July 10, 1956

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CARBURETOR DEVICES, INCLUDING AN AUXILIARY STARTING CARBURETOR

2,754,094

Filed March 25, 1955

2 Sheets-Sheet 1

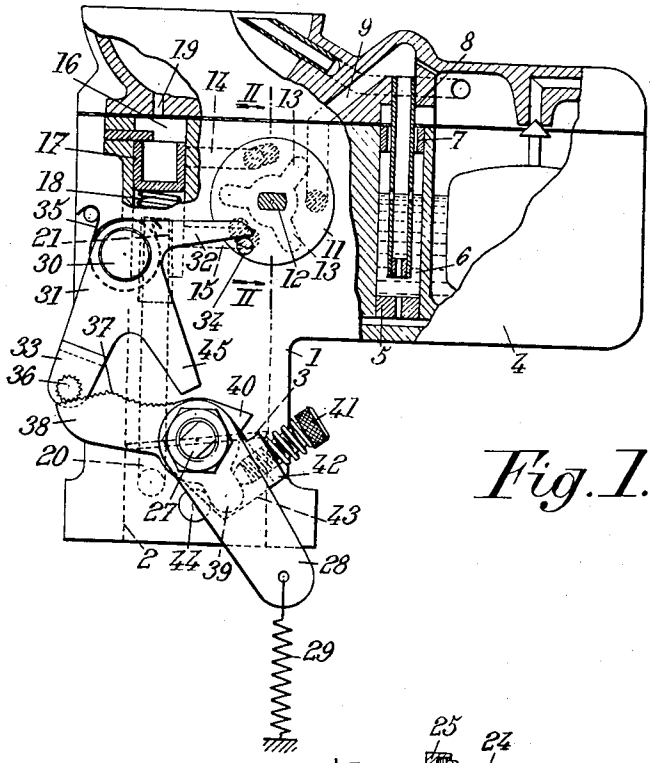


Fig. 1.

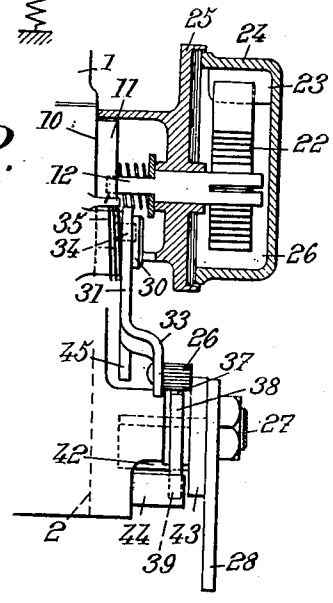


Fig. 2.

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Fig. 3.

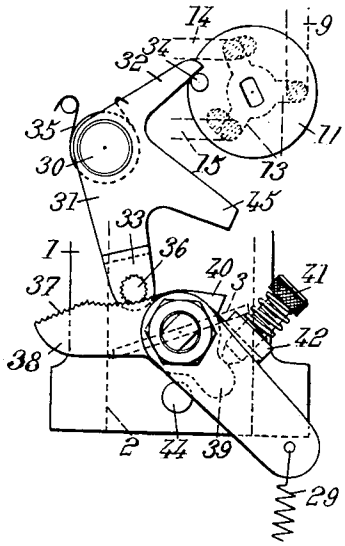


Fig. 4.

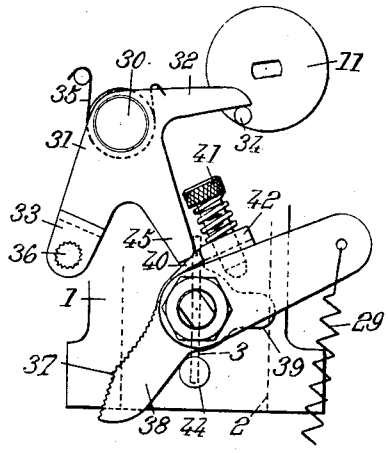
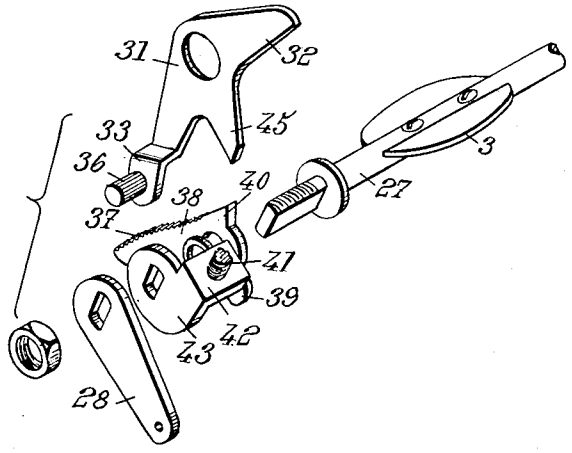


Fig. 5.



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2,754,094

Patented July 10, 1956

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CARBURETOR DEVICES, INCLUDING AN AUXILIARY STARTING CARBURETOR

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Application March 25, 1955, Serial No. 496,865

Claims priority, application France April 5, 1954

3 Claims. (Cl. 261—41)

The present invention relates to carburetor devices including an auxiliary starting carburetor, that is to say a carburetor unit capable of making, and supplying to the induction pipe leading to the engine at a point of said pipe downstream of the throttle valve located therein, a rich fuel mixture for starting the engine.

The chief object of the present invention is to provide a carburetor device of this kind which is better adapted to meet the requirements of practice than those used up to this time.

Such carburetor device includes valve means for controlling the flow of fuel to the auxiliary starting carburetor so that the fuel mixture supplied by said auxiliary starting carburetor is delivered into the suction pipe downstream of the throttle valve. Furthermore, means are provided between said control valve means and the throttle valve so that the throttle valve is partly open when the control valve means are opened, that is to say brought into a position where fuel is fed to the auxiliary starting carburetor. The invention consists essentially in arranging said interconnecting means in such manner that when the control valve means have been opened and the throttle valve partly opened, the control valve means can be closed without the throttle valve being brought back directly to its fully closed position, return of said throttle valve to its fully closed position being possible only by temporarily giving it a supplementary opening.

Other features of the present invention will become apparent in the course of the following detailed description.

A preferred embodiment of my invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example and in which:

Fig. 1 diagrammatically shows, partly in elevation and partly in section, a carburetor device made according to my invention.

Fig. 2 is a partial elevation in a direction at right angles to that of Fig. 1 of said carburetor device including thermo-sensitive control valve means shown in section on the line II—II of Fig. 1.

Figs. 3 and 4 are views similar to Fig. 1 showing two different relative positions of the parts.

Fig. 5 is an exploded perspective view of the essential elements of the transmission means interposed between the control valve means and the throttle valve.

The carburetor device is of any suitable general construction. For instance, on Figs. 1 and 2, reference numeral **1** designates the body of the carburetor device, **2** the induction pipe leading to the engine and **3** the throttle valve. The carburetor device includes a float chamber **4** for feeding fuel to the auxiliary starting carburetor through a calibrated orifice **5**. This auxiliary starting carburetor includes a well **6** vented through a calibrated passage **7**. An upward conduit, constituted by a tube **8** provided with holes located at the end and/or in the side thereof, extends into said well **6** and communicates, at its upper part, with a downward conduit **9** opening at the surface of a flat wall **10**.

The auxiliary starting carburetor includes a control valve member **11** rotated by a spindle **12** and provided with radial grooves **13** communicating together. According to its position, this control valve may:

Either connect through its grooves **13** conduit **9** (through which fuel is fed from the float chamber) with two conduits **14** and **15** which connect orifices provided in wall **10** with orifices provided, at two different levels, in a cylinder **16**, or

Cut off the respective connections between said conduits.

In cylinder **16** there is provided a piston **17** urged upwardly by a spring **18**. Cylinder **16** is vented at its upper part by a passage **19** and it communicates at its lower part with the induction pipe **2** at a point thereof downstream of throttle valve **3**, through a conduit **20**.

The arrangement is such that conduit **14** is either closed or opened by piston **17** and conduit **20** is either opened or closed by piston **17**, respectively, according as to whether the suction downstream of throttle valve **3** is lower or higher than a predetermined value respectively. When conduit **20** is closed, as above stated, by piston **17**, the communication between conduits **15** and **20** is still established through small section orifices such as **21**.

Control valve member **11** may be actuated, either manually or automatically, for instance by a thermo-sensitive device such as diagrammatically shown on Fig. 2. This thermo-sensitive device includes a bimetallic strip **22** one end of which is fixed to the spindle **12** of control valve member **11** and the other end of which is engaged in an anchorage **23** carried by a cover **24**. This cover **24** is applied in a fluidtight manner on a support **25** fixed on the body **1** of the carburetor. Thus the bimetallic strip is enclosed in a chamber **26** through which it is possible to circulate a stream of air or gas at the temperature which is to determine the operation of the control valve member **11**.

Throttle valve **3** is rigid with a spindle **27** on which is fixed the lever **28** for operating said throttle valve. This lever is subjected in the usual fashion to the action of a spring **29** which constantly urges throttle valve **3** toward its maximum closing position.

According to the present invention, the means interposed between control valve member **11** and throttle valve **3** are arranged in such manner that when the control valve member is opened and the throttle valve partly opened, the control valve member can be closed without the throttle valve being returned to its maximum closing position as long as said throttle valve has not temporarily been given a supplementary opening displacement.

For this purpose, advantageously, the displacements of the control valve element are transmitted to the throttle valve through two members cooperating with each other through surfaces in mutual friction engagement during these displacements, the friction effect that is produced being such that it prevents said members from following the displacements of the control valve member when said member is moving in the closing direction. When the throttle valve is temporarily moved in the opening direction, it temporarily eliminates this friction so that the above mentioned members can then move freely.

This frictional effect may act exclusively in the above indicated direction, which is preferable when the control valve member is manually actuated, but it may also act in both directions, that is to say in the opening as well as in the closing direction, and in this case it is also necessary to move the throttle valve temporarily in the opening direction, when the engine is cold, in order to permit movement of the control valve member in the opening direction.

This solution is particularly suitable when the control

valve member is actuated by a thermo-sensitive device because the effort exerted by such a device is relatively small. In this case in particular, the desired frictional effect may be obtained by making the cooperating surfaces sufficiently rough.

The drawings show an embodiment of such a device.

On a spindle **30**, carried by the body **1** of the carburetor, there is mounted an oscillating lever **31** including two arms **32** and **33**. Arm **32** extends across the path of travel of a finger **34** carried by control valve member **11** and projecting at the periphery thereof. A spring **35**, of relatively small strength, acting upon lever **31** urges arm **32** toward contact with finger **34**. Arm **33** carries a pin **36** adapted to cooperate with the edge **37** of a lever **38** mounted on the spindle **27** of throttle valve **3**.

Lever **38** is free to oscillate on spindle **27** between two positions limited by two projections **39** and **40** respectively. In one of these positions, the projection **39** is in contact with an adjustable abutment constituted by a screw **41** carried by a transverse plate **42** formed by a bent extension of a disc **43** fixed on spindle **27**. In the other of these positions, projection **40** is in contact with an abutment fixed with respect to spindle **27** and constituted for instance by said plate **42**. Thus the angular displacements of lever **38** with respect to throttle valve **3** are limited.

The edge **37** of lever **38** is so shaped that when the control valve member **11** is moved in the opening direction (in clockwise direction in the construction of Fig. 1), which causes lever **31** to pivot (in anti-clockwise direction), lever **38** tends to be moved in clockwise direction, corresponding to the opening of throttle valve **3**, such a movement necessitating a sliding displacement of pin **36** on edge **37**.

The characteristics of levers **31** and **38** and, in particular, the state of the mutual friction surfaces of pin **36** and edge **37** are such that, when edge **37** is in contact with pin **36**, lever **31** cannot pivot. In order to obtain this result, said cooperating surfaces may be made sufficiently rough.

An abutment **44**, carried by the body **1** of the carburetor and cooperating with projection **39**, limits in one direction the angular displacements of lever **38** and therefore, owing to the provision of screw **41** and projection **39**, those of throttle valve **3** in the closing direction (Fig. 1). The opening corresponding to idling of the engine is thus limited in an accurate fashion and can be adjusted by means of screw **41**. The same abutment **44**, cooperating with lever **38** proper, can also limit the angular displacements of lever **38** in the other direction and therefore, owing to the provision of plate **42** and projection **40**, those of throttle valve **3** in the opening direction (Fig. 4).

According to a supplementary feature, means are provided for keeping the control valve member out of action when the throttle is opened beyond a predetermined angular value.

For this purpose, for instance, lever **31** carries a third arm **45** disposed across the path of travel of an abutment rigidly fixed to the spindle **27** of the throttle valve, this abutment being for instance constituted by plate **42**.

Such a carburetor device works in the following fashion.

When the engine is running, bimetallic strip **22** keeps control valve member **11** closed, as shown by Fig. 1. The throttle valve is opened and consequently the edge **37** of lever **38** is not in contact with pin **36** carried by lever **31**, and the arm **32** of this lever is kept by spring **35** in contact with the finger **34** of the control valve member **11**.

When the engine is stopped, lever **38** is pushed by the throttle valve return spring **29** into the position shown by Fig. 1, the edge **37** of lever **38** being then in contact with pin **36**. When the engine has cooled down, the elements of the carburetor device remain in the position shown by Fig. 1, despite the small action exerted by bimetallic strip **22**, due to the friction existing between pin **36** and edge **37**.

If the driver temporarily actuates the throttle valve in the opening direction by means of the throttle pedal, the spindle **27** of said valve drives, in an anticlockwise direction, plate **42** which, acting upon projection **40**, causes lever **38** to pivot and releases lever **31**. Bimetallic strip **22** can then act on control valve member **11**, bringing it into the position shown by Fig. 3 and driving simultaneously, through its projection **34**, the arm **32** of lever **31**.

The driver can now release the throttle pedal and the elements come into the positions shown by Fig. 1. Lever **38** has its edge **37** applied upon pin **36** so that throttle valve **3** cannot return into the idling position illustrated by Fig. 1, but remains in a more opened position which permits a supplementary air stream necessary for starting to flow past it. Control valve member **11** then occupies a position such that it suitably controls the supply of fuel to the auxiliary starting carburetor.

If, in the position of Fig. 3, the engine is allowed to run, the bimetallic strip is gradually heated up to a higher and higher temperature and the control valve member **11** can then freely turn in the closing direction. But lever **31** remains stopped in the position it occupies by the cooperation of pin **36** and edge **37**. Consequently, the fuel mixture becomes leaner and leaner due to the displacement of the control valve member in the closing direction, but the engine still runs at a relatively high speed because the throttle valve is opened at a relatively great angle.

It is thus possible to run the engine as long as it may be desired at a relatively high speed without using a rich mixture for too long a time and anyway for a time longer than that necessary since closing down of the control valve member is automatically obtained. This condition is necessary in cold weather to achieve the necessary heating of the cooling water of the engine and of the lubricating oil.

If the driver wishes to slow down the engine, it suffices to depress for a short time the throttle pedal so as to release lever **31**. This lever then assumes the position corresponding to that of the control valve member and when the driver releases the throttle pedal, the throttle valve comes into the corresponding position.

When bimetallic strip **22** is sufficiently hot, control member **11** has reached the end of its closing displacement and a slight thrust exerted on the throttle pedal returns lever **31** to the idling position shown by Fig. 1. The closing displacement of the throttle valve is then limited by abutment **44** and screw **41** between which the projection **39** of lever **38** is pushed.

If the throttle valve is fully opened (Fig. 4), plate **42** keeps the arm **45** of lever **31** in position and therefore prevents control valve member **11** from opening despite the cooling of bimetallic strip **22** which might happen due to the reduction of the air stream that is flowing along said strip.

Of course, whereas I have described the device with an automatically actuated control valve member, it might be operated manually. In this case, the driver can obtain an accelerated idling without the auxiliary starting carburetor supplying fuel to the engine.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. In a carburetor device for an internal combustion engine, the combination of an induction pipe leading to said engine, a throttle valve in said induction pipe, resilient means for constantly urging said throttle valve toward closing, an auxiliary starting carburetor opening

into said induction pipe at a point thereof downstream of said throttle valve, valve means for controlling the flow of fuel to said auxiliary starting carburetor, and means interposed between said throttle valve and said fuel flow control valve means, such that said control valve means can be opened only after said throttle valve has been opened, for preventing direct closing of said throttle valve from opened position to fully closed position when said control valve means are closed after having been temporarily opened, said means interposed between said throttle valve and said fuel flow control valve means including a member arranged to be unidirectionally driven by said control valve means in one direction, resilient means for urging said member in the opposed direction, and a second member operatively connected with said throttle valve with a lost motion, said two members being arranged to engage each other frictionally in such manner as to prevent them from following the closing displacements of said control valve means.

2. A combination according to claim 1 in which the respective cooperating surfaces of said two members are rough so as to provide for their frictional mutual engagement.

3. In a carburetor device for an internal combustion engine, the combination of an induction pipe leading to said engine, a throttle valve pivotable in said induction pipe, a spindle rigid with said valve journalled in said pipe about the valve pivot axis, resilient means for constantly urging said throttle valve toward closing, an auxiliary starting carburetor opening into said induction

pipe at a point thereof located downstream of said throttle valve, rotary valve means pivoted about an axis parallel to that of said throttle valve for controlling the flow of fuel to said auxiliary starting carburetor, a finger carried by the periphery of said rotary valve means, a lever rotatable about an axis parallel to the above mentioned axes, said lever including a first branch adapted to cooperate with said finger and a second branch making an angle with the first mentioned one, resilient means for urging said first mentioned branch toward said finger, and another lever rotatable with a limited angular play about said axis, said last mentioned lever including a branch arranged so as frictionally to engage the second branch of the first mentioned lever under the effect of at least one of said resilient means, the frictional engagement of said lever branches being determined to prevent relative slipping of one with respect to the other, in such manner that opening of said rotary valve means is prevented through said levers by said throttle valve in closed position and direct return of said throttle valve into fully closed position after a temporary opening thereof and opening of said rotary valve means is prevented even after subsequent closing of said rotary valve means by the friction between said levers in engagement with each other.

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