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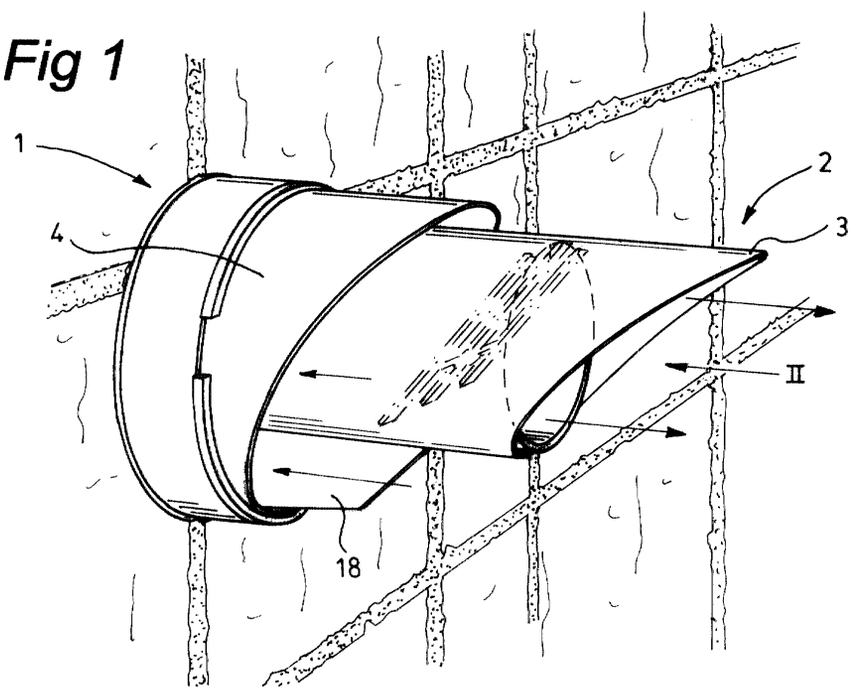
(54) Horizontal balanced flue

(57) The invention relates to an assembly of an air inlet and flue-gas outlet nozzle of the horizontal type (2), intended for fitting to an air inlet pipe (4) and a flue-gas outlet pipe (3) which runs inside and may project out of the latter, comprising an outlet pipe part which projects out of the interior of an inlet pipe part, in line therewith, and in a fitted position is connected to the flue-gas outlet pipe, a grate zone (8), in which an outlet grate (5) which overlaps the flow passage of the outlet nozzle, being provided in the outlet pipe part, at a distance from its outlet end, and, with a horizontally running inlet pipe part, the interior of the outlet pipe part, at least in the grate zone and its section which may lie upstream, being designed to drain in the upstream direction, in order, in the fitted position, to drain into the outlet pipe.

Fig 1



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Description

[0001] The present invention relates to an assembly of an air inlet and flue-gas outlet nozzle of the horizontal type, which assembly is intended for fitting to an air inlet pipe and to a flue-gas outlet pipe which runs inside and may project out of the latter, and which assembly comprises an inlet pipe part and an outlet pipe part which projects out of the interior of the inlet pipe part, in line therewith, and in a fitted position is connected to the flue-gas outlet pipe.

[0002] Assemblies of this type are known. To prevent birds and other small animals, as well as objects, such as leaves, from being able to enter the discharge nozzle from the outside, it is customary to provide the discharge nozzle with an outlet grate which overlaps the flow passage of the said nozzle. Outlet grates of this type are separate components which have to be fitted onto the discharge nozzle. Particularly in the case of plastic discharge nozzles, this requires an additional mould. The grates have the significant drawback that drops of condensation start to form on them and in the winter these may form icicles and may ultimately lead to the discharge nozzle freezing up altogether. In less wintry conditions, the condensation will run downwards along the grate and cause problems elsewhere, particularly in the case of a combined inlet/outlet nozzle, since the condensation can then generally enter the inlet nozzle, which is particularly undesirable. In connection with condensation, it should be pointed out that this problem occurs in particular if flue gases are discharged via the discharge nozzle.

[0003] It is an object of the present invention to provide an improved assembly of an air inlet and flue-gas outlet nozzle of the horizontal type, in which the problems arising from condensation forming on the outlet grate are prevented, preferably being eliminated altogether.

[0004] According to the invention, the abovementioned object is achieved by creating an assembly of the type described at the outset, in which in the outlet pipe part, at a distance from its outlet end, there is a grate zone, in which an outlet grate which overlaps the flow passage of the outlet nozzle is provided, and in which, with a horizontally running inlet pipe part, the interior of the outlet pipe part, at least in the grate zone and possibly its upstream section, is designed to drain in the upstream direction, in order, in the fitted position, to drain into the flue-gas outlet pipe. Positioning the grate zone with an outlet grate therein at a distance from the outlet end has two significant advantages. Firstly, since it is provided upstream of an outlet end, the outlet grate is situated in a warmer part of the outlet system, so that condensation which forms on the outlet grate is less likely to freeze. Secondly, protection from the outside world is provided. Particularly in wintry conditions, this has the advantage that the outlet grate is protected from wind and therefore also cannot adopt a temperature which is lower in relative terms as a result of what is known as the chill factor brought about by the wind, which would make it more susceptible to icing in the event of condensation. In this context, tests carried out by the applicant have shown that even a minimum distance of approximately 10 mm between the outlet grate and the outlet end may be sufficient. It should be clear that as this distance becomes greater, the warmer the zone of the outlet pipe part in which the grate is situated and the better the grate is protected from the outside world. The distance between the outlet grate and the outlet end, as seen in the longitudinal direction of the outlet pipe part or in the direction of flow through the latter, will in practice be between approximately 10 mm and approximately 30 mm. To prevent condensation which forms on the outlet grate from still being able to reach the outlet end of the outlet pipe part, where it can cause problems, for example by freezing or by entering the inlet pipe part, according to the invention it is furthermore provided that at least the grate zone and that section of the outlet pipe part which may lie upstream are designed to drain in the upstream direction. As a result, the condensation is discharged via the interior of the flue-gas outlet pipe, counter to the discharge direction of the flue gas. In this case, the temperature of the flue gases ensures that this condensation water will not freeze. For customary high-efficiency boilers, returning condensation water in this way does not cause any problems, since boilers of this type are provided as standard with a special receptacle in the outlet channel for condensation water in order to prevent this condensation water from entering the boiler. The grate zone and the section of the outlet pipe part which may lie upstream so as to drain into the flue-gas outlet pipe can per se be designed in a wide variety of ways, optionally with the aid of measures or combinations of measures which are known per se. Positioning an outlet pipe part, or at least its bottom zone, so as to slope downwards in the upstream direction, so that it can thus act as a return channel for condensation, is in itself generally considered insufficient to achieve reliable drainage of condensation which has formed on the outlet grate. In fact, according to the prior art, the flue-gas outlet pipe is fitted into the outlet pipe part, the downstream end wall, which lies inside the internal circumference of the inlet pipe part, of the flue-gas outlet pipe then forming an edge which rises up from the bottom zone of the outlet pipe part and impedes drainage of condensation into the flue-gas outlet pipe. The drainage in the upstream direction into the flue-gas outlet pipe may substantially be achieved in two ways, which if appropriate can be combined. The first way is for the upstream end of the outlet pipe part, or at least the bottom zone thereof, to lie at a higher level, so as to produce drainage, than the downstream end of the flue-gas outlet pipe, or at least the bottom zone thereof; in other words, the outlet pipe part is, as it were, fitted into the flue-gas outlet pipe instead of, as is known from the prior art, the reverse situation in which the flue-gas outlet pipe

is fitted into the outlet pipe part. The second way in which the drainage into the flue-gas outlet pipe can be implemented is by designing the outlet grate itself to drain into the flue-gas outlet pipe, in other words for the outlet grate to be positioned completely or partially in the flue-gas outlet pipe.

[0005] According to a preferred embodiment, in the assembly according to the invention the outlet grate, in the upstream direction too, at least partially, lies in front of the outlet pipe part, in order, in the fitted position, to lie above a bottom zone, which acts as a return channel, of the flue-gas outlet pipe. It is thus possible for the condensation which has formed on the outlet grate to drop directly off the outlet grate into the flue-gas outlet pipe. This effect whereby condensation which has formed on the grate drops directly into the flue-gas outlet pipe can, if appropriate, be promoted still further by providing the grid elements of the grate, such as bars, with a suitable shape and/or providing them with drop-off rims/push-off edges.

[0006] For the above reasons, a further advantageous embodiment of the assembly according to the invention provides that the upstream end of the outlet pipe part, or at least its bottom zone, merges in stepped form, in the radially outward direction, by means of a step into a support pipe part for the outlet pipe, the height of the step being greater than the predetermined wall thickness of the flue-gas outlet pipe. In this way, it becomes possible for the flue-gas outlet pipe still to be fitted into a pipe part, namely the support pipe part, while, since the outlet pipe part merges into the upstream support pipe part via a widening, drainage is ensured by the fact that the widening as such is larger than the wall thickness of the flue-gas outlet pipe. In an embodiment of this type, to prevent an opening or gap which is open towards the interior of the outlet pipe part being able to form between the outlet pipe part and the flue-gas outlet pipe at the transition from the outlet pipe part to the flue-gas outlet pipe, which gap could lead to problems if it were to fill up with water of condensation, according to the invention it is advantageous if a lip, which extends upstream in line with the outlet pipe part, is provided on the top side of the step, in such a manner that the lip and step together form a U-shaped receiving slot, which opens out in the upstream direction, for the outlet end of the flue-gas outlet pipe. To prevent water of condensation from being able to reach the outside of the flue-gas outlet pipe via this receiving slot, it is advantageous if the height of the U-shaped slot is approximately equal to the wall thickness of the flue-gas outlet pipe, in such a manner that, in the fitted position, the outlet end of the flue-gas outlet pipe is connected in a sealed manner, via a labyrinth seal, to the outlet pipe part. In combination with the abovementioned lip, it should be clear that, in connection with the drainage, it is highly advantageous if the inwardly facing surface of the lip bears flat against the inner surface of the outlet pipe part.

[0007] To further improve the drainage from the outlet grate into the flue-gas outlet pipe, in the embodiment in which the outlet pipe part merges in a stepped manner, in the upstream direction, into a support pipe part, it is preferable if the outlet grate, in the bottom zone of the outlet pipe part, is attached thereto in at least one attachment point, and in which the step, as seen in the longitudinal direction of the outlet pipe part, adjoins this attachment point or at least partially overlaps the attachment point. As a result, the flue-gas outlet pipe can then be pushed onto the attachment point or can be partially pushed under the attachment point or pushed under the bottom end of the outlet grate. This is advantageous, since condensation will generally form predominantly on the upstream side of the outlet grate.

[0008] An embodiment of the invention which is advantageous with a view to direct drainage from the outlet grate into the flue-gas outlet pipe part provides that the outlet grate is attached to the top side of the outlet pipe part, and that there is a free space between, on the one hand, the outlet grate and, on the other hand, the underside and preferably also the side edges of the interior of the outlet pipe part, in such a manner that a flue-gas outlet pipe which has been fitted into the flue-gas outlet nozzle from the upstream end on the top side can reach a stop at the outlet grate and on the underside can project downstream beyond the outlet grate. Transversely with respect to the longitudinal direction of the flue-gas outlet nozzle, the free space will therefore then have a dimension which is at least equal to and preferably greater than the wall thickness of the flue-gas outlet pipe which is to be fitted into the discharge nozzle. Taking into account conventional wall thicknesses of flue-gas outlet pipes of this nature, the free space will then preferably be at least 5 mm and more preferably at least approximately 10 mm. Incidentally, it should be noted that the maximum distance will be determined in particular by regulations relating to the grid size of the outlet grate. The regulations which are currently in force in the Netherlands specify that a ball with a diameter of 16 mm must not be able to pass through the grate. Therefore, according to the invention this free space may easily amount to 15 mm or even 15 mm plus the predetermined wall thickness of the flue-gas outlet pipe.

[0009] Since the outlet grate lies in the interior of the nozzle, it is protected from influences of weather prevailing in the environment and, as a result of the flue gases which are to be discharged past it, it can more easily be kept at a temperature above 0, which prevents condensation which has formed on the grate from freezing and therefore prevents the formation of ice or icicles. Since, on the underside of the grate, the flue-gas outlet which is to be fitted into the discharge nozzle from the upstream direction in the downstream direction projects beyond the grate, the result is that condensation which drips off the grate passes into the flue-gas outlet and can be discharged, in a manner which is inherently conventional, via the flue-gas outlet, counter to the direction of flow of the gas or air which is to be discharged through

this outlet. Inter alia, this prevents condensation from the grate from collecting inside and at the bottom of the discharge nozzle, in front of the end edge of the flue-gas outlet which has been fitted into the latter.

[0010] To ensure that the downstream end of the flue-gas outlet pipe projects beyond at least the bottom end of the outlet grate, the shape of the downstream end of the flue-gas outlet pipe will have to be adapted to the shape and positioning of the outlet grate, or conversely the way in which the outlet grate is surrounded and positioned will have to be adapted to the shape of the downstream end of the flue-gas outlet pipe, or alternatively a combination of these measures will be required. For example, if the outlet grate runs transversely with respect to the longitudinal direction of the discharge nozzle, the downstream end of the flue-gas outlet pipe may, for example, be bevelled, in which case the pointed end of the bevel then faces downwards during the insertion, in order to be able to project beyond the bottom end of the outlet grate, or, by way of example, it is possible for the flue-gas outlet pipe to be provided, at its bottom end, with an extension in the form of a type of channel or lip. In order not to have to impose particular demands on the shape of the downstream end of the flue-gas outlet pipe, however, according to the invention it will be preferable if the shaping and positioning of the outlet grate is adapted to the shaping of the downstream end of the flue-gas outlet pipe, specifically to the shaping of conventional flue-gas outlet pipes. This shaping is generally a right-angled cut with respect to the longitudinal axis of the said flue-gas outlet pipe. Therefore, according to an advantageous embodiment of the invention, it is preferable if the outlet grate extends from this top side towards the underside while running back into the outlet nozzle upstream. For example, the outlet grate, from the top side, may, for example, extend obliquely with respect to the longitudinal axis of the assembly, towards the underside.

[0011] According to an advantageous embodiment of the invention, the outlet grate is a lattice with main bars which run from the top side towards the underside and have free ends at their underside, and with one or more connecting bars which lie clear of the interior and connect the main bars to one another. A lattice of this type is then attached to the outlet pipe part by means of the top ends of the main bars, while otherwise the bars are completely clear of this inner side and can therefore create the abovementioned free space at the underside and the side edges.

[0012] The assembly according to the invention may advantageously be produced as a single-piece injection-moulded product made from aluminium or plastic, for example.

[0013] To minimize the air resistance of the outlet grate, according to the invention it is advantageous if the outlet grate is composed of bars which, as seen parallel to the longitudinal direction of the outlet pipe part, are teardrop-shaped in cross section, the pointed side of the teardrop shape pointing downstream.

[0014] According to a second aspect, the invention also relates to the air inlet part of the assembly. If appropriate, this second aspect may also be used completely independently of the first aspect, i.e. the air outlet part of the assembly according to the invention, or alternatively the second aspect may also be used in combination with assemblies in which the air inlet part is designed as is known from the prior art. Claims 15-18 relate to this second aspect of the invention and for this reason can also be read and considered entirely independently of Claims 1-14. According to the second aspect of the invention, it is highly advantageous if the outflow opening of the outlet pipe part, as seen in the outflow direction, lies a certain distance beyond the inlet of the inlet pipe part, if a partition is provided in the interior of the inlet pipe part, which partition is connected on one side to the interior of the inlet pipe part and on the other side to the exterior of the outlet pipe part, and if inlet openings for air or gas are formed in the partition, which inlet openings, preferably leaving clear a rim which runs over the external circumference of the outlet pipe part, are connected to the outlet pipe part and, at least in the bottom half of the inlet pipe part, leave a closed partition part running along the exterior thereof. As a result of the inlet openings for air or gas being connected to the outlet pipe part or at least as far as possible bearing against it, the air which is introduced via the air inlet will be forced to flow closely along the outlet pipe part, which on account of the flue gases discharged through it is relatively warm. This counteracts the formation of frost or condensation at the air inlet. Preferably, the inlet openings will not be directly connected to the outlet pipe part, but rather will leave clear an edge which runs over the external circumference of the outlet pipe part. This edge contributes to preventing rain from penetrating into the inlet. This is because the edge prevents rainwater or possibly water of condensation which flows along the exterior of the outlet pipe part towards the inlet openings from passing through the inlet openings. This is because the edge will form a dropping edge which blocks this rainwater or water of condensation and guides it towards the underside of the outlet pipe part, where it comes off the edge and drops into the interior of the inlet pipe part, but still on the upstream side of the partition, as seen in the inlet direction of flow. The remaining part of the partition, which runs along the interior of the inlet pipe part, in the bottom half thereof, also prevents the penetration of rain or also the penetration of condensation. That part of the partition which lies in the bottom half of the inlet pipe part will, in the direction of flow of the inlet stream, be recessed with respect to the edge which lies above it, the so-called dropping edge.

[0015] The fact that the inlet partition, or at least the inlet openings, are recessed, preferably by approximately 10 mm or more, with respect to the inlet end edge of the inlet pipe part makes it more difficult, if not altogether impossible, for rain to penetrate directly through

the inlet openings.

[0016] In order, with a specific diameter, to obtain a larger passage area, according to the invention it is preferable if at least a section of that part of the partition which comprises inlet openings runs obliquely with respect to the longitudinal axis of the inlet/outlet nozzle, specifically, in particular, running obliquely downwards from the top side towards the underside, as seen in the direction of flow of the inlet stream.

[0017] So that water which collects in front of the bottom, closed part of the inlet partition can be discharged without entering the inlet channel, according to the invention it is advantageous for an outflow opening to be provided in the underside of the inlet pipe part and, upstream thereof, with respect to the inlet direction, for a stop to be provided on the outer side of the inlet pipe part, for the air inlet pipe which is to be pushed over the inlet pipe part, in such a manner that the base zone of the air inlet pipe, which in the fitted position lies upstream of the said outlet opening, acts as a drainage channel for the said water. In this context, it is particularly advantageous if the air inlet pipe part, upstream of the said outlet opening, is raised in the base zone. Together with the base zone of the air inlet pipe part, which lies beneath it, it is then possible to form a drainage channel which is closed in the circumferential direction.

[0018] To improve the incoming flow of air via the inlet part, according to the invention it is preferable if a longitudinal partition, which extends between the inlet pipe part and outlet pipe part, projects out of the inlet of the inlet pipe part. In this case, a longitudinal partition of this type will in the first instance have a bearing function for the purpose of fixing the inlet pipe part and outlet pipe part with respect to one another and, on account of projecting out of the inlet pipe part, will also serve as a baffle plate. According to the invention, if desired, it is possible for a plurality of longitudinal partitions of this type, which act as baffle plates, to be provided. If the inlet pipe part is positioned eccentrically with respect to the outlet pipe part, however, generally a longitudinal partition of this type will only be provided at the section of the inlet which is relatively wide with respect to the eccentricity. A longitudinal partition of this type ensures that air flows which run along the outside wall are also introduced into the air inlet via the baffle plate. Longitudinal partitions of this type which act as baffles may also, quite independently of the discharge nozzle according to the invention or the partition provided with inlet openings in the inlet pipe part, be advantageous for other known inlet/outlet nozzles which are already known per se from the prior art.

[0019] The present invention will be explained in more detail below with reference to two exemplary embodiments which are diagrammatically depicted in the drawing, in which:

Fig. 1 shows a perspective view of a first embodiment of an assembly according to the invention in a position fitted to an outside wall.

Fig. 2 shows a front view of the assembly shown in Fig. 1, in the direction of arrow II-II in Fig. 1;

Fig. 3 shows a longitudinal section through the assembly shown in Figures 1 and 2;

Fig. 4 shows a longitudinal section through the assembly from Figures 1-3 which has been fitted to an air inlet and flue-gas outlet pipe;

Fig. 5 shows a longitudinal section in accordance with that shown in Fig. 3, but in this case through a second embodiment of an assembly according to the invention;

Fig. 6 shows a front view in accordance with that shown in Fig. 2, but in this case of the assembly according to the second embodiment which is shown in longitudinal section in Fig. 5; and

Fig. 7 shows a cross sectional view in the direction of VII-VII from Fig. 5 through a bar of the outlet grate, although this could equally well be a cross-sectional view of a bar 6 or 7 of the grate from Figures 1-4.

[0020] Fig. 1 shows a perspective view of an outer surface of an outside wall 1, out of which an assembly according to the invention of a combined inlet/outlet nozzle fitted to an inlet and outlet duct (also referred to as an air inlet pipe or flue-gas outlet pipe) projects. This assembly 2 substantially comprises an outlet pipe part 3 and an inlet pipe part 4. The inlet pipe part 4 is positioned around the outlet pipe part 3 and the outlet pipe part 3 is positioned eccentrically in the inlet pipe part 4, in such a manner that the distance between the outlet pipe part 3 and the inlet pipe part 4 is greatest at the underside and the distance between the inlet pipe part 4 and the outlet pipe part 3 is smallest at the top side, as can be seen, inter alia, in Fig. 2. As can be seen in particular from Figs. 3 and 4, the outflow end 31 of the outlet pipe part 3 and the inflow end 30 of the inlet pipe part 4 are shaped or cut so that they are curved with respect to the longitudinal axis of the pipe part in question. It should be clear that this curved profile may also be an oblique, that is to say bevelled, profile. The curved or bevelled profile prevents rain from penetrating in via the outflow end 31 and/or inflow end 30.

[0021] An outlet grate 5 in lattice form is provided in the interior of the outlet pipe part 3. This lattice-like outlet grate 5 (referred to below as the grate) comprises three so-called main bars 6, the top ends of which are attached to the interior of the outlet pipe part 3 and the bottom ends 11 of which hang freely, leaving clear a space m between the bottom ends 11 and the interior of the outlet pipe part 3. This space m is approximately 10 mm. To strengthen the lattice-like grate 5, the main bars 6 are connected by a connecting bar 7. If appropriate, more than one connecting bar 7 may be provided, for example two or three connecting bars 7 may be provided. The cross-sectional shape of the main bars 6 and connecting bar 7 may be teardrop-shaped, as illustrated

in Fig. 7.

[0022] As can be seen clearly in Fig. 3, inter alia, the grate 5 extends from the top side towards the underside, while the grate also runs backwards into the nozzle. In particular, the grate 5, from the top side, extends obliquely with respect to the longitudinal axis of the outlet pipe part 3 towards the underside of the outlet pipe part 3. As can also be seen clearly in particular in Figs. 1, 3 and 4, the discharge end of an outlet channel 21 can therefore be pushed onto the top side, which acts as a stop 8, of the main bars 6, the bottom end 9 of the said outlet channel 21 then projecting beyond the bottom ends 11 of the main bars 6, as seen in the discharge direction A. In this way, it is possible to make drops 12 of condensation which have formed on the lattices of the grate 5 flow downwards along these lattices and drop into the outlet channel 21. The outlet channel 21 which, as is known per se from the prior art, is positioned so as to slope obliquely upwards in the discharge direction A, will then discharge the drops 12 of condensation inwards in order to be discharged further. It should be clear that the downstream end 10 of the outlet channel 21 does not per se actually have to be cut. Particularly if the grate 5 runs, for example, transversely with respect to the longitudinal direction of the outlet pipe part 3, this downstream end 10 could also run obliquely, in which case it will be important for the bottom end 9 of the downstream end 10 to lie further downstream than the diametrically opposite top end 32 of the downstream end 10. Furthermore, it will be clear that the number of main bars 6 will be very much dependent on the diameter of the outlet pipe part 3 and on the maximum permissible lattice width, which is laid down by certification requirements. The certification requirement which is currently in force in the Netherlands has already been stated above.

[0023] The above-described grate 5 in the outlet pipe part 3, which is also referred to as the discharge nozzle, is a particular embodiment of the first aspect of the invention, which aspect in particular prevents condensation which forms on the more or less indispensable grate from being able to cause problems. This is because the grate 5 according to the invention ensures that the condensation which has formed thereon is guided back into the outlet channel 21, a significant advantage being that the discharge nozzle and the grate can be produced as a single-piece injection moulding. A further significant point is that the grate 5 is set back inside the outlet pipe part 3 and is thus protected from external weather influences and can be heated better by relatively warm flue gases in order to prevent ice from forming. Preferably, the grate 45 will be set back by at least 10 mm, more preferably at least 15 mm, with respect to the end 31 of the outlet pipe part 3, for example may be set back by approximately 25 mm as indicated by C in Fig. 4.

[0024] As will be explained in more detail with reference to Figures 5 and 6, the first aspect of the invention, as an alternative to using the grate 5 which has been described with reference to Figures 1-4, can also be implemented with a grate provided in some other way. The basic embodiment of the first aspect of the invention provides for the grate 5 (Figs. 1-4) or 50 (Figs. 5 and 6) to be positioned set back from the end 31 of the outlet pipe part 3, for example by a distance C (Figs. 4 and 5) of at least 10 mm, preferably at least 15 mm. The grate 5, 50 may in this case be formed as an integral unit with the outlet pipe part 3, for example as a single-piece injection moulding. The fact that the grate 5, 50 is set back counteracts the formation of ice as a result of condensation freezing on the said grate. The grate 5, 50 may in this case be attached to the outlet pipe part 3 over the entire internal circumference of the outlet pipe part 3, if appropriate in a discontinuous manner, but at points which are distributed over the internal circumference. For example, it is possible for the bars 6, 7; 56, 57 to be attached to the outlet pipe part 3 by means of opposite ends. The grate 5, 50 could also serve as a stop for the discharge channel 20.

[0025] The second aspect of the invention relates in particular to the inlet part of an assembly of a combined inlet/outlet nozzle of the horizontal type, in which the outlet pipe part projects through and beyond the inlet pipe part and is preferably arranged eccentrically with respect to the inlet pipe part. The inlet channel is in this case formed by the space between the outlet pipe part and the inlet pipe part which lies around it.

[0026] According to the second aspect of the invention, an inlet partition 13 is provided in the interior of the inlet pipe part, which partition on one side is connected to the interior of the inlet pipe part and on the other side is connected to the exterior of the outlet pipe part. This inlet partition 13 therefore connects the inlet pipe part and the outlet pipe part, which can be produced as a single-piece plastic injection moulding. To counteract the formation of frost or condensation in the inlet, the inlet openings 14 in the inlet partition 13 are as far as possible placed against the outlet pipe part 3, which will be relatively warm on account of the flue gases which are to be discharged through it. A closed partition part 15 is left in the bottom half of the inlet pipe part. The closed partition part 15 prevents rain from penetrating into the inlet. According to the invention, rain is prevented from penetrating into the inlet via the external surface of the outlet pipe part 3 by not continuing the inlet openings 14 all the way to the outlet pipe part 3, but rather leaving a free edge 16. This edge 16, with a radial thickness of, for example, 2 to 5 mm, will form a guide edge for guiding water downwards, where this water can drip off the edge 16. Then, as seen with respect to the inflow direction I, it falls onto the upstream side of the partition part 15 which has been left on account of this partition part 15 being in a recessed position with respect to the edge 16 as seen in the entry direction I. In its base zone, the inlet pipe part 4 is provided with a raised part 36 in which, in the vicinity of the partition part 15, there is an outflow opening 35 for draining frost, condensation and

rainwater. In this way, at the inlet channel 20 which has been fitted onto the inlet pipe part 4, as shown in Fig. 4, a drainage channel 23 is formed, which is delimited by the raised portion 36, on the one hand, and the upstream end of the base zone of inlet channel 20, on the other hand. The drainage direction is via outflow opening 35 and the arrow which points vertically downwards from the drainage channel 23 in Fig. 3.

[0027] The inlet openings 14 are separated from one another by substantially radially running webs 17, which on the one hand suspend the outlet pipe part 3 in the inlet pipe part 4 and on the other hand have a grate function, in order to ensure that the inlet openings 14 do not become excessively large, in connection with the penetration of objects (as stated above, the test criterion in the Netherlands is that it must not be possible for a ball with a diameter of 16 mm to pass through).

[0028] As can be seen in particular from Figs. 3 and 4, the partition 13, or at least its section which contains the inlet openings 14, runs obliquely from the top downwards, into the inlet, before running approximately vertically at the bottom end, at 15. This has the advantage that for a specified diameter the passage area of the inlet openings 14 increases.

[0029] According to a third aspect of the invention, which can advantageously be used in combination with the second aspect of the invention, but can also be employed separately, a longitudinal partition 18 is provided, which extends in the longitudinal direction of the inlet pipe part 4, projects outside the inlet pipe part and continues along the outlet pipe part 3 outside the inlet pipe part 4. This longitudinal partition 18 on the one hand enhances the strength of the suspension of the outlet pipe part 3 and the inlet pipe part 4, and on the other hand, which is of at least equal importance, functions as a baffle plate for wind which is directed along the outer wall 1. This baffle plate 18 ensures that wind of this type is guided more successfully towards the inlet opening 14.

[0030] Figures 5 and 6 respectively show a longitudinal section and a front view of an assembly according to a second embodiment of the invention. Where corresponding components in terms of function or form are used, these components are denoted by the same reference numerals in Figures 5 and 6 as those which were used in Figures 1-4. These reference numerals therefore require no further explanation. The embodiment shown in Figures 5 and 6 differs from the embodiment shown in Figures 1-4 substantially with regard to two points. The first point of difference relates to the outlet grate, which in Figures 5 and 6 is denoted by the reference numeral 50, and the second point of difference relates to the bottom section 15 of the inlet partition 13.

[0031] Unlike the grate 5, the outlet grate 50 is provided with bars 56 and 57 of which the opposite ends are in each case fixedly connected to the interior of the outlet pipe part 3. This makes the grate 50 more robust and less susceptible to damage than the grate 5. The locations where the bars are connected to the interior of the outlet pipe part 3, known as the attachment points, are denoted by 59. The grate 50 has a central section 53, which lies further upstream (in the opposite direction to the direction of arrow A) than the attachment points 59 of the bars. In the exemplary embodiment illustrated in Figs. 5 and 6, in at least the bottom zone of the inlet pipe part 3, along the entire circumference of the inlet pipe part 3, the inlet pipe part 3 merges, via a stepped section 65, into a support pipe part 62. The step from the inlet pipe part 3 to the support pipe part 62 is directed outwards, i.e. in the radial direction, with respect to the longitudinal axis of the inlet pipe part 3 (although it is by no means necessary for the inlet pipe part 3 to be of round cross section). The inner surface of the inlet pipe part 3 is continued in the upstream direction (in the opposite direction to arrow A) by means of a lip 60 at the top side of the step 65, in order in this way to form a receiving slot 61 which opens out in the upstream direction. Then, the upstream end 10 (cf. Fig. 3) of the outlet channel 21 can be accommodated in the slot 61. In this case, support pipe 62 and lip 60 form a labyrinth seal and, as will be clear, the top surface of lip 60 will lie closer to the longitudinal axis 66 of the outlet pipe part 3 than, in the fitted position, the inner surface of outlet channel 21. If the internal surface of lip 60 which faces towards centre axis 66 then slopes downwards slightly, at least upstream of the bottom zone, drainage in the upstream direction is ensured. In order to ensure drainage in the upstream direction at all times in the outlet pipe part 3, at least the bottom zone 67 of the inlet pipe part 3 will slope obliquely downwards in the upstream direction (in the opposite direction to arrow A). In the embodiment shown in Figs. 5 and 6, the drainage in the flue-gas outlet pipe/outlet channel 21 is therefore twofold: firstly, in the fitted position the grate 50 with a central zone 53 lies inside the outlet channel 21, and secondly in the fitted position the connection of the grate 50 at the bottom attachment points 59 to the outlet channel 21 drains in the upstream direction thereof.

[0032] The other point of difference between the embodiment shown in Figs. 5 and 6, on the one hand, and that shown in Figures 1-4, on the other hand, is the inclined profile of the bottom zone 15 of the inlet partition 13. Consequently, the bottom of the edge 16 lies at a distance in front of the bottom section of partition 15 (as can be seen in Fig. 5), so that the risk of water which drops off edge 16 being able to pass partition 15 in a direction which is opposite to that of arrow A decreases further.

[0033] Finally, Fig. 7 shows a teardrop-shaped cross section of the bar 56, which teardrop-shaped cross section preferably also applies to bar 57 and can also highly advantageously be used for the bars 6 and 7 of the embodiment shown in Figures 1-4. This teardrop shape, of which the point 70, as can be seen clearly from Fig. 7, points in the outflow direction of the flowing gases, reduces the flow resistance. In the case of inclined bars, such as the sectors 69 of the grate 50 and the bars 6

from grate 5, this teardrop shape, which runs parallel to the longitudinal axis 66, also has the effect of forcing drops to be guided downwards, so that they will drop off the bar more easily.

[0034] Finally, it should be pointed out that where the present text refers to the formation of condensation or frost on the outlet grate, this should also be understood as meaning the drops of rain which are blown onto the said grate. The same applies in connection with condensation and/or frost formation, and the discharged moisture may in this case also be moisture originating from any drops of rain which have been blown in.

[0035] In the present application, the term grate zone is understood as meaning a zone which extends in the longitudinal direction of the flue-gas outlet pipe part and inside which the grate is positioned. This zone may be regarded as being delimited upstream of the flue-gas outlet pipe part by the part of the outlet grate which lies furthest upstream and as being delimited in the downstream direction by the part which lies furthest downstream.

[0036] It should be clear that the pipe-shaped discharge nozzle according to the invention and the combined inlet/outlet nozzle according to the invention need in no way be based on cylindrical pipe parts, as outlined in the drawings. These pipe parts may also be oval, rectangular or of some other shape.

Claims

1. Assembly of an air inlet and flue-gas outlet nozzle of the horizontal type, intended for fitting to an air inlet pipe and to a flue-gas outlet pipe which runs inside and may project out of the latter, comprising:

   - an inlet pipe part; and
   - an outlet pipe part which projects out of the interior of an inlet pipe part, in line therewith, and in a fitted position is connected to the flue-gas outlet pipe,

   characterized

   in that in the outlet pipe part, at a distance from its outlet end, there is a grate zone, in which an outlet grate which overlaps the flow passage of the outlet nozzle is provided, and

   in that with a horizontally running inlet pipe part, the interior of the outlet pipe part, at least in the grate zone and possibly its upstream section, is designed to drain in the upstream direction, in order, in the fitted position, to drain into the flue-gas outlet pipe.

2. Assembly according to Claim 1, in which the outlet grate, in the upstream direction, at least partially, lies in front of the outlet pipe part, in order, in the fitted position, to lie above a bottom zone, which acts as a return channel, of the flue-gas outlet pipe.

3. Assembly according to one of the preceding claims, in which the upstream end of the outlet pipe part, or at least its bottom zone, merges in stepped form, in the radially outward direction, by means of a step into a support pipe part for the outlet pipe, the height of the step being greater than the predetermined wall thickness of the flue-gas outlet pipe.

4. Assembly according to Claim 3, in which a lip, which extends upstream in line with the outlet pipe part, is provided on the top side of the step, in such a manner that the lip and step together form a U-shaped receiving slot, which opens out in the upstream direction, for the outlet end of the flue-gas outlet pipe.

5. Assembly according to Claim 4, in which the height of the U-shaped slot is approximately equal to the wall thickness of the flue-gas outlet pipe, in such a manner that in the fitted position the outlet end of the flue-gas outlet pipe is connected in a sealed manner, via a labyrinth seal, to the outlet pipe part.

6. Assembly according to Claim 4 or Claim 5, in which the inwardly facing surface of the lip bears flat against the inner surface of the outlet pipe part.

7. Assembly according to one of the preceding Claims 3-6, in which the outlet grate, in the bottom zone of the outlet pipe part, is attached thereto in at least one attachment point, and in which the step, as seen in the longitudinal direction of the outlet pipe part, adjoins this attachment point or at least partially overlaps the attachment point.

8. Assembly according to one of the preceding claims, in which the outlet grate is attached to the top side of the outlet pipe part, and in which there is a free space between, on the one hand, the outlet grate and, on the other hand, the underside and preferably also the side edges of the interior of the outlet pipe part, in such a manner that a flue-gas outlet pipe which has been fitted into the flue-gas outlet nozzle from the upstream end on the top side can reach a stop at the outlet grate and on the underside can project downstream beyond the outlet grate.

9. Assembly according to Claim 8, in which the outlet grate, running back into the nozzle, extends from this top side towards the underside.

10. Assembly according to Claim 8 or Claim 9, in which the outlet grate, from the top side, extends obliquely with respect to the longitudinal axis of the outlet pipe part, towards the underside.

11. Assembly according to one of the preceding Claims

8-10, in which the said free space is at least 5 mm and preferably at least 10 mm.

12. Assembly according to one of the preceding Claims 8-11, in which the grate is a lattice with main bars which run from the top side towards the underside and have free ends at their underside, and with one or more connecting bars which lie clear of the interior and connect the main bars to one another.

13. Assembly according to one of the preceding claims, produced as a single-piece injection-moulded plastic product.

14. Assembly according to one of the preceding claims, in which the outlet grate is composed of bars which, as seen parallel to the longitudinal direction of the outlet pipe part, are teardrop-shaped in cross section, the pointed side of the teardrop shape pointing downstream.

15. Assembly according to one of the preceding claims, in which the outflow opening of the outlet pipe part, as seen in the outflow direction, lies a certain distance beyond the inlet of the inlet pipe part, a partition being provided in the interior of the inlet pipe part, which partition is connected on one side to the interior of the inlet pipe part and on the other side to the exterior of the outlet pipe part, and inlet openings for air or gas being formed in the partition, which inlet openings, preferably leaving clear a rim which runs over the external circumference of the outlet pipe part, are connected to the outlet pipe part and, at least in the bottom half of the inlet pipe part, leave a closed partition part running along the interior thereof.

16. Assembly according to Claim 15, in which at least a section of that part of the partition which comprises inlet openings runs obliquely with respect to the longitudinal axis of the inlet/outlet nozzle.

17. Assembly according to Claim 15 or 16, comprising a longitudinal partition which extends between the inlet pipe part and outlet pipe part and projects out of the inlet of the inlet pipe part.

18. Horizontal, double-walled inlet/outlet nozzle, the outflow opening of the outlet pipe part, as seen in the outflow direction, lying at a certain distance beyond the inlet of the inlet pipe part, one or more baffle plates running outside the inlet pipe part, in the longitudinal direction of the nozzle, along the exterior of the outlet pipe part.

Fig 1

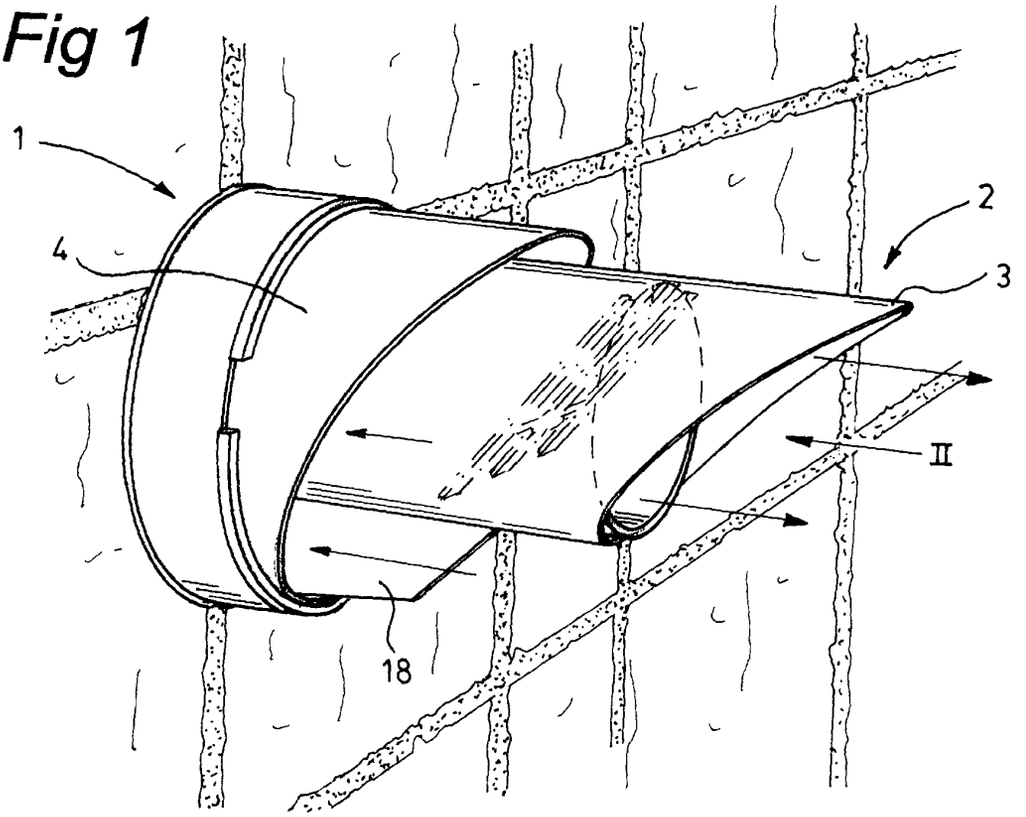

Fig 2

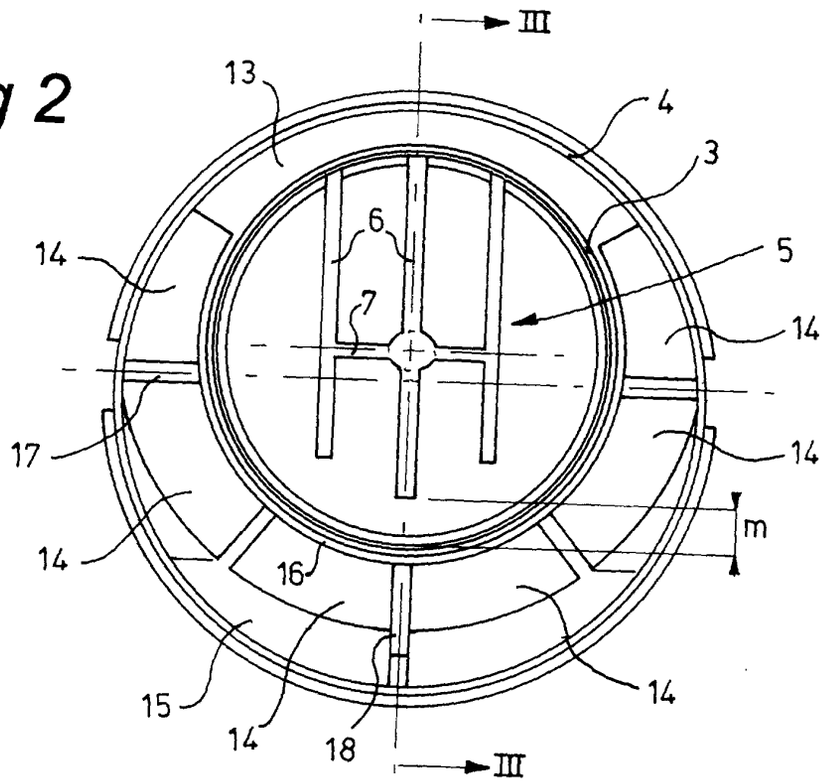

Fig 3

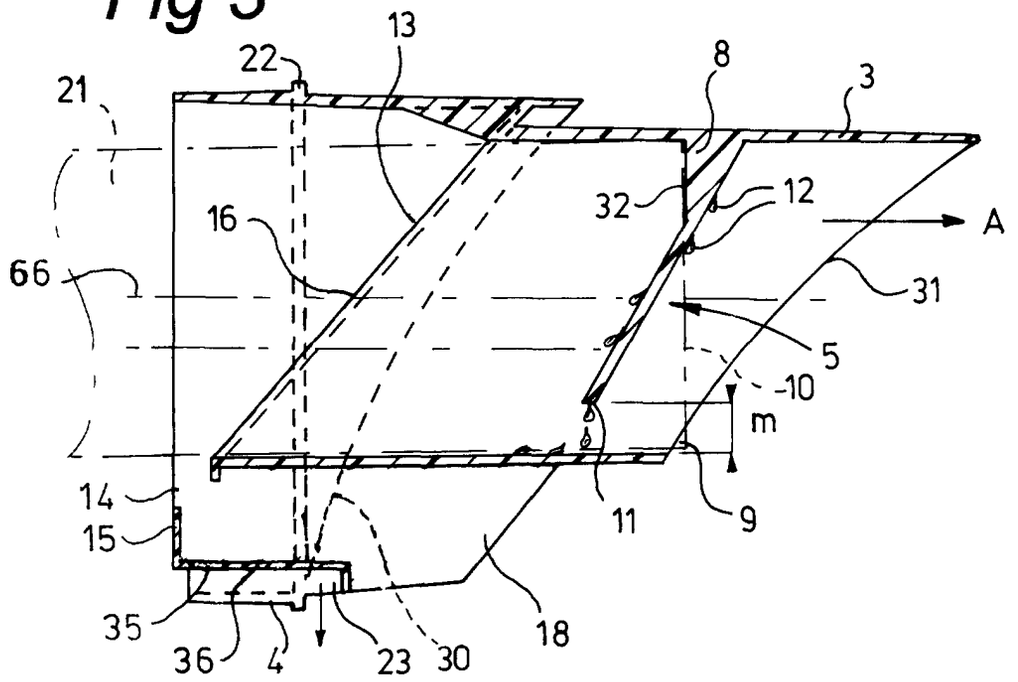
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Fig 4

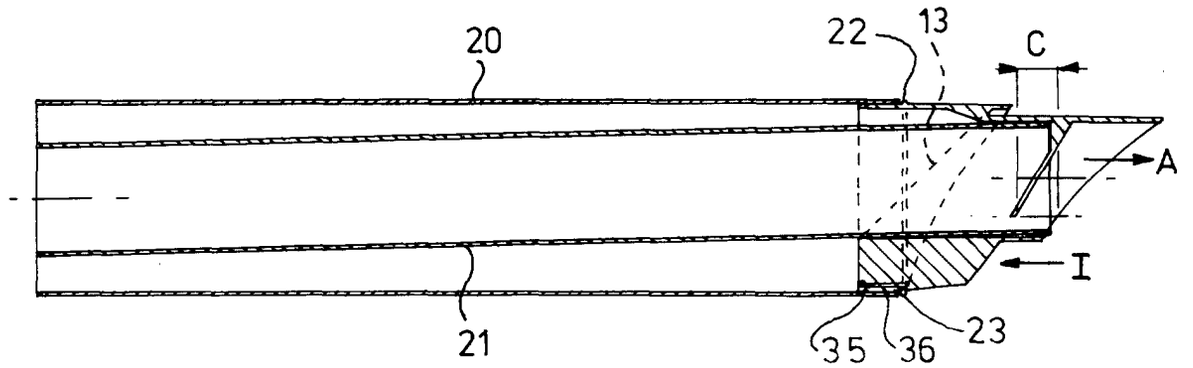
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Fig 5

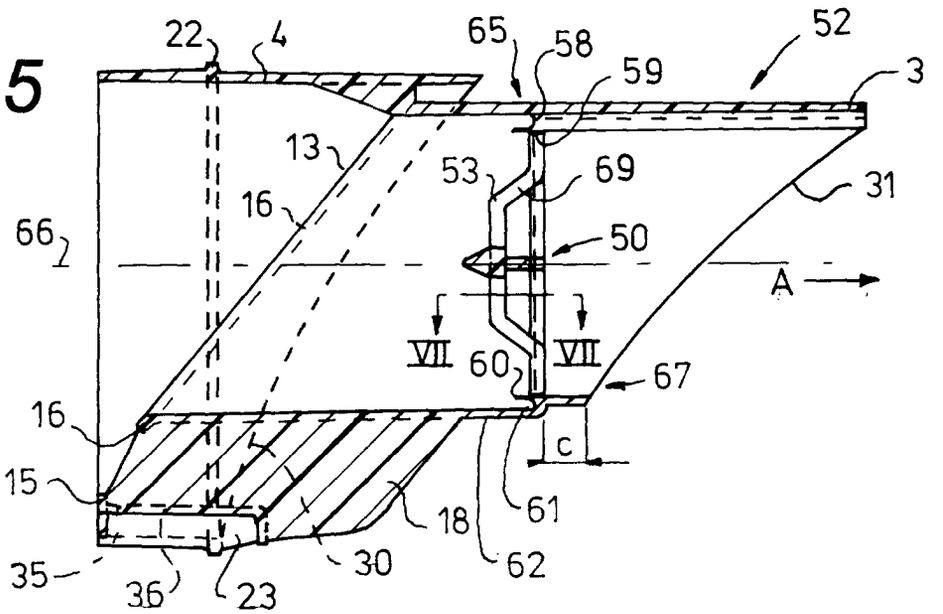

Fig 6

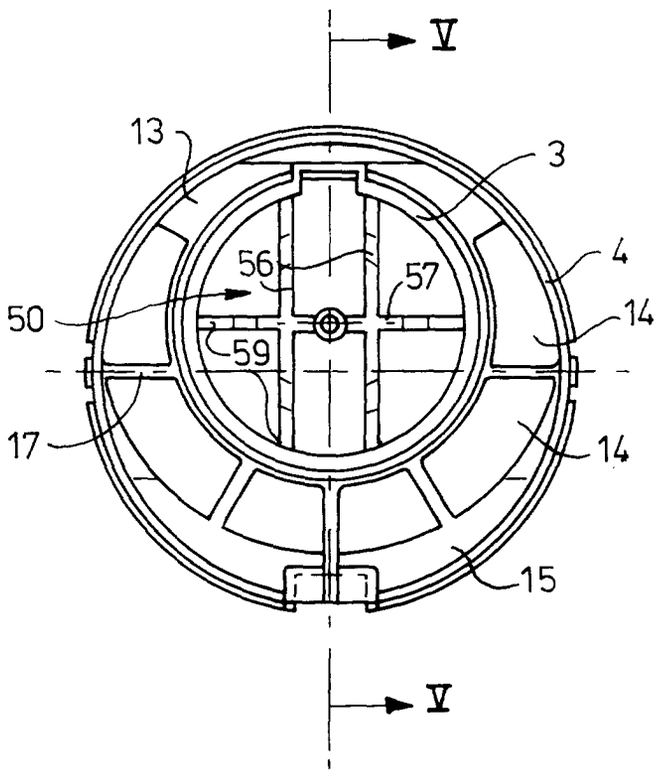

Fig 7