United States Patent

Baudry

[15] **3,688,752**

[45] **Sept. 5, 1972**

[54] **DEVICE FOR REDUCING THE EMISSION OF POLLUTION RESPONSIBLE PRODUCTS BY EXTERNAL CARBURATION ENGINES DURING THE DECELERATION PERIODS**

[72] Inventor: **Jean Baudry,** Rueil Malmaison, France

[73] Assignee: **Institut Francais du Petrole, des Carburants et Lubrifiants,** Rueil Malmaison, France

[22] Filed: **June 24, 1970**

[21] Appl. No.: **49,225**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 886,499, Dec. 19, 1969, abandoned.

[30] **Foreign Application Priority Data**

Dec. 24, 1968 France.....68180576

[52] **U.S. Cl.**.....**123/97 B,** 123/119 D, 123/124 R, 123/198 DB

[51] **Int. Cl.**.....**F02d 9/00,** F02m 23/00, F02m 23/04

[58] **Field of Search**.....123/119 D, 119 DB, 124 R, 124 A, 123/124 B, 97 B, 198 DB, 198 DC

[56] **References Cited**

UNITED STATES PATENTS

2,386,340	10/1945	Olson	123/124 B
2,755,786	7/1956	Doering	123/124
3,374,991	3/1968	Walker	123/124 B

Primary Examiner—Wendell E. Burns
Attorney—Craig, Antonelli & Hill

[57] **ABSTRACT**

A device for reducing the amount of noxious products in the exhaust gases of a car engine during de deceleration periods thereof, including in combination means for completely suppressing the supply of carburetted air to the engine during the decelerations and means for introducing into each cylinder, during each deceleration period, a stream of non -carburetted air through a duct separate from the inlet pipe and which opens in the latter in the vicinity of the inlet valve head.

17 Claims, 9 Drawing Figures

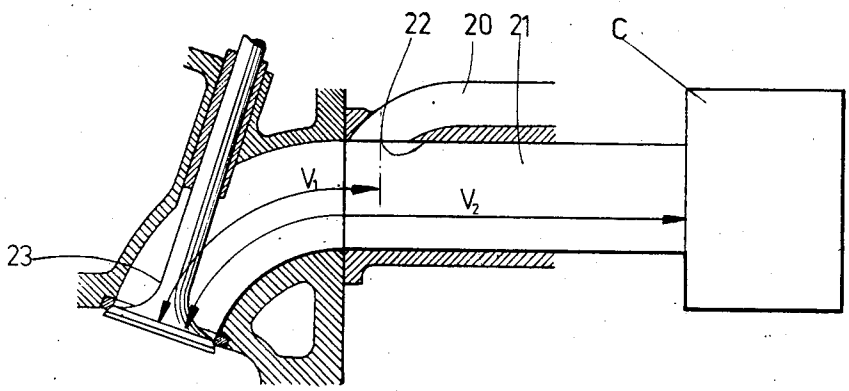


FIG.1

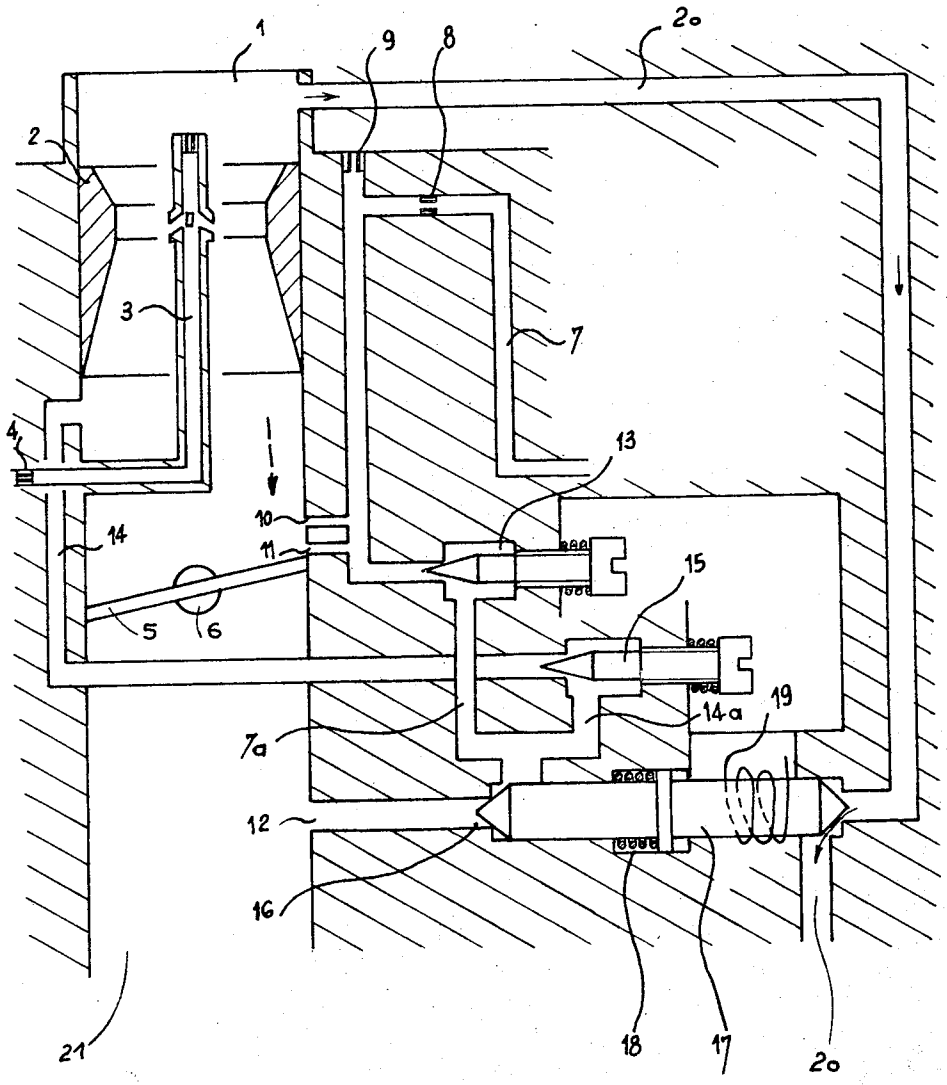


FIG.1A

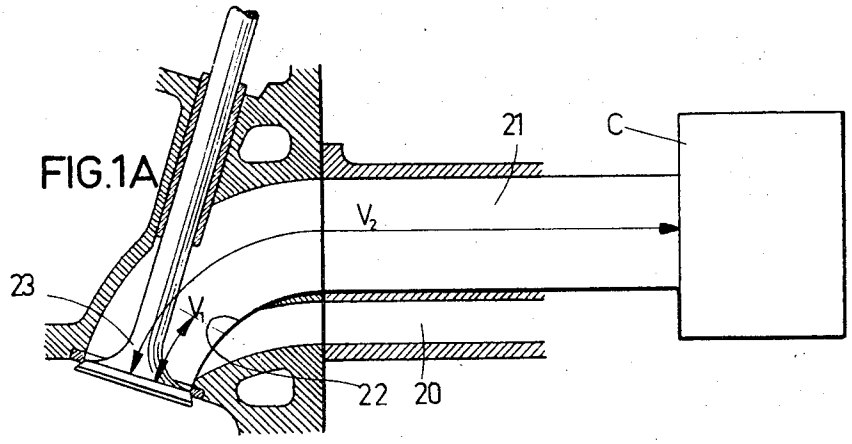


FIG.1B

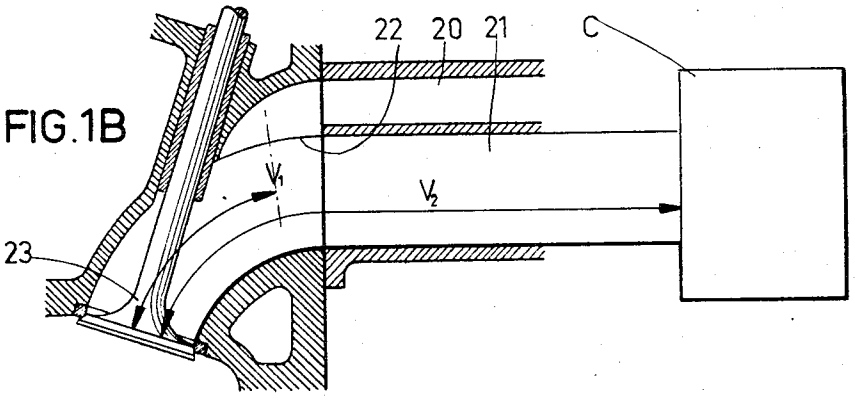


FIG.1C

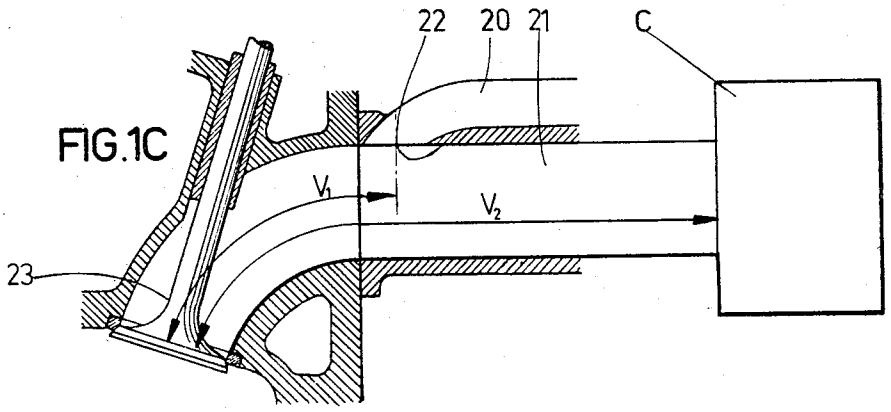


FIG. 2

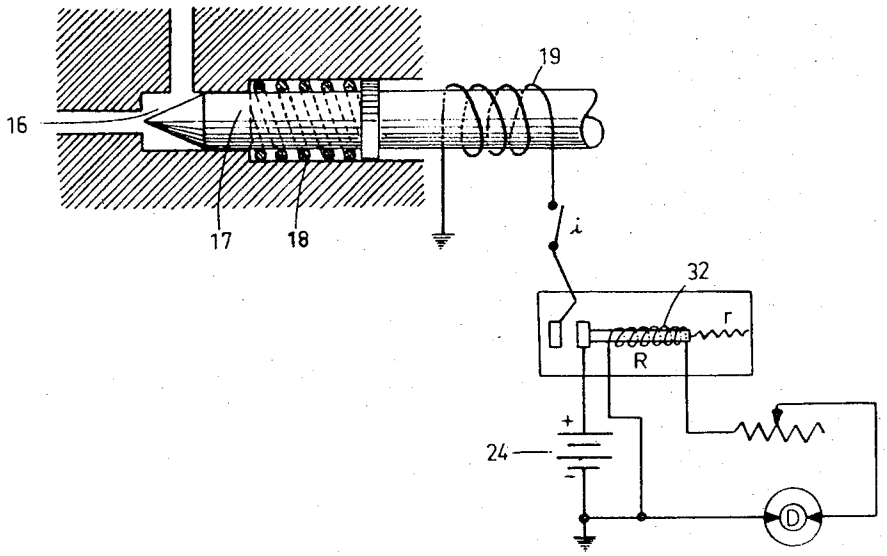
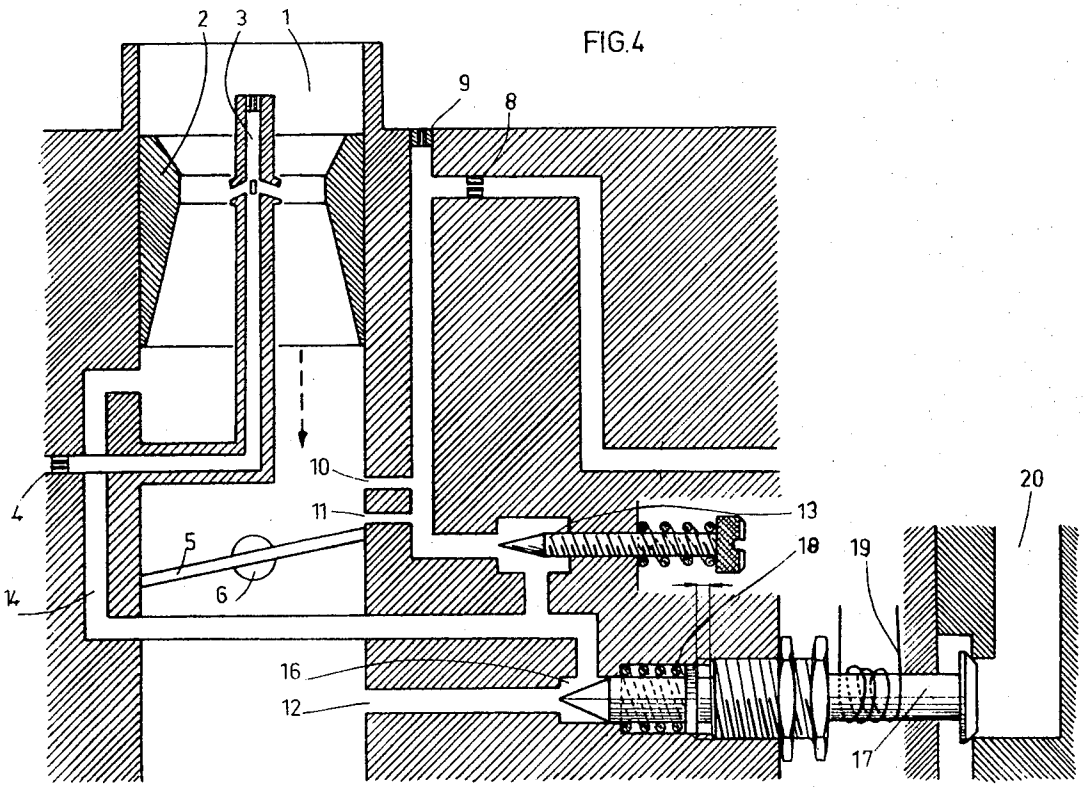


FIG. 4



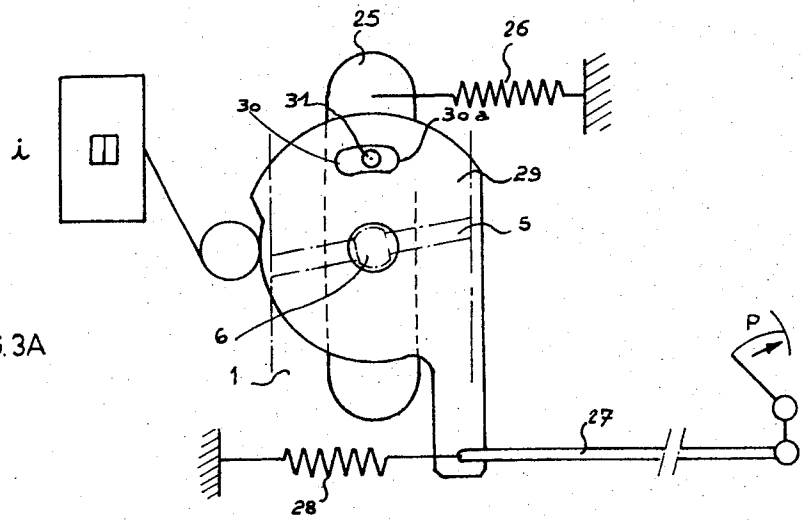


FIG. 3A

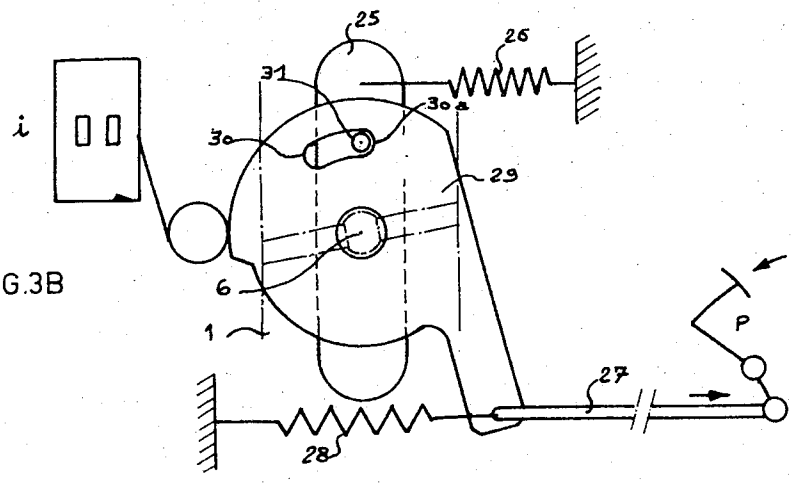
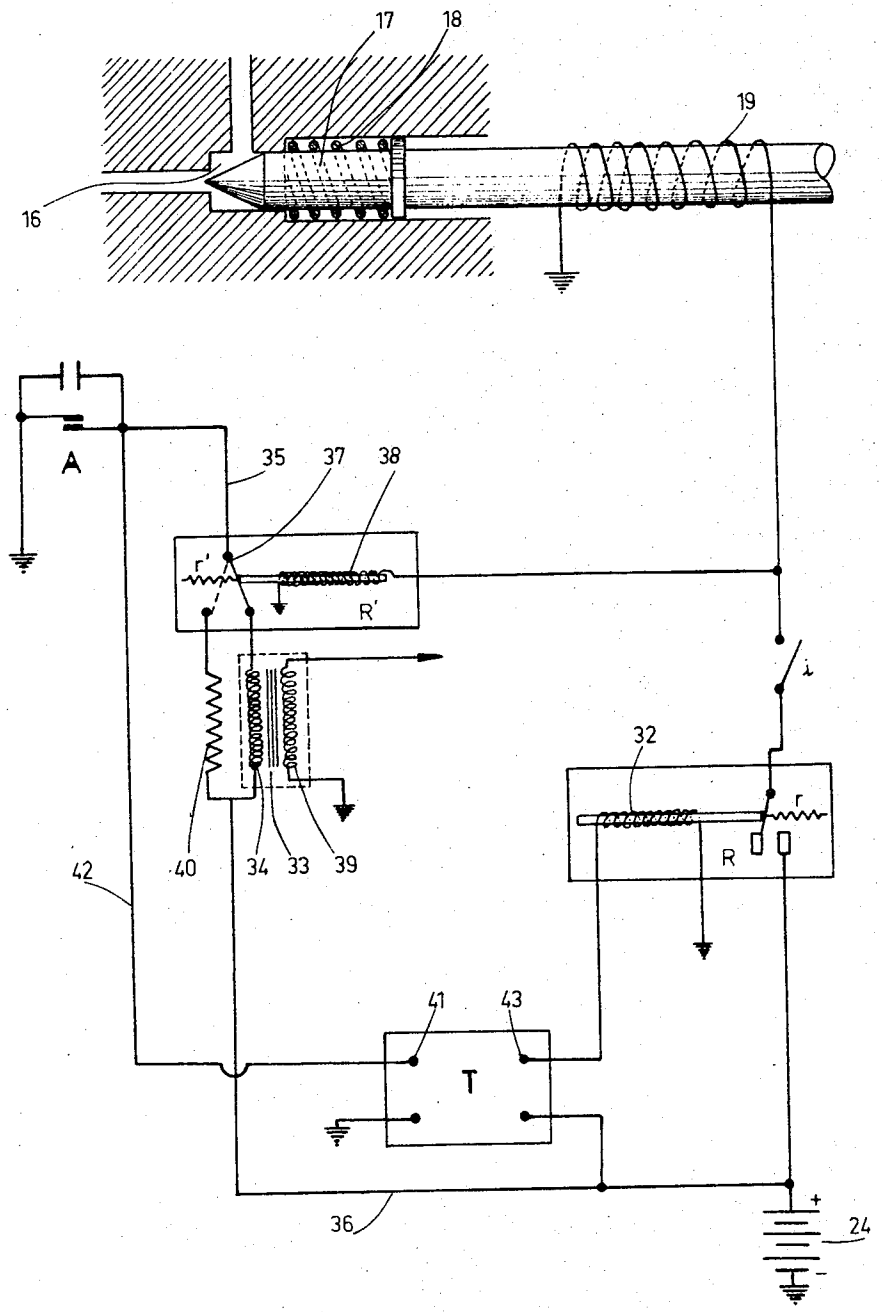


FIG. 3B

FIG. 5



DEVICE FOR REDUCING THE EMISSION OF POLLUTION RESPONSIBLE PRODUCTS BY EXTERNAL CARBURATION ENGINES DURING THE DECELERATION PERIODS

This application is a continuation-in-part of application Ser. No. 886,499 filed Dec. 19, 1969 now abandoned.

The present invention relates to a new automatic device permitting a reduction of the emission of pollution responsible products from external carburation engines during the deceleration periods of these engines.

It is known that the emission of unburnt hydrocarbons, belonging to the noxious factors of the atmospheric pollution through external carburation engines, is specially significant during the deceleration periods of the engines, as a result of incomplete combustions which occur during these periods.

In the urban traffic, for a vehicle which is not equipped with any anti-pollution device, the volume of unburnt hydrocarbons emitted during the decelerations represents about 30 percent of the overall volume of these hydrocarbons discharged with the exhaust gases.

Consequently, it is of special interest, in the prevention of atmospheric pollution, to reduce the amount of noxious products in the exhaust gases during the deceleration periods.

There has already been proposed a number of means for reducing the emission from car engines of products polluting the atmosphere.

Said means include the process of injecting air into the exhaust gases of the engines, so as to induce a post-combustion of the unburnt hydrocarbons contained in these gases.

This process exhibits however a number of drawbacks, particularly the power consumption of the air injection pump which is driven by the engine, an increase in the manufacturing cost, due to the provision of this pump and of the noble steels or alloys which must then be employed in the manufacture of the exhaust manifold wherein the post-combustion takes place, and also as a result of the cost of the safety devices which are absolutely necessary to prevent any risk of back-firing.

Moreover, the use of this process results in an increase in the temperature of the engine and consequently requires a more efficient cooling thereof.

There exist also some other means for reducing the amount of air polluting products in the exhaust gases of the externally carburated engines and it is possible to use these different means simultaneously, said means consisting respectively in a better control of the carburation, in a design of the induction-pipe of the engine adapted to provide for the best possible distribution of the fuel within the combustion chamber and in an optimum regulation of the ignition advance for each working condition of the engine.

Even if these last mentioned means are used jointly, they do not permit a reduction in the atmospheric pollution by the exhaust gases which is sufficient to comply with the actual requirements with regard to the air pollution prevention.

Moreover, none of the above-indicated means results in a substantial reduction of the atmospheric pollution during the deceleration periods.

It is possible to obtain such a reduction by regulating the device controlling the flow rate of the gas admitted into the engine so that this device remains slightly more open during the decelerations than during the idling periods of the engine, thereby reducing the value of the negative pressure or vacuum in the inlet pipe during the decelerations, this negative pressure being responsible for the induction into the combustion chamber of gaseous mixtures which burn incompletely, during the deceleration periods.

However this solution does not provide sufficient results with regard to the emission of noxious products during the deceleration periods and exhibits moreover the serious drawback of considerably reducing the braking effect through the engine during the decelerations, since the closure of the device controlling the induction of the gases into the engine (throttle valve) is then less complete during the decelerations than in a conventional engine.

The other means which have been proposed, prior to the present invention, for reducing the atmospheric pollution during the deceleration periods, include in particular devices for cutting off the flow of fuel through the idling jet, during the deceleration periods.

However tests have shown that such devices do not provide for a complete cutting off of the fuel supply into the engine and thus reduce only imperfectly the emission of unburnt hydrocarbons during the decelerations.

The reason of this imperfect cutting off derives from the fact that the circuits of the carburetor other than the idling circuit, i.e. the main fuel circuit and the transition fuel supply or coupling circuit, are subjected, during the decelerations, to a residual negative pressure produced by the air flow corresponding to the idling position of the throttle valve.

It is remembered that a transition fuel supply circuit for conventional carburetors is constituted by conduits for admission of a mixture of air and fuel, these conduits opening into the inlet pipe of the engine substantially close to the throttle valve.

These conduits provide for a transition between the feeding of the engine with fuel through the idling jet and its feeding from the main jet opening into the throat of the inlet Venturi, for the engine speed range corresponding to its operating load, since the feeding through the main jet is really initiated only for a sufficient flow rate of air admitted through the inlet Venturi, corresponding to a minimum opening of the throttle valve.

Moreover when the throttle valve is closed immediately after it has been fully opened, the wall of the inlet manifold of the different cylinders of the engine may be covered with a substantial quantity of fuel in the liquid state.

Then the closing of the gas throttle, during a deceleration, by reducing the air pressure in the inlet manifold, facilitates the vaporization of this fuel. The air fuel mixture thus flowing burns incompletely and the exhaust gases are then highly loaded with unburnt hydrocarbons.

An object of the invention is accordingly to suppress, or at least to reduce as much as possible, all the above-mentioned drawbacks, by providing a device for reducing the emission of noxious products from the external carburation engines during the deceleration periods, adaptable to the engines which are provided with car-

buration means supplied with air and fuel, this carburation means being connected to at least one inlet pipe opening into at least one cylinder through an orifice provided with means for intermittent closure thereof, and being provided with an idling fuel supplying circuit, comprising the combination of the following elements.

a. — means for completely suppressing, during the deceleration periods, the flow of carburetted mixture feeding said cylinder, and

b. — means for admitting non-carburetted air into said cylinder, during the deceleration periods, through duct opening in said inlet pipe upstream of said carburation means, with respect to the direction of the air flow through said inlet pipe, at such a point of said inlet pipe that the volume of that part of the inlet pipe of said cylinder comprised between this point and said means for intermittent closure is at most equal to one half of the volume of the inlet pipe of said cylinder comprised between said carburation means and said means for intermittent closure.

It has been experimentally ascertained that it was possible under these conditions to almost completely suppress the emission of unburnt hydrocarbons during the decelerations, without any bump in the operation of the engine.

In most cases the greatest decrease in the amount of unburnt hydrocarbons in the exhaust gases is obtained when said duct for admitting non-carburetted air during the deceleration periods opens in the inlet pipe of said cylinder at such a point that the volume of said inlet pipe located between this point and said means for intermittent closure is at most equal to one third of the volume of the inlet pipe of said cylinder comprised between said carburation means and said means for intermittent closure.

It must be noted that a rather broad meaning is given to the term "deceleration" throughout this specification, the deceleration periods being defined as all the periods during which the engine does not deliver any power, being driven by the kinetic energy of the vehicle, or through its own momentum, at a speed of rotation higher than its normal idling speed.

Practically such deceleration periods occur every time the vehicle drives the engine, the power of which is fixed at its minimum value, at a higher speed than the speed which would be that of this engines, for the same position of the power control means thereof, if the engine was out of gear from the vehicle which drives it actually.

Such conditions occur constantly when the vehicle is travelling downhill or during a period of slowing down.

The device according to the invention will be used in combination with every suitable means, which may for example be of a known type, adapted to detect these deceleration periods of the engine.

These detection means may for example comprise means for detecting at least two parameters one of which is a function of the position of the power controlling device (accelerator pedal or throttle valve) and the other related to another characteristic of operation of the engine, such as its speed of rotation, the conditions of the transmission between engine and wheels (clutch, gear box) . . . etc.

The invention will be described hereinunder more in detail, with reference to some non-limitative embodiments thereof, illustrated by the attached drawings wherein,

FIG. 1 illustrates one embodiment of the invention, wherein the admission of fuel and the admission of air corresponding to the idling condition of the engine are both provided for through means separate from that corresponding to the operation of the engine under load;

FIG. 1 A shows a location selected for the orifice of the duct supplying non-carburated air, in close vicinity to the inlet valve of a cylinder,

FIG. 1 B and 1 C show two other locations which may be selected for this orifice,

FIG. 2 illustrates an example of controlling means simultaneously cutting off the fuel and air supply through the Venturi,

FIG. 3A and 3 B illustrate the operation of the device which re-establish the fuel and air supply during an acceleration, in this first embodiment,

FIG. 4 shows a slight modification of the embodiment illustrated by FIG. 1,

FIG. 5 illustrates another modification of the embodiment of FIG. 2 wherein is further provided the switching off of the ignition during the decelerations.

In the first embodiment of the invention, illustrated by FIGS. 1 and 1A to 1C, the reference numerals 1 and 2 respectively indicate the air inlet pipe of the engine and the Venturi in the throat of which the fuel is admitted through the pipe 3 supplied from the bowl (not shown) of the carburetor, through the main jet 4. The throttle valve is indicated by the reference numeral 5, 6 designating the rotation axis of this throttle valve.

The carburetor shown comprises, conventionally, a second fuel inlet pipe 7, also connected to the bowl of the carburetor and including a nozzle 8 and an air inlet 9.

This pipe 7 feeds all the transition fuel supply conduits 10 and 11 which open into the inlet pipe 1 slightly upstream of the throttle valve 5, with respect to the direction of flow of the gases (indicated by an arrow in dotted line), these transition fuel supply conduits having the above indicated function.

The pipe 7 also supplies the idling conduit 12 which opens out downstream of the throttle valve 5.

The flow rate of the fuel through the idling conduit 12 is regulated in a conventional manner through the adjusting screw 13.

In this embodiment of the invention, the air supply during the idling period is provided through a conduit 14 separate from pipe 1 and connected to the latter upstream of throttle valve 5. This valve is adapted to close pipe 1 as completely as possible when the gas pedal is depressed whereas in a conventional carburetor, a stopping member limits the closure of this throttle valve, precisely in order to leave the air inlet necessary to the operation of the engine in the idling condition.

The flow rate of air in the idling condition through pipe 14 is adjusted by means of the adjusting screw 15.

The pipes 7*a* and 14 are interconnected and connected to the idling conduit 12 through an orifice 16 which can be obturated by a valve 17 which is normally kept in the open position through a return spring 18. During each deceleration, the full closing of the throt-

tle valve, which occurs when the gas pedal is depressed, is accompanied by the actuation of the valve 17, into its closed position, which provides for a simultaneous cutting off of the fuel supply and of the air flow through the Venturi 2. The closing of the valve 17 is for example achieved by supplying electric current to a coil 19.

According to the invention the simultaneous cutting off, through the throttle valve 5 and through valve 17 respectively, of the air flow through the Venturi 2 and of the fuel supply, is accompanied by an induction of non carburetted air into the cylinder, through a duct 20 separate from the pipe 1 and opening into the inlet pipe 21 of this cylinder, which extends the pipe 1, through an orifice 22 located in the vicinity to the head 23 of the inlet valve 5 (FIG. 1 A).

The location of the orifice 22 in the inlet pipe is such that the volume V_1 of that part of the inlet pipe 21 which is located between this orifice and the seat of the inlet pipe 23 is at most equal to one half of the volume V_2 of the inlet pipe 21 of the considered cylinder, which is located between the carburetor C and the seat of the valve head.

In the illustrated embodiment, the duct 20 forms a derivation of pipe 1 upstream of the Venturi 2.

The valve 17, placed on the idling circuit, is adapted to control the flow of air through the duct 20 exclusively in its position of closure of the orifice 16.

This admission of non-carburetted air will prevent the negative pressure in the inlet pipe 1 of being too high, in the position of full closure of the throttle valve and, due to the location selected for the orifice 22, according to the invention, in the vicinity of the head 23 of the inlet valve, will provide during the decelerations for a reduction of the sucking effect into the cylinder, of the fuel which might have been deposited in the liquid state on all or a part of the wall of pipe 21 located upstream the orifice 22, and will also prevent a scavenging action of the air flow on this deposited fuel.

FIGS. 1 B and 1 C show two further locations which might be selected for the aperture 22 in the vicinity of the head of the inlet valve.

FIG. 2 illustrates an embodiment of the means for detecting the deceleration periods of the engine and for actuating the valve 17.

In this embodiment the electric circuit energizing the electric coil 19, supplied from battery 24, comprises two switches R and *i*, connected in series.

The control of the switch i is coupled with that of the gas throttle 5 (FIGS. 3 A and 3 B).

The latter is provided with a control device 25, fast with the axis 6 of the throttle valve and to which is connected a spring 26 urging the throttle valve toward its position of closure of pipe 1.

The control lever 27 of the accelerator pedal, having one end fast with the spring 28 which urges the accelerator pedal toward its upper position (position shown by FIG. 3 A) is connected to a cam 29 which is freely rotatable about the axis 6 of the throttle valve and is provided with a slot 30 whereinto is engaged a stud 31 fast with the device 25 which controls the throttle valve.

Cam 29 has a profile adapted to cooperate with a device for controlling the switch i, so as to bring this switch into its closed position for the position of this cam corresponding to the displacement of the accelerator pedal back to its upper position and the opening of this switch (FIG. 3 B) solely by a pressure applied onto the gas pedal.

The switch R, which is normally kept in its open position by a return spring r, is adapted to be closed through a device, such as the relay 32 (FIG. 2) as soon as the speed of rotation of the engine becomes substantially greater than the value corresponding to the idling condition of this engine, for example when the speed becomes greater than 800 rpm. In this example, the relay 32 is energized, which causes the closure of the contacts of R, when the electric voltage between the terminal of the dynamo D exceeds a predetermined value, this voltage being a function of the speed of rotation of the engine. In the alternative embodiment illustrated by FIG. 5, the relay is actuated through a tachometric device T connected to the contact breaker A of the ignition circuit.

The switch R being closed, when the accelerator pedal is released, which corresponds to the conditions of a deceleration, the switch i closes in turn (FIG. 3A), which results in the energization of coil 19, whereby valve 17 is closed. This closure results in the cutting-off of the idling conduit 12, thereby suppressing both the air supply through the pipes 14 and 14 *a*, and the fuel supply through pipes 7 and 7*a*, since moreover, as already pointed out, the throttle valve 5 is adapted to close pipe 1 as completely as possible in its closed position, thereby preventing any flow of air or at the most giving passage to only a very slight air stream, insufficient to initiate the flow through the transition conduits 10 and 11.

By simply depressing the gas pedal P, resulting in the opening of switch *i* (FIG. 3 B) through cam 29, as indicated above, it is possible to de-energize coil 19.

The valve 17 then opens, thereby re-establishing the feeding of the engine with a carburetted mixture through the idling jet 12, before the opening of the throttle valve 5. According to the embodiment illustrated in FIGS. 3A and 3B, this is achieved by providing some time lag between the control of the opening of switch *i* and the opening of the throttle valve 5, this time lag corresponding to the interval of the stroke of the accelerator pedal during which the engine is fed through the idling conduit 12.

This interval, which may be fixed at the time of the construction of the engine and optionally made adjustable is determined by regulating the angular stroke between the edge 30 a of slot 30 and the stud 31 in the upper position of the accelerator pedal in the closed position of the throttle valve.

In the alternative embodiment of FIG. 4, the adjusting screw 15 is suppressed and the valve 17 is used both for cutting off the supply of the idling circuit during the deceleration periods and for adjusting the flow rate of carburetted air during the idling periods.

According to a preferred embodiment, the device according to the invention is moreover adapted to switch off the ignition circuit of the engine cylinders during the deceleration periods, in addition to the cutting off of the fuel supply of these cylinders.

This advantageous embodiment of the invention makes it possible to prevent during the deceleration periods any bump which may occur in the operation of the engine, particularly at the beginning of the

deceleration period, as a consequence of the ignition of the mixture which is then introduced into the cylinders (the very low residual fuel content of this mixture is due to the fuel which may have been deposited on the walls of the inlet pipe and particularly on that section of this pipe which is comprised between the orifice **22** and the seat of the inlet valve, this section having however, according to the invention the minimum possible length).

Such an embodiment is diagrammatically illustrated in FIG. **5**, the illustrated embodiment being however by no way limitative.

In this Figure, wherein the same reference characters have been used to designate the same elements as in FIG. **2**, the reference numeral **33** indicates the coil of the ignition circuit of the engine, the primary winding **34** of this coil being normally connected on the one hand to the contact breaker A of the ignition circuit through the wire **35** and on the other hand to the positive terminal of the battery through the wire **36** via the movable contactor **37** of a second relay R', the winding **38** of which is connected in series to the switch i and to the relay R and is thus energized during the deceleration periods of the engine.

The return spring *r'* keeps the contactor **37** in its position indicated in full line in FIG. **5**, in the absence of any electric energization of coil **38**.

Reference numeral **39** designates the secondary winding of the ignition coil of the engine.

In this embodiment, the relay R is not energized through the dynamo, but through a tachometric device supplied from the battery and which includes an input terminal **41** connected to the contact breaker through the wire **42** and an output terminal **43** connected to the winding **32** of the relay R.

The output voltage of T increase as a function of the breaking frequency of the contact breaker A, and thus as a function of the running speed of the engine, which makes it possible to close the switch of the relay R for a predetermined value R of the running speed of the engine, this value being adjustable through potentiometer means (not shown) included in the tachometric device T.

Such a tachometric device is commercially available and needs therefore no detailed description.

During a deceleration period, the energization of winding **38** triggers the contactor **38** into its position indicated in dotted line in FIG. **5**, which makes it possible to deenergize the primary winding **34** of coil **33** and consequently to interrupt the ignition in the different cylinders.

The electric current in the primary circuit flows then through a resistance **40**, the value of which is so selected that the current intensity therethrough is substantially equal to that flowing through the coil **34**, the resistance **40** being connected in parallel to the coil **34**.

This arrangement makes it possible, in an embodiment like that of FIG. **5**, in which the running speed of the engine is detected in the primary winding of the firing circuit, to substantially maintain the same electrical intensity in this primary circuit, in spite of the suppression of the ignition, thereby not disturbing the operation of the tachometric device T.

The remarkable results which can be obtained by the invention in the prevention of the atmospheric pollution have been shown by tests performed on the same vehicle fed with commercially available premium grade gasoline and wherein the emission of noxious products had been already reduced by means of an optimum control of the carburation, by a special design of the inlet pipe and by the regulation of the ignition advance.

During a first series of tests, the engine was not equipped with any device for reducing the emission of noxious products during the decelerations and the average amount of unburnt hydrocarbons in the exhaust gases during the decelerations, for different tests, was 260 ppm (parts per million, in volumes)

A new series of tests was performed after having equipped the engine with a device of a known type, mentioned in the introductive part of this specification, reducing the emission of noxious products during the decelerations by a larger opening of the throttle valve than during the idling periods, so as to reduce the value of the negative pressure in the inlet pipe of the engine during the decelerations.

The average amount of unburnt hydrocarbons in the exhaust gases during this new series of tests was 125 ppm.

A last series of tests was performed by substituting a device according to the invention for the above-indicated known device. The average amount of unburnt products in the exhaust gases was only 19 ppm during a first group of tests wherein the ignition was not interrupted in the deceleration periods and this amount only rose to 24 ppm during tests which were performed with cutting off the ignition during the decelerations.

Thus it appears that by using the device according to the invention, instead of the known prior device, it is possible to obtain, as compared to the use of this prior device a reduction of more than 100 ppm of the amount of unburnt hydrocarbons in the exhaust gases during tests of deceleration performed under the same conditions, while avoiding moreover all the above-mentioned drawbacks of the prior device.

Furthermore, by using the device according to the invention it is possible to obtain an amount of carbon monoxide in the exhaust gases substantially equal to zero, whereas this amount is equal to about 0.30 percent (by volume) when the prior device is used, under the same operating conditions of the engine.

What I claim is:

1. A device for reducing the emission of pollution responsible products by external carburation engines during the deceleration periods of these engines, adaptable to engines provided with carburation means supplied with air and fuel, said carburation means being connected to at least one inlet pipe opening into at least one cylinder through an orifice provided with means for intermittent closure, and including an idling fuel supply circuit, this device comprising the combination of the following elements:

a. means for completely suppressing, during the deceleration periods, the flow of carburetted air feeding said cylinder and,

b. means for admitting non-carburetted air into said cylinder during the deceleration periods, through a duct opening in said inlet pipe upstream of said carburation means, with respect to the direction of the air flow through said inlet pipe, at such a point of said inlet pipe that the volume of that part of the

inlet pipe of said cylinder comprised between this point and said means for intermittent closure is at most equal to one half of the volume of the inlet pipe of said cylinder comprised between said carburation means and said means for intermittent closure.

2. A device according to claim 1, wherein are provided in combination means switching off the ignition in said cylinder during the deceleration periods.

3. A device according to claim 1, wherein said duct admitting non-carburetted air opens in the inlet pipe of said cylinder at such a point thereof that the volume of that part of the inlet pipe of said cylinder comprised between this point and said means for intermittent closure is smaller than one third of the volume of the inlet pipe of said cylinder comprised between said carburation means and said means for intermittent closure.

4. A device according to claim 1, wherein said duct admitting non-carburetted air opens in the inlet pipe of said cylinder in close vicinity to said means for intermittent closure.

5. A device according to claim 1, wherein is provided means for simultaneously controlling the cutting off of the idling fuel supply circuit and the opening of said duct admitting non-carburetted air, during the deceleration periods, and vice-versa apart from the deceleration periods.

6. A device according to claim 5, wherein said means for simultaneous control consists of a two-position electrovalve connected to means for detecting the deceleration periods.

7. A device according to claim 1, wherein said means for completely suppressing during the deceleration periods the flow of carburetted air feeding said cylinder includes a throttle valve controlling said flow, adapted to completely obturate said inlet pipe of said cylinder during the deceleration periods and a device obturating said fuel supply circuit which provides for the idling operation of said engine.

8. An external carburation engine, including carburation means supplied with air and fuel, said carburation means opening into at least one cylinder through an inlet pipe provided with at least one device for intermittent closure and comprising an idling fuel supply circuit, and comprising in combination a throttle valve controlling the flow rate of carburetted air through said inlet pipe, and having a position of complete obturation of said inlet pipe during the idling and deceleration periods of the engine, a conduit supplying a carburetted mixture to the engine at idling speed, said conduit opening into said inlet pipe downstream of said throttle valve with respect to the direction of flow of the gases through said inlet pipe, and including means for cutting off the flow of carburetted mixture through said conduit exclusively during the deceleration periods of the engine, and means for admitting non-carburetted air into said cylinder during the deceleration periods through an additional duct opening in said inlet pipe downstream of said throttle valve with respect to the air flow through said inlet pipe, wherein said duct admitting non-carburetted air opens into said inlet pipe at such a point that the volume of that part of the inlet pipe of said cylinder comprised between this point and said means for intermittent closure is at most equal to one half of the volume of the inlet pipe of said cylinder comprised between said carburation means and said means for intermittent closure.

9. An engine according to claim 8, wherein said means for simultaneous control consists of a two-position electrovalve connected to means for detecting the deceleration periods.

10. An engine according to claim 8, wherein said means for completely suppressing during the deceleration periods the flow of carburetted air feeding said cylinder includes a throttle valve controlling said flow, adapted to completely obturate said inlet pipe of said cylinder during the deceleration periods and a device obturating said fuel supply circuit which provides for the idling operation of said engine.

11. An engine according to claim 8, including a circuit for the idling operation of the engine and for the transition between the idling and the normal operation of the engine, wherein are provided means for successively effecting during the deceleration periods the closing of the throttle valve and that of said idling and transition circuit and effecting conversely the opening of said idling and transition circuit prior to that of said throttle valve during a return to the normal operating conditions of the engine, after a deceleration.

12. An engine according to claim 8, wherein are provided in combination means interrupting the ignition during the deceleration periods.

13. A process for reducing the emission of pollution responsible products from the external carburation engines during the deceleration periods, applicable to the engines having at least one inlet pipe for carburetted mixture connected to carburation means and including a throttle valve, said pipe opening out in at least one cylinder through an inlet orifice provided with means for intermittent closure, this engine including an idling fuel circuit, wherein are performed substantially simultaneously the following operations during the deceleration periods of the engine:

a. completely suppressing the flow of carburetted mixture supplied to said cylinder, and

b. introducing non-carburetted air into said pipe at such a point thereof that the volume of that part of the inlet pipe of said cylinder comprised between this point and said means for intermittent closure is at most equal to one half of the volume of the inlet pipe of said cylinder comprised between said carburation means and said means for intermittent closure.

14. A process according to claim 13, wherein the introduction of non-carburetted air into said inlet pipe is effected at such a point thereof that the volume of that part of the inlet pipe of said cylinder comprised between this point and said means for intermittent closure is smaller than one third of the volume of the inlet pipe of said cylinder comprised between said carburation means and said means for intermittent closure.

15. A process according to claim 13, wherein the introduction of non-carburetted air into said cylinder is effected in the immediate vicinity of said means for intermittent closure.

16. A process according to claim 13, applied to an engine provided with a circuit for the idling operation and for the transition between the idling and the normal operative conditions of the engine, wherein are effected during a deceleration successively the closing of

the throttle valve and of said idling and transition circuit and wherein, conversely, the opening of said idling and transition circuit is effected prior to the opening of the throttle valve, during the return to the normal operating conditions of the engine after a deceleration.

17. A process according to claim 13, wherein the ignition is interrupted during the deceleration periods.

* * * * *