Feb. 4, 1941. C. B. SEYMOUR 2,230,311

FUEL ECONOMIZER FOR AUTOMOTIVE ENGINES

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Fig. 1

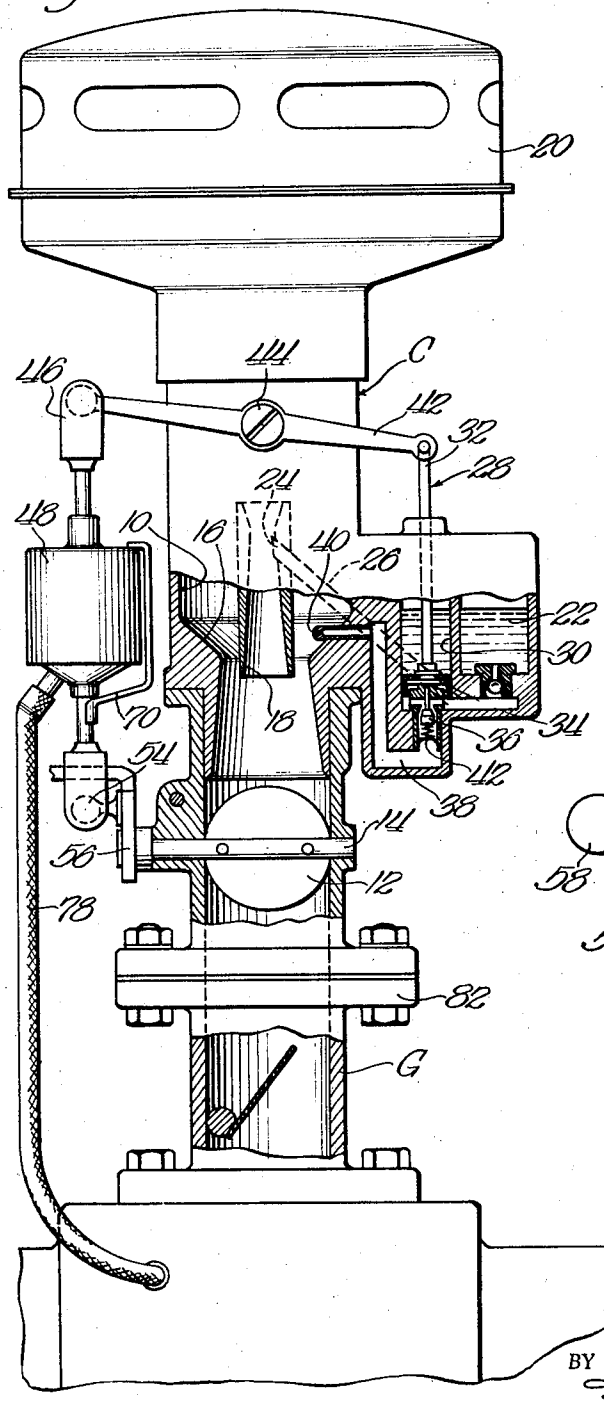
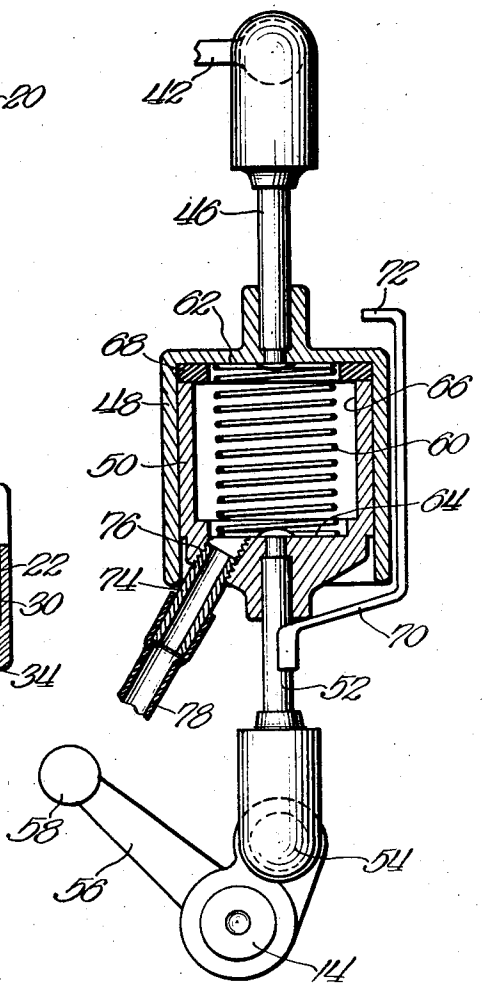


Fig. 2



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FUEL ECONOMIZER FOR AUTOMOTIVE ENGINES

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13 Claims. (Cl. 123—119)

My invention relates to improvements in fuel economizers for automotive engines and similar devices.

My invention relates more particularly to an automatic device normally associated with the carburetor of an internal combustion engine to operate the power jet and/or the accelerating pump of the carburetor of the engine.

Today most carburetors are provided with some form of power jet which enriches the mixture as the speed or load increases. This jet is usually controlled from the carburetor throttle spindle, the mixture being enriched in proportion as the throttle is opened.

When a governor is installed on an engine and the engine speed is controlled by the governor valve, the carburetor throttle is ordinarily held in a wide open position. Where there is a power jet, this position corresponds to a maximum enrichment of the explosive mixture supplied to the engine. When the governor valve need only be opened slightly to give the proper speed and carry the load, the mixture furnished by the carburetor is that corresponding to high speed, as the carburetor valve is wide open and thus the power jet permits an enriched mixture to be furnished to the engine, regardless of the speed or load carried. Under such conditions it is obvious that the mileage per gallon decreases and a great loss in mileage per gallon results as well as damage to the pistons and cylinder walls of the engine, due to the furnishing of an improper mixture to the same.

Therefore in engines which are supplied with a governor, in addition to the carburetor, it is necessary to provide some means of compensating for the operation of the power jet in relation to the position of the governor valve, instead of the carburetor valve. This has been done in some instances by providing means associated with the governor for controlling the operation of the power jet. One form of carburetor now on the market has an accelerating pump and power jet actuated by a rocker arm operated by a link connection to a crank on the carburetor valve spindle. There are devices on the market today which disconnect this link from the crank on the carburetor spindle and connect the same to a piston formed as part of the governor and adapted to control the power jet pump in accordance with the vacuum condition in the intake manifold beyond both the carburetor valve and the governor valve.

My invention is an improvement over any and all of the devices of this type at present on the market.

The principal object of the present invention is to provide a fuel economizer capable of connection between the accelerating pump and the carburetor valve crank capable of control by the condition of vacuum in the intake manifold beyond both the carburetor and the governor valve.

A further object of the present invention is to provide a unit capable of being substituted for the present link between the accelerating pump of the carburetor and the throttle valve of the same, having a connection with the intake manifold of the internal combustion engine whereby the condition of vacuum in the intake manifold will control the operation of the power jet pump during certain periods and under certain conditions.

A further object of the present invention is to provide a device of this type capable of controlling the operation of the power jet of the carburetor at "idle" and when a vehicle engine is under the control of a governor.

A further object of the present invention is to provide in connection with a governor, means which take over the operation of the link connection to the carburetor valve shaft when a governor is used in association with a carburetor so that the accelerating pump and fuel jet are no longer directly operated from the carburetor valve shaft. Thus the loss in mileage which would result if the governor were associated with the carburetor and no change made in the connections for operating the accelerator pump and power jet is eliminated.

Other objects and advantages will be more apparent from the following description, wherein reference is had to the accompanying sheet of drawings, upon which

Fig. 1 is a fragmentary, somewhat diagrammatic, side elevational view with parts broken away in section showing generally the carburetor, the governor and an intake manifold of an internal combustion engine; and

Fig. 2 is a vertical cross sectional view of the economizer unit.

In the embodiment of the invention which I have chosen to illustrate, I have shown a generally standard form of Stromberg carburetor C comprising a conduit member 10 having the usual throttle valve 12 mounted upon the valve shaft 14. This carburetor may also have the usual venturi 16 and mixing tube 18. The usual air filter 20 is mounted upon the conduit 10 above the carburetor. It will be understood that

the carburetor shown is a down-draft carburetor, and therefore the choke valve (not shown) is located above the venturi 16.

The usual float chamber 22 is provided upon one side of the conduit 10 and the main gasoline jet 24 is adapted to be supplied with fuel from this chamber through the tube 26. An accelerating pump 28 is adapted to be associated with the float chamber and is positioned in the cylinder 30. The accelerating pump may generally include the piston rod 32 and piston 34. This piston is usually in the form of a cup leather washer. This pump is supplied with fuel from the float chamber through a check or inlet valve 36 and fuel within the cylinder is discharged through the outlet conduit 38 and supplied to the power jet 40, which is directed into the conduit 10. The valve 36 is normally seated under the pressure of a compression spring 42 mounted therebelow and is only open when the piston 28 operates.

The piston rod 28 may have its upper end pivotally connected to a rocker arm 42. The rocker arm 42 is rotatably mounted upon a pivot 44 upon the side of the carburetor, and has its other end pivotally connected to an arm 46. The arm 46 has its lower end rigidly connected to an open ended cylinder 48, within which a piston 50 is reciprocally mounted. The piston 50 may have the upper end of an arm 52 rigidly connected to the same and have its lower end 54 pivotally connected to a crank 56 secured to one end of the throttle valve shaft 14. The manual throttle lever may be suitably connected to the end 58 of the crank 56.

The piston 50 is adapted to be normally held in an extended position in the cylinder 48 by a compression spring 60 positioned between the upper wall 62 of the cylinder 48 and a bottom wall 64 in the chamber 66 within the piston 50. A sealing gasket 68 is provided in the upper end of cylinder 48 against the wall 62 so that when the piston 50 is moved forward in the cylinder it may seat upon the sealing washer and form an air tight seal. The gauge arm 70, fastened to the arm 52 and extending sideways and then upwardly adjacent the cylinder 48, has an inwardly turned ledge 72 which, when the piston and cylinder are separated by the spring 60, limits the extent of separation.

I provide a short nipple member 74 screw-threadedly mounted in a tapped opening 76 in the bottom end of the piston 50. A flexible elastic hose 78 may have its end expanded and passed over the end of the nipple 74 to form a connection between the interior of the cylinder 50 and the hose 78. The hose 78 may extend downwardly and be connected to a similar nipple fastened at a desirable place in the intake manifold 80 of the automotive engine.

As has previously been stated, the present invention is concerned with the combination of the above described carburetor and a governor. The governor G may comprise a governor conduit member 80 having the usual upper and lower flanges 82 for suitable connection between the lower end of the carburetor and the intake manifold. The governor valve 84 is disposed within the gas passage 80 of the governor and is adapted to control the supply of combustible mixture to the motor, so as to maintain the speed of the motor constant. Any suitable mechanism may be used for controlling the valve 84. As shown, the valve 84 is a controlled, unbalanced or flap valve and the governor control mechanism is preferably of the well known Hoof type, such as described in Patent No. 1,966,722.

If this governor were merely associated with the carburetor without the interjection of the arms 46 and 52, without flexibility therein and if there would be a rigid connection between the arm 42 and the crank 56, at speeds or loads requiring the governor valve to be only partly open, there would be a loss in efficiency of the fuel consumption. However, with the arms 46 and 52 provided with a cylinder and telescoping piston and a conduit 78 leading to the intake manifold 80, the following results are obtained. When the motor is idling and the car is at rest, the carburetor valve is substantially closed, the governor valve is open and the accelerating pump piston 34 is substantially in its upper position. If it is desired to start the car in motion, the carburetor throttle valve is opened substantially and the governor valve will remain open until the motor reaches the governed speed. During this period, and as long as the vacuum in the intake manifold is not equivalent to over six inches of mercury, the unit will stay in its extended position, which is opposite from that shown in Fig. 2 and with the end of the piston 50 separated approximately ⅛ inch from the sealing gasket 68. This distance is sufficient to allow the end of the piston 34 to open the valve 36 and permit passage of fuel through the power mixture jet. When the vacuum in the intake manifold exceeds equivalent to six inches of mercury, it will overcome the spring 60 and cause the unit to compress, with the result that the upward movement of arm 46 under the pressure of spring 60 will be sufficient to close the power jet mixture valve.

From the above and foregoing explanation, it is believed to be clear that with the arrangement described, whenever the automotive engine is under the control of the governor valve 84 and the carburetor valve is wide open, the control of the opening or closing of the power jet will absolutely depend upon the vacuum condition in the intake manifold of the engine. Since this vacuum increases with the lessening of the load or an increase of the speed, and decreases with an increased load or a reduction speed or both, it is also obvious that because the operation of the unit depends entirely upon the condition that exists in the intake manifold, it will not interfere with the supply of fuel through the power jet whenever the speed and load require this fuel supply operation. It is therefore believed to be obvious that I have provided a device for use with carburetors and governors whereby an objectionable result formerly obtained by the use of governors is eliminated. It will further be obvious that in the event no governor is associated with the carburetor and the intake manifold, that the function of the device will then be controlled by the carburetor valve.

While I have illustrated and described a specific embodiment of my invention, changes and modifications may be made in the exact details thereof, and I do not wish to be limited in any particular; rather what I desire to secure and protect by Letters Patent of the United States is:

1. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein having a crank, a main jet, a power jet, a lever pivoted on the carburetor to control said power jet and a link of proper length to connect said lever and crank, a governor comprising a conduit member in

alignment with the carburetor conduit member, a controlled governor valve in the governor conduit, of a cylinder associated with said link, a piston in said cylinder associated with an extension of said link, said cylinder actuated in one direction by vacuum on the downstream side of the controlled governor valve, a spring to move the piston in the other direction, the piston rod for the piston forming one end of said link, a rod extending from the opposite end of the cylinder forming the other end of said link whereby change in the pressure conditions in the manifold resulting from the position of the controlled governor valve will vary the length of said link and thereby control the amount of gas flow through said power jet.

2. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein having a crank, a main jet, a power jet, a lever pivoted on the carburetor to control said power jet and a link of proper length to connect said lever and crank, a governor comprising a conduit member in alignment with the carburetor conduit member, a controlled valve in the governor conduit, of a cylinder associated with said link, a piston in said cylinder associated with an extension of said link, a conduit from said cylinder to the intake manifold of said engine, said cylinder actuated in one direction by vacuum therethrough on the downstream side of the governor valve, a spring to move the piston in the other direction, the piston rod for the piston forming one end of said link, a rod extending from the opposite end of the cylinder forming the other end of said link whereby change in the pressure conditions in the manifold resulting from the location of the controlled governor valve will vary the length of said link and thereby control the amount of gas flow through said power jet.

3. The combination with the carburetor for an internal combustion engine having a conduit member, a crank shaft therein, a throttle valve on said shaft, a crank on said shaft, a fuel system including a pump mechanism discharging into said conduit, means to change the richness of the mixture discharged by said pump mechanism into said fuel system, said means including a link connected between said crank and said pump mechanism and means associated with said link and connected with the intake manifold of the internal combustion engine adapted to shorten or lengthen said link in accordance with the pressure in said intake manifold.

4. The combination with the carburetor for an internal combustion engine having a conduit member, a crank shaft therein, a throttle valve on said shaft, a crank on said shaft, a fuel system including a pump mechanism discharging into said conduit, means to change the richness of the mixture discharged by said pump mechanism into said fuel system said means including a link connected between said crank and said pump mechanism, and means associated with said link and connected with the intake manifold of the internal combustion engine adapted to shorten or lengthen said link in accordance with the pressure in said intake manifold, said last mentioned means including a pair of arms, a cylinder connected to one of said arms, a movable wall in the chamber of said cylinder connected to the other of said arms, a spring in said cylinder against said movable wall and a conduit between said cylinder and the intake manifold.

5. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein, having a shaft, a crank on the shaft, a fuel system discharging into said conduit, said system including an accelerating pump and power jet, means to change the amount of liquid fuel discharged by said accelerating pump and power jet into said fuel system, said means including a link connected between said crank and said fuel system, and means associated with said link and connected with the intake manifold of the internal combustion engine adapted to shorten or lengthen said link in accordance with the pressure in said intake manifold.

6. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein, having a shaft, a crank on the shaft, a fuel system discharging into said conduit, said system including an accelerating pump and power jet, means to change the amount of liquid fuel discharged by said accelerating pump and power jet into said fuel system, said means including a link connected between said crank and said fuel system, and means associated with said link and connected with the intake manifold of the internal combustion engine adapted to shorten or lengthen said link in accordance with the pressure in said intake manifold, said means including a pair of arms, a cylinder connected to one of said arms, a piston in the chamber of said cylinder connected to the other of said arms, a spring between said piston and said cylinder and a conduit between said chamber and the intake manifold.

7. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein, having a shaft, a crank on the shaft, a fuel system discharging into said conduit, said system including an accelerating pump and power jet, means to change the amount of liquid fuel discharged by said accelerating pump and power jet into said fuel system, said means including a link mechanism connected between said crank and said fuel system and means associated with said link mechanism and connected with the intake manifold of the internal combustion engine adapted to shorten or lengthen said link in accordance with the pressure in said intake manifold, said mechanism including a cylinder having a chamber, a piston movable therein and resilient means for moving the piston in one direction, vacuum from the intake manifold adapted to move the piston in the opposite direction.

8. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein, having a shaft, a crank on the shaft, a fuel system discharging into said conduit, means to change the richness of the mixture discharged by said fuel system including a pump mechanism and a link connected to the carburetor throttle valve and to said fuel system, and means associated with said link and connected with the intake manifold of the internal combustion engine adapted to shorten or lengthen said link in accordance with the pressure condition in said intake manifold to increase or decrease the action of said pump mechanism.

9. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein having a valve shaft, a crank on the shaft, a fuel system discharging into said conduit, said fuel system including a pump mechanism, means operating on

said pump mechanism to change the richness of the mixture discharged by said fuel system including a link connected between said crank and said pump mechanism, of a governor comprising a conduit member in alignment with the carburetor conduit member, a controlled governor valve in the governor conduit, a cylinder forming part of said link, a piston in said cylinder attached to a separate part of said link, spring means normally extending said link to its proper length and a connection between said cylinder and the intake manifold of the internal combustion engine whereby change in pressure conditions in the manifold may shorten or lengthen said link.

10. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein having a valve shaft, a crank on the shaft, a fuel system discharging into said conduit, means to change the richness of the mixture discharged by said fuel system including a pump mechanism, a link connected between said pump mechanism and said crank, of a governor comprising a conduit member in alignment with the carburetor conduit member, a controlled governor valve in the governor conduit, a cylinder forming part of said link, a piston in said cylinder attached to a separate part of said link, spring means normally extending said link to its proper length and a connection between said cylinder and the intake manifold of the internal combustion engine whereby change in pressure conditions in the manifold may shorten or lengthen said link without regard to the position of said carburetor valve.

11. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein having a valve shaft, a crank on the shaft, a fuel system discharging into said conduit, means to change the richness of the mixture discharged by said fuel system including a pump mechanism, a link connected between said pump mechanism and said crank, of a governor comprising a conduit member in alignment with the carburetor conduit member, a controlled governor valve in the governor conduit, a cylinder forming part of said link, a piston in said cylinder attached to a separate part of said link, spring means normally extending said link to its proper length and a connection between said cylinder and the intake manifold of the internal combustion engine whereby change in pressure conditions in the manifold may shorten or lengthen said link, said conditions caused by the position of said controlled governor valve.

12. The combination with the carburetor for an internal combustion engine having a conduit member, a throttle valve therein having a valve shaft, a crank on the shaft, a fuel system discharging into said conduit, means to change the richness of the mixture discharged by said fuel system including a pump mechanism, a link connected between said pump mechanism and said crank, of a governor comprising a conduit member in alignment with the carburetor conduit member, a controlled governor valve in the governor conduit, a cylinder forming part of said link, a piston axially aligned in said cylinder and attached to a separate part of said link, spring means normally extending said link to its proper length, and a connection between said cylinder and the intake manifold of the internal combustion engine whereby change in pressure conditions in the manifold may shorten or lengthen said link, said connection including a conduit whereby changes in pressure conditions may shorten the link in accordance with the position of the governor valve.

13. In a carburetor having a throttle control member, a fuel mixture enriching device, and means operatively connecting said throttle control member and said fuel mixture enriching device for enriching said fuel in response to movement of said throttle control, said connecting means including means adapted to be connected with the intake manifold of the internal combustion engine and adapted to vary the operative dimensions of said connecting means in accordance with pressure in the intake manifold.

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