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(54) CONTAINERS FOR CATALYSTS FOR EXHAUST EMISSION CONTROL

We, TI SILENCERS LIMITED, a British Company of Squires Gate Lane, Blackpool, Lancashire FY4 3RN, do hereby declare the invention for which we pray that a Patent 5 may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to the construction of containers for receiving catalysts to be placed 10 in the exhaust systems of internal combustion engines, primarily those of road vehicles, for breaking down the unburnt products in the exhaust gases and thereby reducing the quan-

tity of pollution emitted.

One known form of catalyst structure comprises a ceramic honeycomb with the catalyst deposited in its interstices. These ceramic bodies have given rise to severe problems in locating them securely, bearing in mind 20 the inevitable differential thermal expansion and the mechanical weakness of the ceramic material. An alternative to the ceramic body is a honeycomb of sheet metal, made for example by superimposing alternate layers of

25 corrugated sheet and flat sheet. In one known structure of this kind, a composite sheet comprising one corrugated layer and one flat layer is rolled up to form a cylindrical body and is located in a sheet metal cylindrical 30 container which has frusto-conical inlet and

outlet ends. The catalyst itself is deposited in the channels of the honeycomb structure.

Even these metal catalyst-supporting bodies have been found to move under the repeated 35 heating and cooling to which they are subjected in use. In particular where (as is usually the case) the body and the container are of circular cross-section the body is liable to rotate.

There have been many proposals in earlier 40 patent specifications for locating the catalyst body against both lateral and longitudinal movement in the container despite repeated heating and cooling and despite differential

thermal expansion. For example in Geman Auslegeschrift 24 38 092 it has been proposed 45 to provide projections, for example flanges or spikes, projecting radially inwards from the outside cylindrical wall of the container and into the catalyst-supporting body. The aim of this construction is to prevent axial movement. It is also known to locate the body axially between two spiders that each extend across a respective end of the container.

The aim of the invention is to provide a simple and very economical way of locating the catalyst-supporting body not only axially but also against rotational movement within a cylindrical container. According to the invention there is proposed a container for receiving a catalyst structure for controlling the emissions in the exhaust system of an internal combustion engine, the container comprising a round cylindrical central portion adapted to receive a cylindrical catalyst-supporting body that substantially fills that portion, and inlet 65 and outlet end portions, and at least one locating element adjacent the position to be occupied by an end face of the body, characterised by the provision of at least one prong on the locating element, placed to dig into the adjacent end face of the catalyst-supporting body and thereby prevent rotation of the latter with respect to the container about the axis of the container.

For example the prong or prongs may be 75 provided on a spider that extends across that end of the body; the spider may be made of intersecting metal strips, with their ends welded or otherwise secured to the wall of the container. The dimensions and placing of the spider are preferably such that the act of assembling the components of the container together around the catalyst-supporting body forces the prong or prongs into the body to the required extent.

Preferably there are such spiders, each with

at least one prong, at both ends. Although the invention is primarily applicable to catalystsupporting bodies of the metal honeycomb type, it may be applied to the ceramic type.

The invention will now be further described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a longitudinal section on the axis of a catalyst container according to the inven-

Figure 2 is a transverse section through the container of Figure 1, taken on the line A-A in

Figure 3 shows one of the spiders used in 15 the container, looking axially;

Figure 4 shows the spider of Figure 3, looking perpendicular to its axis;

Figure 5 is a detail view showing an alternative way of securing the ends of the spider 20 to the wall of the container; and

Figure 6 is a detail view showing a further possible modification.

The container illustrated in the drawings is of known general construction, comprising a round cylindrical central portion1, basically frusto-conical inlet and outlet portions 2 and 3, and basically cylindrical inlet and outlet connecting subs 4 and 5. The container is made of sheet metal and is designed to receive a cylindrical catalyst-supporting substrate body (not shown but represented by the numeral 6) which substantially fills the central portion 1 of the

A Vee-section strip 7 is welded diametrically 35 across the entry end of the inlet portion 2 with its apex upstream and serves to spread the incoming stream of exhaust gases and discourage them from flowing only through the central part of the body 6.

The ends of the inlet and outlet stubs 4 and 5 are flared, as shown, and each welded to the smaller end of the associated frustro-conical inlet or outlet portion.

The larger ends of the inlet and outlet portions 2 and 3 terminate in cylindrical flanges 8 that fit into the ends of the central portion 1. Across each flange extends a fourlegged spider 9 made up of two intersecting metal strips welded together at their intersection. The strips are set edge - on to the flow of exhaust gases and their free ends 10 are bent over to extend circumferentially, for easy spot-welding to the insides of the flanges 8. Figure 5 shows an alternative construction in which the bent-over portions are omitted and the strips are arc-welded to the insides of the flanges 8.

The legs of the spiders 9 are curved to allow free thermal expansion without stress.

Formed on one edge of each leg of each of the spiders 9 there is a prong 11, the prongs being on the edges which face towards the body 5. In the example shown the prongs are of rectangular profile and quite shallow, only 2.5 mm measured in a direction parallel to

the axis of the container.

The spiders are welded in place in the mouths of the inlet and outlet portions 2 and 3 before those portions are joined to the central portion 1. First one of the portions 2 and 3 is welded to the central portion, then the body 6 is inserted, and then the other portion 3 or 2 is mounted with its flange 8 in the end of the portion 1 and the assembly is placed in a jig that forces this portion 3 or 2 axially to an accurately controlled extent or under a predetermined axial load so that the prongs 11 on both spiders 9 are forced into the end faces of the body 6 to a predetermined extent, locally crushing and deforming the material of the body, and those prongs form a positive key between the body and the container. The remaining portion 3 or 2 is then welded to the cylindrical portion 1 under these conditions.

Alternatively the body 6 could be placed in the central cylindrical portion 1 before either of the end portions 2 or 3 is fitted, then both these end portions are fitted and welded in

place simulaneously.

It will be appreciated that the provision of the prongs 11 engaging the end faces of the catalyst-supporting body 6 ensures that this body is securely prevented from rotating within the container, even under severe thermal conditions, and this result is achieved at negligible cost, and without any additional components.

In a further alternative construction, illustrated in Figure 6 the spiders 9 could be a sliding fit in the central portion 1 and could be inserted from opposite ends, with the body 6 already in place, then subjected to a predetermined axial load or a predetermined axial displacement to force the prongs 11 into the body 6 to the required degree, whereupon the spiders are welded to the portion 1. The inlet and outlet portions 2 and 3 are then welded on later, for example fitting onto, rather than into, the portion 1, as indicated at 8¹ in Figure

WHAT WE CLAIM IS:-

1. A container for receiving a catalyst structure for controlling the emissions in the exhaust system of an internal combustion engine, the container comprising a round cylindrical central 115 portion adapted to receive a cylindrical catalyst-supporting body that substantially fills that portion, and inlet and outlet end portions, and at least one locating element adjacent the position to be occupied by an end face of the body, characterised by the provision of at least one prong on the locating element, placed to dig into the adjacent end face of the catalystsupporting body and thereby prevent rotation of the latter with respect to the container about the axis of the container.

2. A container according to claim 1 having locating elements at both ends and at least one prong on each.

3. A container according to claim 1 or claim 130

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2 in which the or each locating element comprises a spider extending across the container and secured by the ends of its legs to the wall of the container.

4. A container according to claim 3 in which the spider is made up of metal strips set edgeon to the intended direction of flow through the container and the or each prong is formed on an edge of the metal strip.

5. A container according to claim 4 in which the or each prong has a depth, measured along the axis of the container, of substantially 2.5

mm

6. A container according to claim 3 which is built up of a cylindrical central portion and basically frusto-conical inlet and outlet portions which have flanges that fit into the ends of the cylindrical portion, the or each spider being secured in the flange of the adjacent inlet or outlet portion.

7. A container according to claim 3 which is built up of a cylindrical central portion and basically frusto-conical inlet and outlet portions which have flanges that fit over the ends of the cylindrical portion, the or each spider being

secured directly in the associated end of the cylindrical portion.

8. A method of assembling a container according to claim 6, complete with a catalyst30 supporting body, comprising securing the inlet or outlet portion to one one end of the cylindrical portion, inserting the body in the cylindrical portion, then fitting the outlet or inlet portion to the other end of the cylind35 rical portion and displacing it axially under a predetermined load or to a predetermined extent with respect to the other portions to force the prong or prongs into the end face

or faces of the body, and then securing the outlet or inlet portion to the cylindrical portion.

9. A method of assembling a container according to claim 6, complete with a catalyst-supporting body, comprising placing the body in the cylindrical portion, and applying the inlet and outlet portions, with the spider or spiders already fitted, to the ends of the cylindrical portion under a predetermined load or with predetermined displacement, and securing the inlet and outlet portions to the central portion.

10. A method of assembling a container according to claim 7, complete with a catalyst-supporting body in it, comprising placing the body in the cylindrical portion, fitting spiders in both ends of the cylindrical portion, applying an axial load to the spiders to force the prong or prongs into the end face or faces of the body, and securing the spiders in place in the cylindrical portions, then securing the inlet and outlet portions.

11. A container according to claim 1, substantially as described with reference to

the accompanying drawings.

12. A method of assembling a container complete with a catalyst-supporting body in it, according to claim 8, 9, or 10, substantially as described with reference to the accompanying drawings.

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1 SHEET

This drawing is a reproduction of the Original on a reduced scale

