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(54) Ice-free discharge structure

(57) Discharge structure for an outlet structure of a gas discharging apparatus, such as a heating system, in particular a heating boiler comprising a gas discharge pipe (4), means (7) for screening the outlet of the gas discharge pipe and means (6) for collecting condensation coming from the screening means, in which at least near the outlet of the gas discharge pipe means (26) are provided for guiding and passing condensation from the collecting means to the inside of the gas discharge pipe, the screening means comprising a cover plate (8) placed above the outlet of the gas discharge pipe, further comprising condensation discharging means comprising a number of circumferentially arranged bars (18) or strips that surround the outlet and a downstream area thereof in radially outward direction and extend with a component in the pipe direction and that are in discharging liquid communication with the collecting means.

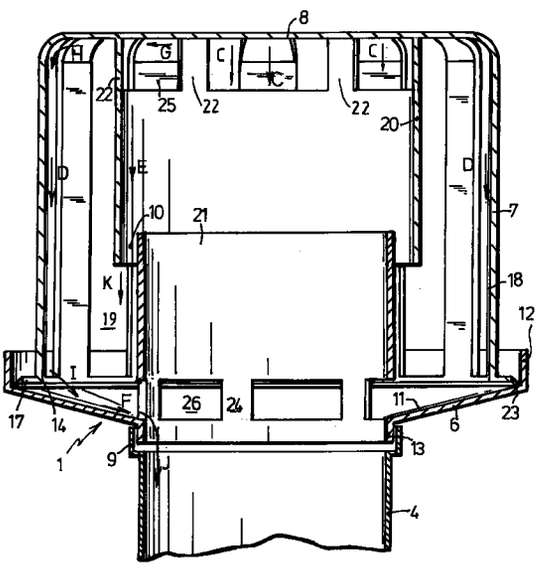

FIG. 4

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Description

The invention relates to a discharge structure for an outlet structure of a gas excuding apparatus, such as a heating system, in particular a heating boiler. The invention further relates to a so-called outlet structure for a colsed gas appliance, comprising an air supply structure and a discharge structure according to the invention.

Outlet structures for open or closed gas appliances are known from patent literature. For this purpose reference can be made i.a. to European patent application 0.654.638 and European patent 0.418.976, both in the applicant's name.

Whenever damp discharge gasses, such as combustion gasses from a so-called high-efficiency boiler, or damp air, reach the outlet of the gas discharge pipe and beyond, condensate will occur on parts of the discharge structure located there, which parts, as a result of the ambient temperature, are colder than the discharged gas. As long as there is a question of condensate this does not necessarily constitute a problem. This can, however, be the case if the ambient temperature is so low, that the condensate freezes and ice accumulates or icicles are formed. These ice formations can prevent the discharge structure from operating properly, especially if they form an uninterrupted plate of ice. When it starts thawing and they loosen from the discharge structure they can damage the roof structure or constitute a hazard for people or objects below or nearby.

The screening means comprise a cover plate located downstream or above the outlet of the gas discharge pipe, which cover plate is arranged substantially perpendicular to the centre line of the discharge pipe. A suchlike cover plate is there to prevent a (fall) wind blowing directly into the gas discharge pipe and thus obstructing the discharge. Besides, the cover plate prevents birds from entering and too much rain coming in as well. Condensate takes place against the lower side of the cover plate. It will be possible for condensate drops to collect on the lower side and drip down. To aid this the lower side is often formed having a central lowest portion, to where the drops can flow along the lower side.

An outlet structure with a provision for collecting and returning condensate to inside parts of the outlet structure is known from the Dutch patent application 94.00659. In one embodiment the discharge structure in that outlet structure is provided with a collecting dish, which has a circumference such that condensate drops from parts located therabove, especially the cover plate, are collected and which connects at its lower end in a water drop discharging fashion to the combustion gas discharge pipe. In this known discharge structure the intention is, among other things, to collect the water drops that have thus been led into the gas discharge pipe at the bottom of the discharge gas pipe, so that from there they are conveyed to the sewer system, for example.

It can happen that the discharge structure is inclined such that the intended lowest portion of the plate is in fact no longer the lowest portion thereof, but instead edge areas of the plate, as a result of which the drops will collect there and fall downwards past the collecting dish, and consequently icicles will form on lower parts such as an air inlet hood or a roof tile, with all the adverse consequences that that entails.

The invention now aims at providing a discharge structure or an outlet structure of the kind described in the opening paragraph, with which an improved and thus safer removal and collection of condensate is possible, so that ice formation is virtually ruled out. To this end the invention provides among other things a discharge structure for an outlet structure of a gas discharging apparatus, such as a heating system, in particular a heating boiler comprising a gas discharge pipe, means for screening the outlet of the gas discharge pipe and means for collecting condensate coming from the screening means, in which at least near the outlet of the gas discharge pipe means are provided for guiding and passing condensate from the collecting means to the inside of the gas discharge pipe, the screening means comprising a cover plate placed above the outlet of the gas discharge pipe, further comprising condensate discharging means comprising a number of circumferentially arranged bars or strips that surround the outlet and a downstream area thereof in radially outward direction and extend with a component in the pipe direction and that are in discharging liquid communication with the collecting means.

The bars or strips ensure interception, adhesion and guiding of the drops to the collecting means, irrespective of the shape of the cover plate, also if the discharge structure is inclined. As a result of adhesion forces the condensate drops will remain on the bars and will flow down along them to the collecting means, across through the gas flow. The bars can make even a lowest portion on the cover plate superfluous. So the plate can be formed in Several different ways, for instance even with a concave lower side. The bars or strips moreover provide for guidance of the discharge gasses and also for wind interruption, so that in the case of hard wind drops are, to a large extent, prevented from being swept along and then landing at places outside the collecting means where ice formation then occurs.

Preferably the bars or strips are substantially vertically oriented. In addition it is preferable if the bars connect at their downstream end to a ring or dish, which may be integral with the cover plate so that they, too, form an integral part with the latter.

It is then especially advantageous if the said ring or dish is provided with radially inward notches or recesses between the bars connections. Thus it is realized that the connection of a bar with the ring, dish or plate will almost certainly, even if in an extremely slanting position, will form a lowest point for the plate, so that drops of condensate formed on the plate will flow off via

the bars to the collecting means. Alternatively, or additionally, near the connection to the bars or strips the cover plate or ring can be provided on the lower side with discharge guiding formations, such as ridges.

The screening means can, in a manner known per se, comprise a wind shelter strip surrounding the outlet at a radial distance, the downstream edge of which is located - in a vertical projection - within the outer circumference of the collecting means. A suchlike wind shelter strip can have the shape of a cylindrical band. Condensate that forms on the inside thereof and subsequently runs off will be collected by the collecting means and discharged via the aformentioned passing means to the gas discharge pipe.

There being present a suchlike wind strip, the bars or strips are radially outwardly spaced from the wind shelter strip.In this way a double discharge of condensate is provided. The run-off of the drops along the bars is not interrupted by horizontal parts such as a wind shelter strip. Moreover, a two-stage wind interruption is provided. In addition, with the same effect, a narrower (less high) wind shelter strip can be selected, whereby the condensate forming surface thereof will be reduced and the structure height can be restricted.

The invention will now be explained on the basis of an exemplary embodiment shown in the accompanying drawings in which:

figure 1 shows a part of the outlet structure including an exemplary embodiment of the discharge structure, shown in exploded view;

figure 2 shows the part of the outlet structure of figure 1, in assembled condition;

figure 3 shows a perspective view of the discharge structure of figure 1; and

figure 4 shows a cross section of the discharge structure of figure 1.

In figure 1 is shown an air supply hood 2, which is provided on its lower side with a main air supply to an air supply pipe 5 located therebelow for a closed gas appliance, also located therebelow, and is provided on the upper end with a surrounding wind ring 3, which screens a secondary air pressure relief opening.

A gas discharge pipe 4, which also comes from the gas appliance and is concentrically located within the air supply pipe 5, reaches above the air supply hood 2.

Above the air supply hood 2 there is a condensate collection dish 6 with positioning ring 13 and outside that an inclined radially outwardly ascending and surrounding collection surface 11 and a surrounding upright outer edge 12. The dish 6 is further provided with a discharge pipe stub 21, which is coaxial with the ring 13 and has the same diameter. The pipe stub 21 is formed integrally with connecting webs 24 regularly spaced from each other in circumferential direction (fig. 4), which in this case are themselves formed integrally with the rest of the dish 6. The discharge pipe stub 21, the webs 24 and the collecting and guiding surface 11 determine radial passages 26 for condensed water to the inside of the discharge pipe 4, which passages are aligned with that surface 11.

Above that a discharge hood 7 is shown (vide also fig. 3), which is formed in one part and comprises as it were a horizontal and a vertical screen structure, the vertical screen structure being formed by vertical bars 18, which are separated from each other by vertical passages 19 and are connected to each other at the top by means of plate 8, which substantially serves as fall wind screen, and are connected to each other at the bottom by means of a surrounding flange 17, which is provided on the outside with a sharp clamping edge 23. The horizontal screen structure is formed by a wind shelter strip 20, which is at a radially inward distance from the bars 18 and located about and at a distance from the upper end of the discharge pipe stub 21 and the area located directly above there. The wind shelter strip 20 and the discharge pipe stub 21 define between them an axial annular space 10 (fig. 4). The wind shelter strip 20 is held in position by means of a number of vertical connecting webs 22 spaced from each other in circumferential direction, which are in this case formed integrally with the wind band 20 and the plate 8. In between the webs 22 there are gas discharge openings 25.

In figure 1 it can be seen the gas discharge pipe 4 is provided at its top end with an edge 9 with an enlarged diameter, in which the positioning ring 13 of dish 6 is received with a press fit. The inner surface of the positioning ring 13 will therefore be in line with the inner surface of the gas discharge pipe 4 (fig. 4).

The other parts of the outlet structure 1 according to the invention can also be positioned from above.

In doing that the hood 7 is positioned on top of the collecting dish 6. Fixing the hood 7 to the dish 6 takes place with the help of a press fit or by clamping (fig. 4), to which end the surrounding flange 17 with the downwardly inclined and outwardly extending clamping edge 23 engages in the inner surface of the upright edge 12 of collecting dish 6.

The outlet structure is thus assembled and takes on the appearance of figure 2 or 4. Upon assembly no screws are needed, nor is riveting necessary. The division in the various parts has the added advantage that the parts can be manufactured from the material most suited to their function, taking among other things the temperature load into consideration. It is important that the collecting dish 6 is made of condensate and temperature resistant material. Attention should be paid that the material used for the hood 7 is resistant to high temperatures, as well as being resistant to condensate and UV proof. Materials filled with glass can be dispensed with, whereby the hygroscopic effects linked to that will be absent.

As a consequence of the ambient temperature out-

side the hood the surfaces which are struck by the discharge gasses will be relatively cold and will thus form potential condensate surfaces. The most important of these are the inner surface of the wind shelter strip 20 and the lower surface of the plate 8. Condensate formed and collected on the plate 8 will be able to drop down in the direction C under the influence of gravity. The condensate formed on the inner surface of the wind shelter strip 20 will flow downwards in the direction E and will then continue to drop downwards (direction K) through the annular gap between the wind shelter strip 20 and the discharge pipe stub 21 to land on the collecting surface 11. From there the condensate can then flow off in radially inward direction F and subsequently pass through the passages 26 and then drop or flow downwards in the pipe 4 in the direction J.

If the outlet structure is slanted the plate 8 will also be inclined, whereby the condensate drops will move outward along the lower surface to the lowest point (G), from where they would drop down outside the collecting dish 6 to then contribute to undesirable formation of ice on lower parts of the roof or of the outlet structure. In accordance with the invention, the hood 7 is provided on the outer circumference with vertical webs or bars 18. Condensate which runs down along the plate 8 in outward direction will arrive at the surface of a bar 18 via the lower surface of the plate 8, be deflected downward (H) under the influence of adhesion and gravitational force and then run off in the direction D, to finally fall from the lower end 14 thereof on the collection surface 11 and to be further drained off (F) in the manner described above. Transferring the condensate drops to the bars 18 is promoted further by the curved course or the extension with a radially outward component of the bars 18 near the connection to the plate 8, whereby in the vicinity of the connecting area between a bar 18 and the plate 8 a lowest point of the top end of the hood 7 is almost always formed. A usually used cover plate with a lowered centre is then no longer needed.

If condensate arrives on the outside of the bars 18 as a result of hard gusts of wind, it will be able to flow downwards along that outside and be collected in the surrounding, bowl-shaped space formed between the lower end 14 of the bars 18, the retaining edge 12 located at some radial outward distance therefrom and the flange 17. At the location of the openings 19 the bowl drains to the inside through the lower portion of these openings 19 (arrow I), so that the condensate too can fall on the collecting surface 11 and can be further drained in the manner described above.

Claims

1. Discharge structure for an outlet structure of a gas discharging apparatus, such as a heating system, in particular a heating boiler comprising a gas discharge pipe, means for screening the outlet of the gas discharge pipe and means for collecting condensation from the screening means, in which at least near the outlet of the gas discharge pipe means are provided for guiding and passing condensation coming from the collecting means to the inside of the gas discharge pipe, the screening means comprising a cover plate placed above the outlet of the gas discharge pipe, further comprising condensation discharging means comprising a number of circumferentially arranged bars or strips that surround the outlet and a downstream area thereof in radially outward direction and extend with a component in the pipe direction and that are in discharging liquid communication with the collecting means.

2. Discharge structure according to claim 1, wherein the bars or strips are substantially vertically oriented.

3. Discharge structure according to claim 1 or 2, wherein the bars connect at a downstream end to an end ring or end disk, which can be part of the cover plate.

4. Discharge structure according to claim 3, wherein the cover plate or ring and the bars form radially inward notches or recesses in the connecting area thereof or in the vicinity.

5. Discharge structure according to claim 3 or 4, wherein the bars or strips are with their upstream end in gravitational liquid communication with the collecting means.

6. Discharge structure according to claim 3, 4 or 5, wherein near the connection to the bars or strips the cover plate or ring is provided on the lower side with discharge guiding formations, such as ridges.

7. Discharge structure according to any one of the preceding claims, wherein the screening means comprise a wind shelter strip surrounding the outlet at a radial distance, the downstream edge of which is located in a vertical projection within the outer circumference of the collecting means, the bars or strips being radially outwardly spaced from the wind shelter strip.

8. Discharge structure according to any one of the claims 3-7, wherein the bars merge at their upstream end in a ring, which is provided with means for entering into a connection with the rest of the discharge structure.

9. Discharge structure according to any one of the preceding claims wherein at the upstream end of the bars or strips, on the radial outward side thereof, retaining means are provided for collecting and discharging condensation which flows down along the outside of the bars or strips to the collect-

ing means.

10. Discharge structure according to claims 9, wherein the retaining means being shaped as a retaining edge surrounding the bars or strips at a radially outward distance.

11. Discharge structure for an outlet structure of a gas discharge apparatus, such as a heating system, in particular a heating boiler, comprising a gas discharge pipe, means for screening the outlet of the gas discharge pipe and means for collecting condensation from the screening means, in which at least near the outlet of the gas discharge pipe means are provided for guiding and passing condensation from the collecting means to the inside of the gas discharge pipe, the screening means comprising a cover plate placed above the outlet of the gas discharge pipe, further comprising means for guiding condensation from the cover plate to the collecting means.

12. Discharge structure according to claim 11, wherein the guide means form a basket structure with the cover plate.

13. Discharge structure according to claim 11 or 12, wherein the guide means extend near the cover plate with at least a component in radial outward direction.

14. Discharge structure according to any one of the preceding claims, wherein the constitutory parts are connected to each other by means of press fits.

15. Outlet structure for closed gas appliances, comprising an air inlet structure and a discharge structure according to any one of the preceding claims.

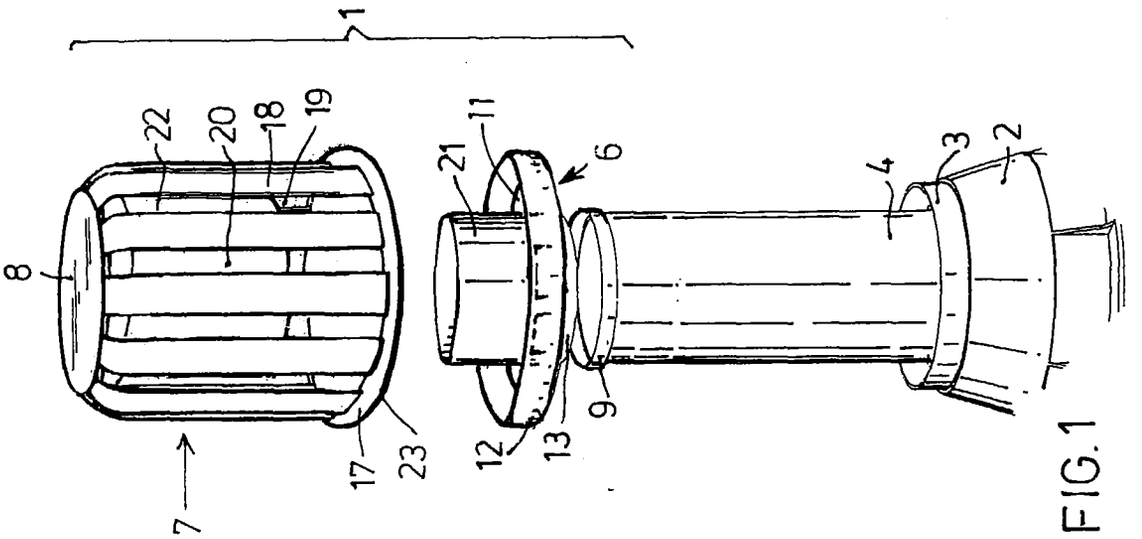

FIG.1

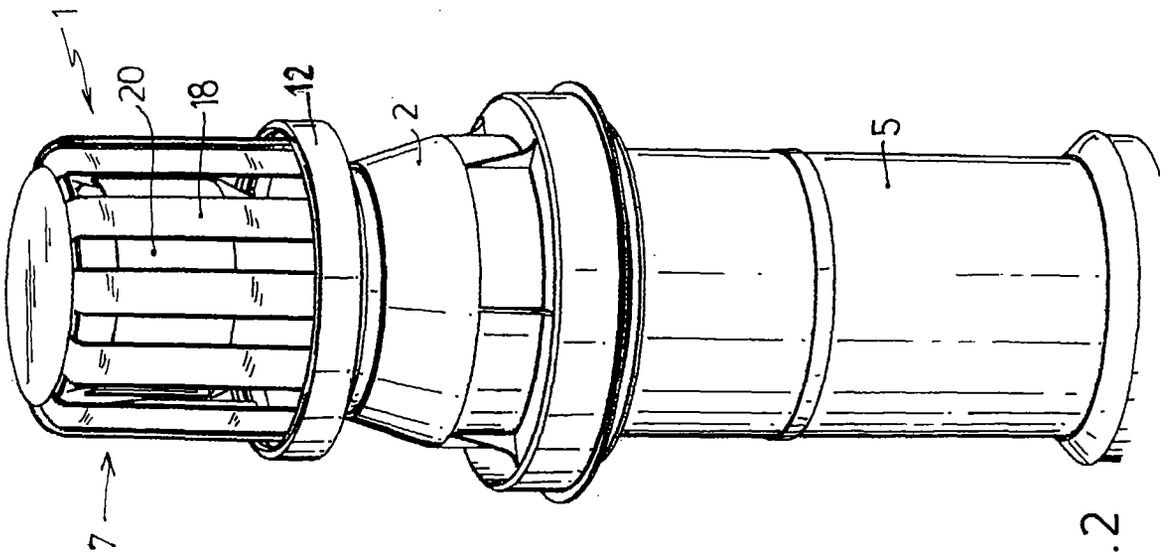

FIG.2

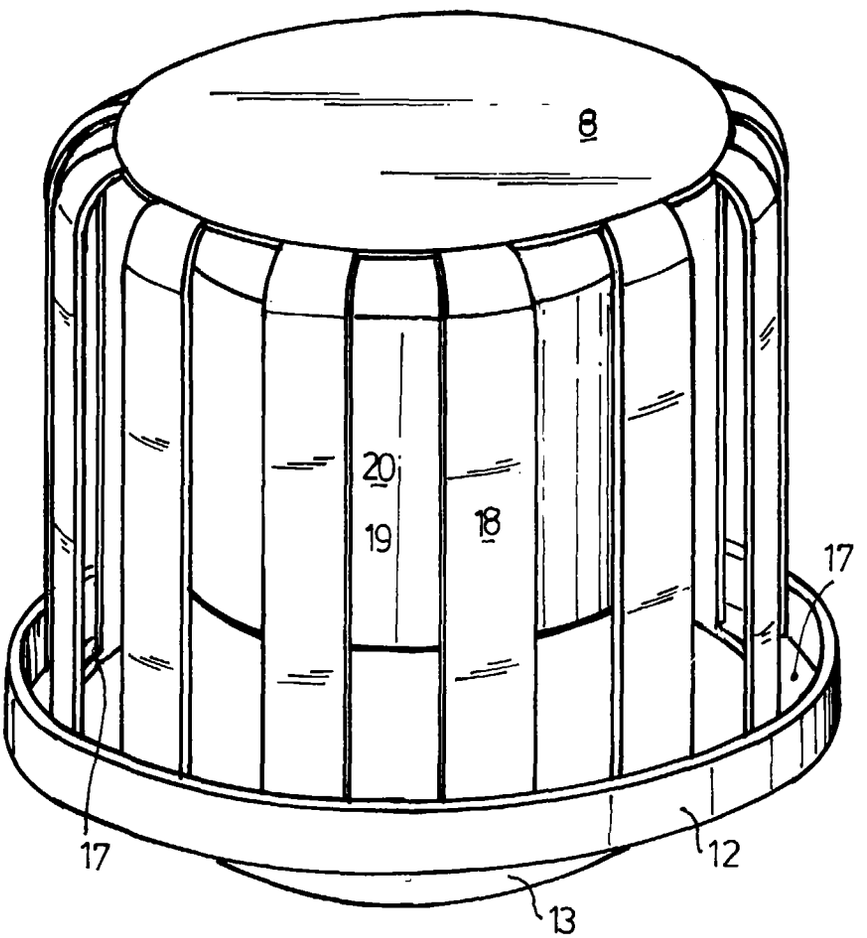

FIG.3

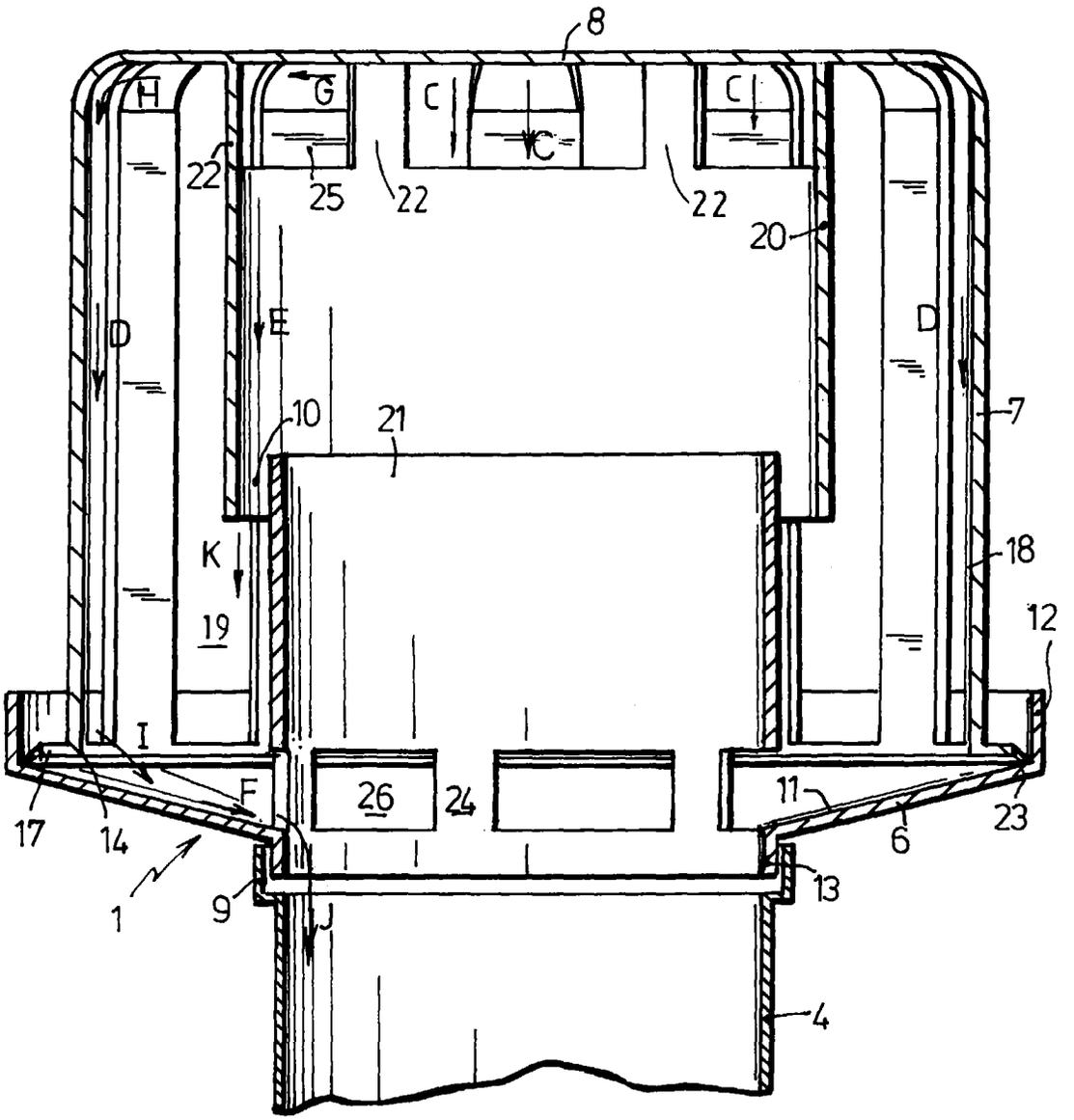
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FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 97 20 1419

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A,D	EP 0 679 841 A (MUELINK & GROL BV) 2 November 1995 * the whole document *	1,11	F23L17/02 F23L17/14
A	US 4 236 443 A (SCHOSSOW GEORGE W) 2 December 1980 * column 2, line 15 - column 3, line 4; figure 1 *	1,11	
A,D	EP 0 654 638 A (UBBINK NEDERLAND BV) 24 May 1995 * the whole document *	1,11	
A	US 3 972 696 A (ANGELILLO OLINDO R) 3 August 1976		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

F23L
F23J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	7 August 1997	Coli, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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