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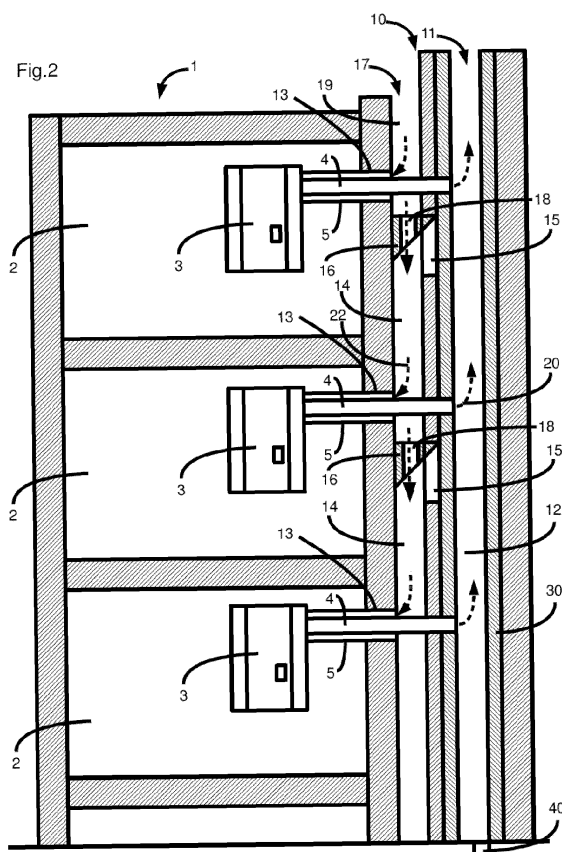
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(54) **A channel device for two or more heaters of the closed type**

(57) The invention concerns a channel device for two or more heaters (3) of the closed type. According to the invention the main channel (12) has a glass fibre composite liner (30) that closes off the outlet openings (15)

of the shunt channels (14) and is operably connected to the outlet channels (4); the partitions (16) have an opening (18) for connecting the respective shunt channels (14, 19); and the shunt channels (14, 19) are operably connected to the inlet channels (5).



Description

[0001] The invention concerns a channel device for supplying combustion air and discharging fume gasses of heaters, particularly for heaters of the closed type, especially type HR+ or HR TOP.

[0002] Introducing a suitable channel device for heaters, especially heaters of the closed type, requires a lot of technical considerations and is in many cases subject to a number of norms. Of course, combustion air needs to be supplied to heaters of the closed type through a channel that is connected to outside air and not to spaces inside the building such as in, for instance, heaters of the open type. This often leads to offering channel devices with a plurality of channels for each heater that traverse the building. Especially when placing heaters of the closed type in a building that previously had heaters of the open type and thus only had an outlet channel for fumes, this often gives cause for installing a supply channel for combustion air for each heater, which is often connected to the atmosphere through the building's wall. This type of channel device is for example known from EP1124098. A solution for example known from DE29814772 is installing a system of concentric pipes. The air required for combustion is sucked in via the exterior pipe. The interior pipe leads the fumes outside. The latter channel device requires a rigid metal construction, which sometimes leads to problems during installation, especially when it has to be installed in an existing structural concrete chimney. Furthermore, in some cases a specific volumetric flow rate for the supply of combustion air and a certain volumetric flow rate for the discharge of fumes must be guaranteed. As will be described below in more detail, in these cases the latter construction causes an unacceptable limitation of these volumetric flow rates.

[0003] In current high efficiency heaters, condensation of moisture in the fume channel must always be taken into account. In the case of a structural concrete chimney, this moisture affects the material of the chimney and the moisture can be transported from the inside to the outside of this chimney under the influence of the capillary effects of the porous walls. This in turn leads to moisture problems in the adjoining spaces. These types of high efficiency heaters are known, for instance, under the HR Top label. This is a Belgian label that is attributed to energy-efficient condensing gas boilers by the Royal Union of Belgian Gas Professionals (Koninklijke Vereniging van Belgische Gasvaklieden or KVBG), a union of natural gas suppliers and distribution networks active in Belgium. The minimum efficiency of the boiler must be 96.3% (Hs or highest calorific value) and is about 10% higher than the HR+ label, which is also a Belgian label attributed by the KVBG. In these condensing boilers the water vapour is condensed. This causes the water vapour to emit its heat, which causes extra heat to be released. Further, this system also provides a low fume gas temperature and there are CO and Nox emission limits. Finally, the

label offers several commercial guarantees.

[0004] The invention aims to provide a method to provide a channel device for two or more heaters of the closed type or a method that solves the aforementioned disadvantages.

[0005] To this end, according to a first aspect of the invention there is provided a channel device for two or more heaters of the closed type containing:

- two or more outlet channels for fume gasses of the respective heaters;
- two or more inlet channels for combustion air of the respective heaters; and
- a structural concrete fume gass channel that comprises a vertical main channel with a main opening at the top that is connected to the atmosphere and two or more vertical shunt channels, the shunt channels comprising:

- an inlet opening configured for connecting an outlet channel for fume gasses of a heater of the open type;
- an outlet opening that ends in the main channel or in case of the outer shunt channel a shunt opening that is directly connected to the atmosphere; and

- a transverse partition wall configured to isolate the respective shunt channel from the adjoining shunt channel,

CHARACTERISED IN THAT

- the main channel comprises a glass fibre composite liner that closes off the outlet openings of the shunt channels and is operably connected to the outlet channels;
- the partition walls comprise an opening for connecting the respective shunt channels; and the shunt channels are operably connected to the inlet channels.

[0006] This offers the advantage that the channel device can be arranged in a simply way in a structural concrete chimney as the glass fibre composite liner is flexible before insertion and can easily adapt itself to the shape of the chimney. Furthermore, the glass fibre composite liner which is resistant to high temperatures, for instance higher than 100°C, offers sufficient protection against penetration of moisture. Finally, the cross-section of the hardened glass fibre composite liner that adapts to the cross-section of the chimney will guarantee a higher volumetric flow rate for discharging fume gasses than a round metal tube. Furthermore, also optimum use is made of the shunt channels that are already present in the chimney to also increase the volumetric flow rate for the supply of combustion air without requiring the arrangement of extra channels that traverse the spaces of the building.

[0007] According to a second aspect of the invention there is provided a method for adapting a channel device

for two or more heaters of the closed type comprising:

- two or more outlet channels for fume gasses of the respective heaters;
- two or more inlet channels for combustion air of the respective heaters; and
- a structural concrete fume gass channel that comprises a vertical main channel with a main opening at the top that is connected to the atmosphere and two or more vertical shunt channels; the shunt channels comprising:

- an inlet opening configured for connecting an outlet channel for fume gasses of a heater of the open type;
- an outlet opening that ends in the main channel or in the case of the outer shunt channel a shunt opening directly connected to the atmosphere; and
- a transverse partition wall configured to isolate the respective shunt channel from the adjoining shunt channel,

CHARACTERISED IN THAT

- in the main channel there is arranged a glass fibre composite liner that closes off the outlet openings of the shunt channels and is operably connected to the outlet channels;
 - In the partition walls there is arranged an opening for connecting the respective shunt channels; and
- the shunt channels are operably connected to the inlet channels.

[0008] Further features and advantages of the invention are provided in the following description of the exemplary embodiments as shown in the drawings, in which:

Figure 1 shows a building comprising a known structural concrete fume gass channel with a shunt channel and heaters of the open type;

Figure 2 shows a channel device according to the invention;

Figure 3 shows an alternative embodiment of a channel device according to the invention;

Figure 4 shows a top view of a channel device according to the invention; and

Figure 5 shows a top view of a known channel device with a concentric tube system in the main channel.

[0009] Figure 1 shows a building 1 with a plurality of floors 2. Each floor comprises a known heater 3 of the open type. This type of heater 3 sucks in combustion air from the space where the heater is arranged. The fume gasses 20 that are generated by this heater 3, are led via an outlet channel 4 to a structural concrete fume gass channel 10. This vertical fume gass channel 10 is of the known shunt-type. This means that the fume gass chan-

nel, apart from a vertical main channel 12 with a main opening 11 at the top that is connected to the atmosphere, also comprises a plurality of vertical shunt channels 14, 19. These shunt channels 14, 19 comprise an inlet opening 13 to which the respective outlet channel 4 for fume gasses of the respective heater 3 is connected. For the building 1 as shown in Figure 1, the two lowest shunt channels 14 comprise an outlet opening 15 that ends in the main channel 12. The outer, this means the highest, shunt channel 19 comprises a shunt-opening 17 that is directly in connection with the atmosphere. Furthermore, there are also shown known transverse partition walls 16 that isolate the respective shunt channels 14, 19 from each other.

[0010] Figure 2 shows a similar building 1 with a plurality of floors 2 and a known structural concrete fume gass channel 10 of the shunt-type. This building 1 was, however, adapted with a channel device according to the invention. On several floors 2 in this building 1 there were arranged heaters 3 of the closed type, for example heaters 3 of the HR Top type. Subsequently there was arranged a glass fibre composite liner 30 in the main channel 12. During the arrangement this glass fibre composite liner 30 is in a compact and flexible condition. This ensures that the glass fibre composite liner 30 can easily be inserted in the main channel 12. When the glass fibre composite liner 30 was inserted along the entire length of the main channel 12, it is expanded under pressure and hardened. A known type of this kind of glass fibre composite liner 30 is on the market under the name Furanflex. This type of glass fibre composite liner 30 is inserted along the top of the chimney in the form of a stocking. As the stocking is soft and flexible, this is an easy task that can be accomplished in a minimal time period. For curved chimneys the channel it is also no longer required to break open the channel at the height of the bends. The stocking is inflated with the help of low pressure steam. Due to the pressure of the steam, the stocking takes on the shape of the existing structural chimney channel and as a matter of speaking sticks to the wall without the free outlet of the chimney being reduced unnecessarily. The resins then harden out and form a hard, gastight inner lining. This way, in a very short time period, a homogenous, smooth and seamless chimney pipe that is perfectly resistant to the acidic condensation water of fume gasses is formed. Such a type of glass fibre composite liner 30 is furthermore also resistant to a continuous maximum fume gas temperature of 200°C. In this way, the inserted glass fibre composite liner 30 closes off the outlet openings 15 of the shunt channels 14. A condensation water drainage 40 is arranged at the bottom of the main channel 12 to collect condensation water from the main channel and/or discharge it to, for instance, the sewer. As can be seen in Figure 2, in the channel device according to the invention the outlet channels 4 for the fume gasses 20 of the respective heaters 3 are connected through this glass fibre composite liner 30 to the main channel 12 to transport

the fume gasses further to the atmosphere via the main opening 11. In the partition walls 16 there is arranged an opening 18 through which the respective shunt channels 14, 19 are connected with each other as well as with the atmosphere via the shunt opening 17. Finally, these shunt channels 14, 19 are connected through the inlet opening 13 to the inlet channels 5 for the combustion air 22 that is now supplied via the shunt opening 17. According to the illustrated preferred embodiment, the respective inlet channels 5 and outlet channels 4 are arranged concentrically through the inlet opening 13 and they are constructed by means of a metal tube system. According to an alternative embodiment which is not shown these inlet channels 5 and outlet channels 4 can equally be arranged not concentrically and be manufactured from other suitable materials. Furthermore, it is also not required to install these channels through the inlet opening 13. New openings can be made for this and the existing inlet openings 13 can be closed off in this case. Optionally, the outlet openings 15 can additionally be closed off with suitable building materials. This can be done before or after insertion of the glass fibre composite liner 30.

[0011] A major advantage of the channel device according to the invention is that, in the context of a specific structural concrete fume gass channel 10, optimum use is made of the channels that are already present in order to realise a maximum volumetric flow rate for the supply of combustion air 22 and for the discharge of fume gasses 20. This becomes clear through the comparison of Figure 4 and Figure 5. In Figure 4 there is shown a top view of a channel device 10 according to the invention. Figure 5 shows a similar top view of a concentric channel device as for example known from DE29814772, of which the inner channel 130 serves the purpose of discharging fume gasses and the outer channel 140 serves the purpose of supplying combustion air. Both channel devices were arranged in a similar structural concrete chimney 10. It is clear that the channel device according to the invention can guarantee a larger volumetric flow rate for the supply of combustion air as compared to the embodiment in Figure 5 as it uses the volumetric flow rate that can be supplied by the shunt channels 14 that are available. The volumetric flow rate of the sucked in combustion air via the shunt opening that can be guaranteed is higher as the cross-section of the shunt channel 17 is larger than the surface available between the outer channel 140 and the inner channel 130. Furthermore, the required volumetric flow rate for the supply of combustion air 22 can be realised without arranging an extra channel devices that traverse the spaces of the building 1 and require extra openings in the walls of the building 1. It is further also clear that the glass fibre composite liner 30 that was expanded in the main channel 12, after insertion in its flexible condition, by means of an overpressure and then hardened, will adapt as well as possible to the walls of the main channel. This also guarantees a larger volumetric flow rate as the cross section of the glass fibre composite liner 30 is greater than the surface of the outlet

channel 130 and even greater than the surface of the supply channel 140. In any respect this glass fibre composite liner 30 offers advantages compared to the rigid metal pipes that are generally installed concentrically. In addition, this glass fibre composite liner 30 is equally durable and resistant to high temperatures, for example more than 100°C and can easily be installed in a structural concrete fume channel. A preferred embodiment of the glass fibre composite liner is resistant to long-term exposure at temperatures of 200°C and has an expected lifespan of 25 years.

[0012] According to an alternative embodiment, the respective shunt channels 14, 19 can be connected to each other by means of the complete removal of the partition walls 16.

[0013] In Figure 3 there is shown an alternative embodiment of a channel device according to the invention that is similar to the embodiment shown in Figure 2. Similar elements are referred to with the same reference signs. The main difference with the embodiment of Figure 2 is that the combustion air is supplied here via a supply channel 50 that can, for example, suck in the outside air at a location next to the building or through a wall of the building. This supply channel for combustion air is connected via the shunt-opening 17 to the outer shunt channel 19 that is now formed by the lowest shunt channel. The top shunt channel 14 is closed off at the top, in the embodiment shown, by a transverse partition wall 16. According to an alternative embodiment which is not shown, an opening 18 can be also be provided in this partition 16 so that combustion air 22 is supplied from above as well as from below to the continuous supply channel that is formed by shunt channels 14, 19 that are connected to each other.

[0014] It is clear that, despite the fact that in the Figures there is always shown a building with three heaters 3 and three floors 2, any combination of a plurality of heaters 3 and a plurality of floors 2 is possible.

[0015] Preferably, the heaters 3 that are arranged in building 1 are of the type HR-top, but the channel device according to the invention is also suitable for other high efficiency heaters such as for example HR+ devices or other similar heaters.

[0016] The invention is of course not limited to exemplary embodiments as described and shown in the drawings, but equally comprises alternatives and combinations that are comprised within the scope of the claims.

Claims

1. A channel device for two or more heaters (3) of the closed type containing:
 - two or more outlet channels (4) for fume gasses (20) of the respective heaters (3);
 - two or more inlet channels (5) for combustion air (22) of the respective heaters; and

● a structural concrete fume gass channel (10) that comprises a vertical main channel (12) with a main opening (11) at the top that is connected to the atmosphere and two or more vertical shunt channels (14, 19), the shunt channels (14, 19) comprising:

● an inlet opening (13) configured for connecting an outlet channel for fume gasses of a heater of the open type;

● an outlet opening (15) that ends in the main channel or in case of the outer shunt channel (19) a shunt opening (17) that is directly connected to the atmosphere; and

● a transverse partition wall (16) configured to isolate the respective shunt channel (14, 19) from the adjoining shunt channel (14, 19),

CHARACTERISED IN THAT

● the main channel (12) comprises a glass fibre composite liner (30) that closes off the outlet openings (15) of the shunt channels (14) and is operably connected to the outlet channels (4);

● the partition walls (16) comprise an opening (18) for connecting the respective shunt channels (14, 19); and

● the shunt channels (14, 19) are operably connected to the inlet channels (5).

2. A channel device according to claim 1, **characterised in that** the outlet channels (4) and corresponding inlet channels (5) are arranged concentrically.

3. A channel device according to any one of the previous claims, **characterised in that** the heaters are of the type HR-top.

4. A channel device according to any one of the previous claims, **characterised in that** there is arranged a condensation water drainage (40) in the main channel (12).

5. A building (1) comprising a channel device according to any one of the previous claims, **CHARACTERISED IN THAT** the building (1) comprises several floors (2) and **in that** on at least two floors (2) there is arranged a heater (3) of the closed type that is operably connected to the channel device.

6. A method for adapting a channel device for two or more heaters (3) of the closed type comprising:

● two or more outlet channels (4) for fume gasses (20) of the respective heaters (3);

● two or more inlet channels (5) for combustion air (22) of the respective heaters; and

● a structural concrete fume gass channel (10)

that comprises a vertical main channel (12) with a main opening (11) at the top that is connected to the atmosphere and two or more vertical shunt channels (14, 19); the shunt channels (14, 19) comprising:

● an inlet opening (13) configured for connecting an outlet channel for fume gasses of a heater of the open type;

● an outlet opening (15) that ends in the main channel or in the case of the outer shunt channel (19) a shunt opening (17) directly connected to the atmosphere; and

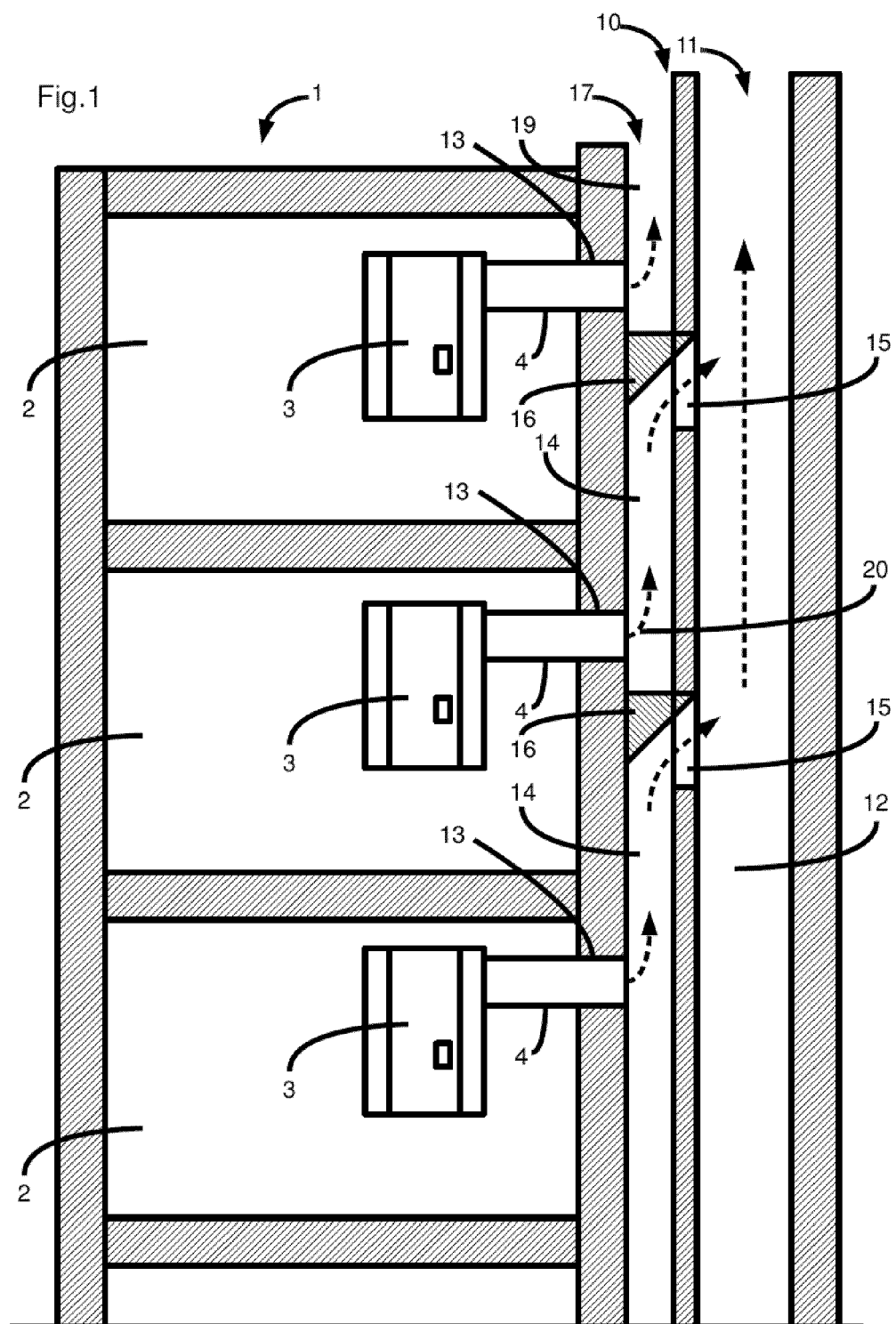
● a transverse partition wall (16) configured to isolate the respective shunt channel (14, 19) from the adjoining shunt channel (14, 19),

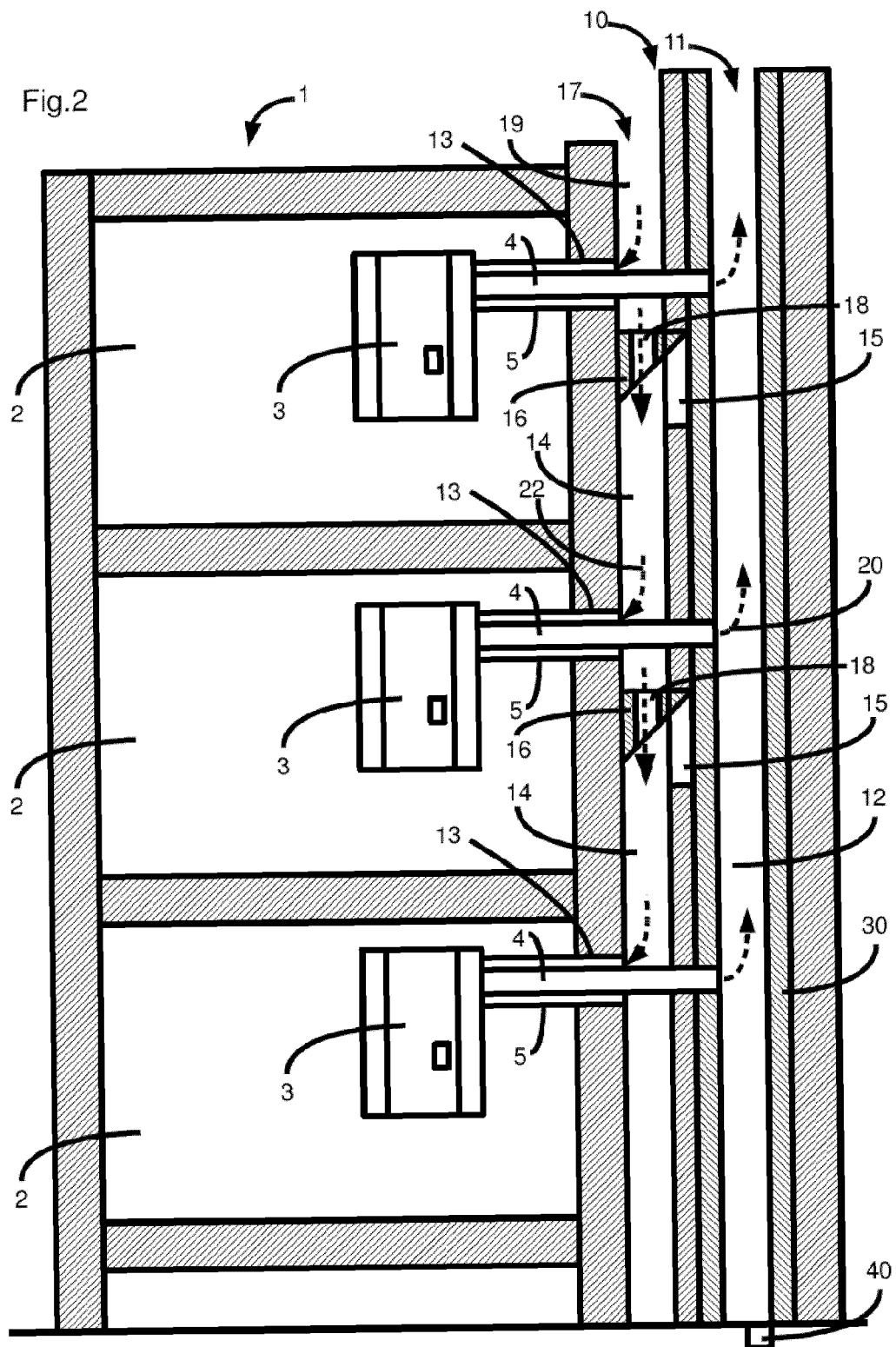
CHARACTERISED IN THAT

● in the main channel (12) there is arranged a glass fibre composite liner (30) that closes off the outlet openings (15) of the shunt channels (14) and is operably connected to the outlet channels (4);

● In the partition walls (16) there is arranged an opening (18) for connecting the respective shunt channels (14, 19); and

● the shunt channels (14, 19) are operably connected to the inlet channels (5).





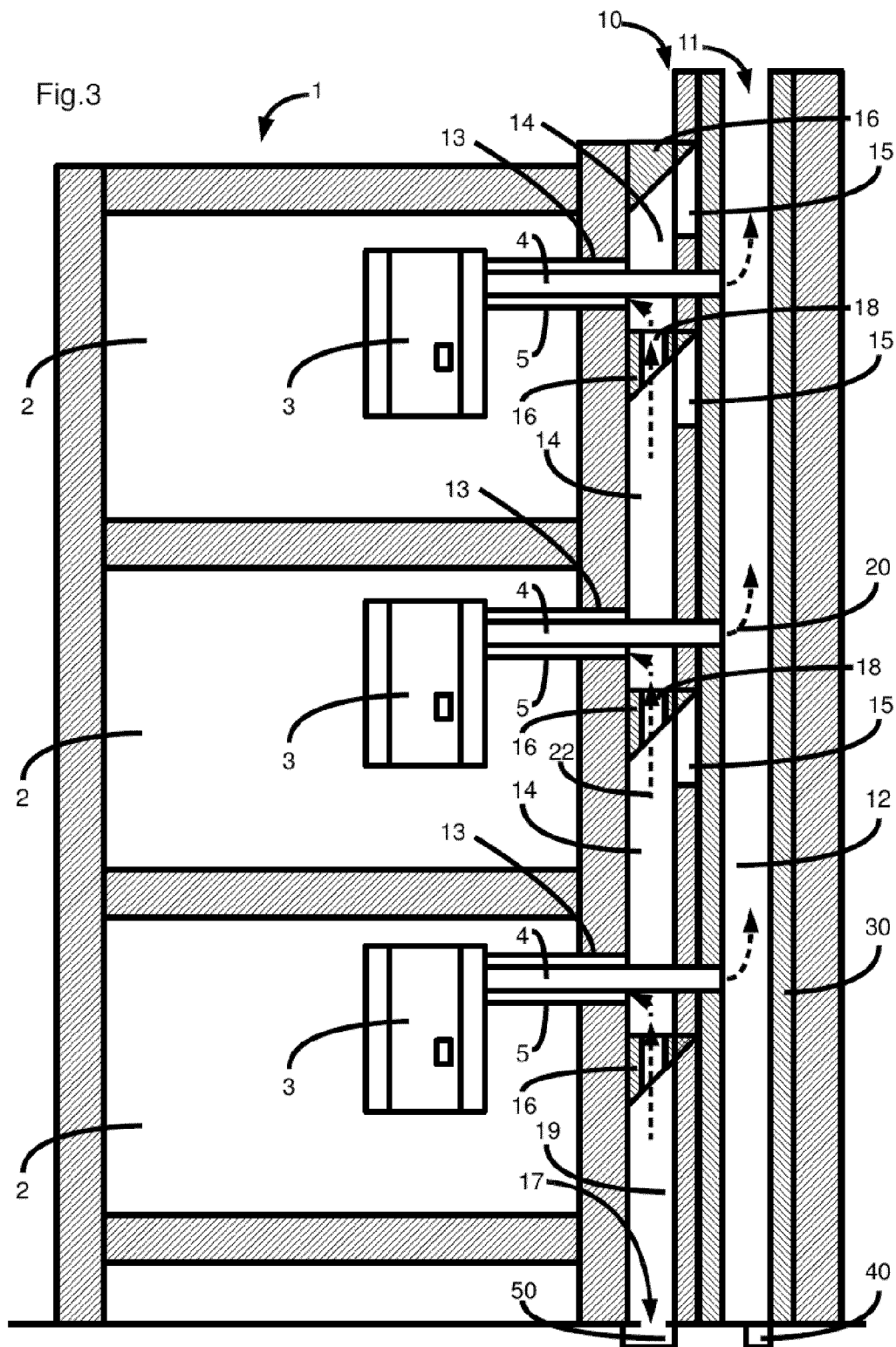


Fig.4

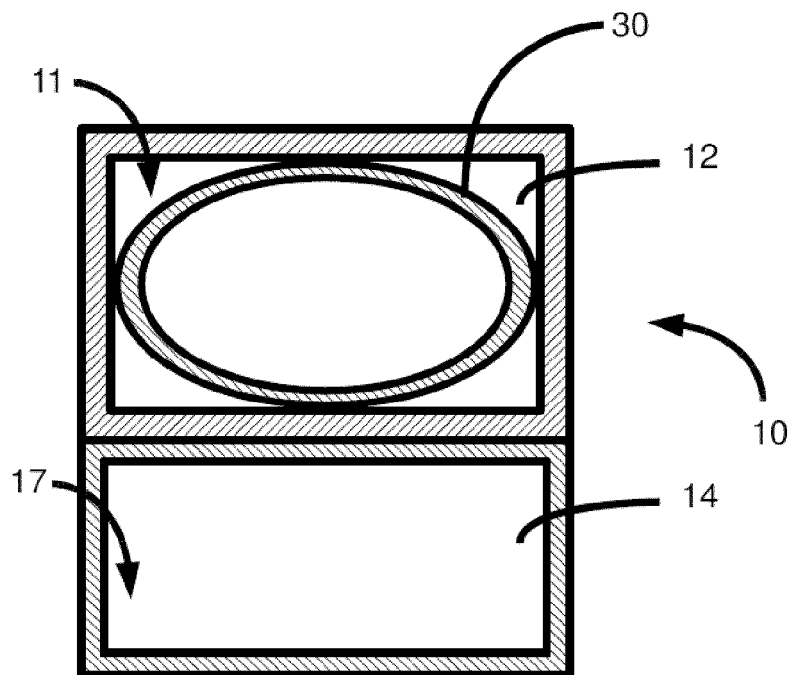
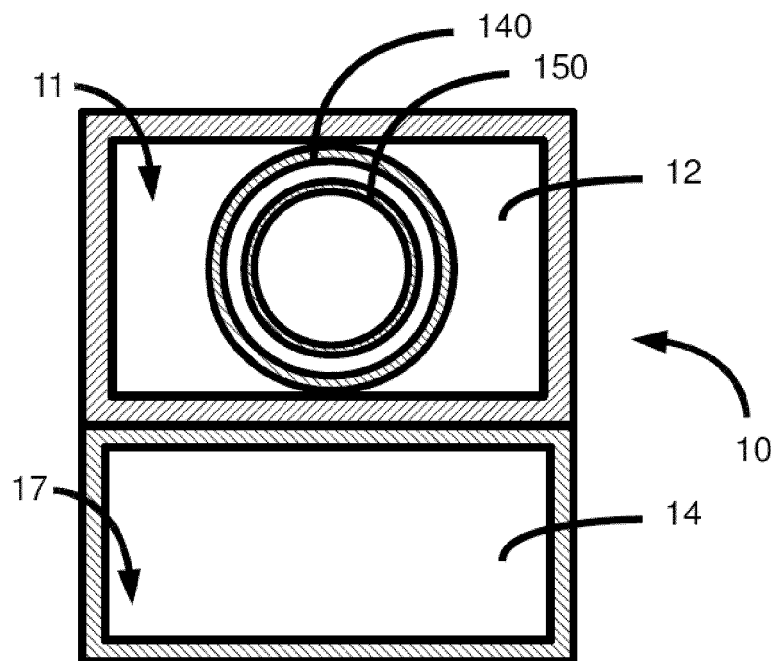


Fig.5





EUROPEAN SEARCH REPORT

Application Number
EP 11 19 0122

DOCUMENTS CONSIDERED TO BE RELEVANT			
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 February 2012	Examiner Mougey, Maurice
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document 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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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