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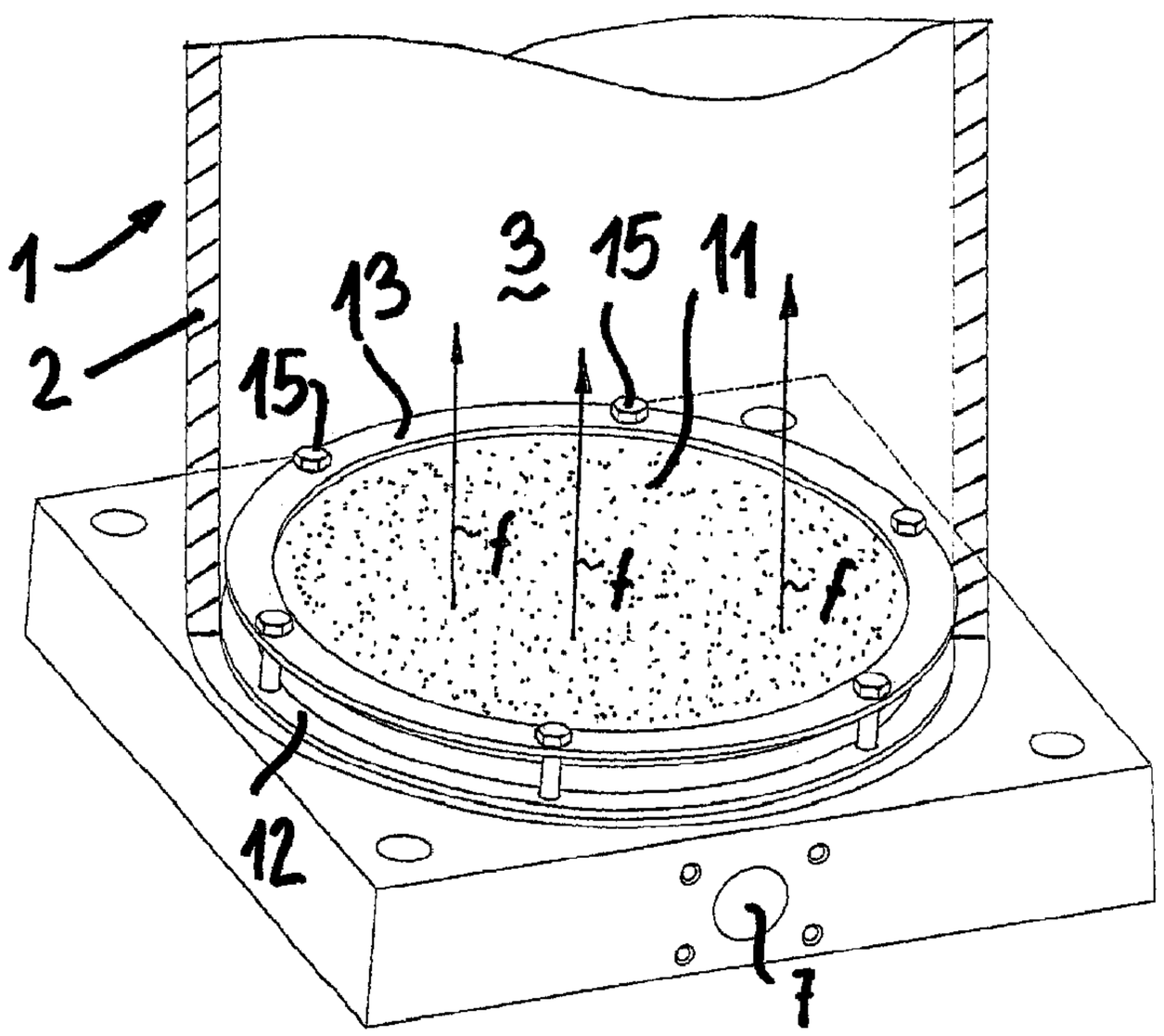
(54) **Titre : ADSORDEUR D'ECOULEMENT DE GAZ**
(54) **Title: GAS FLOW ADSORBER**



(57) **Abrégé/Abstract:**
A gas flow adsorber comprises an adsorption vessel, having a vessel wall defining a cylinder including an adsorption material, the cylinder having a cylinder wall bearing, at the bottom thereof, in a circumferential slot formed on a support plate including a channel therethrough a gas mixture flow is conveyed, the channel having a channel hole passing through an enlarged portion of the support plate, the enlarged portion being coupled to a flat chamber substantially extending through the overall extension of the vessel bottom, the chamber being covered by a disc-like body made of a sintered material.

ABSTRACT

A gas flow adsorber comprises an adsorption vessel, having a vessel wall defining a cylinder including an adsorption material, the cylinder having a cylinder wall bearing, at the bottom thereof, in a circumferential slot formed on a support plate including a channel therethrough a gas mixture flow is conveyed, the channel having a channel hole passing through an enlarged portion of the support plate, the enlarged portion being coupled to a flat chamber substantially extending through the overall extension of the vessel bottom, the chamber being covered by a disc-like body made of a sintered material.

GAS FLOW ADSORBER

BACKGROUND OF THE INVENTION

The present invention relates to a gas flow adsorber, therethrough gas flows, in particular gas mixture flows are conveyed.

Adsorbers operating based on the Pressure Swing Adsorption (P.S.A.) system are already known in the prior art, in which is also known that a fluidization of the inner bed of prior adsorbers must be absolutely always prevented, by properly controlling the maximum rate of the fluid conveyed through the adsorber device bed.

Said prior adsorbers, conventionally comprises further diffusers arranged at the bottom and top of the adsorber vessel, for allowing the adsorber inlet fluid, such as oxygen or nitrogen or air mixtures, to expand in the adsorber. To that end, prior adsorber vessels have a diameter larger than the cross section of the gas inlet or outlet tubes. Thus, as a gas or fluid enters the adsorber vessel, the rate with which said gas or fluid passes through the adsorber material, usually comprising carbon or zeolites molecular sieves, decreases.

The above mentioned diffusers are usually made of thin metal perforated plates, in combination with metal layers having a different mesh size.

In particular, the mesh size substantially depends on the size

of the bodies or particles used as an adsorption material.

A further fluid diffusion system provides to use catalytic devices arranged within the adsorber bed.

Such prior system, however, has the drawback that the gas flow fluid through the adsorber is rather uneven, and, moreover, requires a comparatively long time for passing through the adsorber vessel, thereby dead spaces are undesirably formed in the adsorber vessel.

Moreover, the last approach has the drawback that the adsorber volume has a comparatively large adsorber volume dead part, for providing a required space at the gas or fluid inlet on the bottom of the adsorber, as well as at the adsorber top, where the outlet ports are formed.

In addition, said diffusion plates require to use a metal perforated disc to be arranged between the adsorber outlet and inlet tubes, to prevent the fluid passing through the central portion of the diffuser from achieving excessively high diffusion rates.

Thus, the required additional dead space greatly increases the air or other gas contents in the stream or flow to be processed.

Furthermore, the making cost, weight and geometrical volume of the mentioned prior adsorbers are also greatly increased.

In adsorbers processing non dangerous fluids, such as air, hydrogen or the like mixtures, it is also known to use the so-

called “cocomat” discs, or balls made of a ceramics or the like material, which balls are arranged between the diffusers and adsorption material, to reduce to a minimum the dead space and further optimize the fluid flow diffusion within the adsorber vessel.

In this connection, it should be pointed out that the above mentioned methods have the further drawback that they are not compatible with all the types of fluid passing through the adsorption material, for example oxygen.

Moreover, they are not suitable to carry out very sophisticated procedures, requiring a very high refining degree.

Yet another drawback of prior plate diffusers is that the fluid flow passes through the adsorption material bed in an uneven manner and, moreover, the adsorption material and diffuser costs are very high.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned drawbacks of the prior art, by providing a simple gas flow adsorber having an adsorber vessel, the wall of which defines a cylinder including an adsorption material, the cylinder wall bearing, at the bottom thereof, on a circumferential slot formed on a support plate, said support plate having a channel therethrough a gas mixture flow may pass, said chamber including a hole communicating with an enlarged portion provided in the support plate, which enlarged

portion is coupled to a flat chamber extending substantially through the overall extension of the vessel bottom, said chamber being covered by a disc body made of a sintered material.

Advantageously, the material forming the disc body comprises sintered brass, or sintered stainless steel.

BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter of the present invention will be disclosed in a more detailed manner hereinafter with reference to the accompanying drawings, where:

Figure 1 is a cross-sectional view showing a bottom portion of the adsorber vessel; and

Figure 2 shows, partially in cross-section and partially in a perspective view, the bottom portion of the adsorber vessel.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in figure 1, the adsorber vessel, generally indicated by 1, comprises an adsorber vessel wall 2 defining a cylinder, which, in its inner chamber or space 3, includes an adsorption or adsorbing material 4, shown by horizontal dashed lines.

In particular, through said adsorption material, a gas mixture flow, indicated by the arrows (f) is caused to pass.

At the bottom thereof, the cylindric wall 2 bears on a circumferential slot 5 of a supporting plate, generally indicated by 6.

The supporting plate 6 comprises a supporting plate channel 7

therethrough, as shown by the arrows (g), is conveyed a gas mixture flow, to be supplied through a supplying or feeding hole 8, to the inside of the cylindric vessel 2. As shown, the hole 8 communicates with an enlarged portion 9 formed in the plate 6 and being coupled with a flat chamber 10 substantially extending through the overall extension of the bottom of the vessel 1.

The chamber 10 is covered by a disc body, indicated by the reference number 11, said disc body 11 being made of a sintered material, such as sintered brass or sintered stainless steel.

Thus, owing to the provision of the disc 11 made of a sintered material, it is possible to define with a very great accuracy the porosity of the disc 11, thereby fitting it to the characteristics of the conveyed fluids.

In particular, the fluids conveyed to the chamber 10 pass through the overall extension of the disc 11, as indicated by the arrows (i) in figure 1.

Moreover, owing to the provision of a spacer ring element 12 and a further locking ring element 13, the sintered material disc 11 is locked in its desired position.

By removing the ring element 13, on the other hand, the filtered material disc 11 can be replaced by a further disc having modified technical characteristics.

Figure 2 is a partially cross-sectioned perspective view

showing the cylinder 1 of the subject adsorber device, and, in this view, for clearness reasons, the adsorption material 3 has been omitted.

It is clearly possible to see therein the inlet port of the duct 7, the spacer element 12, and locking ring element 13 to lock on said spacer element 12 the sintered material disc 11.

Thus, due to the locking of the disc 11 by the locking ring 13 and a plurality of clamping screws 15, it is possible to held the sintered material disc 11 at its set position and, moreover, by screwing off the screws 15 it is possible to remove the locking ring element 13, and, accordingly, the sintered material disc 11 to be replaced.

The above replacement must be performed as the sintered material disc 11 is clogged by particles entrained in the gas mixture flow, or as it is necessary to use a disc 11 having different technical characteristic.

The support plate, and the material used for forming the cylinder 1 is advantageously made of aluminium, thereby the adsorber 1 will have an overall light weight, while providing the required mechanical function to allow the adsorber to operate in a continuous manner.

The embodiments of the present invention for which an exclusive property or privilege is claimed are defined as follows:

1. A gas flow absorber, in which gas flows are conveyed therethrough, said gas flow absorber comprising a gas flow absorber vessel having a wall defining a cylinder providing a cylinder chamber including an absorption material, said wall of said cylinder bearing, at a bottom thereof, on a circumferential slot formed on a support plate, said support plate having a channel in which a gas mixture flow is conveyed therethrough, said channel including a channel hole communicating with an enlarged portion formed in the support plate, said enlarged portion communicating with a flat chamber substantially extending through the overall extension of the bottom of said vessel, said chamber is being covered by a disc body

characterized in that

said disc body is made of a sintered material, and

said disc body being locked in a desired position by a spacer ring element and a locking ring element, said locking ring element being clamped by a plurality of clamping screws to hold the disc body at said position, whereby when the clamping screws are unscrewed, the locking ring element is removable for replacing the disc body.

2. A gas flow absorber according to claim 1, characterized in that said sintered material of said disc body is sintered brass.

3. A gas flow absorber according to claim 1, characterized in that said sintered material of said disc body is sintered stainless steel.

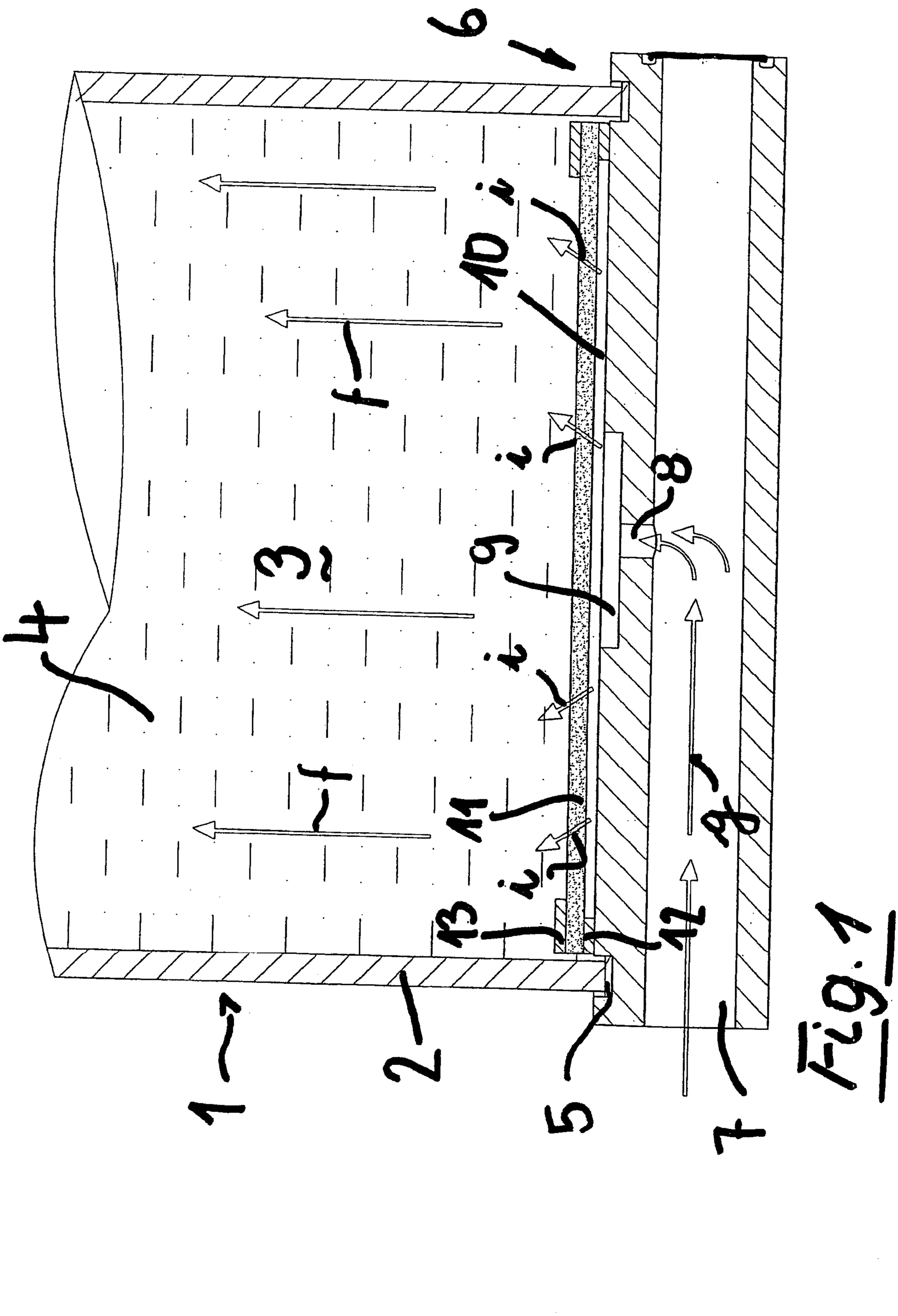


Fig. 1

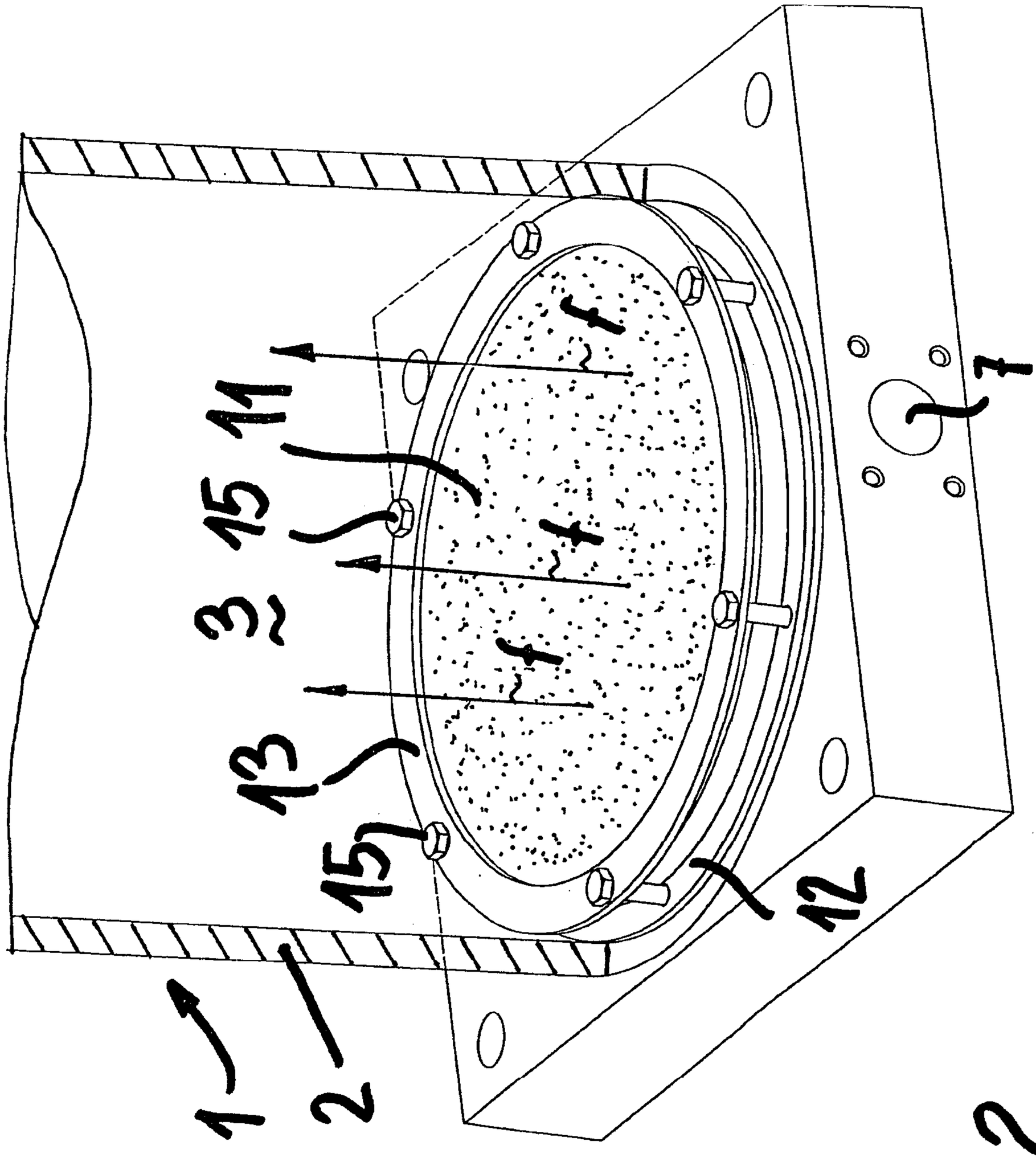
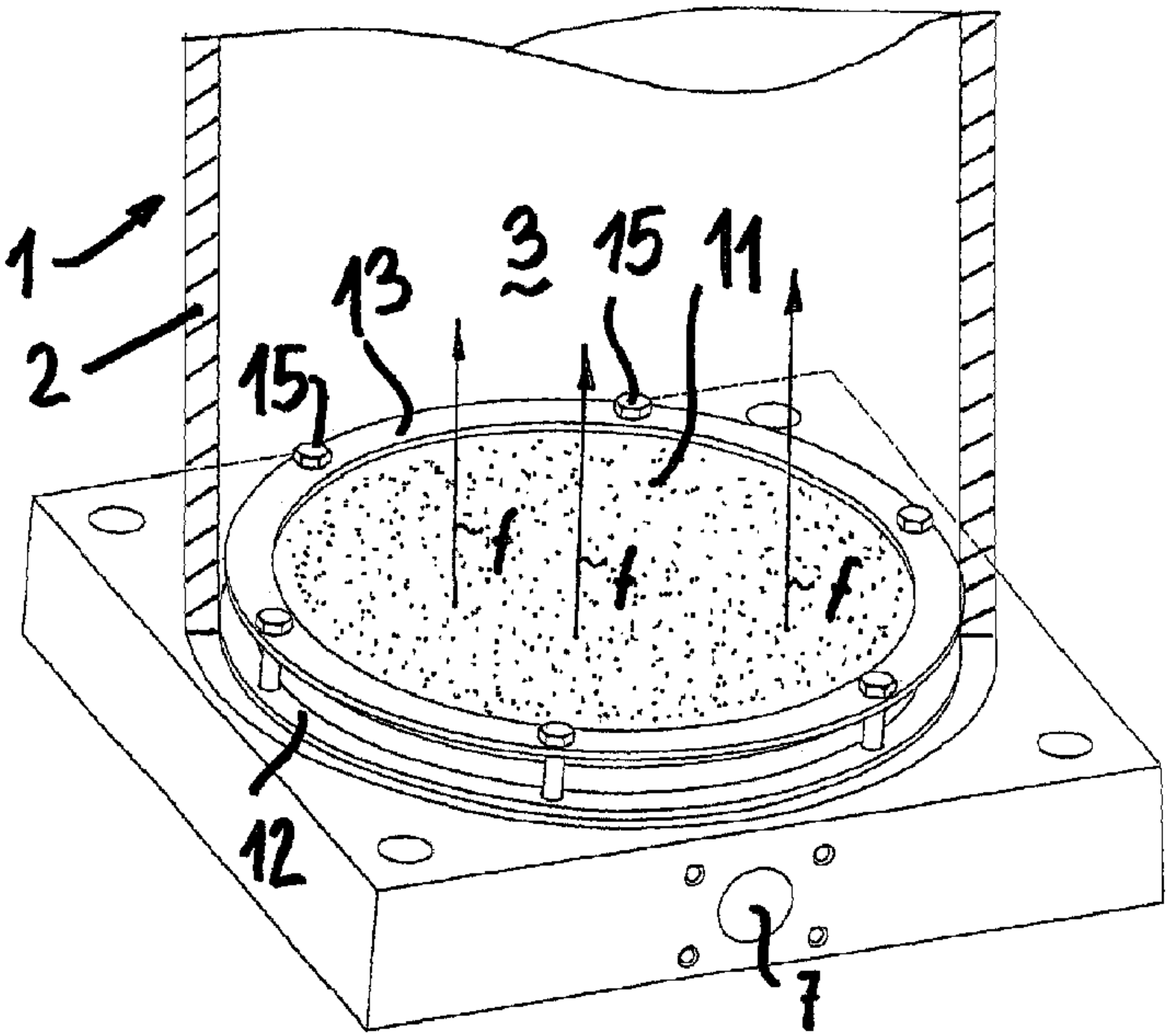


Fig. 2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