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APPLIANCE FOR CATALYTIC REACTIONS

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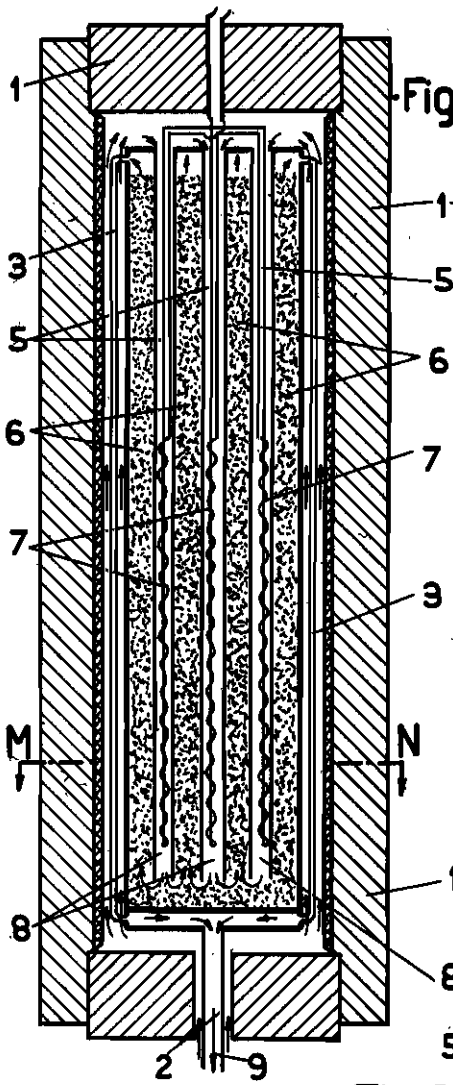
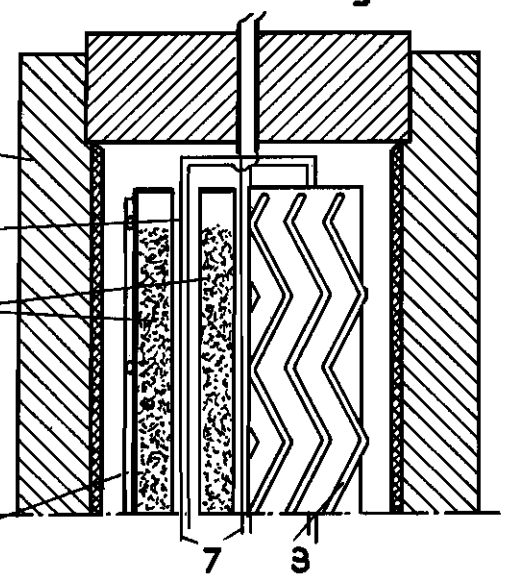
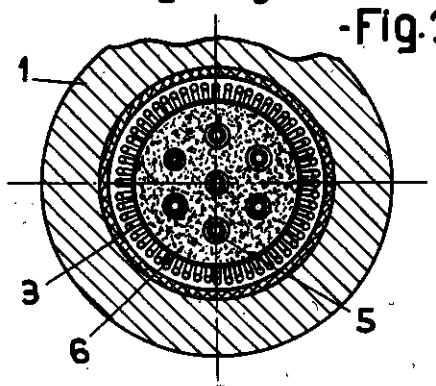
-Fig. 1-



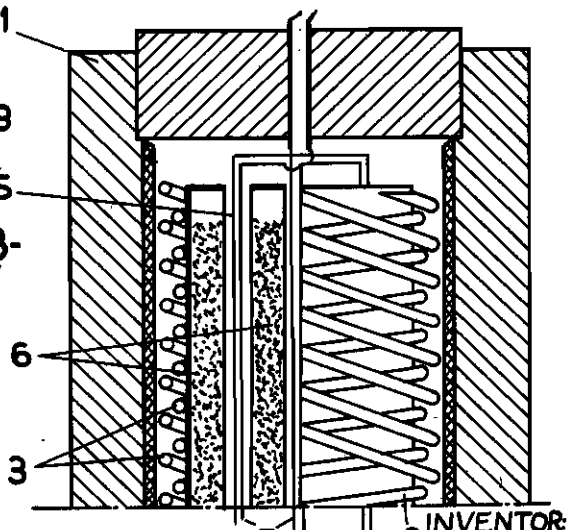
-Fig. 2-



-Fig. 3-



-Fig. 4-



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ALIEN PROPERTY CUSTODIAN

APPLIANCE FOR CATALYTIC REACTIONS

Carlo Picconi, Terni, Italy; vested in the Alien Property Custodian

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In all appliances now in use for catalytic reactions, such as, for instance, those used for the production of ammonia, of methanol and the like, are important the thermic exchanges which occur through metallic surfaces, for which usually different arrangements are chosen according to the purpose to be attained. Of such surfaces one is especially important, namely the one that is intended to recover the quantity of heat required for the continuation of the reaction, which surface constitutes what is usually called "heat recuperator". The other surfaces are intended to distribute the heat or to render it uniform, or to subtract it from the catalysis chamber, according to the kind of reaction and to the type of appliance used.

Such appliances are provided in different arrangements in the industrial processes now in use. They may, however, be essentially reduced to the three following kinds:

(*a*) catalysis chamber and heat recuperator of the nest of tubes type, said chamber and recuperator being located in two separate casings;

(*b*) catalysis chamber and heat recuperator, of the nest of tubes type, arranged the one over the other within a unique casing;

(*c*) catalysis chamber and heat recuperator, of the diaphragm type, arranged in concentric containers within a unique casing.

The present invention realizes a completely new arrangement. Within a unique casing is centrally arranged the catalysis chamber, and around it the nest of tubes constituting the heat exchanging elements of the recuperator.

In the annexed drawing which is given only as an example without limitation:

Fig. 1 is a longitudinal section of the apparatus according to the present invention;

Fig. 2 is a section according to the line M—N of fig. 1;

Fig. 3 is a section, according to two different longitudinal planes of a second form of embodiment of the invention;

Fig. 4 is a section, according to two different longitudinal planes, of a third form of embodiment of the invention.

With reference to said drawing, the gases to be subjected to reaction are introduced into casing **1**, through conduit **2**, and come into contact with the external surface of the nest of tubes **3** constituting the heat exchanging elements of the recuperator. The latter, towards the top of casing **1**, leaves a free passage for the pre-heated gases to get into the heat balancing pipes **5**. In these pipes **5**, immersed in catalytic mass **6** and open at their lower end, are at the same time located electric resistances **7**, which bring the gases to the temperature required in order to develop reaction in catalyser **6**. The gases, passing through the lower openings **8** of pipes **5**, circulate in upward direction in catalyser **6**.

When the reaction has taken place, its products pass through the interior of tubes **3** giving up heat to the gases which. on entering the recuperator, flow along the outside of said tubes **3**, and then, through conduit **9**, come out of the casing. The particular features of the arrangement according to the invention consist essentially: (1) in the use of heat balancing tubes containing at the same time the necessary electric resistances to bring the pre-heated gases to the optimum temperature required to produce the reaction in the catalyser; (2) in the use of a nest of tubes **3**, which form the heat exchanging elements of the recuperator, arranged in one or more layers according to the generating lines of the cylinder forming the catalysis chamber and all around it (see figures 1 and 2). In an alternate construction, illustrated in fig. 3, the said tubes **3**, instead of being rectilinear, may have a winding course, and in the case of several superposed layers they may have their windings in directions opposite to one another. In fig. 4 is illustrated a third form of embodiment of the invention, in which, while a layer of tubes **3** of the recuperator is inclined in one direction in respect to the generating line of the cylinder forming the catalysis chamber, the layer superposed thereto has an opposed inclination, the windings of the single layers running all around the cylinder. The windings of the various layers, of course, instead of crossing one another, may be all in the same direction.

The arrangement provided according to this invention offers appreciable advantages, amongst which is the possibility of sizing better the various parts, of enlarging the catalysis chamber, of reducing the difficulties inherent to construction, and of securing a greater efficiency of the apparatus with an equal volume of the casing.

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