US 20050150222A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0150222 A1**

Kalish et al. (43) **Pub. Date: Jul. 14, 2005**

(54) **ONE PIECE CATALYTIC CONVERTER WITH INTEGRAL EXHAUST MANIFOLD**

(76) Inventors: **Martin W. Kalish**, Livonia, MI (US); **Robert B. Purdy**, Wingham (CA); **Clinton J. McAllister**, Woodstock (CA)

Correspondence Address:
HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303 (US)

(21) Appl. No.: **11/022,067**

(22) Filed: **Dec. 23, 2004**

Related U.S. Application Data

(60) Provisional application No. 60/533,233, filed on Dec. 30, 2003.

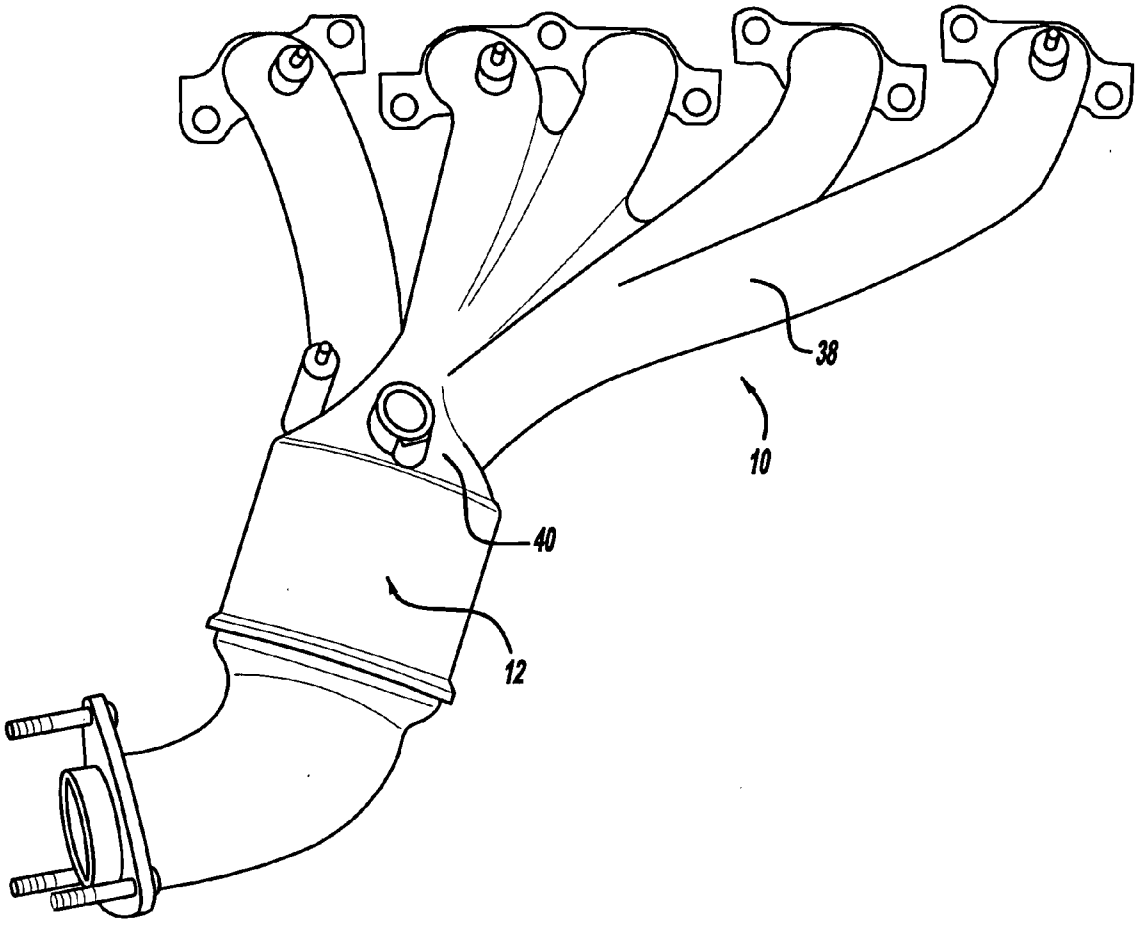
Publication Classification

(51) **Int. Cl.**[7] **F01N 3/00**; F01N 7/10; F01N 3/10

(52) **U.S. Cl.** **60/302**; 60/323

(57) **ABSTRACT**

The present invention relates to exhaust system assemblies and, more particularly, to a one piece catalytic converter can with an integral exhaust manifold. Disposed within the catalytic converter can are the catalytic conversion components. Coupled to the one piece converter can and integral exhaust manifold is a second end cone to provide a substantially air tight seal to the assembly.



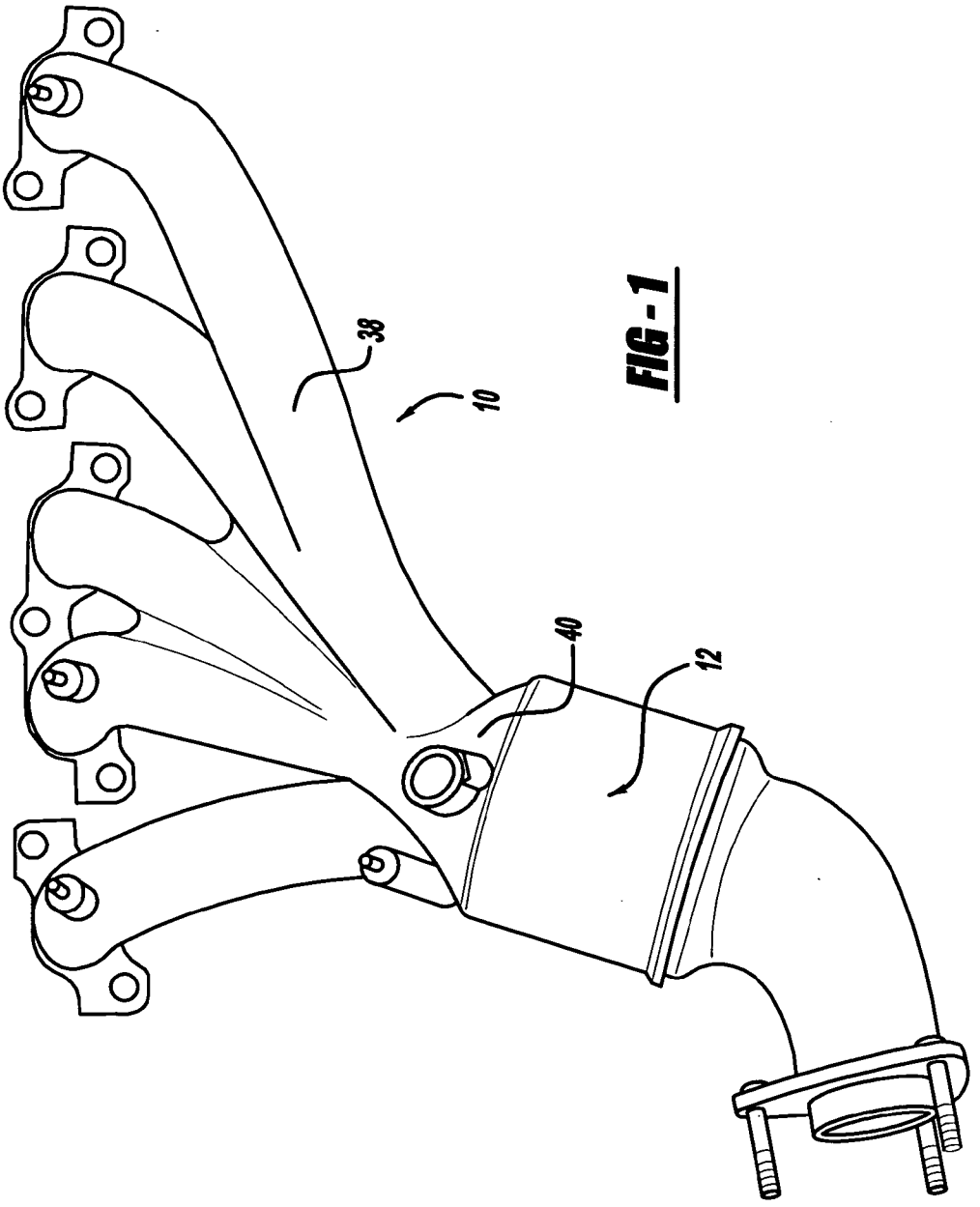


FIG - 1

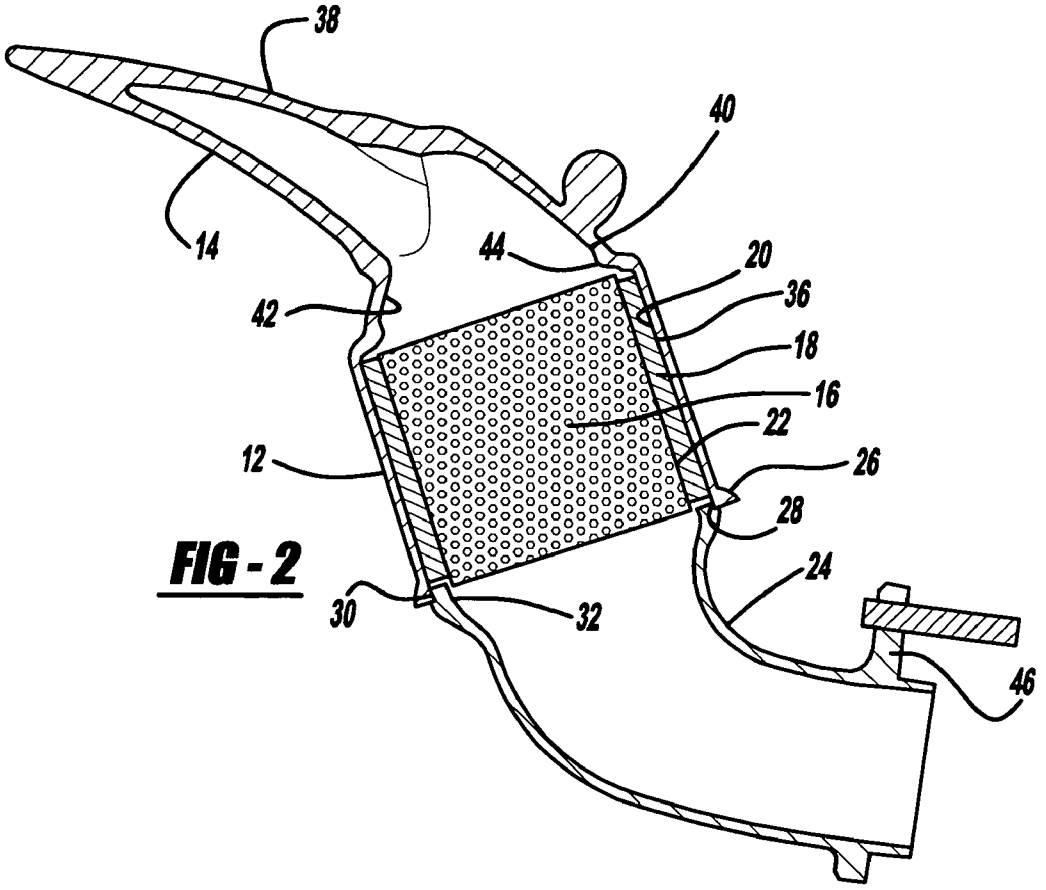


FIG - 2

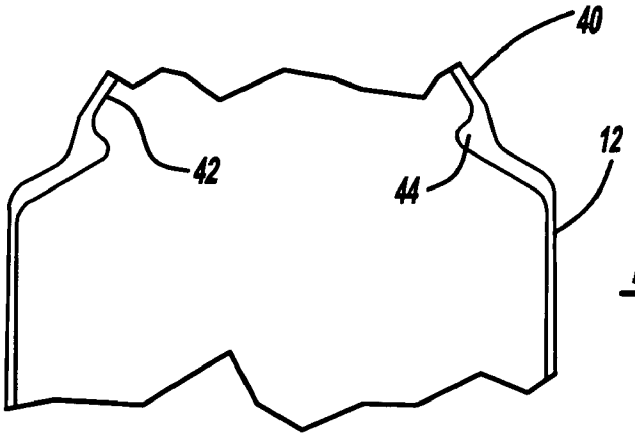


FIG - 3

ONE PIECE CATALYTIC CONVERTER WITH INTEGRAL EXHAUST MANIFOLD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/533,233, filed on Dec. 30, 2003. The disclosure(s) of the above application(s) is (are) incorporated herein by reference.

FIELD OF THE INVENTION

[0002] 1. Technical Field

[0003] The present invention relates to catalytic converters and, more particularly to a one piece catalytic converter can with an integral exhaust manifold. Preferably the integral catalytic converter can and exhaust manifold are formed as a unitary casting. While numerous materials may be suitable for casting the one piece catalytic converter and exhaust manifold, cast irons and, preferably SiMo cast irons are preferred.

[0004] In addition to the one piece catalytic converter with integral exhaust manifold, the present invention also relates to a method of welding an end cone to the one piece catalytic converter and integral exhaust manifold.

[0005] 2. Discussion of Prior Art

[0006] Catalytic converter assemblies are typically formed by mechanically fastening stamped or otherwise machined inlet cones, outlet cones and converter housings together to contain the conversion materials. Among the perceived drawbacks to this type of catalytic converter assembly are the costs associated with assembling multiple pieces to arrive at a useful component and the inherent gas leak paths associated with multi-piece components, especially those employing mechanical fasteners to join the pieces.

SUMMARY OF THE INVENTION

[0007] In a first instance, the present invention addresses the above described drawbacks, among others, by providing a catalytic converter assembly employing a one-piece catalytic converter can and integral exhaust manifold to limit the number of overall components in the assembly.

[0008] In addition to catalytic converter assemblies including a one piece catalytic converter can with integral manifold, the present invention also relates to a method of manufacturing catalytic converter assemblies by welding a second end cone or second end portion of an exhaust manifold to the one piece catalytic converter can and integral exhaust manifold.

DESCRIPTION OF THE DRAWINGS

[0009] **FIG. 1** is a perspective view of a catalytic converter assembly employing a one piece catalytic converter can and integral exhaust manifold according to the teachings of the present invention;

[0010] **FIG. 2** is a cross-sectional view of a catalytic converter assembly employing a one piece catalytic converter housing and integral exhaust manifold according to the teachings of the present invention; and

[0011] **FIG. 3** is a magnified sectional view of the inlet cone portion of the assembly.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Referring to **FIGS. 1 and 2**, shown is a catalytic converter assembly **10** employing a one piece catalytic converter can and integral manifold assembly. The converter can portion is defined by reference numeral **12** and the manifold is defined by reference numeral **14**. Generally, the catalytic converter can portion **12** houses the components necessary for converting the exhaust gases prior to discharge from the vehicle to the atmosphere. While not specifically shown, the converter can and/or the manifold portion of the assembly can be provided with various sensors to monitor gas flow through the system.

[0013] As illustrated, the catalytic conversion components inserted within the converter can portion **12** include a substrate **16** which is held in place by a mounting mat **18**. Z-seals (not shown) which are known in the art, may be used in association with the mat to assist in securing the substrate within the converter can. The mounting mat is disposed adjacent the inner wall **34** of the converter can in the gap **36** occurring between the inner wall **20** of the converter can **12** and the outer surface **22** of the substrate **16**. By employing a mounting mat in the gap, dimensional variations in converter can, the substrate or mounting mat material can be accommodated with what is considered to be a negligible effect on the overall performance of an exhaust system employing the integral assembly **10**. The gap **36** can vary in size but preferably is between 3.5 and 7.5 mm. A properly sized gap allows for adherence to minimize and maximize pressure requirements both during installation of the substrate, which are known to be relatively fragile, and during the systems useful life. Importantly, the gap also allows for the use of a mounting mat made from a hybrid material of ceramics/metal which can be a significant cost savings.

[0014] The mounting mat **18** holds, cushions and thermally insulates the substrate. Mounting mats can be made of intumescent material such as vermiculite, non-intumescent material such as ceramic fibers, or a combination of intumescent and non-intumescent materials bound by an organic compound by way of non-limiting example. Preferably, the mat is non-intumescent and of a basis weight suitable to optimize the holding force, cushioning and insulation of the substrate.

[0015] As should be understood in the art, the substrate **16** is the filtering or exhaust gas conversion component of the assembly. While the substrate **16** is shown as a single piece, it should be understood that the substrate may include multiple pieces which is sometimes referred to as a "cascaded" system. The substrate pieces may be made from the same or different materials having varying catalytic properties. Likewise, the substrate pieces may be of the same or varying design. Additionally, sensors (not shown) may be incorporated into the substrate assembly to monitor and control the flow of exhaust gas through the assembly.

[0016] The integral exhaust manifold portion **14**, itself can be described in terms of two distinct sections, namely the transition pipes **38**, which are typically mounted to an engine block (not shown) and an inlet cone **40**. As should be understood in the art, the inlet cone **40** is shaped internally

along wall **42** to accumulate the exhaust gas entering from pipes **38** and to direct the gas flow to and through the substrate. Thus, the inlet cone **40** is narrower along the transition point with the transition pipes and is wider at the transition point with the converter housing.

[**0017**] As shown most clearly in **FIG. 3**, the inner wall **42** of the inlet cone **40** is provided with an annular inwardly projecting portion **44** in proximity to the mat **18** intended to divert exhaust gas away from the mat **18** and through the substrate **16**. By providing the annular projection **36**, the working life of the mat can be greatly extended.

[**0018**] Also depicted in **FIGS. 1 and 2** is an outlet cone **24** which is shown as including a flange **46** for connection to a muffler assembly (not shown). It should be noted, however, that assembly **10** has applications for direct attachment to a muffler assembly. The one piece catalytic converter can **12** and integral manifold portion **14** forming assembly **10** when appropriately joined with the outlet cone **24**, form a portion of the "hot end" of an exhaust system.

[**0019**] Coupling of the outlet cone **24** to the integral manifold assembly may be done mechanically, adhesively and/or via a weld joint **30**. A preferred weld joint **30** is depicted whereby the converter can includes a first end **26** having a recess **28** for receiving the leading end **32** of the second cone **24** in a close fit relationship. Once the outlet cone **24** is inserted into the recess of the converter can portion, a circumferential weld can be carried out along the weld joint **30** to seal the assembly. In view of the fact that the outlet cone may be formed of a material other than that which is used to cast the integral assembly **10**, care should be taken in selecting the appropriate weld wire material to insure that a secure weld occurs along the joint.

[**0020**] Among the numerous advantages of the one piece catalytic converter with integral exhaust manifold is the elimination of multiple coupling joints which in turn limits the number of potential leak paths along the assembly. As the number of coupling joints increases, the cost to assemble also tends to increase. Another advantage of the present invention is that the one piece catalytic converter with integral exhaust manifold can be cast from a suitable alloy such as SiMo cast iron by way of non-limiting example. Thus, it is believed that the embodiments presented herein represent a potential cost savings to the manufacturer.

What is claimed is:

1. An exhaust system component comprising:

a one piece catalytic converter can with integral exhaust manifold, said converter can including an opening for receiving catalytic conversion components.

2. The exhaust system component of claim 1, wherein said one piece catalytic converter can with integral exhaust manifold is formed by casting.

3. The exhaust system component of claim 2, wherein said casting is formed from SiMo iron.

4. The exhaust system component of claim 1, wherein said integral exhaust manifold includes at least one transition pipe and an inlet cone.

5. The exhaust component of claim 4, wherein said inlet cone includes an inner wall which is narrower along the transition point with said at least one transition pipe and wider along the transition point with said converter can.

6. The exhaust component of claim 5 wherein the inner wall of the inlet cone includes an annular inwardly projecting portion in proximity to the transition point with said converter can.

7. The exhaust system component of claim 1, further comprising a mounting mat disposed adjacent an inner wall of said converter can and a filtering substrate disposed within said mounting mat.

8. The exhaust system component of claim 7, wherein said filtering substrate includes multiple substrate pieces having varying catalytic properties.

9. The exhaust system component of claim 7, further comprising a second end cone which is coupled to said converter can.

10. The exhaust system component of claim 8, wherein said second end cone is coupled to the converter can by welding along a coupling joint.

11. The exhaust system component of claim 10, wherein said coupling joint includes a recess occurring along the opening of said converter can which receives the leading end of the second end cone in a close fit relationship.

12. A method of manufacturing an exhaust system assembly comprising the steps of:

a) providing catalytic conversion components;

b) providing a one piece catalytic converter can and integral exhaust manifold, said converter can including an opening for receiving said catalytic conversion components and said integral exhaust manifold including a first end cone;

c) disposing the catalytic converter components within the opening of said catalytic converter can; and

d) attaching a second end cone to said catalytic converter can to capture the catalytic converter components within said catalytic can.

13. The method of claim 12, wherein said one piece catalytic can and integral exhaust manifold is formed by casting.

14. The method of claim 13, wherein said casting is formed from SiMo iron.

15. The method of claim 12, wherein said second end cone is attached via welding along a coupling joint.

16. The method of claim 15, wherein said coupling joint includes a recess occurring along the opening of said converter can which receives the leading end of the second end cone in a close fit relationship.

* * * * *