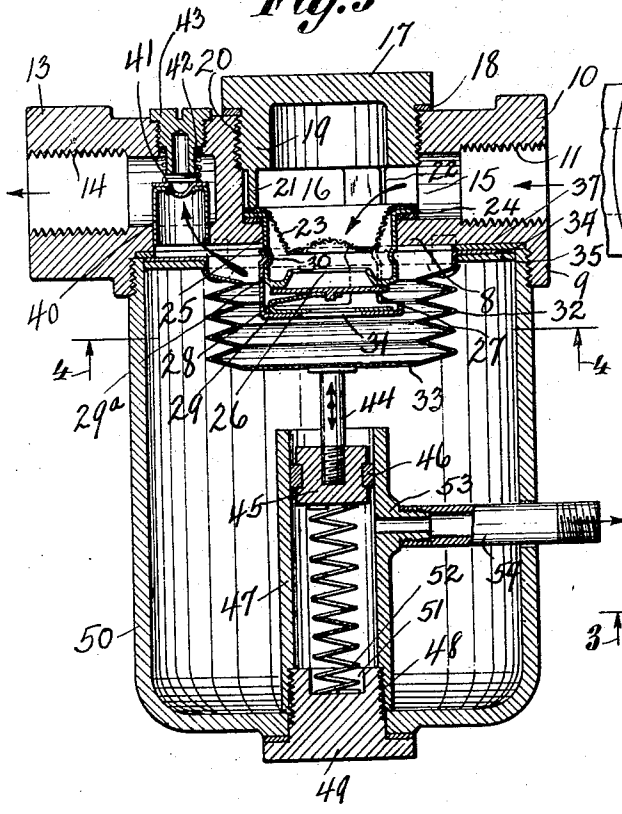
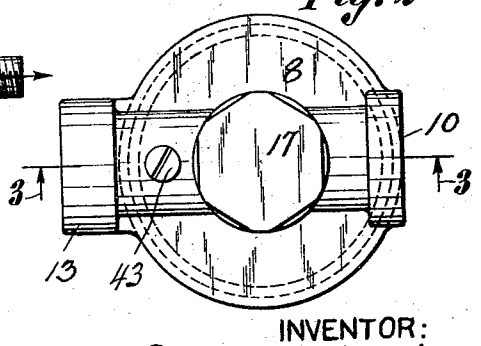


Fig. 2



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Fig. 5

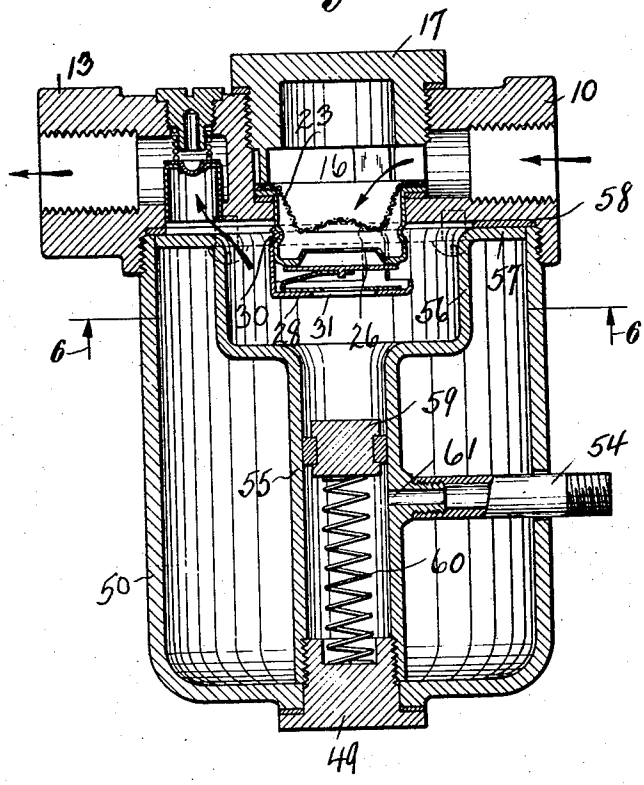
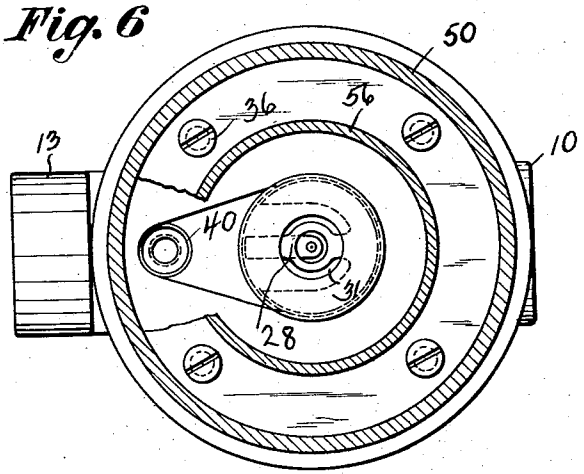


Fig. 6



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UNITED STATES PATENT OFFICE.

GEORGE A. GILLEN, OF NEW YORK, N. Y., ASSIGNOR TO EQUIPMENT & SUPPLY COMPANY, INC., A CORPORATION OF NEW YORK.

FUEL-FEEDING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

Application filed October 18, 1926. Serial No. 142,462.

This invention relates to fuel feeding devices for internal combustion engines and has for its object to provide a novel and improved means attachable directly to the carburetor and operable by the vacuum created in the intake manifold.

One of the objects of my invention is to provide a fuel feeding device for internal combustion engines which may be attached directly to the carburetor and below the same and which dispenses with cooperating valves, float and lever construction such as employed in the well known Stewart vacuum fuel feed system.

Another object of my invention is to construct a fuel feeding device employing a bellows and piston arrangement constructed to cooperate and function by the vacuum created in the inlet manifold to feed the fuel directly to the carburetor from a supply tank located at any position on a motor vehicle.

A further object of my invention is to provide a fuel feeding device capable of being connected to the carburetor of any of the well known types employed in internal combustion engines and particularly motor vehicles and in which the cooperating parts and elements are reduced to a minimum, easily assembled and accessible, positive in operation and free of mechanical difficulties incident to the use of different grades and quality of fuel.

An additional object of my invention is to construct a vacuum fuel feeding device of the character above specified which may be connected directly to the carburetor and operable through the suction created in the intake manifold and in which the flow of fuel is regular and does not depend upon gravity or its location with respect to either the carburetor or the fuel supply tank for its continuous operation.

To enable others skilled in the art to more fully comprehend the underlying features of my invention, reference is had to the accompanying drawing, wherein

Fig. 1 is a view showing the application of my invention and its relation to the intake manifold, supply tank and carburetor. Fig. 2 is a top plan of the device. Fig. 3 is a vertical, sectional view taken on the line 3—3 of Fig. 2. Fig. 4 is a view taken on the line 4—4 of Fig. 3. Fig. 5 is a vertical, sectional view of a modified form of the invention as shown by Fig. 3. Fig. 6 is a view taken on the line 6—6 of Fig. 5.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, 5 designates the intake manifold and 6 a conventional type of carburetor of an internal combustion engine to be supplied with fuel from a main supply tank 7 suitably located.

My invention proper comprises a head 8 having an outer flange 9 and formed with an integral, threaded inlet bushing 10, internally threaded at 11 for connection to a feed pipe or conduit 12 leading to the main supply tank 7. The head is also provided with an outlet bushing 13 also preferably integral therewith and internally threaded at 14 for attachment directly to the carburetor 6 as clearly shown by Fig. 1 of the drawing.

The inlet passage 15 of the inlet bushing communicates with a central fuel chamber 16 extending through the head, the top of said chamber being sealed by a flanged closure or fitting 17 and gasket 18. The closure or fitting 17 is provided with a thickened, vertical wall 19, exteriorly threaded at 20 for connection to the head, the depending, unthreaded and thin wall portion 21 being provided with notches or openings 22 through which the fuel may flow to the central chamber 16. The lower portion of the closure is further adapted to seat and retain a cup shaped strainer 23 on the flanged edge 24 of a feed cup 25 which extends somewhat below the central chamber 16 and bottom surface of the head. The bottom of the cup 25 is provided with a central opening or passage 26, normally closed by a thin disk or plate 27 contacting with the bottom and held in contacting position by a thin, leaf spring 28 enclosed within an open guard 29, said guard having vertical arms 29ª and held in an annular grove 30 on the periphery of the cup 25. The guard 29 is equipped with an opening 31 in its bottom for the passage of fuel from the central chamber 16 to a fuel reservoir or bellows 32, preferably of thin metal. The bottom 33 of the bellows is closed and the top plate 34 thereof is provided with a metal gasket 35 and fastened to the bottom surface of the head by suitable screws 36 passing through a fiber gasket 37. The central portion of the gasket 37 is partially cut away at 38 providing a passage

39 to the bottom of a sleeve 40, said sleeve having a valve 41 held in its closed position by a small compression spring 42 on a threaded screw 43 extending within the outlet bushing. The valve is unseated upon the contraction of the bellows permitting the fuel to flow into the outlet bushing directly to the carburetor.

The operation of the bellows 32 is effected by means of a short piston 44 connected to the closed bottom 33, said piston being in turn provided with a piston head 45, equipped with a piston ring 46 and operable in a sleeve or housing 47 threaded at its lower end 48 to a flanged nut 49 in the bottom of a cup 50, the upper end of the cup 50 being threaded for connection to the flanged portion of the head 8. The nut 49 provides a seat 51 for the lower end of a compression spring 52, the upper end of the spring bearing against the piston head 45. Tapped in the wall of the sleeve or housing which may be provided with a threaded bushing 53 is a pipe or conduit 54 extending through the cup 50 and further connected to the pipe or conduit leading to the intake manifold.

As the suction from the manifold draws the piston and piston head down against the resistance of the spring 52, the bellows are expanded and at the same time the plate or disk in the bottom of the feed cup is also drawn down sufficiently to permit the passage of fuel into the bellows. However, as the piston head closes the opening in the wall of the sleeve or housing 47 and the vacuum is broken, the spring 52 forces the piston upwardly, thus contracting the bellows and feeds the fuel up past the spring controlled valve 41 and into the carburetor. In other words, valve 41 may be referred to as a one way valve since when the bellows are being expanded by the suction from the manifold, the suction also tends to keep the valve 41 seated while the fuel is being drawn in through the inlet and central chamber 16. As the pressure or suction is released, the disk or plate held by the spring at the bottom of the central chamber closes the opening in the bottom thereof so as to prevent the return of any fuel through the inlet as the bellows collapse or reurn to their contracted position.

In a slightly modified form of the invention and as shown by Figs. 5 and 6, I may dispense with the bellows and connected piston and form the sleeve or housing 55 with a top fuel chamber 56, the flange 57 of which may be secured to the bottom of the head and spaced by a gasket 58. The piston head 59 cooperating with the compression spring 60 when the vacuum is broken as the port or opening 61 is closed, forces the fuel up through the gate or outlet valve of the outlet bushing connected directly to the carburetor. The mechanism and construction of the head and central fuel chamber communicating with the inlet bushing is the same as that shown and described in connection with Fig. 3, the fuel feed depending primarily on the action of the piston head since it is found that there is sufficient suction created to draw the fuel within the top fuel chamber 56, prevent its return through the central passage and intermittently feed it through the valve or gate. In other respects, the construction of the head, inlet and outlet bushings and the central fuel chamber is identical with that shown and described in connection with Fig. 3.

In both forms of the invention, it will be readily understood that the piston head 45 or 59 is in the nature of a pump, in the one instance expanding and contracting the bellows or fuel reservoir to force the fuel through the outlet valve and in the second instance acting directly upon the fuel fed into the central reservoir. The suction created through the duct 54 leading to the manifold is always sufficient to draw the piston head downwardly and when the vacuum is broken, the spring forces the piston head upwardly to complete the cycle. In other words, an intermittent vacuum is produced in the sleeve 47 below the piston head and opening or port of the duct 54 which is broken each time the piston head moves down to close the said port. This is effected against the resistance of the spring but when the vacuum is broken, the spring urges the piston head upwardly thus contracting the bellows or fuel reservoir. Consequently, an intermittent, constant feed is produced which is automatic and positive, drawing or sucking the fuel into the device and feeding or discharging it.

In so far as I am aware, commercially successful feeding devices of this class have depended upon the action of gravity to feed the fuel from the reservoir. It will be seen that I have made a departure from this practice by feeding the fuel upwardly or against the force of gravity, thereby enabling me to attach the device to any type of carburetor and totally independent of the main supply tank or source of fluid pressure. The device will operate in practically any position and its location whether above or below the carburetor is immaterial.

While I have shown and described a specific type of valve for the outlet leading directly to the carburetor, I do not wish to be limited or restricted to any particular type of valve construction except one that is preferably accessible from the exterior of the head so that should any foreign matter pass the screen and accumulate to hinder the operation of the one way valve, it may be easily cleaned. The same may be said of the spring controlled plate 27 in the bottom passage of the central fuel chamber which should be of such construction that the passage is opened when the fuel is sucked into the fuel reservoir but closed when the fuel is forced upward and

through the outlet valve to the carburetor. This operation of course prevents the return of the fuel into the central chamber and inlet.

It will also be understood that other means may be resorted to other than a spring to return the piston head when the vacuum is broken thus contracting the bellows or fuel reservoir. However, the operation is under the control at all times by the intermittent vacuum and suction created in the intake manifold or by any other pressure creating agency communicating with the device through a suitable duct or pipe in the manner illustrated and described.

Having shown and described my invention what I now desire to secure by Letters Patent of the United States is:—

1. A fuel feeding device for internal combustion engines comprising a head having a fuel chamber therein, an inlet communicating with the chamber, bellows connected to the head and into which the fuel may flow by gravity through a passage in the bottom thereof, a fuel outlet and control valve therefor communicating with the bellows, a piston and piston head connected to the bottom, said bellows, a sleeve or housing for said piston head, a cap connected to the bottom of the fuel chamber, a threaded nut in the bottom of said cup and fastened to said sleeve, and a duct communicating with the interior of said sleeve for actuating the piston head and bellows whereby the fuel may be forced upwardly through the fuel outlet.

2. A fuel feeding device for internal combustion engines comprising a head having a central fuel chamber therein, an inlet and an outlet bushing for connecting said device to a source of fuel supply and a carburetor respectively, a fuel strainer within said chamber, a top closure for said chamber adapted to retain said fuel strainer, an expansible and contractible member secured to the bottom of the head and into which the fuel may flow from the central fuel chamber, said outlet communicating with the said member, a piston and piston head connected to the bottom of the member, a cup having a sleeve carried by said head, said piston head operable within the sleeve, a threaded nut in the bottom of the cup detachably connected to the sleeve, a duct communicating with the sleeve and leading to the intake manifold of the engine to expand said member and means to contract the same member when the pressure in said duct is broken.

In testimony whereof I affix my signature.

GEORGE A. GILLEN.