

[54] **COMBUSTION ENGINE WITH AT LEAST ONE EXHAUST GAS CLEANING ARRANGEMENT**

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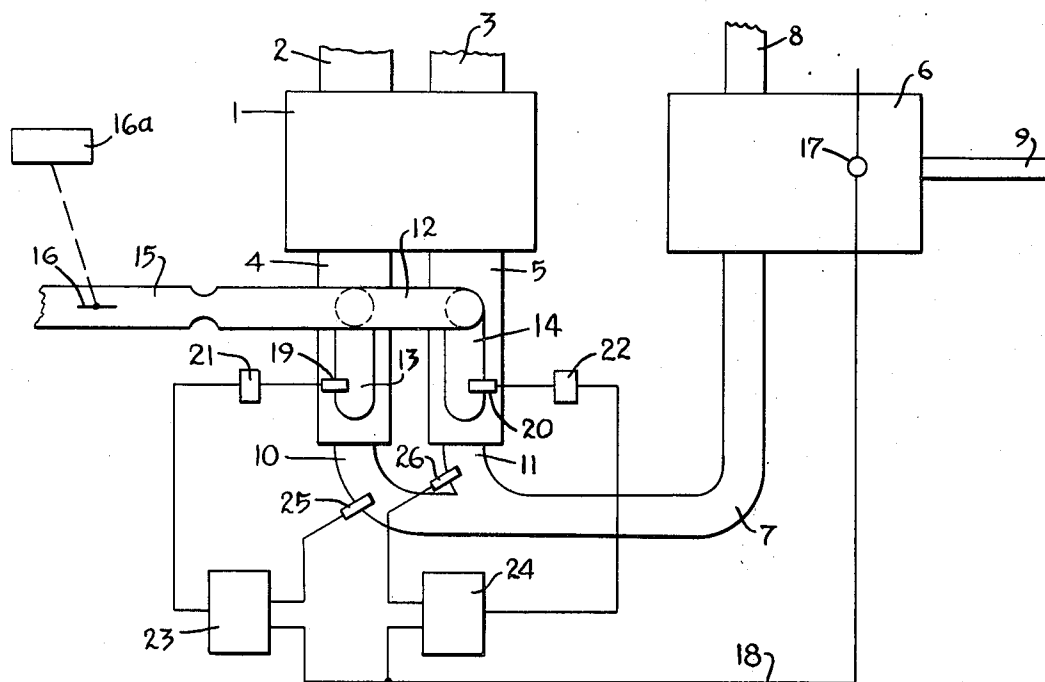
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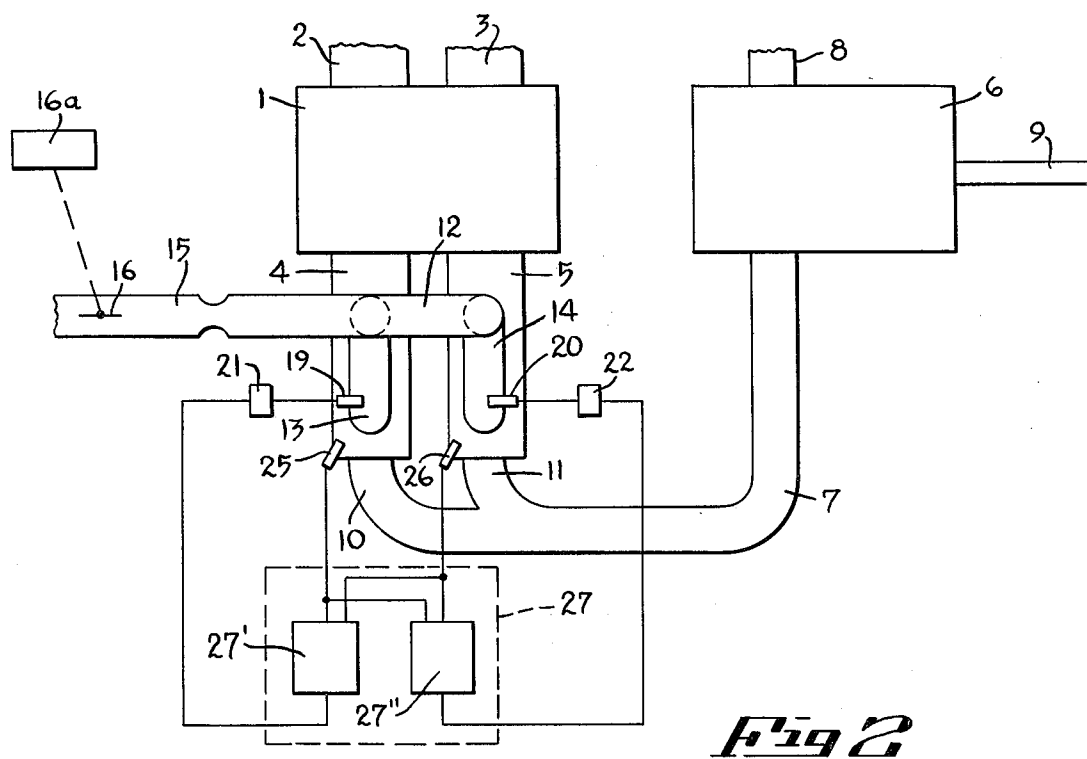
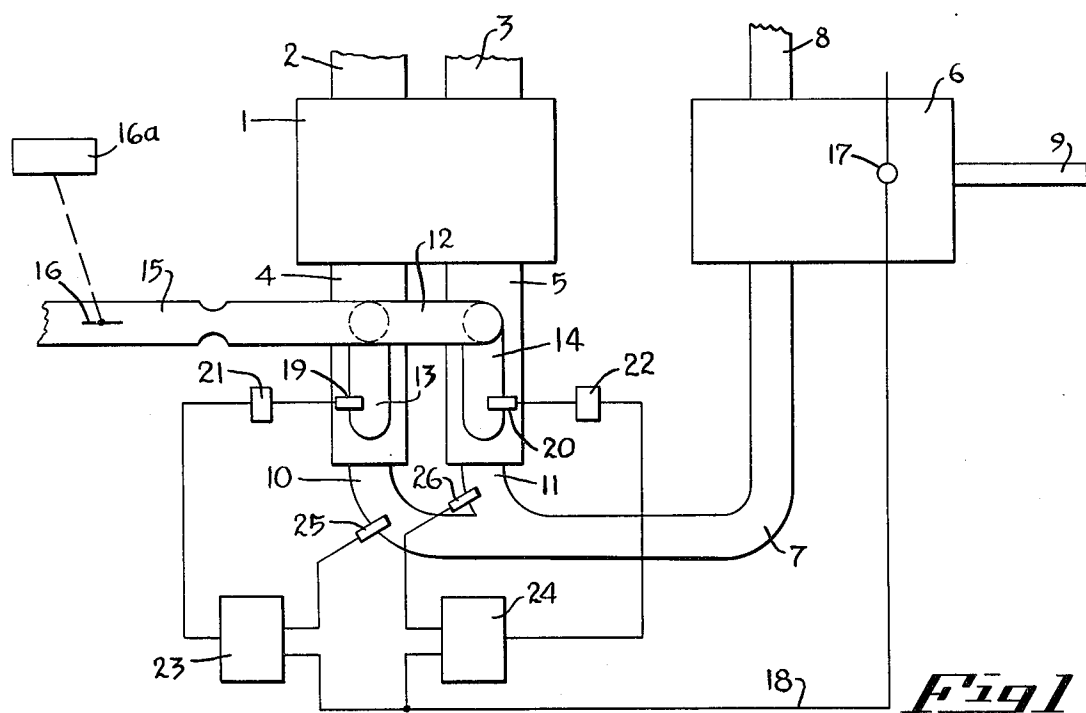
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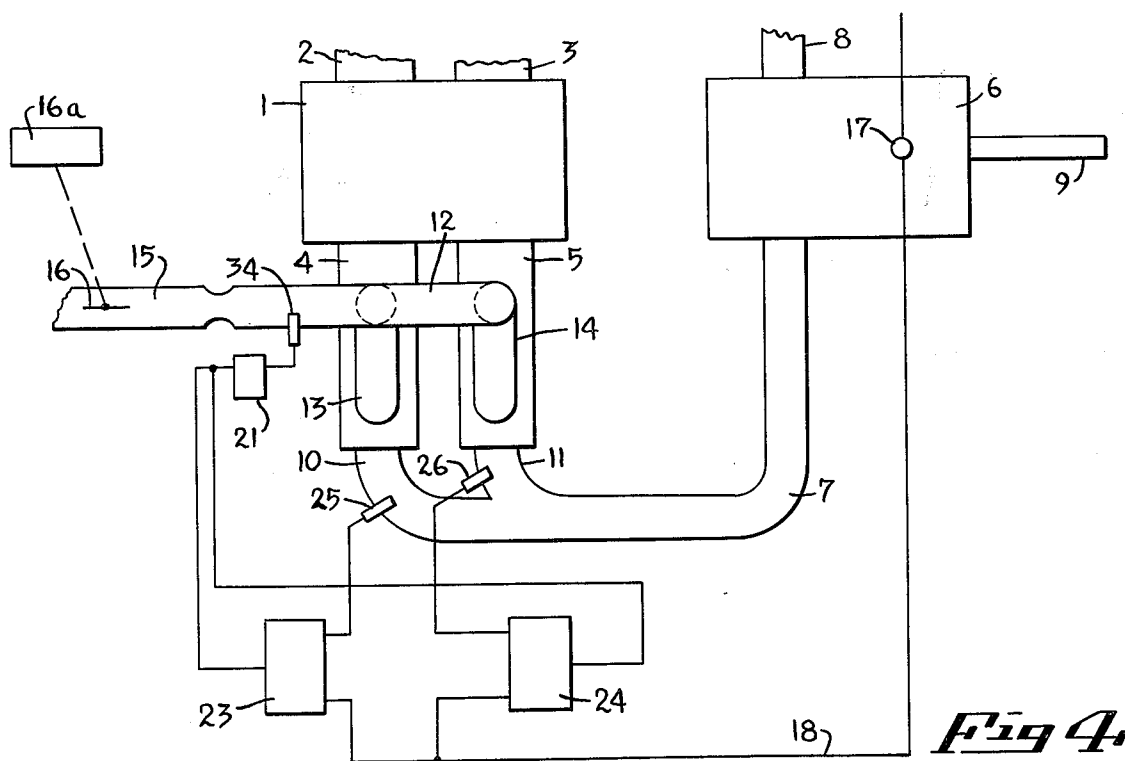
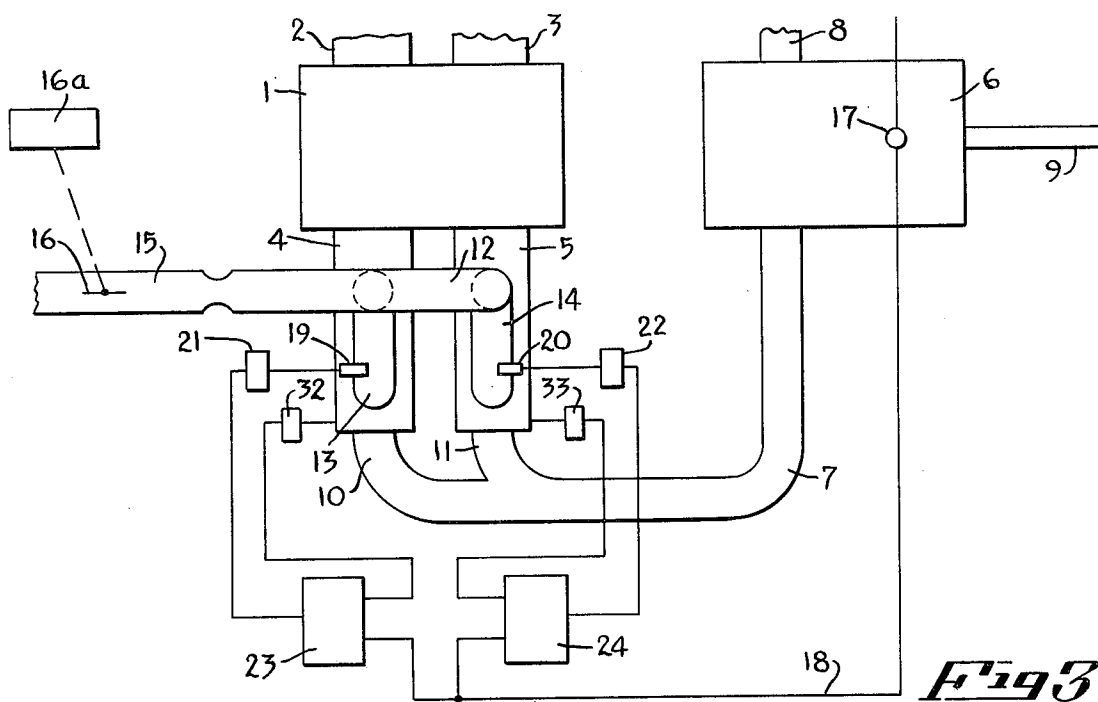
ABSTRACT

In a motor vehicle, a combustion engine having a plurality of combustion spaces, fuel and combustion air supplying devices, exhaust conduits for the individual combustion spaces for delivering the exhaust gas from the combustion spaces, an exhaust gas cleaning arrangement connected in a common branch of the individual exhaust gas conduits, a sensor coupled to the combustion spaces for sensing characteristic conditions of the individual spaces or cylinders, and means responsive to the individual sensed conditions when the individual condition of a cylinder deviates from a predetermined characteristic and developing a signal when such deviation occurs, and means responsive to such signal and controlling the fuel flow to the individual cylinder when the deviation occurs.

29 Claims, 2 Drawing Figures







COMBUSTION ENGINE WITH AT LEAST ONE EXHAUST GAS CLEANING ARRANGEMENT

This is a continuation, of application Ser. No. 262,007, filed June 12, 1972.

CROSS REFERENCE TO OTHER APPLICATIONS

Reference should be had to the full extent of the co-pending application of Peter Manderscheid entitled "Combustion Engine With At Least One Exhaust Gas Cleaning Arrangement" Ser. No. 260,006, filed June 12, 1972 and to the application of Herbert Heitland entitled "Converter For Catalytic Exhaust Gas Cleaning" Ser. No. 260,004, filed June 12, 1972 and of the application of Herbert Heitland and Peter Manderscheid entitled "Arrangement For Exhaust Gas Cleaning" Ser. No. 262,008, filed June 12, 1972 all being filed concurrently and being assigned to the same assignee as the present application.

FIELD AND BACKGROUND OF THE INVENTION

The present invention generally relates to a motor vehicle, and more particularly it relates to a motor vehicle having a combustion engine with combustion spaces, such as cylinders, and which further includes a fuel distribution and measuring system, an exhaust gas system, an exhaust gas cleaning system having associated therewith a temperature sensor for producing control signals in the event very high temperatures are developed within the exhaust gas cleaning system.

The combustion engine and its associated exhaust gas cleaning arrangement which is the subject matter of the first aforementioned co-pending application has its advantage in that its exhaust gas cleaning arrangement provides a protection against overheating even in cases when the cause of the overheating resides not in the defective operation of the cleaning arrangement itself but in the defectively operating combustion spaces of the engine. Such exhaust gas cleaning arrangements can operate at their best and attain their best cleaning efficiency only at relatively high temperatures, however, they are very sensitive to excessively high temperatures which can be caused for example by the failure of the ignition, bad combustion within the combustion spaces or cylinders or a bad mixture formation within the cylinder. Such defective cylinders or cylinder group cause the combustion itself to occur not within the cylinder itself but in the exhaust gas cleaning arrangement.

The cleaning arrangement according to the aforementioned first application attacks the problem associated with the overheating of the exhaust gas cleaning arrangement itself by reducing or in some circumstances completely disconnecting the fuel supply to the combustion spaces.

A problem is, however, encountered in connection with the combustion engines of motor vehicles that during the discontinuing of the fuel supply to the combustion engine the entire combustion becomes stalled. In order to eliminate this disadvantage the structure proposed by the aforementioned first co-pending application provides that for each combustion space or cylinder or combustion space group or cylinder group an individual exhaust gas cleaning arrangement is provided in the individual exhaust gas conduit of the cylinder or of the group and, each of such cleaning arrangement has a separate temperature sensor in it the output signals of which are fed to the fuel dosing and/or air

dosing devices of that particular cylinder or group. In principle such arrangement leads to an enlargement of the number of the cleaning arrangements, especially in the extreme case where each cylinder has its own cleaning arrangement assigned to it. The proposed construction, however, assures that only the individual cylinder or cylinder group is set out of operation the exhaust gas cleaning arrangement of which developed the excessive temperature.

SUMMARY OF THE INVENTION

It is a general object of the present invention to provide a cleaning arrangement for a combustion engine in a motor vehicle which eliminates any and all difficulties which might arise with the structure of the aforementioned first co-pending application.

It is a more particular object of the present invention to provide an exhaust gas cleaning arrangement for a combustion engine wherein in the case of an increased and undesirable temperature within the exhaust gas cleaning arrangement a reduction or discontinuance of the fuel supply is undertaken only to an extent that the engine remains capable of further operation unless all combustion spaces or cylinders became defective.

It is still a further object of the present invention to reduce the number of the exhaust gas cleaning arrangements assigned to the cylinders or cylinder groups in a combustion engine of the above mentioned type. The present invention provides that the exhaust gas cleaning arrangement is placed in the common exhaust gas conduit of several combustion spaces or cylinders or cylinder groups which also have their individual fuel dosing devices and that on portions of the cylinders or cylinder groups sensors are provided for sensing the particular characteristics of the cylinders or cylinder group themselves and which sensor provides output signals which together with the control signals of the temperature sensors of the cleaning arrangement are fed to a gating means coupled with the associated individual fuel dosing device whereby the control signals of the cleaning arrangement are supplied only to regulate the operation of the defective cylinders or cylinder group by controlling its associated fuel and/or air dosing device.

According to the present invention the sensors monitor only those cylinders or group of cylinders which are defective and by means of the output signal of such sensors a gate circuit becomes energized to which in the present embodiment of the invention the control signals from the temperature sensor placed into the exhaust gas cleaning arrangement are also fed. The gate circuit passes the control signals of the temperature sensor of the cleaning arrangement only to the dosing devices of those cylinders or of that particular cylinder which is or are defective and to which the particular gate circuit belongs.

For the characterizing of the state or rather for the monitoring of the state of an individual cylinder or of a cylinder group one may employ the sensors of different types in various regions of the cylinder arrangement. For example, the sensor can be in the form of a temperature sensor for sensing the cylinder temperature, one could also monitor the exhaust gas temperature in the immediate vicinity of the outlet of the cylinder. Or, for example, pressure sensors could be used to monitor the cylinder pressure. Furthermore one could use sensors of various types which, at the same time, are capable of controlling the fuel dosing devices. A defective cylin-

der is characterized by a low cylinder temperature and by a low exhaust gas temperature and by a low pressure in the cylinder. Obviously the excessive temperature then will be present in the exhaust gas cleaner. In some cases one could use sensors to monitor the components in the exhaust gas of the individual cylinders, however, such latter design would require a more complicated arrangement.

The concept of fuel dosing devices is similar to those described in the first aforementioned co-pending application. It should be still noted that the individual cylinders or cylinder groups can have their individual combustion air dosing devices so that the control signals from the exhaust gas cleaning arrangement would be then fed to the combustion air dosing device in addition to the fuel dosing device and limit it or completely disconnect the supply by it, in the event the associated cylinder or cylinder group is defective. In a combustion engine having an outer mixture forming arrangement the above can be constructed in a relatively similar manner by feeding the control signal from the exhaust gas cleaning arrangement through the gate circuit to the operating means of a common closure member controlling a combined fuel-air dosing means, which can be in the form of a choke valve and placed in the individual suction conduit of the defective cylinder or defective cylinder group.

Under the definition of dosing devices within the scope of this invention, one should understand a device which controls or determines the fuel or fuel-air mixture supply to an individual cylinder or to a cylinder group.

At this point it should be noted that the invention is equally applicable to a combustion engine having a direct or indirect fuel injection, similarly as mentioned also in connection with the first aforementioned co-pending application.

Up to this point consideration was given to the case when the individual cylinder or individual cylinder group were controlled by the control signals coming from the temperature sensors on the cleaning arrangement and on the exhaust conduit and fed through an individual gate circuit associated with that cylinder or cylinder group. It is also possible that the output signals of the sensors on the cylinders are fed to a comparing circuit which compares the output signals coming from the sensors on the different cylinders or cylinder groups and determines the defective cylinder or cylinder group and a control signal is passed only to the dosing device associated with such defective cylinder or cylinder group. Such comparison of the different cylinders or cylinder groups resulting from an output signal of the sensors on them which is monitored as a median value and, the cylinder or cylinder group which has a monitored signal which deviates from such median value by a certain magnitude will be characterized as defective.

Inasmuch as the last mentioned variation the output signals of the sensors which are sensing the various characteristics of the individual cylinders or cylinder groups monitor the state of the cylinders of the combustion engine, therefore, under these conditions the temperature sensors at the exhaust gas cleaning arrangement and the gate circuits can be omitted since the output signals of the comparing circuit represent the control signals affecting the operation of the dosing devices. While in the previously discussed principal embodiment of the present invention a regulation is performed back from the temperature of the cleaning

arrangement, in the last discussed embodiment of the present invention there is a forward regulation taking place since it is conditioned solely on the measured data at the cylinders and such regulation can take place so fast that any considerable overheating of the exhaust gas cleaning arrangement is prevented.

BRIEF DESCRIPTION OF THE DRAWING

The invention will become more readily apparent from the following description of preferred embodiments thereof shown, by way of example, in the accompanying drawing, in which:

FIG. 1 is a schematic representation of one embodiment of the exhaust gas cleaning arrangement and its associated control device applied to a combustion engine and in accordance with the present invention;

FIG. 2 is a schematic view similar to FIG. 1 illustrating additional structure;

FIG. 3 is a schematic representation of the exhaust gas cleaning arrangement comprising the present invention; and

FIG. 4 is a schematic representation of the exhaust gas cleaning arrangement of the present invention as applied to pluralities of cylinders arranged in groups.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the single FIGURE in which the combustion engine is identified at 1 and in an exemplary fashion it is illustrated as a four-cylinder machine having cylinders 2, 3 on one side and cylinders 4, 5 on the other side. In the figure the control arrangements and other connections are represented only with respect to one side and it is understood that similar arrangements and connections are to be had also on the side of cylinders 2, 3 in a mirror-like fashion of all the parts appearing and shown with respect to cylinders 4, 5.

In the illustrated embodiments there is only a single catalytically or thermically operable exhaust gas cleaning arrangement 6 which can be an arrangement known from the aforementioned applications, therefore, details of it are not illustrated. The exhaust gas cleaning arrangement 6 is connected to the common exhaust 7 of cylinders 4 and 5 and to the common exhaust conduit 8 of cylinders 2 and 3. The clean gases leave the arrangement 6 to the output conduit 9 which is the usual tail pipe of a combustion engine.

Referring to cylinders 4 and 5 it is noted that the exhaust gases leave the individual cylinders 4 and 5 through the individual branches 10 and 11 of the exhaust gas conduit 7. It is also an important feature of the present invention that the fuel suction conduit 12 has an individual branch 13 and 14 leading to the individual cylinders 4 and 5, respectively. In the illustrated embodiments a combustion engine is shown as having a carbtorator which is placed in the region 15. A choke valve 16 including control means 16a therefor is placed ahead of the carbtorator 15 in the suction conduit 12.

Due to unsatisfactory combustion of the charge in the individual cylinders 2-5 the charge undergoes an after-burning in the exhaust gas cleaning arrangement 6 which causes the development of excessively high temperatures in arrangement 6. In the present embodiments an electric protective arrangement is provided which assures that in the case when excessively high temperatures appear in the exhaust gas cleaning arrangement 6 the fuel supply and/or the combustion air

5

supply to the particular defective cylinder is reduced or completely disconnected. For the monitoring of the temperatures existing in the gas cleaning arrangement 6 there is provided a temperature sensor 17 the electrical output terminal 18 of which, if there is an excess temperature, carries control signals for the individual closure devices 19 and 20 arranged in suction conduit branches 13 and 14 as soon as a critical temperature value has been exceeded in the cleaning arrangement 6. In order that not all the cylinders would become disconnected from the supply and thereby causing a stalling of the entire combustion engine 1, there is provided ahead of each of the energizing or operating devices 21 and 22 of the closure members 19 and 20 gating circuits 23 and 24 which, in addition to the control signals developed by the temperature sensing means 17 in the cleaning arrangement 6 receive also the output signals of the temperature or pressure sensors 25 and 26 placed in the individual branches 10 and 11 of the exhaust gas conduit 7. Consequently, only then when the associated temperature or pressure sensor, such for example, as the sensor 25, indicates a low exhaust gas temperature or pressure characteristic of the defectiveness of the associated cylinder 4, then an appropriate control signal is delivered thereby to the gating circuit 23 and, when simultaneously an overheating of the exhaust gas arrangement 6 is sensed by control signals delivered by the temperature sensor 17, the gate circuit 23 becomes conductive and passes the control signals from sensor 17, or if necessary other electrical devices such as amplifiers can be connected to the output of gate circuit 23, and such output control signal or signals from the gate circuit 23 arrive at the operating means 21 of the closure member 19 so that the fuelair mixture supply only to the cylinder 4 becomes interrupted. The remaining cylinders of the combustion engine 1 will operate further.

In principle would be also possible to place between the outputs of the sensors 25 and 26 on one hand and between their associated inputs of the gate circuits 23 and 24 on the other hand, a comparing circuit 27 (FIG. 2) which similarly as described above could determine the cylinder which has an especially low exhaust gas temperature. In the event the output signals of such comparing circuit 27 are used to control the closure device 21 associated with the defective cylinder, then the gate circuits 23 and 24 as well as the temperature sensor 17 could be dispensed with on the exhaust gas cleaning arrangement 6.

As shown in FIG. 2, there are provided two switching mechanisms 27' and 27'', each one of which is assigned to one of the sensors 25 and 26 at the cylinders 4 and 5. The switches 27' and 27'' are designed in such a manner that they actuate, in each case, one of the actuation devices 21 and 22 in the sense of decreasing the fuel supply at the moment when the difference of the output signals are the two temperature sensors 25 and 26 exceed a certain value. As can be seen, the output circuits of both temperature sensors 25 and 26 are coupled to the switches 27' and 27''. The switches 27' and 27'' work as a function of the difference of the output signals of the two temperature sensors 25 and 26, so that at the time when the output signal of the sensor 25 is of a smaller order of magnitude than that of the sensor 26, switch 27' responds, and in the opposite case, switch 27'' responds.

FIG. 3 shows an exemplified embodiment of the present invention with pressure sensors such as conven-

6

tional pressure switches 28 and 29, which in each case are connected with the interior of the cylinders 4 and 5. The drivers or push rods 30 and 31 of the switches 28 and 29, respectively, which are located on the outlet side of the switches 28 and 29 engage switches 32 and 33, respectively. By the actuation of switches 32 and 33, that is an attainment of a critical pressure value in the cylinder in question, the gate circuit 23 or 24 which in each instance is installed beyond the elements here under discussion, is activated. In all other respects, the embodiment of FIG. 3 operates in the same manner as the one described in connection with the FIG. 1 embodiment.

FIG. 4 shows the use of a switching system which has been designed in accordance with the embodiment of FIG. 1 for the case in which the two cylinders 4 and 5 are grouped together as a cylinder group. As soon as one of the temperature sensors 25 or 26 ascertains that one of the cylinders 4 or 5 is not operating in a proper manner, then an activation of the throttling means 34 takes place for reducing the fuel and air supply with the activation taking place through the intervention of the assigned gate circuit 23 or 24. The throttling means 34 now lies within the suction pipe 15 which is common to the two cylinders 4 and 5 of this cylinder group. Another similar throttling means lies in an additional suction pipe which is common to cylinders 2 and 3. The fuel supply to the cylinder group 2 and 3 is then adjusted in such a manner, by means of an additional set-up of the described type, so that no critical temperature can occur in the common exhaust gas cleaning device 6.

The gate circuit 23 and 24 can be constructed in a simple manner so that a thermoswitch, part of which forms the sensing means 17, at the after burner would remain closed at high temperatures, while thermoswitches monitoring the conditions of the cylinders would be closed at low temperatures, both switches would be lying in a common energizing circuit. Parts of the last mentioned thermoswitches are the sensors 25 and 26. The current would flow only at excessive temperatures in the after burner or cleaning arrangement toward the fuel dosing arrangement of each cylinder so far the thermoswitch of such cylinder would be closed due to low exhaust temperatures and, consequently, such series arrangement of the thermoswitches would disconnect the fuel supply only under such conditions and only for that particular cylinder.

Under the definition of cylinders conventionally the cylinders of a displacement type piston is understood, however, the concept and the principles of the present invention should be extended also to combustion engines having a rotary type piston.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what I claim as new and desire to be secured by letters Patent, is as follows:

1. A combustion engine comprising a plurality of combustion spaces or cylinders, fuel and combustion air supplying means, exhaust conduits for the individual combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected in a common branch of said individual exhaust gas conduits, sensing means coupled to said combustion spaces for sensing characteristic con-

ditions of the individual cylinders, means responsive to an individual sensed condition when the individual condition of a cylinder deviates from a predetermined magnitude and developing a signal when such deviation occurs, means responsive to said signal for regulating the fuel flow to said individual cylinder when said deviation occurs, a temperature sensor means coupled to said exhaust gas cleaning arrangement for sensing the temperature thereof and for producing a signal when said temperature of said exhaust gas cleaning means deviates from said predetermined value, a gate circuit means having a pair of inputs, the output of said individual sensing means sensing the condition of the individual cylinder being connected to one of said inputs of said gate circuit means, the output of said temperature sensor means coupled to said exhaust gas cleaning arrangement being coupled to the other one of said input of said gating circuit means, said gating circuit means passing the output signal of said temperature sensor means of said exhaust cleaning arrangement when an output signal is present at said first output thereof, said fuel supply means comprising operating means, the output of said gating circuit means being coupled to said operating means for energizing said operating means for effecting regulation of said fuel supply to said individual cylinder when the conditions thereof deviate from a predetermined magnitude.

2. The combination as claimed in claim 1, wherein said combustion engine comprises a combustion air dosing means for each of said individual cylinders said combustion air supply means having an operating means for controlling the positioning of said combustion air dosing means, the output signal of said gating circuit means being coupled also to said operating means for said combustion air dosing means.

3. The combination as claimed in claim 1, wherein said output signal of said gating circuit means being effective to disconnect the fuel supply to said individual cylinder means.

4. The combination as claimed in claim 1, wherein said combustion engine comprises an outside fuel-air mixture means, said fuel-air mixture means comprising an operating member and a closure member placed in the supply conduit of said fuel-air mixture, said output signal of said gating circuit means effecting said operating member for closing said closure member and thereby effecting regulation of the fuel-air supply to said individual cylinder.

5. The combination as claimed in claim 2, wherein a comparing circuit is connected to the output of said individual sensor means sensing the conditions of said individual cylinders, said comparing circuit determining when the output of said individual sensor means deviates from a predetermined magnitude representing the normal operation of an individual cylinder.

6. The combination as claimed in claim 1, wherein said sensor means are temperature sensor means for sensing the temperature of the individual cylinders.

7. The combination as claimed in claim 1, wherein said sensor means are pressure sensing means for sensing the pressure in the individual cylinders.

8. The combination as claimed in claim 1, wherein said sensor means are temperature sensors for sensing the temperature of the exhaust from the individual cylinders.

9. A combustion engine comprising a plurality of combustion spaces or cylinders, fuel and combustion air supplying means, exhaust conduits for the individual

combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected in a common branch of said individual exhaust gas conduits, sensing means coupled to said combustion spaces for sensing characteristic conditions of the individual cylinders, and means responsive to an individual sensed condition when the individual condition of a cylinder deviates from a predetermined magnitude so as to lead to overheating of said exhaust gas cleaning arrangement and developing a signal when such deviation occurs, and means responsive to said signal and reducing the fuel flow only to said individual cylinder when said deviation occurs and wherein a temperature sensor means is coupled to said exhaust gas cleaning arrangement for sensing the temperature thereof and for producing a signal when said temperature of said exhaust gas cleaning means deviates from said predetermined value, a gate circuit means having a pair of inputs, the output of said individual sensing means sensing the condition of the individual cylinder is being connected to one of said inputs of said gate circuit means, the output of said temperature sensor means coupled to said exhaust gas cleaning arrangement being coupled to the other one of said inputs of said gating circuit means, said gating circuit means passing the output signal of said temperature sensor means of said exhaust cleaning arrangement when an output signal is present at said first output thereof, said fuel supply means comprising operating means, the output of said gating circuit means being coupled to said operating means for energizing said operating means for effecting regulation of said fuel supply to said individual cylinder when the conditions thereof deviate from a predetermined magnitude.

10. The combination as claimed in claim 9, wherein said combustion engine comprises a combustion air dosing means for each of said individual cylinders, said combustion air supply means having an operating means for controlling the positioning of said individual cylinders, said combustion air supply means having an operating means for controlling the positioning of said combustion air dosing means, the output signal of said gating circuit means being coupled also to said operating means for said combustion air dosing means.

11. The combination as claimed in claim 9, wherein said output signal of said gating circuit means is effective to disconnect the fuel supply to said individual cylinder means.

12. The combination as claimed in claim 9, wherein said combustion engine comprises an outside fuel-air mixture means, said fuel-air mixture means comprising a supply conduit an operating member and a closure member placed in the supply conduit of said fuel-air mixture, said output signal of said gating circuit means effecting said operating member for closing said closure member and thereby preventing fuel-air supply to said individual cylinder.

13. The combination as claimed in claim 9, wherein a comparing circuit is connected to the output of said individual sensor means sensing the conditions of said individual cylinders, said comparing circuit determining when the output of said individual sensor means deviates from a predetermined magnitude representing the normal operation of an individual cylinder.

14. The combination as claimed in claim 9, wherein said sensor means are temperature sensor means for sensing the temperature of the individual cylinders.

15. The combination as claimed in claim 9, wherein said sensor means are pressure sensing means for sensing the pressure in the individual cylinders.

16. The combination as claimed in claim 9, wherein said sensor means are temperature sensors for sensing the temperature of the exhaust from the individual cylinders.

17. A combustion engine comprising a plurality of groups of combustion spaces or cylinders, fuel and combustion air supplying means, a common exhaust conduit for each of said group of combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected to said common exhaust gas conduits, sensing means coupled to said combustion spaces for sensing characteristic conditions of the individual cylinders, and means responsive to an individual sensed condition when the individual condition of a cylinder deviates from a predetermined magnitude so as to lead to overheating of said exhaust gas cleaning arrangement, and developing a signal when such deviation occurs, and means responsive to said signal and reducing the fuel flow only to said individual cylinder when said deviation occurs, there being further included a temperature sensor means coupled to said exhaust gas cleaning arrangement for sensing the temperature thereof and for producing a signal when said temperature of said exhaust gas cleaning means deviates from said predetermined value, a gate circuit means having a pair of inputs, the output of said individual sensing means sensing the condition of the individual cylinder being connected to one of said inputs of said gate circuit means, the output of said temperature sensor means coupled to said exhaust gas cleaning arrangement being coupled to the other one of said inputs of said gating circuit means, said gating circuit means passing the output signal of said temperature sensor means of said exhaust cleaning arrangement when an output signal is present at said first output thereof, said fuel supply means comprising operating means, the output of said gating circuit means being coupled to said operating means for energizing said operating means for effecting regulation of said fuel supply to said individual cylinder when the conditions thereof deviate from a predetermined magnitude.

18. The combination as claimed in claim 17, wherein said combustion engine comprises an outside fuel-air mixture means, said fuel-air mixture means comprising a supply conduit an operating member and a closure member placed in the supply conduit of said fuel-air mixture, said output signal of said gating circuit means effecting said operating member for closing said closure member and thereby preventing fuel-air supply to said individual cylinder.

19. The combination as claimed in claim 17, wherein a comparing circuit is connected to the output of said individual sensor means sensing the conditions of said individual cylinders, said comparing circuit determining when the output of said individual sensor means deviates from a predetermined magnitude representing the normal operation of an individual cylinder.

20. A combustion engine comprising a plurality of groups of combustion spaces or cylinders, fuel and combustion air supplying means, a common exhaust conduit for each of said groups of combustion spaces for delivering the exhaust gas from said combustion spaces, and exhaust gas cleaning arrangement connected to said common exhaust gas conduits, sensing

means coupled to said combustion spaces for sensing characteristic conditions of the individual cylinders, and means responsive to an individual sensed condition when the individual condition of a cylinder deviates from a predetermined magnitude so as to lead to overheating of said exhaust gas cleaning arrangement, and developing a signal when such deviation occurs, and means responsive to said signal for reducing the fuel flow to said cylinder group in which one of said cylinders deviates.

21. The combination as claimed in claim 20, wherein a temperature sensor means is coupled to said exhaust gas cleaning arrangement for sensing the temperature thereof and for producing a signal when said temperature of said exhaust gas cleaning means deviates from said predetermined value, a gate circuit means having a pair of inputs, the output of said individual sensing means sensing the condition of the individual cylinder being connected to one of said input of said gate circuit means, the output of said temperature sensor means coupled to said exhaust gas cleaning arrangement being coupled to the other one of said inputs of said gating circuit means, said gating circuit means passing the output signal of said temperature sensor means of said exhaust cleaning arrangement when an output signal is present at said first output thereof, said fuel supply means comprising operating means, the output of said gating circuit means being coupled to said operating means for energizing said operating means for effecting regulation of said fuel supply to said cylinder group when the condition of any cylinder therein deviates from a predetermined magnitude.

22. The combination as claimed in claim 21, wherein said combustion engine comprises an outside fuel-air mixture means, said fuel-air mixture means comprising a supply conduit an operating member and a closure member placed in the supply conduit of said fuel-air mixture, said output signal of said gating circuit means effecting said operating member for closing said closure member and thereby effecting regulation of the fuel-air supply to said cylinder group that includes said deviating cylinder.

23. The combination as claimed in claim 22, wherein a comparing circuit is connected to the output of said individual sensor means sensing the conditions of said individual cylinders, said comparing circuit determining when the output of said individual sensor means deviates from a predetermined magnitude representing the normal operation of an individual cylinder.

24. A combustion engine comprising a plurality of combustion spaces or cylinders, fuel and combustion air supplying means, exhaust conduits for the individual combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected in a common branch of said individual exhaust gas conduits, pressure sensing means coupled to said combustion spaces for sensing the pressure of the individual cylinders, and means responsive to an individual sensed condition when the individual condition of a cylinder deviates from a predetermined magnitude so as to lead to overheating of said exhaust gas cleaning arrangement and developing a signal when such deviation occurs, and means responsive to said signal and reducing the fuel flow only to said individual cylinder when said deviation occurs.

25. A combustion engine comprising a plurality of groups of combustion spaces or cylinders, fuel and combustion air supplying means, a common exhaust

conduit for each said group of combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected to said common exhaust gas conduits, sensing means coupled to said combustion spaces for sensing characteristic conditions of the individual cylinders, and means responsive to an individual sensed condition when the individual condition of a cylinder deviates from a predetermined magnitude so as to lead to overheating of said exhaust gas cleaning arrangement, and developing a signal when such deviation occurs, and means responsive to said signal and reducing the fuel flow only to said individual cylinder when said deviation occurs and wherein said combustion engine comprises an outside fuel-air mixture means including a supply conduit an operating member and a closure member placed in the supply conduit of said fuel-air mixture, said signal effecting said operating member for closing said closure member and thereby effecting regulation of the fuel-air supply to said individual cylinder.

26. A combustion engine comprising a plurality of groups of combustion spaces or cylinders, fuel and combustion air supplying means, a common exhaust conduit for each said group of combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected to said common exhaust gas conduits, sensing means coupled to said combustion spaces for sensing characteristic conditions of the individual cylinders, and means responsive to an individual sensed condition when the individual condition of a cylinder deviates from a predetermined magnitude so as to lead to overheating of said exhaust gas cleaning arrangement, and developing a signal when such deviation occurs, and means responsive to said signal for reducing the fuel flow to said cylinder group in which one of said cylinders deviates, said combustion engine comprising an outside fuel-air mixture means including a supply conduit an operating member and a closure member placed in the supply conduit of said fuel-air mixture, said signal effecting said operating member for closing said closure member and thereby effecting regulation of the fuel-air supply to said cylinder group that includes said deviating cylinder.

27. A combustion engine comprising a plurality of combustion spaces or cylinders, fuel and combustion air supplying means, exhaust conduits for the individual combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected in a common branch of said individual exhaust gas conduits, sensing means coupled to said combustion spaces for sensing characteristic conditions of the individual cylinders, wherein a comparing circuit is connected to the outputs of said individual

sensor means for sensing the conditions of said individual cylinders, said comparing circuit comparing output signals of said individual sensor means and thereby determining when the sensed characteristic condition of an individual cylinder leads to overheating of said exhaust gas cleaning arrangement and developing a signal when such condition occurs, and means responsive to said signal for reducing fuel flow only to said individual cylinder when such condition occurs.

28. A combustion engine comprising a plurality of groups of combustion spaces or cylinders, fuel and combustion air supplying means, exhaust conduits for the individual groups of combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected in a common branch of said individual exhaust gas conduits, sensing means coupled to parts of said groups for sensing characteristic conditions of the cylinders of the individual groups, wherein a comparing circuit is connected to the output of said individual sensor means of said groups, said comparing circuit comparing output signals of said individual sensor means of different groups and thereby determining when the sensed characteristic condition of a cylinder of an individual group leads to overheating of said exhaust gas cleaning arrangement and developing a signal when such condition occurs, and means responsive to said signal for reducing the fuel flow only to said cylinder group when such condition occurs in one of said cylinders in said group.

29. A combustion engine comprising a plurality of groups of combustion spaces or cylinders, fuel and combustion air supplying means, exhaust conduits for the individual groups of combustion spaces for delivering the exhaust gas from said combustion spaces, an exhaust gas cleaning arrangement connected in a common branch of said individual exhaust gas conduits, sensing means coupled to parts of said groups for sensing characteristic conditions of the cylinders of the individual groups, and means responsive to an individual sensed condition when the individual condition of a cylinder deviates from a predetermined magnitude so as to lead to overheating of said exhaust gas cleaning arrangement, and developing a signal when such deviation occurs, and means responsive to said signal for reducing the fuel flow only to said individual cylinder when said deviation occurs, there being further included a comparing circuit connected to the output of said individual sensor means sensing the conditions of said individual cylinders, said comparing circuit determining when the output of said individual sensor means deviates from a predetermined magnitude representing the normal operation of an individual cylinder.

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