

[54] CATALYTIC CONVERTER MUFFLER ASSEMBLY

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[57] ABSTRACT

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This invention relates to an exhaust muffler for use on internal combustion engine vehicles with said muffler having sound attenuating chambers therein, and more particularly to a muffler that includes oxidation promoting catalysts in the form of pellets within a catalyst retaining member located in a sound attenuating chamber and further to a muffler that also has a bypass valve to assure protection of the catalyst in case of an overheat condition that could as a consequence thereof destroy the catalyst.

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[51] Int. Cl. B01j 9/02, F01n 3/00, F01n 3/14

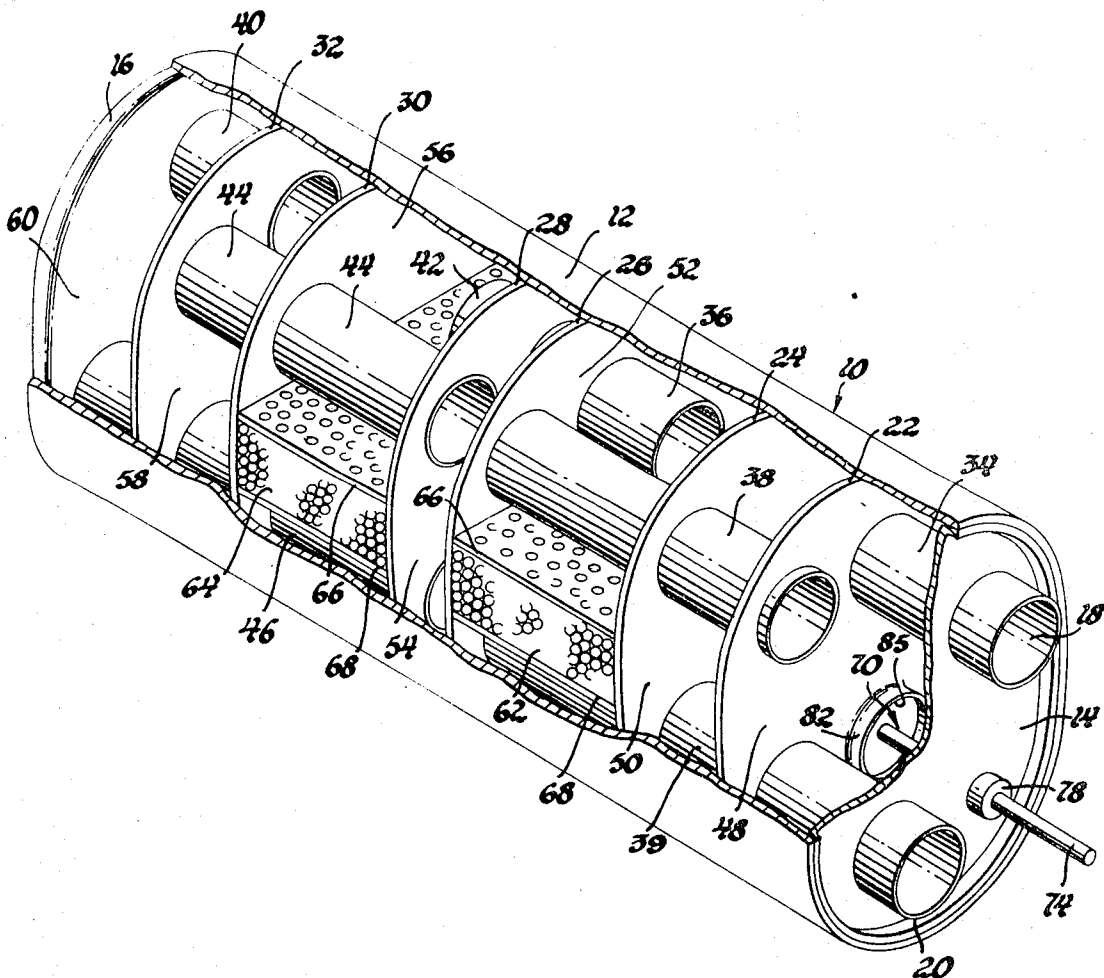
[58] Field of Search..... 23/288 F; 181/37, 44, 51, 181/71; 60/288, 299; 55/276, 304, 312, 313, 418, 419

[56] References Cited

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4 Claims, 4 Drawing Figures

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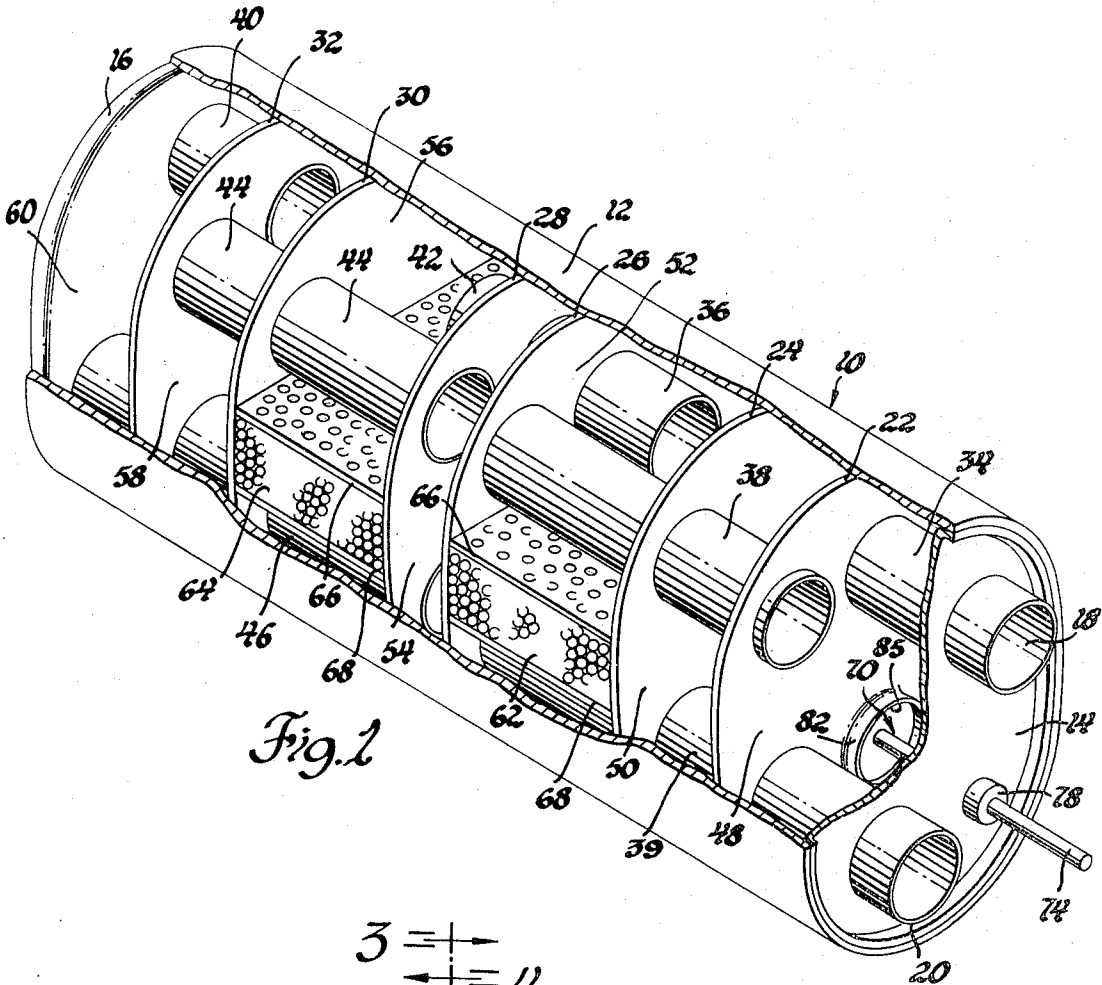


Fig. 1

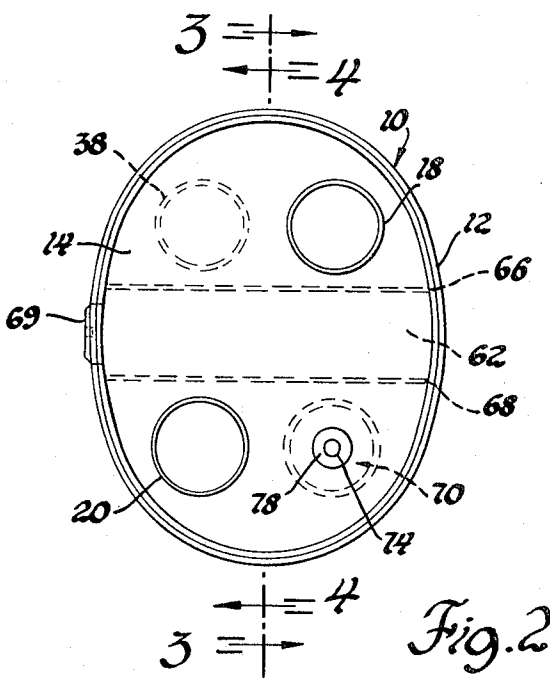


Fig. 2

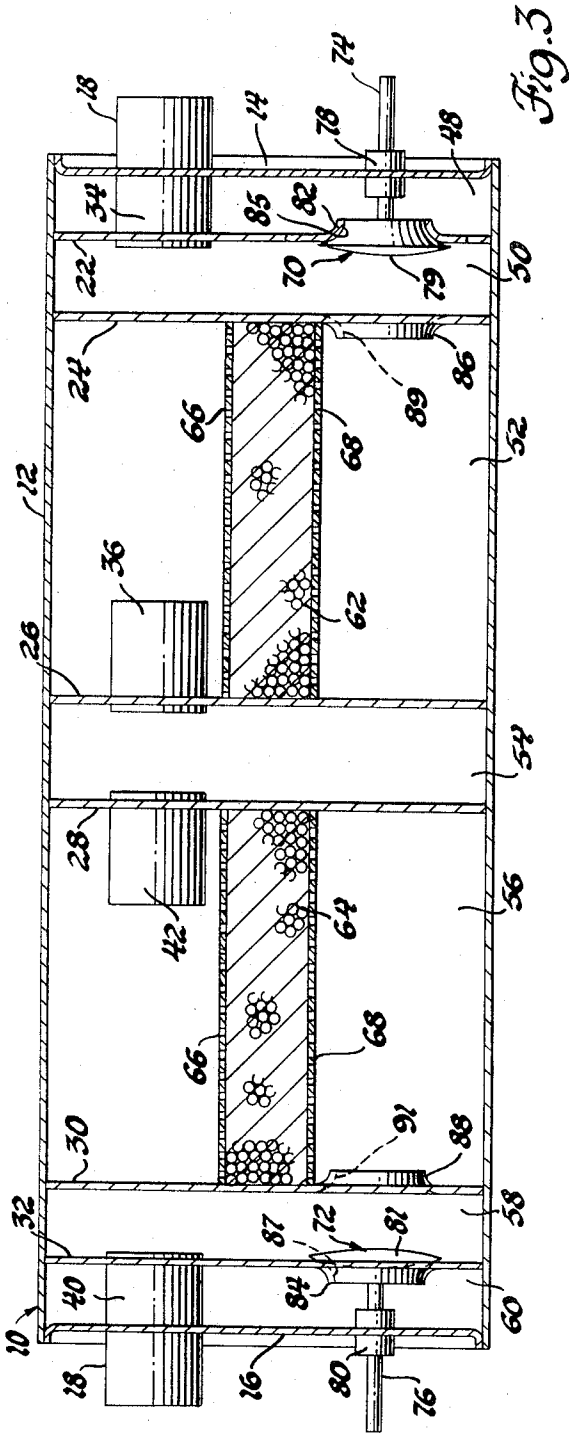


Fig. 3

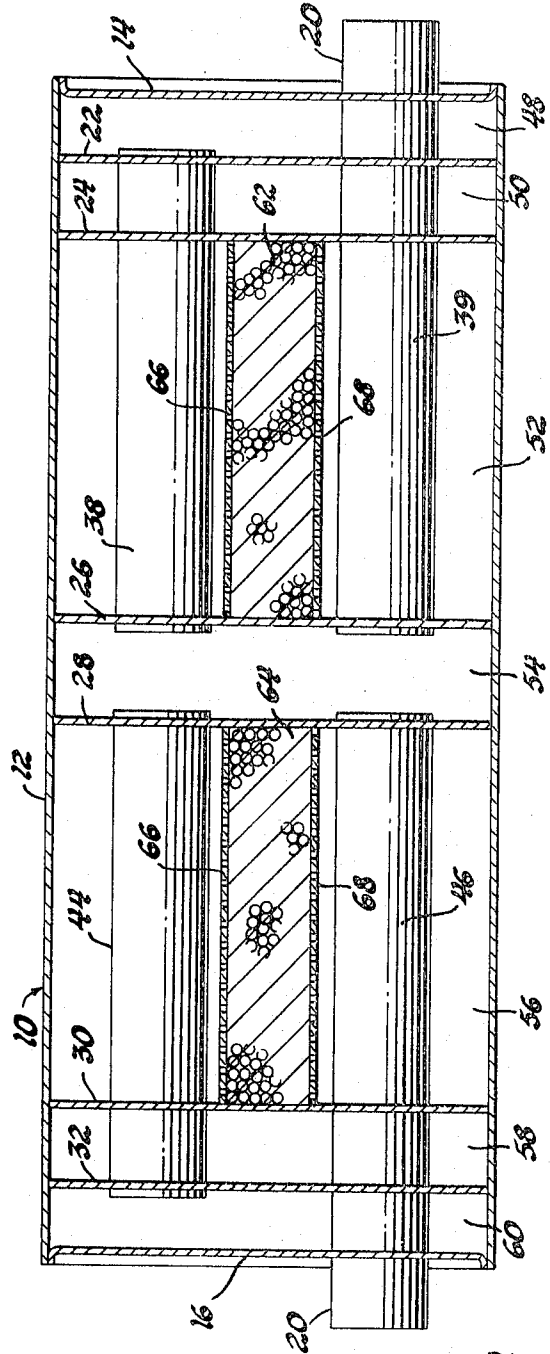


Fig. 4

CATALYTIC CONVERTER MUFFLER ASSEMBLY

In the fabrication of automobile exhaust mufflers it has been the conventional practice to employ a muffler that is connected at its inlet to an exhaust pipe and at its outlet to a tailpipe. The muffler may have and generally does have one or more sound attenuating chambers acoustically coupled to the inlet and outlet for attenuating the noise level of the exhaust gases flowing through the muffler.

Likewise, mufflers have been constructed to promote a more complete combustion for the gases passing therethrough and one common construction of this type of muffler provides for passage of exhaust gases through a single chamber or through a plurality of chambers containing a bed of oxidation promoting catalysts in the form of pellets.

This invention relates to a muffler in which the muffler is provided with a plurality of sound attenuating chambers that are adapted to be acoustically coupled to an exhaust pipe and tailpipe and further to a muffler that includes an oxidation catalyst as well as a bypass valve within the muffler to allow the exhaust gases to be directed to the catalyst but also to be bypassed through the muffler and around the catalyst if the heat of the exhaust gas through the catalyst becomes sufficiently high enough to destroy the catalyst.

Therefore:

An object of the present invention is to provide a catalytic exhaust muffler which is simple and inexpensive in construction.

A further object is to provide a muffler having a catalytic bed therein.

Another object is to provide a muffler having a catalytic bed therein as well as sound attenuating chambers acoustically coupled to an exhaust inlet and outlet for attenuating noise levels of the exhaust gases flowing through the muffler.

Another object is to provide a muffler having bypass valve means therein to assure overheat protection of the catalyst.

Another object is to provide a muffler that can be used with a single exhaust system; and

A further object is to provide a muffler that is constructed in a single housing to allow connection to a dual exhaust system.

The invention both as to its construction and mode of operation will be better understood by reference to the following disclosure and drawings wherein:

FIG. 1 is a cutaway isometric view of a dual muffler showing layout and arrangement of the interior.

FIG. 2 is an end view of the dual muffler showing the inlet connection for the exhaust pipe and the outlet connection for the tailpipe for one side of the muffler, as well as the location of the bypass valve.

FIG. 3 is a sectional view taken along section 3—3 of FIG. 2 showing the side of the muffler through which the exhaust gas flows when the bypass valve is open and the muffler is functioning in the converter mode; whereas

FIG. 4 is a view through section 4—4 of FIG. 2 showing the exhaust pipe connection as well as the location of a second different pipe, that serves as a bypass pipe around the converter when the valve is closed and the gases bypass the converter.

Referring in detail to the drawings, specifically to FIG. 1, there is shown a catalytic type exhaust muffler

10. Muffler 10 is made up of a substantially hollow shell 12 that is generally cylindrical in shape having end caps, or discs or end plates 14,16 closing the ends of the shell 12. Discs 14 and 16 each contain an inlet pipe 18 that is adapted to be connected to an exhaust pipe and an outlet pipe 20 that is adapted to be connected to a tailpipe. It is understood that the muffler shown is a dual muffler and therefore requires a dual connection to the intake and exhaust pipes. It is further understood that only a half of the muffler system shown would be necessary in a single exhaust system.

Within muffler 10 are a plurality of spaced apart baffle plates 22, 24, 26, 28, 30 and 32, having a plurality of aligned holes therein that hold a plurality of pipes or conduit members 34, 36, 38, 39, 40, 42, 44 and 46 in spaced relative aligned relationship within the holes and in alignment between the baffle plates. The spaces between the baffle plates form the acoustic chambers 48, 50, 52, 54, 56, 58 and 60. The function and use of acoustic chambers are well known in the muffler art.

Between baffle plates 24 and 26 and within the acoustic chamber 52 there is also provided a catalyst retaining means 62 having apertured upper and lower plates 66,68 respectively. Likewise, a second catalyst retaining means 64 is formed between baffle plates 28 and 30 within acoustic chamber 56 also having an apertured upper plate 66 and an apertured lower plate 68. An oxidizing catalyst in the form of pellets is placed within the catalyst retaining means. A closure member 69 in the form of a screw type plug or press fitted plug, or any similar means is provided in the side of the catalyst retaining means for replenishing the catalyst material if required. It is understood that only one catalyst retaining means would be necessary for a single exhaust muffler as well as only half the baffle plates and acoustic chambers would be necessary.

As best shown in FIG. 3, muffler 10 also includes bypass valve means 70,72 that are located or held in end plates 14,16 and includes actuator means 74,76 that protrude through the baffle plates 14,16 through a sealing means 78 and 80. Any form of sealing means having the desired heat withstanding characteristics could be used. Actuation of the valve can be accomplished by any mechanical means such as a vacuum diaphragm valve, or electric motor. A temperature sensing device is also required to activate the mechanical means at the required temperature. This is a well known expedient in the art. The bypass valves have generally bulbous shaped heads 79,81 thereon that fit into and thereby provide a seal in conforming or mating struckout portions that form holes in the respective baffle plates. In the open position or conversion mode the head portions 79,81 of the bypass valves are seated in the struckout portions 82 and 84 that form holes 85 and 87 in baffle plates 22 and 32 respectively. In the bypass mode or closed position of the bypass valve, the head portions 79,81 are in contact with and are sealed in the struckout portions 86,88 that form holes 89 and 91 in baffle plates 24,30 respectively.

Normal operation of the muffler will be the conversion mode. Referring to the right side of the muffler and in the conversion mode, exhaust gas from the exhaust pipe enters through the inlet pipe 18 in baffle plate 14 where the exhaust gas passes into acoustic chamber 50 then through the opening 89 in baffle plate 24, through the catalyst bed confined between apertured plates 66,68. The exhaust gas then passes through

pipe 36 into acoustic chamber 54, through pipe 39 (FIG. 4) to outlet pipe 20.

When the catalyst bed reaches a predetermined temperature, a temperature sensing device, actuates a solenoid or other similar means to move the valve to the bypass mode. In the bypass mode, where entrance of the gas into and through the catalyst is diverted, valve 70 is moved to seat in struckout portion 86 to close the opening 89 in baffle plate 24 to cause the gas that enters through pipe 18 to pass into acoustic chamber 50, then through previously closed opening 85 into acoustic chamber 48. The gas then passes through pipe 38 (FIG. 4) located in acoustic chamber 52 into acoustic chamber 54, pipe 39 to a tailpipe adapted to be attached to the outlet at 20. As is readily apparent, even though the catalyst is completely bypassed, the exhaust gas still passes through the acoustic chambers, the function of which is well known in the prior art.

As to the operation of the left side or the second bank of the muffler the operation is the same as the right side. In the conversion mode, exhaust gas passes into pipe 18 through acoustic chamber 58 through the opening 91 in baffle 90 30 the catalyst in catalyst retainer 64, through pipe 42 into acoustic chamber 54 and out through pipe 46 (FIG. 4) to the tailpipe system that is adapted to be attached at 20.

In the bypass mode, bypass valve 72 is moved to seat the head portion 81 in struckout portion 88 to close opening 91 in baffle plate 30, to cause the exhaust gas that enters pipe 18 to pass into acoustic chamber 58 then pass through the opening 87 in baffle plate 32 into acoustic chamber 60. The gas passes out of acoustic chamber 60 through pipe 44 (FIG. 4) into acoustic chamber 54 and into the exhaust system through pipe 46 (FIG. 4). Since this is a dual exhaust system, the exhaust gas enters intake pipes 18 on both ends of the muffler and it is being exhausted through outlet pipes 20 on both ends of the muffler. Also, each side of the muffler functions separately from the other side. Therefore, one side of the muffler could be in the conversion mode, and the other side in the bypass mode. The exhaust gases entering each side, will only flow into and out of the same side.

It is understood that the muffler could be constructed as a single muffler. In such a construction, only half or one side of the dual muffler as shown would be required.

The invention as shown and described will provide an integral converter and muffler that will save space, reduce cost and also provide sound attenuating means in either the conversion or bypass mode of the muffler.

While the embodiments of the present invention as herein disclosed constitute a preferred form, it is to be understood that other forms might be adopted.

We claim:

1. An exhaust muffler comprising: a substantially hollow muffler shell having an exhaust gas inlet and an exhaust gas outlet; a catalyst retaining means comprising apertured bottom and top plates within said shell having a catalyst therein; a plurality of spaced apart parallel baffle plates also within said shell forming acoustic chambers, a plurality of conduit members between the baffle plates that are adapted to direct exhaust gases from said inlet through said baffle plates and acoustic

chambers through said catalyst in said catalyst retaining means to the outlet; and a bypass valve positioned between adjacent baffle plates; whereby said bypass valve is adapted to open an aperture in one baffle plate to direct gas to said catalyst retaining means during a conversion mode, and is further adapted to close the aperture and open a second aperture in the adjacent baffle plate to direct exhaust gases around said catalytic retaining means during a bypass mode.

2. An exhaust muffler comprising: a substantially hollow shell having end plates; exhaust gas inlet and outlet means in one of the end plates; a plurality of spaced apart baffle plates forming acoustic chambers therebetween, said baffle plates being arranged parallel with said end plates and being substantially perpendicular to said hollow shell; catalyst retaining means having a catalyst confined between two apertured plates positioned within an acoustic chamber and fixedly held between two spaced apart baffle plates; means cooperating with said exhaust gas inlet and exhaust gas outlet to direct exhaust gas through said baffle plates to the acoustic chambers, and a bypass valve having a rod extending through said one end plate and a head on the opposite end of said rod positioned between adjacent baffle plates whereby said head on said rod is adapted to cooperate with apertures in adjacent baffle plates when said rod is actuated, to open an aperture in one baffle plate to direct gas through the catalyst during a conversion mode, and to close the aperture and open an aperture in the other of said baffle plates to direct exhaust gases around said catalyst during a bypass mode.

3. A dual exhaust muffler comprising: a substantially hollow shell having end plates; said hollow shell being generally divided into two separate sections; exhaust gas inlet and outlet means for each section formed respectively in each of said end plates with said inlet and outlet means leading into and out of each section; a plurality of spaced apart baffle plates forming acoustic chambers therebetween, arranged parallel with said end plates and being substantially perpendicular to said hollow shell; a catalyst retaining means in each of said separate sections having a catalyst confined between two apertured plates positioned within two separate acoustic chambers and being fixedly held between respective baffle plates; means in each of said sections cooperating with said exhaust gas inlets and exhaust gas outlets to direct exhaust gas through said baffle plates to the acoustic chambers, and bypass valve means having rods extending through each of said end plates having head portions on the opposite ends of each of said rods whereby said heads on said rods are adapted to cooperate with apertures in adjacent baffle plates when said rods are actuated to open an aperture in one baffle plate in each section, to direct gas through the catalyst during a conversion mode and to close the apertures and open an aperture in the other of said baffle plates in each section to direct exhaust gases around said catalyst during a bypass mode.

4. In a muffler as set forth in claim 2 wherein said means to direct exhaust gas through said baffle plates to the acoustic chambers is a plurality of aligned pipes through said baffle plates leading into and out of said chambers.

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