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Bray et al.

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[54] **SPRING LOADED CATALYTIC CONVERTER WITH EXTERNALLY MOUNTED SPRING**

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[52] **U.S. Cl.** ..... **23/288 FC**; 23/288 F

[51] **Int. Cl.**[2] **B01J 8/00**; F01N 3/15

[58] **Field of Search** ..... 23/288 F, 288 FC; 138/108, 138/111, 112

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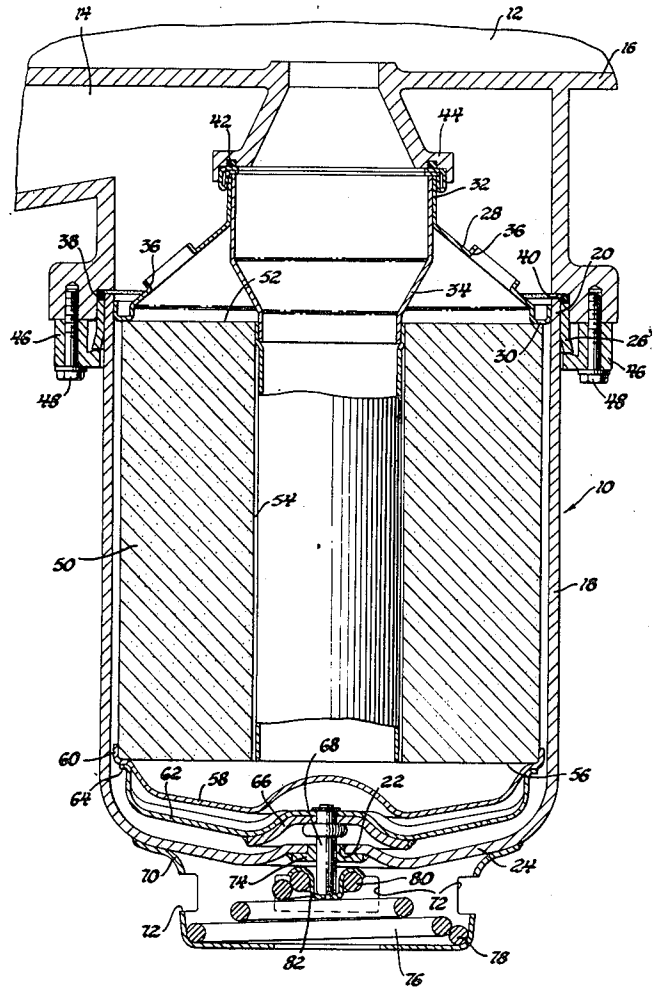
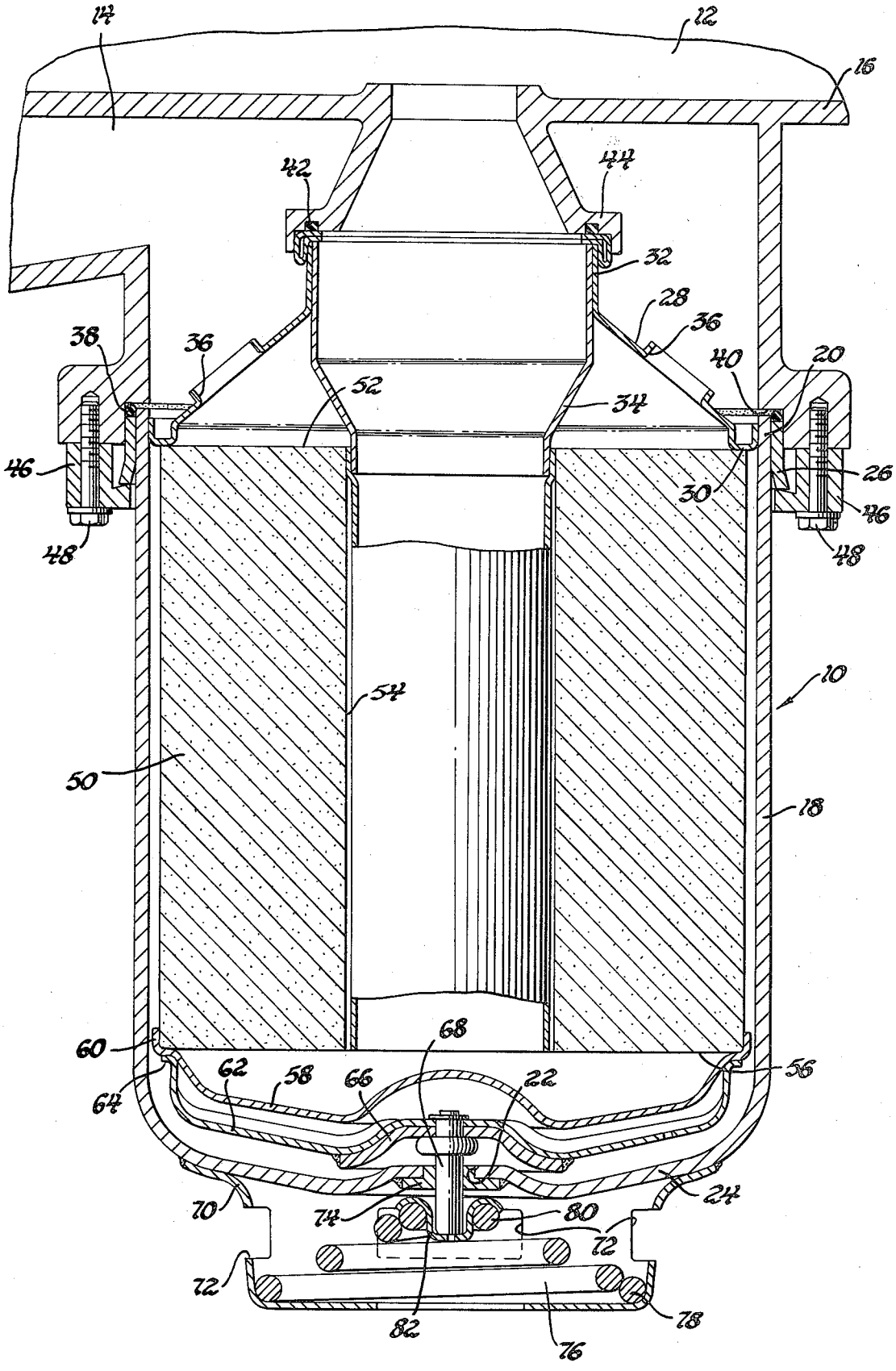
[57] **ABSTRACT**

In a catalytic converter having a casing with an inlet and outlet for exhaust gas flow and a peripheral catalyst element seat at one end, a monolithic catalyst element within the casing against the seat and a flow reversing baffle having a peripheral rim engaging the end of the catalyst opposite the seat, a load bearing member has a peripheral rim engaging the peripheral rim of the baffle and a central finger projecting outward through an opening in the casing into a ported retainer cup fixed to the outside of the casing; and a conical spring is compressed inside the cup with the large diameter end abutting the cup and the small diameter end engaging the finger to exert force through the load bearing member to hold the catalyst member firmly against the seat, the ported retainer cup allowing atmospheric air circulation over the spring for cooling.

1 Claim, 1 Drawing Figure

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SPRING LOADED CATALYTIC CONVERTER WITH EXTERNALLY MOUNTED SPRING

BACKGROUND OF THE INVENTION

This invention relates to catalytic converters for internal combustion engine exhaust systems and particularly to such converters having monolithic catalyst elements within a casing. It is desirable to hold such monolithic catalyst elements firmly in place within their casings to prevent chipping and breakage of the element during shock or vibration. However, it is advisable to plan for different rates of thermal expansion between the ceramic based catalyst element and the metal casing.

One method of holding the catalyst element firmly within the casing while allowing for different thermal expansion between the element and the casing is to spring load the catalyst element within the casing with a spring stronger than any shock to which the converter is likely to be subjected. However, the high temperatures usually maintained in the operation of such catalytic converters require special alloy springs to maintain their force characteristics; and this adds to the cost of such converters.

SUMMARY OF THE INVENTION

This invention provides for a spring loaded monolithic catalytic converter with the spring maintained outside the converter casing and exposed to atmospheric air for cooling. This invention shows means whereby such a spring can exert a force on the catalytic element within the casing and discloses a converter with a high strength spring of a design especially suited to maintaining a compact outer size for the converter. Further details and advantages of this invention will be apparent from the drawing and following description of the preferred embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the FIGURE, a combustion engine exhaust system includes a catalytic converter **10**, an exhaust passage **12** for carrying exhaust gases to catalytic converter **10** and another exhaust passage **14** for carrying exhaust gases from catalytic converter **10**. Exhaust gas passages **12** and **14** might be defined by an engine mounted exhaust manifold such as that partially shown at **16**.

Catalytic converter **10** comprises a casing including a generally cylindrical shell **18** which is open at the axial end **20** nearest manifold **16** and has a small axially central opening **22** at the other axial end **24**. Retaining ring **26** is fixed around end **20** of shell **18** by welding or similar means.

The casing further comprises an annular end member **28** having a peripheral rim formed into a catalyst element seat **30** and pressed into open end **20** of shell **18**. The radially inner portion **32** of annular end member **28** fits around, and is sealingly fixed to, an inlet conduit **34** which is aligned axially with respect to cylindrical shell **18** and extends axially toward the other end **24** of shell **18**. Annular end member **28** also includes one or more outlet openings **36** therethrough.

Catalytic converter **10** is mounted directly on manifold **16**, with the open end of shell **18** sealed with an O-ring **38** on an outer circular mounting seat **40** and inlet conduit **34** sealed by an O-ring **42** to an inner mounting flange **44**. With converter **10** thus mounted, inlet conduit **34** opens to exhaust passage **12**; and outlet openings **36** open to exhaust passage **14**. A plurality of clamps **46**, bolted to manifold **16** by bolts **48**, engage retaining ring **26** and maintain converter **10** in place.

Within shell **18**, a monolithic catalyst element **50** has one axial end **52** abutting catalyst seat **30** and a central axial opening **54** through which inlet conduit **34** extends. At the other end **56** of catalyst element **50**, a flow reversing baffle **58** has a peripheral rim **60** which sealingly engages catalyst element **50** at its outer diameter. A load bearing member **62** is disposed within shell **18** just beyond baffle **58**. Load bearing member **62** has a peripheral rim **64** which bears against peripheral rim **60** of baffle **58**, a reinforcing disk **66** welded to the axial center thereof and a finger **68** fixed to the axial center of load bearing member **62** and reinforcing disk **66** and projecting outward through opening **22** in shell **18**.

A ported retaining cup **70** having ports **72** therein is welded to end **24** of shell **18**. Finger **68** thus projects into the volume enclosed by retaining cup **70**. A sealing washer **74** surrounds finger **68** in opening **22** and prevents exhaust to the atmosphere of any exhaust gases that may have escaped around baffle **58**. Sealing washer **74** allows axial freedom of movement for finger **68** and thus for load bearing member **62**.

A conical spring **76**, within ported retaining cup **70**, has a large diameter end **78** adjacent cup **70** and a small diameter end **80** engaging finger **68** by means of an adapter **82**. Spring **76** is compressed within cup **70** and thus exerts an axial force through finger **68**, load bearing member **62** and peripheral rim **60** of baffle **58** to hold catalyst element **50** firmly against catalyst element seat **30**.

In operation, exhaust gases enter catalytic converter **10** from exhaust passage **12** through inlet conduit **34** and flow toward the other end of converter **10**, where flow reversing baffle **58** forces them to flow back through catalyst element **50** and outlet openings **36** to exhaust passage **14**. Flow reversing baffle **58** thus prevents contact between the hot exhaust gases and load bearing member **62**.

Spring **76**, being outside shell **18** in ported retaining cup **70**, is removed from the hot area of the converter **10** and exposed to atmospheric air circulating through ports **72** for cooling. The temperature of spring **76** is thus reduced to the point where less expensive spring steel may be used. The conical design of spring **76** allows the coils to nest within each other upon compression so that the axial length of the spring is reduced to the maximum extent for compactness of the catalytic converter **10** and consequent maximum freedom of placement of catalytic converter **10** within a crowded vehicle engine compartment.

The embodiment as described is only a preferred embodiment of this invention. Since equivalent embodiments will occur to those skilled in the art, this invention should be limited only by the claims which follow.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A catalytic converter for an engine exhaust system comprising, in combination: a generally cylindrical housing having an axially central inlet and an outlet at one end thereof for exhaust gas flow, a peripheral catalyst element seat at the one end thereof and an axially central opening at the other end thereof; a generally cylindrical monolithic catalyst element having one

axial end positioned against the catalyst element seat, another axial end and a central axial opening therethrough extending between the axial ends and aligned with the housing inlet for conducting exhaust gases from the one axial end to the other; a flow-reversing baffle having a circumferential rim in sealing contact with the other axial end of the catalyst element, the baffle being effective to direct exhaust gas flow from the catalyst element opening radially outward and back through the catalyst element to the outlet; ported spring retaining means fixed to the other end of the housing outside the housing opening; spring means positioned in the spring retaining means for cooling by atmospheric air; and a load-bearing member positioned between the flow-reversing baffle and the other end of

the housing, the load-bearing member having a peripheral rim positioned against the peripheral rim of the flow-reversing baffle and a centrally positioned finger projecting out of the housing in slidable sealing engagement with the housing through the housing opening into engagement with the spring means, whereby the force of the spring means is transmitted through the peripheral rims of the load-bearing member and flow-reversing baffle to the catalyst element to retain it firmly against the catalyst element seat, the load-bearing member being otherwise spaced from the flow-reversing baffle for minimum thermal contact therewith, whereby the flow-reversing baffle protects the load-bearing member from the hot exhaust gases.

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