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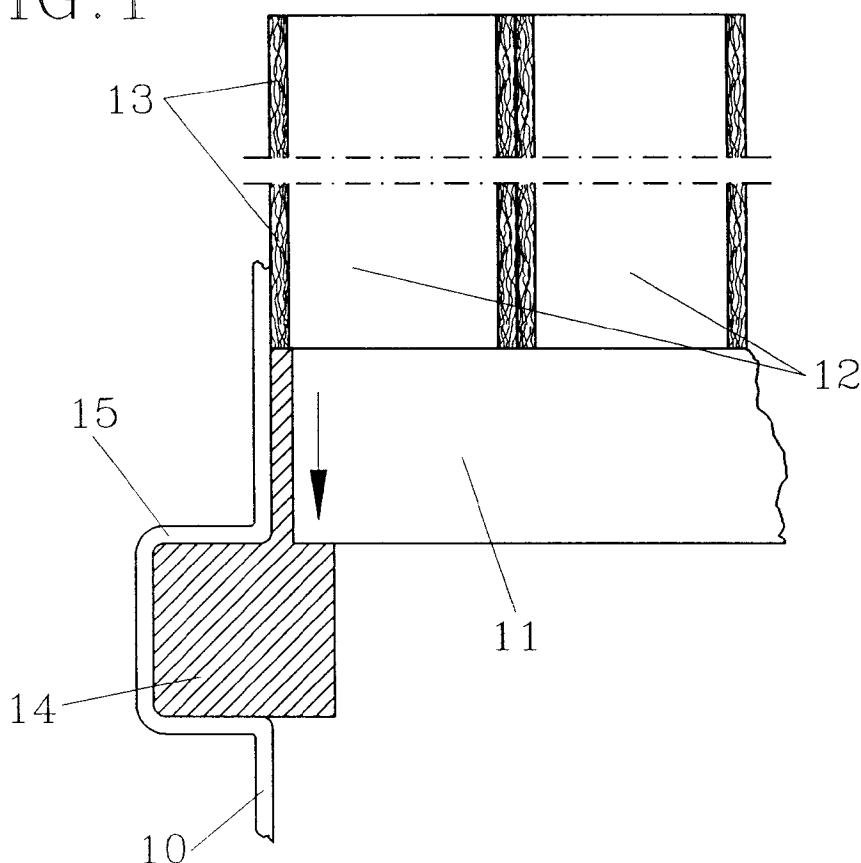
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(54) Support for ceramic monolith blocks

(57) A support for ceramic monolith blocks (12) inside a catalytic reactor chamber for cleaning exhaust gas. The blocks (12) are located upon at least one essentially horizontal grating (11) between an inlet to the

reactor chamber and an outlet from said chamber. The grating (11) is vertically displaceable between the walls (10) of the chamber. The displaceability is damped by means of resilient means (14).

FIG. 1



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Description

FIELD OF THE INVENTION

The present invention refers to a support for ceramic monolith blocks inside a catalytic reactor chamber for cleaning exhaust gas, which blocks are located upon at least one essentially horizontal grating between an inlet to the reactor chamber and an outlet from said chamber.

BACKGROUND OF THE INVENTION

Catalytic reactor chambers with ceramic monolith blocks are for example used within large combustion plants, in order to catalytically reduce the concentration of unhealthy and environmentally polluting contents in the exhausts. The monolithic blocks are provided with a large number of narrow channels extending through the respective blocks, in which channels the exhausts flow while they pass from the inlet of the reactor to its outlet.

At vertically mounted catalytic exhaust reactors for large diesel engines, the fragile ceramic catalytic material (often 150x150 mm in section and 200-300 mm high catalytic blocks, provided with protective collars of fibre-glass fabric) must be prevented from vibrating freely, from wearing against its supporting surface or from creating gaps to the reactor wall or between themselves, so that the gas may leak past the catalytic blocks and thereby avoiding cleaning. This is achieved by arranging a system of springs and seals which press against the sides of the catalytic blocks at two adjacent sides for each supporting surface, and in this way making them stand steady without any gaps. For a number of reasons, these systems will be complicated, because they have to be tight, at the same time they are subjected to strong thermal loads. They also press very hard against the side of the blocks standing nearest to the spring apparatus, while the blocks which stand at the far end from the spring apparatus are only subjected to a small pressure. It may also be very difficult to reach these apparatuses from the outside, because the reactors are often mounted close to two or three walls.

This means that those ceramic blocks which are closest to the side surfaces which form support surfaces for the blocks will be subjected to much more wear than the blocks which are located adjacent the spring apparatuses.

So far, it has been necessary to take expensive steps to insulate the catalytic reactor chamber from the frame vibrations normally occurring at large Diesel engines on ships.

THE TECHNICAL PROBLEM

The purpose of the present invention is to provide an improved support for monolithic blocks inside a catalytic reactor chamber, so that the mechanical wear on

the monolithic blocks is reduced, without the need for complicated vibration dampening devices at the reactor chamber.

THE SOLUTION

For this purpose, the invention is characterized in that the grating is vertically displaceable between the walls of the chamber, and that said displaceability is damped by means of resilient means.

According to a preferable embodiment of the invention, several monolith blocks are mounted within a common metal support frame which distances the fragile block surface from direct contact with the grating.

DESCRIPTION OF THE DRAWINGS

The invention will be described hereinafter with reference to embodiments that are shown in the enclosed drawings, wherein

- Fig. 1 is a schematic vertical section through a reactor chamber with a support according to a first embodiment of the invention,
- Fig. 2 is a corresponding section through a support according to a second embodiment of the invention, and
- Fig. 3 shows correspondingly as Fig. 1 and 2 a third embodiment of the invention.

DESCRIPTION OF EMBODIMENTS

Normally, a reactor chamber has an oblong shape with a rectangular cross section, and it is installed vertically, e.g. in a vessel for cleaning of exhausts from one or more Diesel engines.

The inner of the chamber is screened against the surroundings by means of side walls 10. Internally, the chamber is provided with gratings 11 in several stairs. The gratings form supports for honeycomb monoliths 12 of a ceramic material, which contribute to reduce for example contents of nitric oxide in the exhausts. Each honeycomb monolith is provided with a stocking 13 which extends along the vertical sides and forms a seal against the adjacent blocks and the side walls 10.

Each grating 11 is mounted so that it is vertically displaceable between the chamber walls 11, and the displaceability is damped by means of resilient means 14. This is achieved by means of a support cushion 14 of resilient material, which makes it possible for the gratings with the monolith blocks 12 to move somewhat vertically with reference to the reactor walls.

Because of this vertical flexibility, the reactor chamber may vibrate or oscillate in the vertical plane, without these movements being transmitted directly to the monolith blocks, which in principle are supported "floating" via the support cushions 14 of the gratings.

In the embodiment according to Fig. 1, the support

14 is realized, so that it is fixed inside a niche part 15 of the chamber wall 10, and projects for some distance into the chamber with support surfaces for the grating 11. Also, the grating has lateral support by the resilient support cushion 14.

Fig. 2 shows an alternative embodiment, in which the grating 11, as in the embodiment shown in Fig. 1, not merely is supported by the support cushion 14, but is clamped by means of a strip 16 between two cushions 14 which absorb movements both in the horizontal and the vertical plane.

Fig. 3 shows still another alternative embodiment, in which the monolith blocks 12 are mounted in one or more groups, e.g. four and four, and being sealed by means of a shape non-deformable support frame 17 which in its turn is supported by the grating 11. The support frame 17 is designed as a box structure in thin stainless steel plate with four sides which are open upward and downward. A narrow border 18 is folded 90° in toward the bottom side of the blocks and constitutes the only contact surface against the grating. The support frame 17 is mounted elastically sealing by means of narrow packing 19 of heat expanding material, partly between the support frame and the reactor wall 10, and partly between the support frame and the monolith blocks.

The grating is provided with a border 20 running along the outer edge, diverging outwards in cross section like a truncated cone, which engages an outwards V-shaped part 21 of the reactor wall 10. A space between the border 20 and the wall part 21 houses the resilient support cushion 14.

The support cushion 14 is preferably manufactured from stainless steel thread which has been formed by "felting" and pressing to form a resilient cushion 14, which has a progressive spring rate. The cushion forms an insulator which can absorb very high temperature and which is resistant to ageing.

The invention is not limited to the above described embodiment, instead more variants are conceivable within the scope of the following claims. For example, the attachment of the gratings 11 with reference to the chamber walls via supports, may be made in many different ways.

2. A support according to claim 1, **characterized** in that a group of monolith blocks (12) are held together by means of a metal support frame (17) as a shape permanent block unit having a defined geometry.
3. A support according to claim 2, **characterized** in that the grating (11) is provided with a border (20) running along the outer edge, diverging outwards in cross section like a truncated cone, which grips into an outwards V-shaped part (21) of the reactor wall (10) via a resilient support cushion (14).
4. A support according to claim 3, **characterized** in that the support frame (17) is mounted elastically sealed by means of thin gaskets (19) of heat expanding material, partly between the support frame and the reactor wall (10), and partly between the support frame and the monolith blocks.
5. A support according to claim 1, **characterized** in that the resilient means (14) are located between the grating (11) and horizontally arranged support surfaces (15) at the chamber walls (10).
6. A support according to claim 5, **characterized** in that cushions (14) are located between the underside of the grating (11) and the support surfaces (15) of the chamber walls.
7. A support according to claim 6, **characterized** in that cushions (14) are also located between the upper side of the grating and support surfaces (15) at the chamber walls.
8. A support according to claim 1, **characterized** in that the resilient means comprises felted steel thread which has been compressed to form a cushion (14).

Claims

1. A support for ceramic monolith blocks (12) inside a catalytic reactor chamber for cleaning exhaust gas, which blocks (12) are located upon at least one essentially horizontal grating (11) between an inlet (12) to the reactor chamber and an outlet from said chamber, **characterized** in that the grating (11) is vertically displaceable between the walls (10) of the chamber, and that said displaceability is damped by means of resilient means (14).

FIG. 1

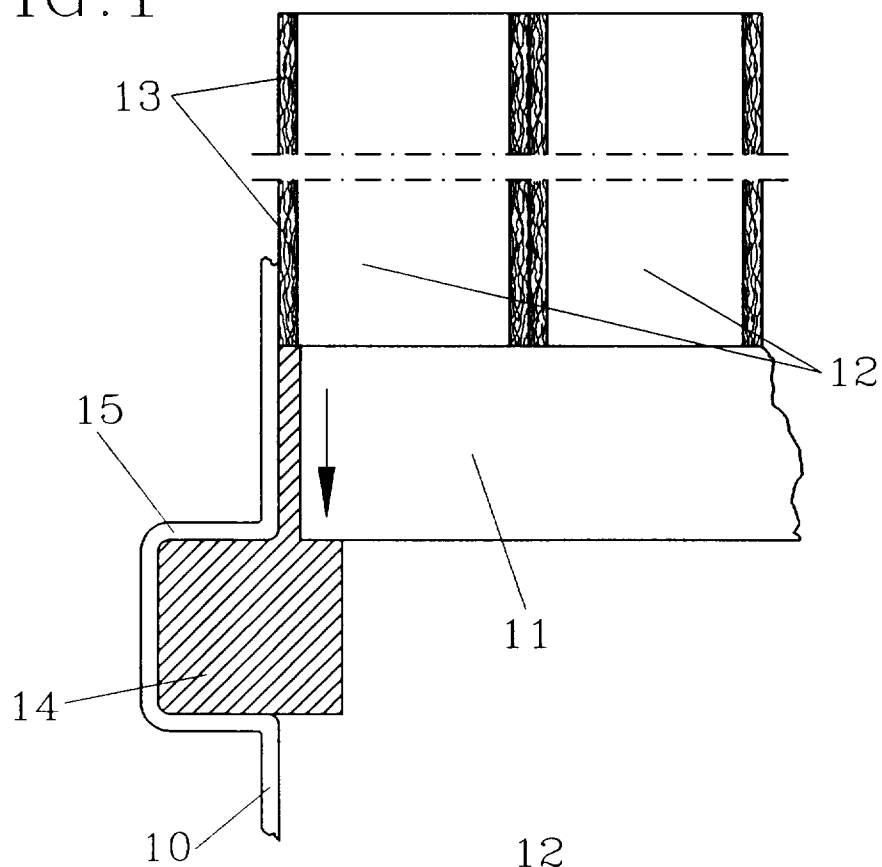


FIG. 2

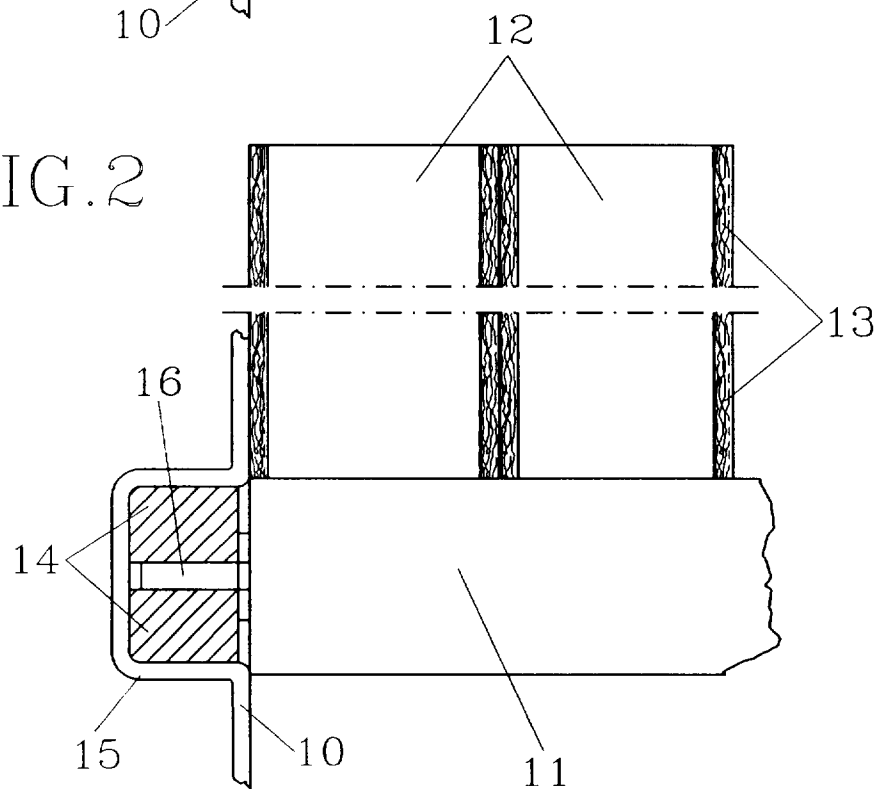
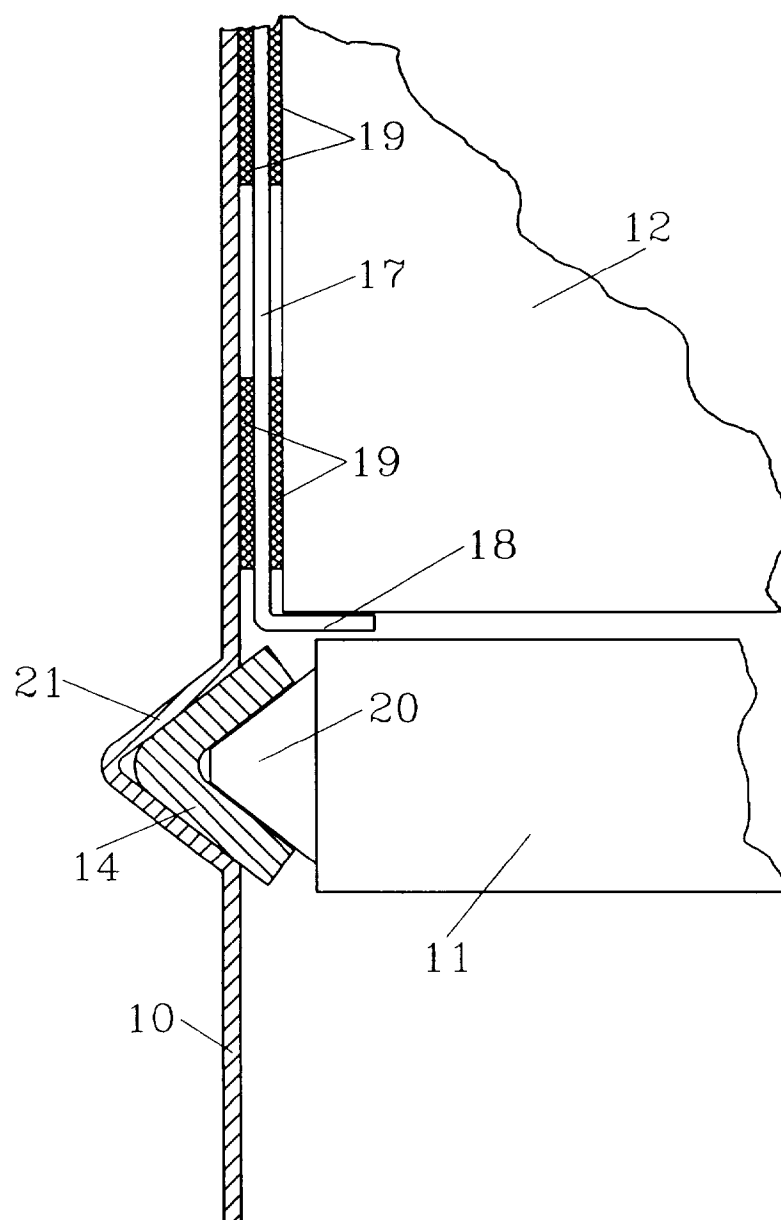


FIG.3





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EUROPEAN SEARCH REPORT

Application Number
EP 95 85 0177

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	GB-A-1 094 256 (ENGELHARD INDUSTRIES) * page 9, line 78 - page 10, line 88; figures 1,2 *	1,2,5	F01N3/28 B01D53/86
Y	FR-A-2 179 256 (KALI-CHEMIE) * page 2, line 2 - line 31; figure 1 *	1,2,5 6	
A	DE-A-35 12 580 (URÜNDÜL) * page 11, last paragraph - page 14, last paragraph; figures 1-8 *	1,5,6	
A	PATENT ABSTRACTS OF JAPAN vol. 13 no. 105 (C-575), 13 March 1989 & JP-A-63 278531 (BABCOCK HITACHI) 16 November 1988, * abstract *	1	
A	DE-A-38 25 958 (SIEMENS) * column 2, line 63 - column 4, line 2; figures 1,2 *	1	
A	DE-A-38 36 626 (KST-MOTORENVERSUCH) * the whole document *	3,5-8	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	US-A-4 985 212 (KAWAKAMI)		F01N B01D F23J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 January 1996	Examiner Friden, C
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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