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(54) Protective cage for a wall duct system

(57) A wall duct system (1) is described with an outer pipe (3) and an inner pipe (5), the end (6) of which projects beyond the end (4) of the outer piper (3). A cage (10) extends over the ends (4;6) of the pipes (3;5) and is connected to the said ends. For coupling to the outer pipe, the cage has an attachment collar (12). For coupling to the inner pipe, the cage comprises, on its front (11), two receiving spaces (21,22) with a radial distance between them. If the inner pipe is arranged in a first receiving space (21), the inner pipe is substantially coaxial with respect to the outer pipe. If the inner pipe is arranged in a second receiving space (22), the inner pipe is inclined with respect to the outer pipe. In this way, it is possible to bring about three possible orientations of the inner pipe with respect to the outer pipe by means of a single cage (10).

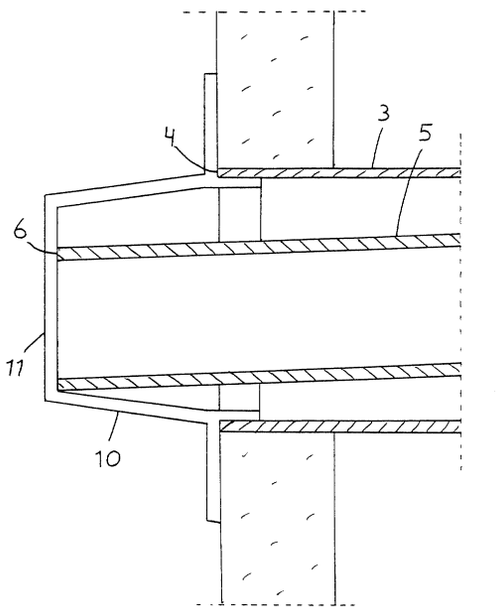

FIG. 2

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Description

[0001] The present invention relates in general to a wall duct system, comprising two pipes arranged one inside the other, for a combustion unit, such as a central heating boiler.

[0002] Such wall duct systems are known in practice. In such systems, the inner pipe is a flue-gas outlet duct for discharging flue gas from the combustion unit to the outside air, and the substantially annular space between the inner pipe and the outer pipe is an air feed duct for feeding fresh air to the combustion unit from the outside. For design reasons, it is desirable for the outer pipe to be substantially horizontally oriented or to slope downwards at a slight angle towards the outside, so that no rain water can flow inwards, i.e. towards the combustion unit, through the air supply duct. The inner pipe is generally arranged concentrically inside the outer pipe.

[0003] In terms of their efficiency, central heating boilers can be classified into three types: "normal efficiency" (NE), "improved efficiency" (IE), and "high efficiency" (HE), with an efficiency of <83%, 83-90%, and >90%, respectively. Wall duct systems of the above type can be used for all three types of central heating boilers. However, the demands which they have to satisfy differ for the three types of central heating boilers referred to above. In the case of an HE boiler, it is permitted that water, such as rain water, reaches the boiler via the inner pipe. In the case of an IE boiler or an NE boiler, however, this is not permitted.

[0004] In practice, these different demands are satisfied by designing the wall duct systems in different ways. For example, in the case of a wall duct system for an NE boiler or an IE boiler, the inner pipe is preferably arranged at a slight angle, with the lowest point being situated at that end of the inner pipe which is remote from the boiler, referred to below as the "distal end". Rain water which enters into the distal end of the inner pipe collects on the outwardly sloping base of the inner pipe and flows away outwards. It is also permissible that the inner pipe in this case is horizontally oriented; although the water will not flow away outwards, the water will evaporate on account of the hot flue gases and will be discharged to the outside together with the flue gases.

[0005] However, in the case of an HE boiler, in winter an arrangement of this nature would lead to unacceptable formation of ice as a result of the high moisture content of the flue gasses. To prevent this, in the case of an HE boiler, the inner pipe is arranged inclined such that the distal end forms the highest point.

[0006] The distal end of the inner pipe is held in position with respect to the distal end of the outer pipe by a cage, which also protects the distal ends of the inner and outer pipes from entry by leaves and the like. On account of the different orientations of the inner tubes for the different types of central heating boilers, it has hitherto been necessary to provide different types of these cages.

[0007] An important object of the present invention is to provide a wall duct system in which, using only one type of cage, it is still possible to create three different orientations of the inner pipe with respect to the outer pipe.

[0008] More particular, the present invention aims to provide a cage for a wall duct system, which cage can be used to give an inner pipe three different orientations with respect to an outer pipe.

[0009] Furthermore, the present invention aims to provide a cage for a wall duct system which can be produced relatively easily and at low cost.

[0010] According to a first important aspect of the present invention, a protective cage for a wall duct system has at least two different coupling options for an inner pipe. In this case, different orientations of the inner pipe with respect to the outer pipe are possible using one and the same protective cage by coupling the inner pipe to different ones of said coupling options.

[0011] According to a second important aspect of the present invention, a protective cage has at least one coupling option for an inner pipe, in which case the inner pipe is oriented eccentrically with respect to the outer pipe. In this case, different orientations of the inner pipe with respect to the outer pipe are possible using one and the same protective cage by rotating the protective cage with respect to the centre axis of the outer pipe.

[0012] In a preferred embodiment of the present invention, a protective cage for a wall duct system has at least two different coupling options for an inner pipe. In a first coupling option, the inner pipe is held in a centred position with respect to the outer pipe, thus ensuring a horizontal orientation of the inner pipe. In a second coupling option, the inner pipe is held eccentrically with respect to the outer pipe, thus ensuring an inclined orientation of the inner pipe. In a first orientation of the protective cage with respect to the outer pipe, the upwards sloping orientation of the inner pipe is ensured; in a second orientation of the protective cage with respect to the outer pipe, which is rotated through 180° with respect to the first orientation, the downwards sloping orientation of the inner pipe is ensured.

[0013] In an alternative embodiment of the present invention, a protective cage for a wall duct system has at least one coupling option for an inner pipe, the inner pipe being held eccentrically with respect to the outer pipe, thus ensuring an inclined orientation of the inner pipe. In a first orientation of the protective cage with respect to the outer pipe, the upwards sloping orientation of the inner pipe is ensured; in a second orientation of the protective cage with respect to the outer pipe, which is rotated through 180° with respect to the first orientation, the downwards sloping orientation of the inner pipe is ensured; in a third orientation of the protective cage with respect to the outer pipe, which is rotated through 90° with respect to the first orientation, the horizontal orientation of the inner pipe is ensured.

[0014] These and other aspects, characteristics and

advantages of the present invention will be explained in more detail by the following description of a preferred embodiment of a wall duct system according to the invention with reference to the drawing, in which identical reference numerals denote identical or similar components, and in which:

figure 1 diagrammatically shows a longitudinal section through a wall duct;
figure 2 diagrammatically shows a wall duct with a sloping inner pipe;
figure 3 diagrammatically shows a vertical cross-section through part of a cage according to the present invention;
figures 4A-C are views of a cage according to the present invention with a concentrically fitted inner pipe;
and figures 5A-C are views of a cage according to the invention with a slopingly fitted inner pipe.

[0015] Figure 1 diagrammatically shows a wall 2 where the outside air is situated on one side (the left-hand side in the figure) and a combustion unit, which is not shown for the sake of simplicity, is situated on the other side (the right-hand side in the figure). In the wall 2 there is a passage opening through which an outer pipe 3 of a wall duct system 1 extends. The free or distal end 4 of the outer pipe 3 is situated substantially in the plane of the outer surface of the wall 2. At its other end, the outer pipe 3 is connected to an air inlet of the combustion chamber of the combustion unit (not shown). The outer pipe 3 is substantially horizontally oriented; the outer pipe 3 could also slope downwards slightly, i. e. the distal end is the lowest point.

[0016] Inside the outer pipe 3 is arranged an inner pipe 5, the free or distal end 6 of which extends beyond the distal end 4 of the outer pipe. At its other end, the inner pipe 5 is connected to a gas outlet of the combustion unit (not shown).

[0017] Combustion gases are discharged from the combustion unit to the environment via an outlet duct 7 defined by the inner pipe 5, as indicated by the arrows P1. Fresh air is fed from the environment to the combustion unit via a feed duct 8 defined between the inner pipe 5 and the outer pipe 3, as indicated by the arrows P2.

[0018] At a location situated in the vicinity of the combustion unit (not shown), the inner pipe 5 is held in place inside the outer pipe 3 by means of any appropriate members which are known per se and are not shown for the sake of simplicity. It is assumed that the inner pipe 5 and the outer pipe 3 are centred with respect to one another at this location.

[0019] The wall duct system 1 also comprises a protective cage 10, which is arranged over the distal ends 4 and 6 of the outer pipe 3 and the inner pipe 5, respectively. An important function of the cage 10 is, firstly, allowing gas/air to pass through and, secondly, preventing leaves and animals from being able to enter the pipes 3 and/or 5. The cage 10 comprises a grate-like front 11 which extends over the open, distal end 6 of the inner pipe 5, and a substantially annular attachment collar 12, by means of which the cage 10 is attached to the outer pipe 3. The attachment collar 12 is expediently cylindrical, and the attachment collar bears against the inner surface of the outer pipe 3. Although it is possible to fix the attachment collar 12 with respect to the outer pipe 3, for example by means of a screw or the like, it is sufficient for the attachment collar 12 to be clamp-fitted into the outer pipe 3.

[0020] An annular flange 13 is arranged around the attachment collar 12. The principal function of this flange 13 is to prevent rain from being able to reach the gap between the outer pipe 3 and the wall 2 directly. The flange 13 may be formed integrally with the cage 10, as illustrated; preferably, however, to facilitate fitting of the wall duct 1, the flange 13 is designed as a separate component, preferably made from rubber or a similar material, and the cage 10 is provided with means for retaining the flange 13, for example a circumferential groove on the outer surface of the cage 10.

[0021] Between the front 11 and the attachment collar 12, the cage 10 has a grate-like lateral surface section 14, the axial length of which substantially corresponds to the axial length of that part of the inner pipe 5 which projects beyond the outer pipe 3. Preferably, and as shown, the lateral surface section 14 adjoins the circumferential edge of the front 11, but this is not essential: the front 11 could have a greater diameter than the lateral surface section 14. Preferably, and as shown, the lateral surface section 14 adjoins the attachment collar 12 and therefore the inner circumferential edge of the flange 13, but this is not essential, too: the lateral surface section 14 could have a larger diameter than the attachment collar 12 and could thus adjoin the surface of the flange 13.

[0022] The lateral surface section 14 may be cylindrical, in which case the diameter of the front 11 is substantially equal to the diameter of the attachment collar 12. In the example shown, the front 11 has a smaller diameter than the attachment collar 12, so that the lateral surface section 14 is in the form of part of a conical wall.

[0023] The distal end 6 of the inner pipe 5 is attached to the front 11 of the cage 10, as will be explained in more detail below. Therefore, the cage 10 also serves to hold the distal end 6 of the inner pipe 5 in place with respect to the distal end 4 of the outer pipe 3. The precise location where the inner pipe 5 is attached to the front 11 of the cage 10 is the decisive factor for the orientation of the inner pipe with respect to the outer pipe.

[0024] In the example illustrated in figure 1, the distal end 6 of the inner pipe 5 is centred with respect to the front 11 of the cage 10, meaning that the middle of the front substantially coincides with the centre axis of the inner pipe 5. Since the front 11 is concentric with respect

to the attachment collar 12, the cage 10 in this case positions the distal end 6 of the inner pipe 5 concentrically with respect to the distal end 4 of the outer pipe 3. Since, as stated above, the inner pipe 5 is already held concentrically with respect to the outer pipe 3 closer to the boiler (not shown), the inner pipe 5 is in this case, therefore, oriented coaxially with respect to the outer pipe 3, and therefore substantially horizontally, over its entire length.

[0025] Figure 2 is a diagrammatic side view, similar to figure 1, of an example in which the distal end 6 of the inner pipe 5 is situated below the middle of the front 11 of the cage 10, i.e. the middle of the front 11 is situated at a vertical distance above the centre axis of the inner pipe 5. In that case, therefore, the cage 10 positions the distal end 6 of the inner pipe 5 eccentrically with respect to the distal end 4 of the outer pipe 3, specifically in such a manner that the centre of the distal end 6 of the inner pipe 5 is at a lower level than the centre of the distal end 4 of the outer pipe 3. Since, as stated above, the inner pipe 5 is held concentrically with respect to the outer pipe 3 closer to the boiler (not shown), the inner pipe 5 is therefore in this case inclined to the horizontal, as shown in exaggerated form in figure 2, the distal end 6 forming the lowest point, so that any rainwater which enters does not flow to the connected boiler, but rather drains outwards.

[0026] It should be clear than an inclined orientation of the inner pipe 5 with respect to the outer pipe 3 in such a manner that the distal end 6 forms the highest point can easily be achieved by rotating the cage 10 through 180° with respect to the position shown in figure 2.

[0027] Furthermore, it is possible to achieve a horizontal orientation of the inner pipe 5 with respect to the outer pipe 3 by rotating the cage 10 through 90° with respect to the position shown in figure 2. Although in this case the inner pipe 5 is not coaxial with respect to the outer pipe 3, the centre axis of the inner pipe 5 is in a horizontal plane. An advantage of this method of fitting is that it is possible, irrespective of the precise orientation of the outer pipe 3, to achieve a precise horizontal orientation of the inner pipe 5 by correctly adjusting the rotational position of the cage 10. In such an embodiment of the present invention, it is then sufficient for the cage 10 to have only a single, eccentric receiving space for the inner pipe 5, and there is no need for a second centred receiving space for the inner pipe 5.

[0028] Figure 3 diagrammatically shows a vertical cross section of a preferred embodiment of a cage 10 according to the present invention. On its inner side, that is to say on its principal surface facing towards the attachment collar 12, the front 11 is provided with first and second receiving spaces 21 and 22 for accommodating the circular end 6 of the inner pipe 5. Each receiving space 21 and 22 is formed as a series of one or more notches or sunken sections or recesses or slots in the material of the front 11 or, as shown, as a series of one or more notches or sunken sections or slots in projections 16, 17 formed on the front 11.

[0029] The front 11 is designed as a grate, as shown more clearly in figure 4 et seq., which grate preferably, and as shown, comprises a combination of radial bars and tangential bars. The receiving spaces 21 and 22 are formed on the said bars, preferably on the radial bars, although it is not necessary for the said projections to be formed on all the bars.

[0030] To receive the circular end 6 of the inner pipe 5, the recesses which define a receiving space are situated on the circumference of a circle with a diameter equal to the diameter of the inner pipe 5. In the embodiment illustrated in figure 3, the cage 10 has a vertically oriented radial bar 15, with a first projection 16 situated in the vicinity of its top end and a second projection 17 situated in the vicinity of its bottom end. The first projection 16 comprises a recess 21_1 which forms part of the first receiving space 21 and a recess 22_1 which forms part of the second receiving space 22. The second projection 17 comprises a recess 21_2 which forms part of the first receiving space 21 and a recess 22_2 which forms part of the second receiving space 22. The recess 21_1 and 21_2 which form part of the first receiving space 21 are located on a circle whose centre point M_{21} lies on the centre axis of the cage 10. The recesses 22_1 and 22_2 which form part of the second receiving space 22 are on a circle whose centre point M_{22} is situated at a radial distance from the centre axis of the cage 10.

[0031] If, during installation, the end 6 of the inner pipe 5 is arranged in the first receiving space 21, the inner pipe 5 will be substantially coaxial with respect to the outer pipe 3, as explained above. Figure 4A shows a perspective view of this situation, and figure 4B shows a front view. Figure 4C shows an enlarged view of part of figure 4A.

[0032] If, during installation, the end 6 of the inner pipe 5 is arranged in the second receiving space 22, the inner pipe 5 will form a slight angle with the outer pipe 3, as explained above. Figure 5A shows a perspective view of this situation, and figure 5B shows a front view. Figure 5C shows an enlarged view of part of figure 5A. In the situation illustrated in figures 5A-C, the second receiving space 22 is situated higher than the first receiving space 21, as illustrated in figure 3, so that the end 6 of the inner pipe 5 forms the highest point of this pipe and rain water which enters will be discharged to a connected boiler. If the cage 10 is rotated through 180° with respect to its centre axis, the end 6 of the inner pipe 5 will form the lowest point of this pipe and incoming rainwater will be discharged outwards; however, this situation is not illustrated separately.

[0033] To fix the cage 10 with respect to the inner pipe 5, any suitable attachment means 30 may be present. In the example shown, the cage 10 comprises an attachment plate 32 extending tangentially between two axial bars 31 of the lateral surface section 14 and having a threaded hole 33 for accommodating an attachment

screw (not shown). After the inner pipe 5 has been put in place, fixation is effected by tightening this attachment screw. Obviously, the cage 10 may be provided with a plurality of such attachment plates 32.

[0034] To summarise, the present invention provides a wall duct system 1 with an outer pipe 3 and an inner pipe 5, the end 6 of which projects beyond the end 4 of the outer pipe 3. A cage 10 extends over the ends 4 and 6 of these pipes 3 and 5 and is connected to these ends. For coupling to the outer pipe, the cage has an attachment collar 12. For coupling to the inner pipe, the cage comprises two receiving spaces 21 and 22, which are at a radial distance from one another, on the front 11 thereof. If the inner pipe is arranged in a first receiving space 21, the inner pipe is substantially coaxial with respect to the outer pipe. If the inner pipe is arranged in a second receiving space 22, the inner pipe is at an angle with respect to the outer pipe. Consequently, it is possible to establish three possible orientations of the inner pipe with respect to the outer pipe by means of a single cage 10.

[0035] The cage 10 is preferably made from plastic or aluminium, preferably as an injection-moulded product.

[0036] It will be obvious to a person skilled in the art that the scope of the present invention is not restricted to the examples discussed above, but rather various amendments and modifications to these examples are possible without departing from the scope of the invention as defined in the appended claims. For example, it is not necessary for a bar 15 on which a receiving space is formed to be vertically oriented, as can be seen from figures 4 and 5.

[0037] In the above, with reference to figure 3, an illustrative example has been discussed wherein a receiving space 21 or 22 comprises two notches or recesses or slots 21_1 and 21_2 or 22_1 and 22_2, respectively. However, this number of two notches or recesses per receiving space is not essential; in principle, there may be any desired number of notches or recesses. The said number may even equal one: in figure 3, the effect achieved by the present invention would be attained even if, for example, the bottom projection 17 were not present.

[0038] Furthermore, it is in principle possible for the lateral surface section 14 not to be present, for use in a wall duct system in which the inner pipe 5 does not project beyond the outer pipe 3. In this case, the front 11 would directly adjoin the attachment collar 12.

[0039] Furthermore, the front 11 does not have to be positioned perpendicular to the centre axis of the cage 10.

[0040] Any design of a cage in which the front has at least two receiving spaces for the end of an inner pipe is an embodiment of the inventive idea. In the preferred exemplary embodiment described, a first receiving space corresponds to a coaxial positioning of the inner pipe with respect to the outer pipe, while a second receiving space corresponds to an inclined positioning of the inner pipe with respect to the outer pipe. However, if desired it is also possible for the two receiving spaces to correspond to two different, non-coaxial arrangements of the inner pipe with respect to the outer pipe, with different angles of inclination.

Claims

1. Cage (10) for a wall duct system (1) with two pipes (3;5) arranged one inside the other, which cage comprises:

   - an attachment collar (12) for attaching the cage (10) to an end (4) of a first pipe (3) of the wall duct system (1);
   - and a front (11) with at least two receiving spaces (21;22) for receiving an end (6) of a second pipe (5) of the wall duct system (1);

   the said two receiving spaces (21;22) being located at a radial distance from one another.

2. Cage according to claim 1, wherein a first receiving space (21) is designed to effect a centering of the second pipe (5) with respect to the first pipe (3), and wherein a second receiving space (22) is designed to establish an eccentric position of the second pipe (5) with respect to the first pipe (3).

3. Cage according to claim 1 or 2, wherein each receiving space (21;22) is defined by at least one recess or notch or slot or the like (21_1,21_2;22_1,22_2) in the front (11) or in a projection (16;17) formed on the front (11).

4. Cage according to any one of the preceding claims, wherein each receiving space (21;22) is circular, a first receiving space (21) having a centre point (M_{21}) which is located on the centre axis of the cage (10), and the second receiving space (22) having a centre point (M_{22}) which is situated at a radial distance from the centre axis of the cage (10).

5. Cage according to any one of the preceding claims, wherein the cage is made from plastic or aluminium, preferably as an injection-moulded product.

6. Wall duct system (1) comprising an outer pipe (3) with a distal end (4) and an inner pipe (5) arranged inside the outer pipe, with a distal end (6), intended for connection to an air inlet and a combustion-gas outlet, respectively, of a combustion unit, such as a central heating boiler or the like, which wall duct system (1) furthermore comprises a cage (10) according to any one of the preceding claims, which is coupled to the said distal ends (4;6) of the pipes (3;5).

7. Wall duct system according to claim 6, wherein the distal end (6) of the inner pipe (5) is fitted in the first receiving space (21) of the cage (10) and is thus centred with respect to the outer pipe (3).

8. Wall duct system according to claim 6, wherein the distal end (6) of the inner pipe (5) is fitted in the second receiving space (22) of the cage (10), and wherein the cage (10) is fitted in such a manner that the inner pipe (5) is inclined with respect to the outer pipe (3), the distal end (6) of the inner pipe (5) being the highest point.

9. Wall duct system according to claim 6, wherein the distal end (6) of the inner pipe (5) is fitted in the second receiving space (22) of the cage (10), and wherein the cage (10) is fitted in such a manner that the inner pipe (5) is inclined with respect to the outer pipe (3), the distal end (6) of the inner pipe (5) being the lowest point.

10. Wall duct system according to claim 6, wherein the distal end (6) of the inner pipe (5) is fitted in the second receiving space (22) of the cage (10), and wherein the cage (10) is fitted in such a manner that the inner pipe (5) is horizontally oriented.

11. Wall duct system (1) comprising an outer pipe (3) with a distal end (4) and an inner pipe (5) is arranged inside the outer pipe, with a distal end (6), intended to be connected to an air inlet and a combustion-gas outlet, respectively, of a combustion unit, such as a central heating boiler or the like, which wall duct system (1) furthermore comprises a cage (10) which is coupled to the said distal ends (4;6) of the pipes (3;5), which cage comprises:

- an attachment collar (12) for attaching the cage (10) to the distal end (4) of the outer pipe (3);
- and a front (11) with at least one receiving space (22) for receiving the distal end (6) of the inner pipe (5); the receiving space (22) being designed to establish an eccentric position of the inner pipe (5) with respect to the outer pipe (3);

the distal end (6) of the inner pipe (5) being fitted in the receiving space (22) of the cage (10), and the cage (10) being fitted in such a manner that the inner pipe (5) is horizontally oriented.

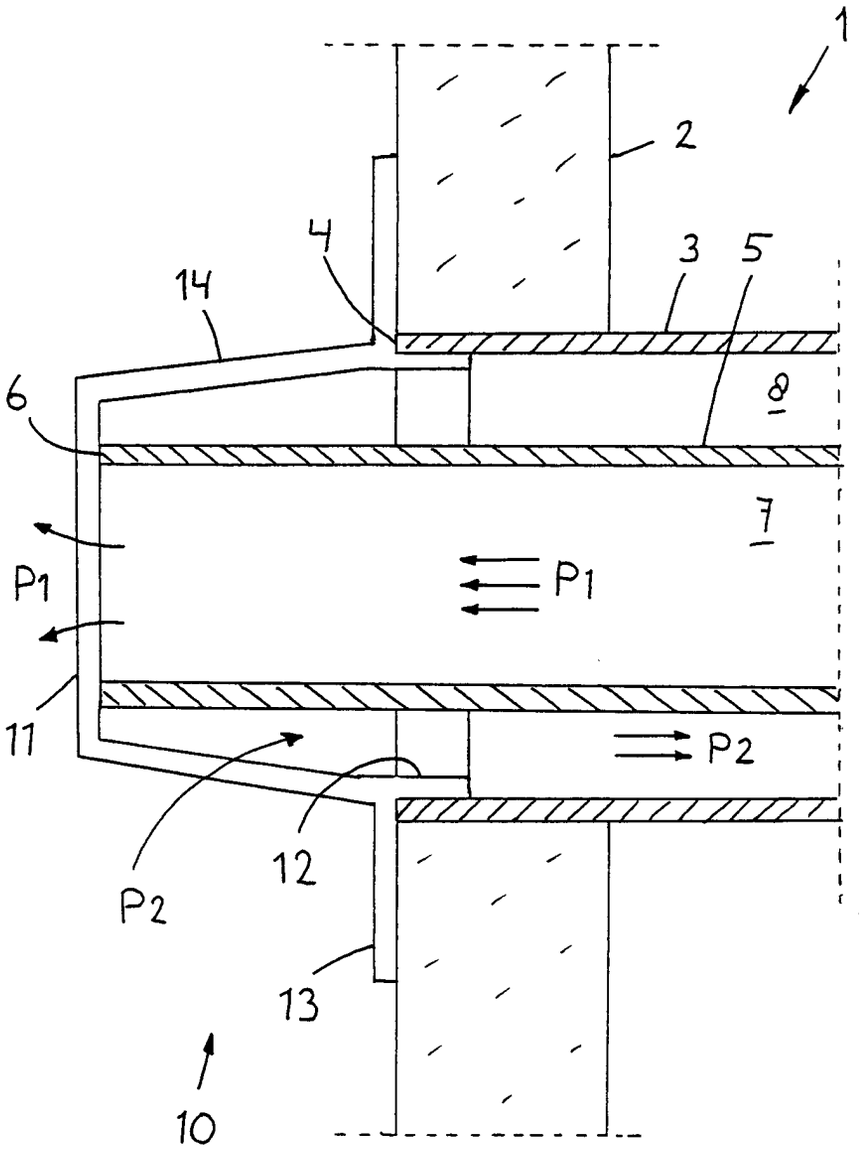

FIG. 1

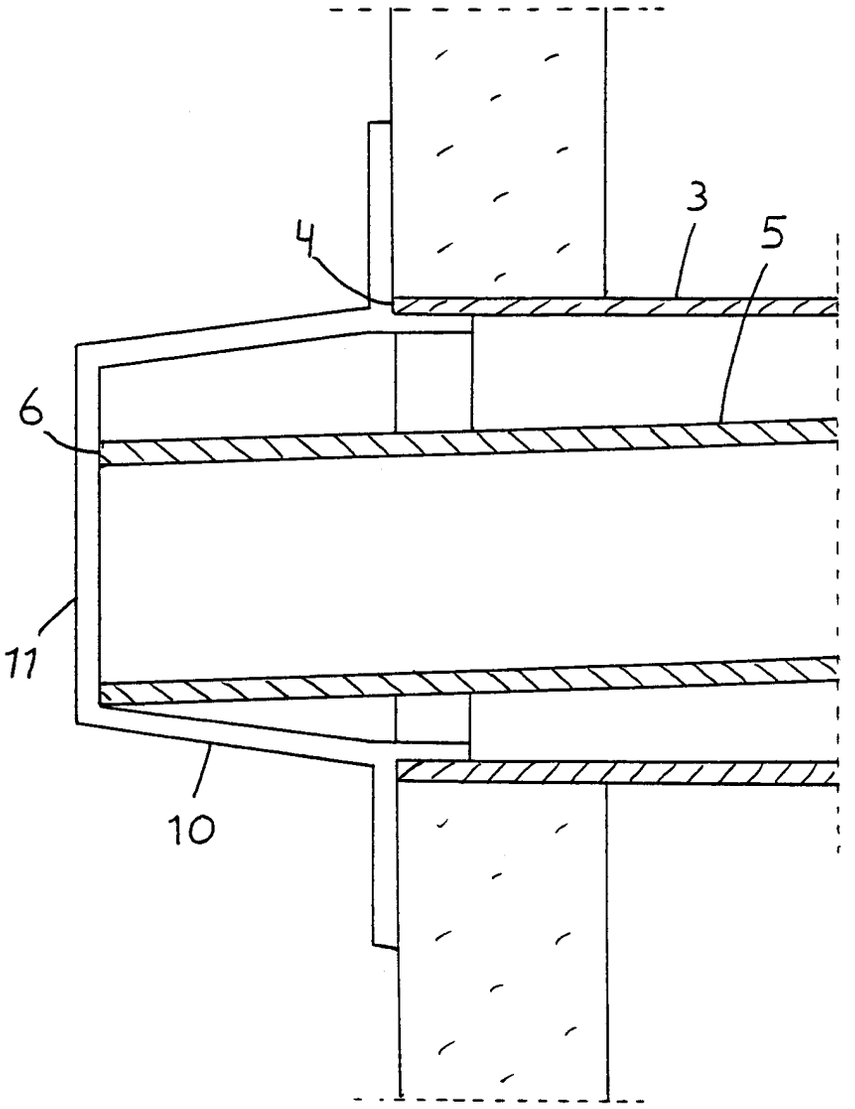

FIG. 2

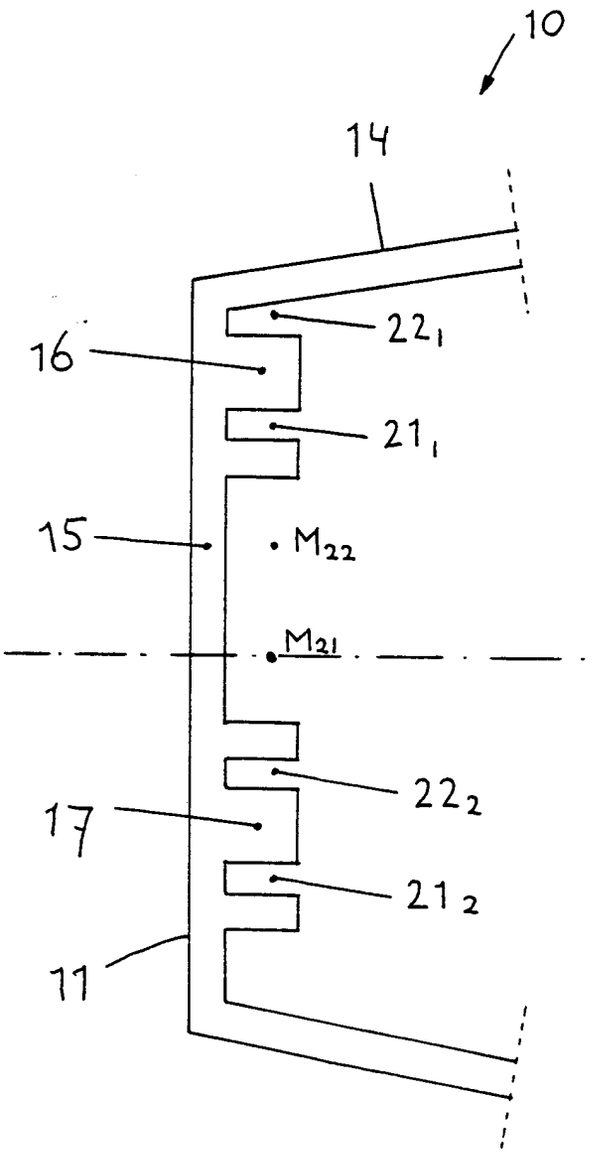

FIG. 3

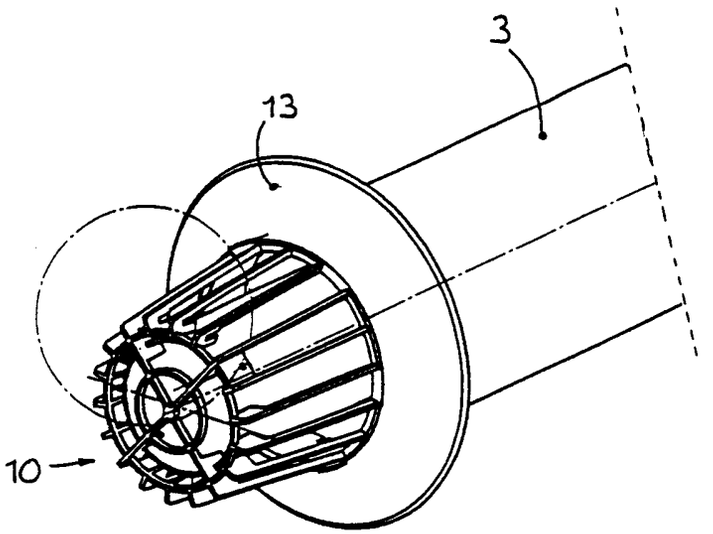

FIG. 4A

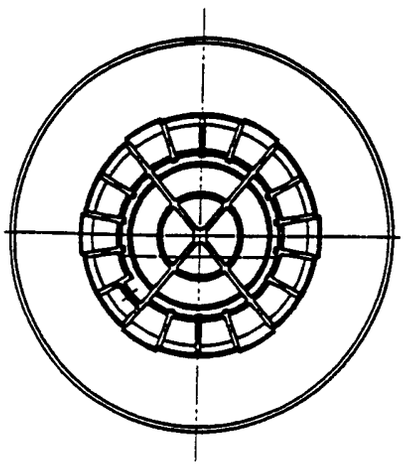

FIG. 4B

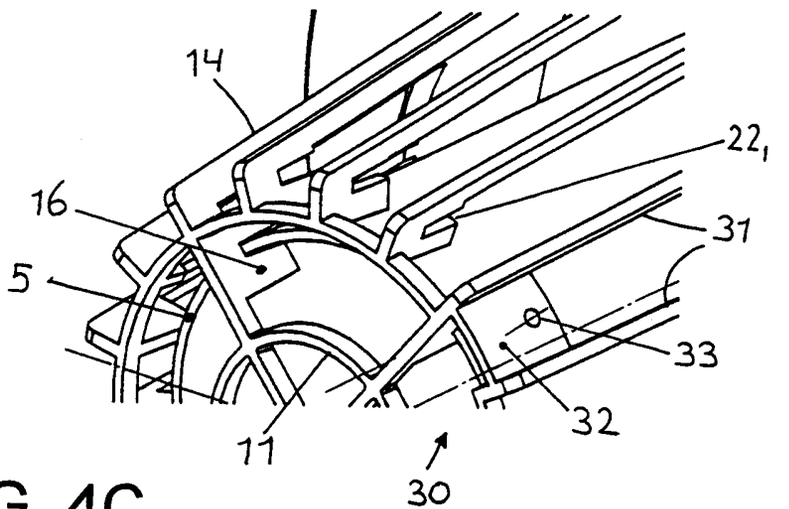

FIG. 4C

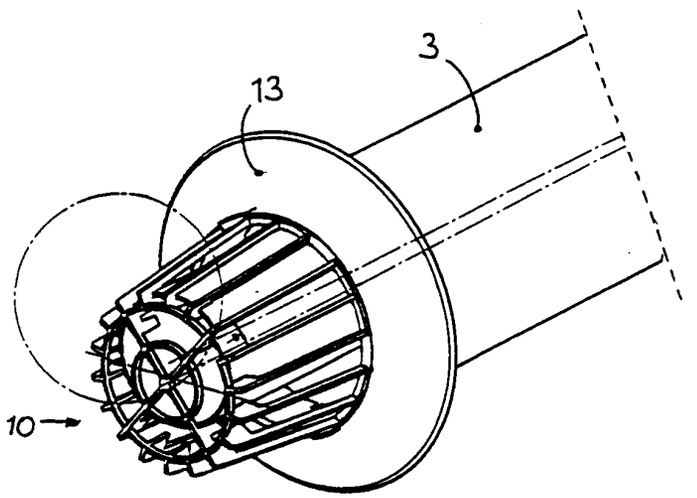

FIG. 5A

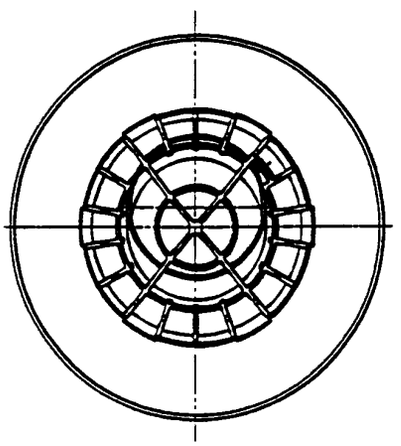

FIG. 5B

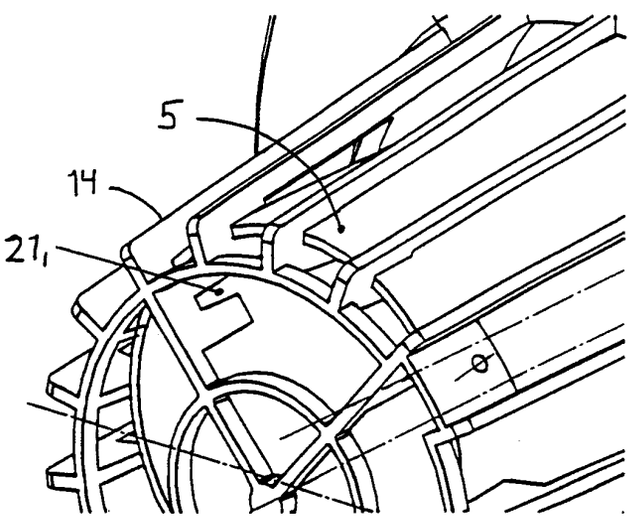

FIG. 5C

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 20 4141

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.7)
A	DE 295 15 326 U (VAILLANT JOH GMBH & CO) 30 November 1995 (1995-11-30) * the whole document *	1,6,11	F23L17/04
A	GB 1 572 691 A (SAUNIER DUVAL) 30 July 1980 (1980-07-30) * the whole document *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

F24F
F23J
F23L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 February 2001	Coli, E

CATEGORY OF CITED DOCUMENTS

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