Panel-shaped catalytic element with fastening means

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UNITED STATES PATENTS

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Panel type catalyst elements with peripheral flanges that provide a U-shape profile to hold a gasket member provide for easier and improved clamped attachment to spaced supporting frame members.

4 Claims, 1 Drawing Figure
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PANEL-SHAPED CATALYTIC ELEMENT WITH FASTENING MEANS

The invention relates to a panel-shaped catalytic element with a means for detachable, gas-tight fastening to a frame with the aid of clamping attachment means provided at the frame substantially perpendicularly to the support surface, such as a threaded bolt or a screw with nut and a tension clasp or tension clamp, and with the aid of a sealing gasket between the catalytic element and the frame.

Known catalysts are encased in panel-shaped casings which either peripherally grasp the catalyst exterior or form a rectangular box having perforations particularly in the upper and lower panel surfaces. The box is filled with the catalytic material. The envelope for the catalyst, however, may consist also of wire network which at the sides turns into frames. Thusly constructed catalytic elements are fastened within a gas purification system, for example in one plane in such manner that the entire waste gas stream must pass through the catalytic elements. In this connection, it is known to weld a frame consisting of lateral and longitudinal struts to the respective vessel or combustion chamber. The edges of the catalytic elements are laid on the frame struts. It also is known to arrange a sealing gasket between the frame and the catalytic element. The sealing strips or ropes are riveted along the frame struts on the support surfaces.

Thus in the known devices the threaded bolts, screws or the like together with nuts and tension clamps, each of which spreads over two adjacent catalyst elements, serve the attachment and sealing of the catalytic elements to the support surface. By tightening the nut the tension clamps are pressed from above onto the catalytic elements which transmit the pressure to the gasket fixed below between the catalytic element and the frame struts.

The known arrangement has as one of its disadvantages, the result that the tension bolts are of appreciable length. The length is required because they have to project beyond the entire height of the catalytic elements. Otherwise the screwing tight of the tension clamps over the catalytic elements would not be possible. Upon tightening and tensioning it happens not infrequently that the long threaded bolts tear off. The tearing off of the long threaded bolts, moreover, is caused, on the one hand, in that due to very high temperatures, for example 600° to 700° C. the tensile strength values drop strongly, and on the other hand an oxidation of the metal occurs. Another disadvantage of the known devices is that a sufficient sealing effect of the fastening device is not always attained, particularly when the catalytic elements already have been replaced once or several times.

A renewal of the sealing strips becomes necessary as this has to be done inside the unit by removal of the rivets of the old gasket and installation of new rivets for the new gasket.

It is an object of the present invention to create a panel-shaped catalytic element with a fastening device which can be detached easily, is readily accessible and thus conveniently assembled, and also assures a good sealing effect.

The object is attained in a novel manner in that each catalyst element has flanges on at least two opposite side walls and the sealing gasket is attached at the flange sides facing toward the frame. In an advantageous manner the gasket now is fastened directly to the catalytic element. The latter only need to be laid on the frame and then fastened. The flange at the side walls of the catalytic element may extend along the upper or the lower edge or also at any desired plane therebetween. Also an absolute gas tightness is obtained. The impute waste gas no longer can bypass around the catalyst to the exterior by channels in the gasket areas.

An advantageous further development of the invention resides in that the upper cover portion of the catalytic element extends beyond the side walls, is crimped at the edge toward the side wall and parallel with the latter and forms together with the upper portion of the side wall a U-shaped flange into which the gasket is squeezed. It also is particularly advantageous in accordance with the invention that the gasket consists of an asbestos/graphite cord or rope. However, other high temperature stable materials may also be used. The manufacture of such a catalytic element is simple, economical and stable. By the squeezing-in of the gasket during the manufacture, the installation is substantially facilitated. If the gasket is applied in the crimped flange at the upper edge of the catalytic element, the fastening device, that is the threaded bolt or the screw can be made substantially shorter than in the case of the previously known devices. The installation and dismounting are very simple and require little time. On tightening the nut or the threaded bolt, or other screw member during the installation, the danger of tearing off no longer exists because the bolt or screw, respectively, is substantially shorter than in the case of the known arrangements.

Instead of a threaded stud fastened to the support surface and used with a nut, there may be utilized, as already stated, a cap screw or bolt which either is screwed through the support, or is thrust through and welded tight or locked with a nut, or one may use a cap screw which is screwed into a threading provided in the support.

In accordance with the invention it is particularly advantageous to have the flange consist of a ring affixed to the side walls and having an L- or U-shaped profile. Such ring, as already set forth above, may be arranged around the side walls in any desired plane and fastened thereto, for example by welding.

The catalyst shape is not limited to rectangles; also round, many-cornered or circular segment catalysts may be inserted.

Further features and advantages of the present invention are evident from the following description in reference to the drawing. This drawing shows a cross-section through a portion of the frame provided with fastening devices, the catalytic element being shown fragmentally. At 2, a frame strut 3 is welded to the container wall 1. To the right, an additional fastening device together with the frame strut 4 is shown. The struts of the frame have legs disposed vertically relative to each other. They may, however, be arranged relative to each other in another manner corresponding to another shape of the catalyst. At certain intervals threaded studs on bolts 5 are attached to the frame by welding. A nut 6 is screwed onto the upper part of such bolt.
The catalytic element 7 consists of an envelope with a bottom portion 8, side walls 9, and an upper cover portion 10. The side wall 9 is crimped outwardly at its upper part. Beyond this stretch there extends the upper cover portion 10 which likewise is crimped at the outer edge. Thereby a U-shaped flange 11 is formed together with the upper portion of the side wall. An asbestos rope 12 is embedded therein as sealing gasket.

The frame struts 4 likewise are formed with a U-shape cross-section. The frame strut 3 at the border, that is to say, the frame strut 3 welded to the vessel wall 1 has an L-profile. The catalytic element 7 is placed on the frame. The sealing gasket 12 is compressed by placing across each two adjacent catalytic elements a tension clasp 13 which by a centrally located perforation permits the upward penetration of the threaded bolt 5. By tightening the nut 6, the desired pressure on the gaskets 12 can be adjusted. The tension clasp 14 at the left side of the drawing has an L-profile, the downwardly directed leg to the left of the bolt 5 forming the counter support portion to replace the missing U-shaped flange of another catalytic element.

I claim as my invention:

1. In a catalyst support means for use in a gas purification reaction container having a series of catalyst containing casings therein for gas flow therethrough, said support means including an edge frame member affixed to the inner wall of said container and extending inwardly therefrom, means to support each of said catalyst casings comprising outwardly projecting flanges on opposing side walls of each casing, a cover for each of said casings having a peripheral flange to overlap said projecting flanges, intermediate frame strut means positioned transversely of said reaction container and said edge frame member to support said casings, a sealing gasket between said projecting flanges and said intermediate frame strut means, a sealing gasket between the projecting flanges and said edge frame member, a spaced apart threaded bolt means with a nut extending perpendicularly from said edge frame member and each of said intermediate frame strut means, a transverse clamp member engaged by each of said bolt means, said transverse clamp members engaging said edge frame member and each of said projecting and peripheral flanges and said intermediate frame strut means, thus to compress said sealing gasket between said flanges and said edge frame member and said intermediate frame strut means, whereby the tightening of said bolt means will maintain said casings in fixed position with respect to each other and said edge frame member and said strut means.

2. The apparatus according to claim 1 further characterized in that the gaskets consist of a graphite-asbestos sealing rope.

3. The catalyst support means of claim 1 wherein said peripheral flanges of said covers extend beyond the side walls of said casings and are crimped at their edges downwardly toward said side walls and parallel thereto to form U-shaped flanges jointly with said outwardly projecting flanges and with the casing side walls, and into which said sealing gaskets are compressed.

4. The catalyst support means of claim 1 wherein said intermediate frame strut means comprises inverted U-shaped elements.