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[54] **ELECTRONICALLY CONTROLLED**
CARBURETOR
 12 Claims, 2 Drawing Figs.

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 261/50, 261/69
 [51] Int. Cl. F02m 7/04
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ABSTRACT: A control installation for the suction line of an internal combustion engine in which the elastic line section of the suction line is adapted to be adjusted by means of a shutter, actuated by an electric motor which is controlled from a control apparatus with two inputs dependent on conditions in the internal combustion engine.

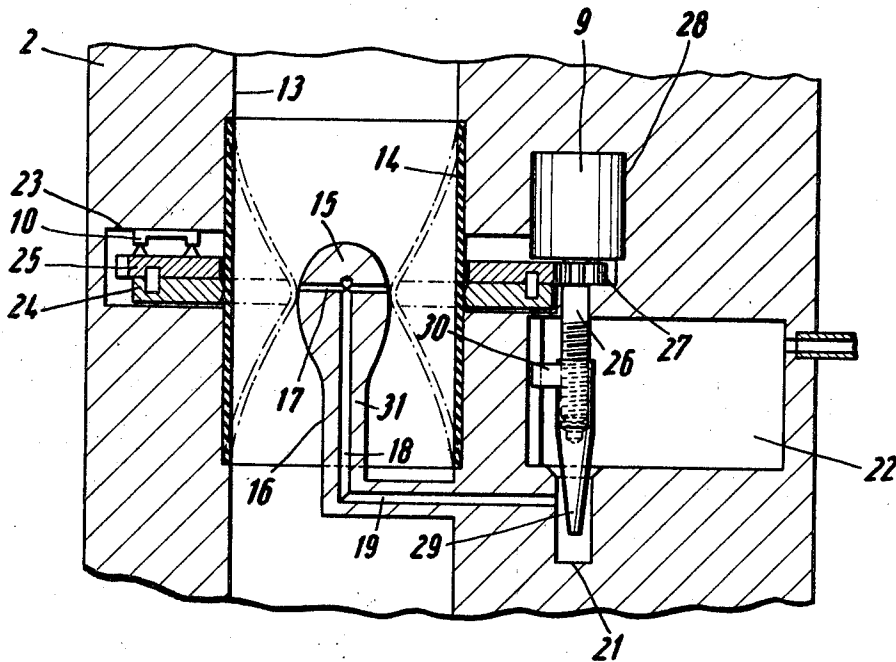


Fig. 1

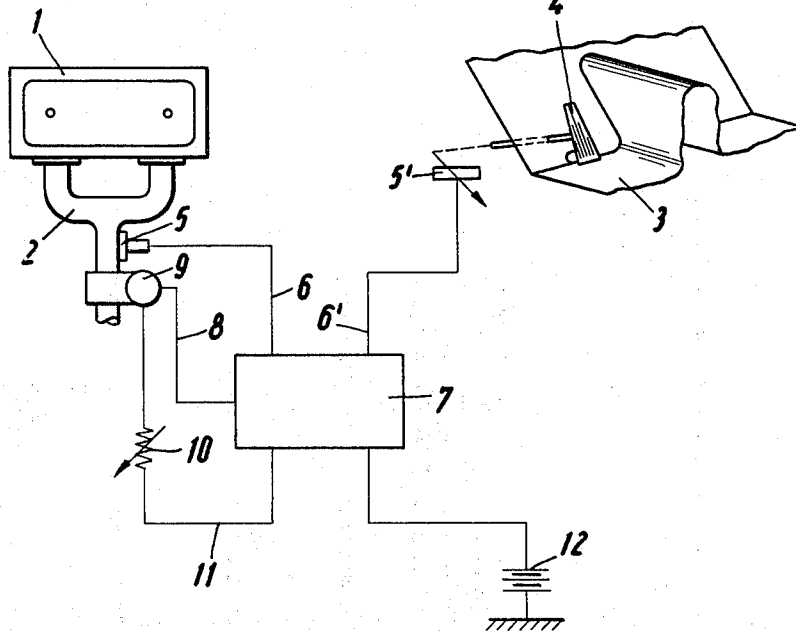
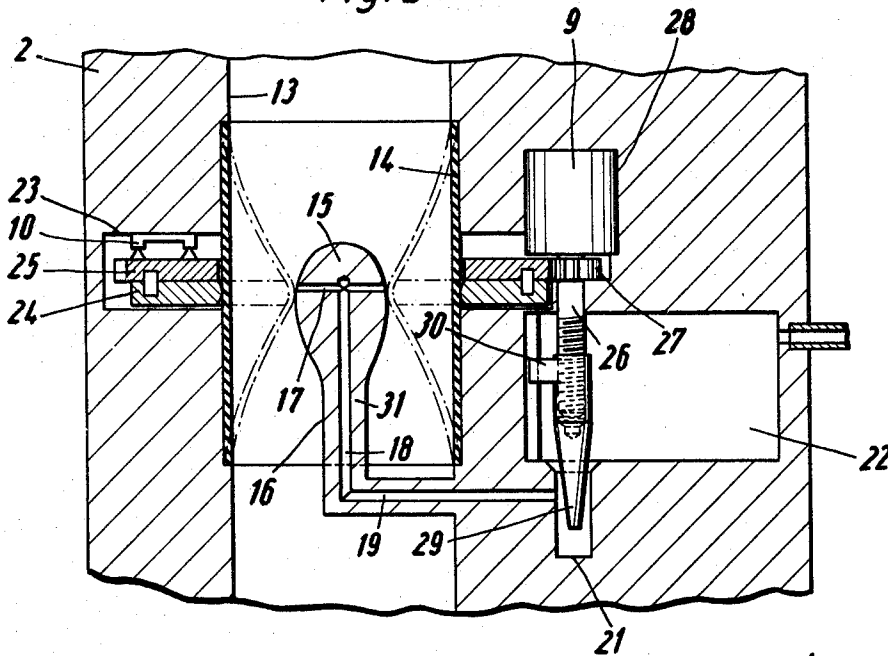


Fig. 2



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ELECTRONICALLY CONTROLLED CARBURETOR

The present invention relates to a suction line for internal combustion engines having a line section consisting of elastic material whose flow cross section is adapted to be changed.

An internal combustion engine is known in the prior art, in the suction line of which is provided an elastic control element serving for the control of the air supply for the fuel-air mixture, which is acted upon by the vacuum prevailing in the suction pipe. This prior art construction, however, entails the disadvantage that this elastic structural part has to be made relatively thin walled in order to react to the existing vacuum. As a result thereof, the control element tends to flutter in case of high vacuum, whence an exact control of the air supply is not possible.

The present invention is based on the purpose to adjust the elastic line section in the suction pipe by an electromechanical installation dependent on reference magnitudes of the internal combustion engine. The metering of the fuel quantity is thereby also intended to be controlled with the aid of this installation.

This is achieved according to the present invention in that a lamellar shutter acts on the elastic line section of the suction line which is adjusted by an electric motor whereby the electric motor is controlled by a control apparatus influenced by at least two reference magnitudes of the internal combustion engine. An installation is created thereby which enables a functionally correct adjustment of the elastic line section, matched to the operating conditions of the internal combustion engine. The reference magnitudes are taken off preferably at pulse transmitters which are coordinated to a control member as well as to the suction line of the internal combustion engine.

The electric motor is arranged parallel to the axis of the suction line and includes a threaded spindle provided with a pinion, whereby the pinion cooperates with the lamellar shutter. The lamellar shutter can be adjusted with simple means by this arrangement. The electric motor provided with a threaded spindle cooperates with a nozzle needle which for the corresponding opening cross section of the elastic line section of the suction line, regulates the associated fuel quantity. As a result thereof, a good mixture formation is assured in all load ranges of the internal combustion engine whereby a minimum consumption and maximum efficiency is achieved.

Accordingly, it is an object of the present invention to provide an installation for the suction line of an internal combustion engine having an elastic line section which obviates the aforementioned shortcomings and drawbacks encountered in the prior art.

Another object of the present invention resides in a carburetor-type engine described above which can be controlled to provide an exact regulation of the air supply without danger of fluttering.

Still another object of the present invention resides in a control system for controlling both the elastic line section of the suction line as well as the fuel supply for a carburetor-type internal combustion engine which is simple in construction and reliable in operation while simultaneously assuring a good mixture formation in all load ranges.

These and further objects, features and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawing which shows, for purposes of illustration only, one embodiment in accordance with the present invention, and wherein:

FIG. 1 is a schematic view of an installation according to the present invention; and

FIG. 2 is a partial cross-sectional view through a suction line with a fuel mixture regulating installation according to the present invention.

Referring now to the drawing wherein like reference numerals are used throughout the two views to designate like parts and more particularly to FIG. 1, there is illustrated in this FIG. an internal combustion engine 1 with a suction line or intake manifold 2 and a sheet metal panel 3 of the floor of a

motor vehicle having a control member 4, illustrated as gas pedal. Pulse transmitters 5, 5' are coordinated to the suction line 2 and to the control member 4 which are constructed, for example, as potentiometers. However, it is also possible to provide other types of pulse transmitters of any known construction. The pulse transmitters 5, 5' are connected by electric lines 6, 6' with a control apparatus 7 of any conventional known construction. A cable 8 leads from the control apparatus 7 to an electric-adjusting motor 9 from which again a cable leads to the pulse transmitter 10. The pulse transmitter 10 is constructed as check-back potentiometer and is connected with the control apparatus 7 by means of a cable 11. The described installation is fed from a conventional current source 12.

According to FIG. 2, the suction line includes a channel 13 in which is provided a line section 14 consisting of elastic material. Additionally, a spray pipe 16 provided with a pear-shaped end piece 15 is arranged in the channel 13; the spray pipe 16 is provided with bores 17, 18, 19. The bore 19 terminates in a dead end bore 21 which is provided in a fuel space 22. The flow cross section of the channel 13 of the suction line can be changed by the elastic line section 14. For this purpose, a lamellar shutter 24 of any conventional construction is provided in a recess 23 of the suction line 2. The lamellar shutter 24 cooperates with a shutter-adjusting ring 25 which coacts with a pinion 27 arranged on a shaft 26 of the adjusting motor 9. The adjusting motor 9 is mounted in a bore 28 of the suction line and is connected with a nozzle needle 29 by the shaft 26 that is constructed as a threaded spindle. The nozzle needle 29 protrudes with its tip into the bore 21 and is secured against rotation by means of a guide member 30 which is supported in a groove 31 of the fuel supply space 22. The pulse transmitter 10 is accommodated in the recess 23 which cooperates with the shutter-adjusting ring 25.

During starting of the internal combustion engine, the position of the control member 4 and the vacuum prevailing in the suction line 2 are indicated and transmitted to the control apparatus as values by means of the pulse transmitter 5' and by the pulse transmitter 5. These values are processed by the control apparatus 7 and thereupon control the adjusting motor 9. The adjusting motor 9 controls the lamellar shutter 24 which opens and closes the elastic line section 14 and therewith regulates the air passage cross section in channel 13 of the suction line 2. Simultaneously therewith, the adjusting motor 9 meters by means of the nozzle needle 29 the fuel quantity associated with the given air passage cross section. The prevailing position of the lamellar shutter is fed back to the control apparatus 7 by the pulse transmitter 10. Since the control apparatus 7 as well as the various pulse transmitters are of known construction, not forming part of the present invention and consisting of commercially available elements and circuit components, a detailed description thereof is dispensed with herein.

While we have shown and described only one embodiment in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to a person skilled in the art, and we therefore do not wish to be limited to the details shown and described herein but intend to cover all such changes and modifications as are within the scope of those skilled in the art.

We claim:

1. A suction line for internal combustion engines having a line section made from elastic material whose flow cross section is adapted to be changed, characterized in that a shutter means acts on the elastic line section of the suction line, electric motor means operatively connected with said shutter means to adjust the same, and means including a control apparatus influenced by at least two reference magnitudes of the internal combustion engine for controlling the electric motor.

2. A suction line according to claim 1, characterized in that the shutter means is a lamellar-type shutter.

3. A suction line according to claim 1, characterized in that the reference magnitudes are taken off from pulse transmitter means which are coordinated to a control member as well as to the suction line of the internal combustion engine.

4. A suction line according to claim 3, wherein said control member is the gas pedal, and the pulse transmitter means coordinated to the suction line is adjusted in dependence on the vacuum prevailing in the suction line.

5. A suction line according to claim 3, characterized in that the electric motor is arranged substantially parallel to the suction line and includes a threaded spindle provided with a pinion, said pinion being operatively connected with said shutter means.

6. A suction line according to claim 5, characterized in that the electric motor provided with a threaded spindle cooperates with fuel-adjusting means which controls the fuel quantity corresponding to the existing flow cross section of the elastic line section.

7. A suction line according to claim 6, characterized in that said adjusting means includes a nozzle needle provided with a threaded bore cooperating with said threaded spindle, and means for holding said nozzle needle against rotation while permitting linear movement.

8. A suction line according to claim 7, characterized in that the shutter means is a lamellar-type shutter.

9. A suction line according to claim 8, wherein said control member is the gas pedal, and the pulse-transmitter means coordinated to the suction line is adjusted in dependence on the vacuum prevailing in the suction line.

10. A section line according to claim 1, characterized in that the electric motor is arranged substantially parallel to the suction line and includes a threaded spindle provided with a pinion, said pinion being operatively connected with said shutter means.

11. A suction line according to claim 1, characterized in that the electric motor provided with a threaded spindle cooperates with fuel adjusting means which controls the fuel quantity corresponding to the existing flow cross section of the elastic line section.

12. A suction line according to claim 11, characterized in that said adjusting means includes a nozzle needle provided with a threaded bore cooperating with said threaded spindle, and means for holding said nozzle needle against rotation while permitting linear movement.

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