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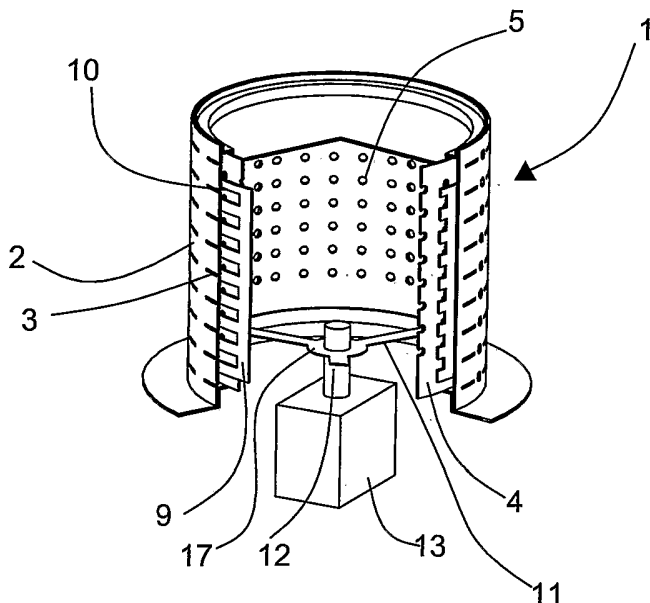
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(54) Title: ADJUSTABLE BURNER



(57) Abstract: A burner (1) suppliable with a mixture of air and fuel comprises a body (2) of the burner provided with a diffuser in the surface of which openings (3) are made for the exit of said mixture delivered into the body (2) of the burner (1), distributing means (4; 9, 9a, 9b) inserted inside said body (2) of the burner, said distributing means (4; 9, 9a, 9b) comprises a regulating element (9, 9a, 9b) provided with further openings (10, 18) for the transit of said mixture, said regulating element (9, 9a, 9b) being movable within said body (2) of the burner. The body (102) of the burner can be subdivided into a plurality of sectors (110), each one of which is independently suppliable by the other sectors.



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Adjustable burner

The present invention relates to an adjustable burner, in other words a burner wherein the power supplied during operation can be varied within wide limits.

In adjustable burners known from the prior art there is the problem that during operation at power noticeably below nominal maximum power the flames generated by combustion of the mixture of air and fuel conveyed to the burner tend to flatten out on the surface of the diffuser with consequent overheating of the diffuser.

To overcome this drawback, in the prior art the diffuser of an adjustable burner is made from materials suitable for withstanding particularly high temperatures without getting damaged, which however has the consequence of significantly increasing the cost of the burner.

Another problem that occurs in burners known from the prior art is unequal distribution of the flow of mixture of air and fuel at the outlet openings of the mixture that are made in the diffuser of the burner. In fact, the flow of mixture tends to be greater at the openings that are nearest the outlet of the Venturi tube and less at the openings that are more distant from the outlet. This gives rise to the risk of unstable flames and adjustment difficulties.

In the prior art this drawback is remedied by providing the burner with a distributing element of the flow of mixture arranged inside the body of the burner and interposed between the Venturi tube and the body of the burner. This flow-distributing element is also provided with openings, generally distributed along its entire surface. The mixture

that leaves the Venturi tube, before reaching the outlet openings made in the diffuser of the burner, must pass through the openings of the diffusing element. This causes redistribution of the flow of mixture, which is thus substantially uniform at the outlet openings.

The distributing elements known from the prior art are connected to the body of the burner by means of welding and are positioned by means of an aligning pivot. Fixing by means of welding and positioning by means of an aligning pivot give rise to a noticeable increase of time and cost in producing the burner.

The object of the present invention is to provide an adjustable burner in which the phenomenon of flattening of the flames on the diffuser is absent or at least greatly reduced in such a way as to make it possible to make the diffuser without using materials that are highly resistant to temperature.

A further object of the present invention is to provide a burner in which there is a substantially uniform distribution of the flow of mixture at the outlet openings thereof that are made in the diffuser of the burner, achieving all this with moderate outlay of cost and time.

According to the present invention a burner is provided that may be fed with a mixture of air and fuel, comprising a burner body provided with a diffuser in the surface of which openings are made for the exit of the mixture, delivered into the body of the burner, distributing means for distributing the flow of mixture, said distributing means being inserted inside the body of the burner characterized in that the distributing means comprises a regulating element for regulating the flow of said mixture, said

regulating element being provided with further openings for the transit of the mixture, said regulating element being movable inside the body of the burner.

Owing to the fact that the regulating element is movable inside the body of the burner, it is possible to vary the reciprocal position of the openings made in the diffuser of the burner and of the further openings made in the body of the regulating element. This enables the overall section of the outlet placed at the disposal of the mixture to be varied in such a way that as the power supplied by the burner varies, i.e. as flow of mixture to the burner varies, it is possible to maintain an outflow speed of the mixture that prevents flattening on the diffuser of the burner of the flames produced by the combustion of the mixture.

This condition can be maintained within a wide power range, for example between 20% and 100% of the nominal power of the burner.

Owing to the invention it is thus possible to create an adjustable burner within a wide power range without having to resort to materials that are highly resistant to heat, thereby noticeably reducing manufacturing costs.

According to a further aspect of the present invention, there is provided a burner that may be fed with a mixture of air and fuel, comprising a burner body provided with a diffuser in the surface of which openings are made for the exit of the mixture delivered into the body of the burner, distributing means inserted inside the body of the burner, said distributing means comprising a distributing element provided with further openings for the transit of the

mixture, characterized in that the distributing element is connected to the body of the burner by means of mechanical interference fit.

The mechanical interference fit between the distributing element and the body of the burner enables rapid, simple and cheap assembly of the burner, with noticeable time and production cost savings.

According to a yet further aspect of the present invention there is provided a burner that may be fed with a mixture of air and fuel, comprising a burner body in the surface of which openings are made for the exit of the mixture delivered into the body, characterized in that the burner body is subdivided into a plurality of sections, each one of which may be fed independently of the others.

The invention will now be disclosed by way of non-limiting example with reference to the attached drawings, in which:

Figure 1 is an elevation view of a burner according to the invention;

Figure 2 is the section II-II in Figure 1;

Figure 3 is a partially fragmentary perspective view of a first version of a burner according to the invention;

Figure 4 is a view of the burner in Figure 3, slightly rotated in relation to the view in Figure 3;

Figure 5 is a schematic section of the burner in Figures 3 and 4;

Figure 6 is a plan view of a detail of the burner in Figures 3 to 5;

Figure 7. is a plan view of a first variation of the detail in Figure 6;

Figure 8 is a plan view of a second variation of the detail in Figure 6;

Figure 9 is a perspective view of a first embodiment of the regulating element of the first variation of a burner according to the invention;

Figures 9a-9d schematically illustrate the operation of the regulating element in Figure 9;

Figure 10 is a perspective view of a second embodiment of the regulating element of the first variation of a burner according to the invention;

Figures 10a-10d schematically illustrate the operation of the regulating element in Figure 10;

Figure 11 is a perspective view of a third embodiment of the regulating element of the first variation of a distributor according to the invention;

Figure 12 is a perspective view of a second variation of a burner according to the invention;

Figure 13 is a partially fragmentary view like the one in Figure 12;

Figure 14 is a perspective view of the internal part of the burner in Figures 12 and 13;

Figure 15 is an enlarged detail of Figure 13;

Figure 16 is an enlarged detail of Figure 12;

Figure 17 is a perspective view of a distributing element of the burner in Figures 12 and 13.

In Figures 1 and 2 there is illustrated a burner 1 according to the invention comprising a burner body 2 in the surface of which openings 3 are made through which a mixture of air and fuel can exit that was delivered into the body 2 of the burner 1 by means of a Venturi tube 6.

Inside the body 2 of the burner 1 a distributing element 4 is arranged, for example having a cylindrical shape, interposed between the Venturi

tube 6 and the body 2 of the burner 1. The distributing element 4 is provided with a series of further openings 5 through which the mixture of air and fuel delivered into the burner 1 by means of the Venturi tube can pass before exiting from the openings 3 made in the body 2 of the burner 1.

The distributing element 4 is used to level the flow of mixture that reaches the openings 3 of the body 2 of the burner 1, which, in the absence of the distributor, would be greater at the openings 3 that are nearer the outlet 6a of the Venturi tube 4 and less at the openings that are further from the outlet 6a.

The distributing element 4 is centered inside the body 2 of the burner 1 on two projections: an upper projection 7 and a lower projection 8 that protrude inside the body 2 of the burner 1 and respectively form an upper and a lower base of the body 2. The lower base 8 is provided with a central opening 8a for the passage of the Venturi tube 6.

For secure alignment and positioning of the distributing element 4 inside the body 2 of the burner 1 the coupling between the distributing element 4 and at least one of the projections 7, or 8, is a mechanical interference fit, the other projection 7, or 8, acting as an centering element.

Figures 3 to 9D illustrate a second embodiment of a burner 1 according to the invention, in which between the distributing element 4 and the body 2 of the burner 1 there is interposed a regulating element 9 equipped with openings 10 distributed along its entire surface, the function of the regulating element 9 is to vary the transit section of the mixture between the inside and the outside of the

body 2, to adjust the speed of flow of the mixture conveyed to the openings 3 made on the diffuser of the burner 1. The regulating element 9 is associated with moving means 12, 13 suitable for causing a shift of the regulating element 9 in relation to the body 2 of the burner 1 and to the distributing element 4.

The shift comprises a translation of the regulating element 9 in relation to the body 2 of the burner 1 and to the distributing element 4, in a direction parallel to a longitudinal axis of the body 2 of the burner.

For this purpose, the regulating element 9 is connected by means of a plurality of arms 11, for example three arms 11 staggered by 120° in relation to one another, to an annular element 17 fixed to the shaft 12 of a linear actuator 13, that controls translation of the regulating element 9.

The shift of the regulating element 9 causes a variation in the relative positions of the openings 3 of the body 2 of the burner 1, of the openings 5 of the distributing element 4 and of the openings 10 of the regulating element 9, thus varying the transit section available for the exit of the mixture of air and fuel delivered into the burner 1.

In particular, this transit section will decrease as the operating power of the burner decreases, in such a way that the speed of exit of the mixtures is maintained at a value that is sufficient to prevent flattening of the flames on the surface of the body 2 of the burner, and will increase as operating power increases in such a way as to maintain the speed of exit of the mixture below the value that causes separation of the flames from the surface of the body 2 of the burner 1.

Figures 9A-9D illustrate the operation of the further distributing element 9. In particular, Figures 9B, 9C and 9D illustrate three different positions of the regulating element 9 in relation to the body 2 of the burner. Figure 9B refers to a position of the regulating element 9 in relation to a condition of low-power operation of the burner 1, Figure 9C refers to a position of the regulating element 9 in relation to a condition of medium-power operation of the burner 1 and Figure 9D refers to a position of the regulating element 9 in relation to a condition of maximum-power operation of the burner 1.

Figures 6, 7 and 8 are plan views of the regulating element 9, in three different embodiments, wherein the regulating element 9 is provided with anti-stopping means 14, 15, 16, suitable for preventing the regulating element 9 from stopping during its translation against the internal surface of the body 2 of the burner 1.

In fact, the body 2 of the burner 1 normally consists of a metal sheet curved into a cylindrical shape, with a joint, for example a weld, along a generatrix of the cylindrical body 2 of the burner 1. The joint, even if it has been made with precision, inevitably always protrudes inside the body 2 of the burner 1. On the other hand, the radial play between the body 2 of the burner 1 and the regulating element 9 must be very small to prevent, or minimise, leaks of mixture, which would make it impossible or at least very difficult to adjust the speed of exit of the mixture to variations of the space for the transit of the mixture.

The value of this play is as great as the protrusion towards the inside of the body 2 of the burner 1 of

the joint line, which could thus interfere with translation of the regulating element 9.

To avoid the risk of stopping, the regulating element 9 is provided with said anti-stopping means 14, 15, 16 that is suitable for preventing contact between the external surface of the regulating element 9 and the joint during movement of the regulating element.

Figures 6, 7 and 8 show some examples of embodiments of the anti-stopping means 14, 15, 16.

In Figure 6 the anti-stopping means takes the form of an opening 14 along a generatrix of the further regulating element 9, which is positioned at the junction of the body 2 of the burner 1, in such a way that during movement of the regulating element 9 there is no interference with the joint.

In Figure 7 the anti-stopping means take the form of a recess 15 that in turn extends along a generatrix of the regulating element 9 and is positioned at the junction of the body 2 of the burner 1.

In Figure 8 the anti-stopping means take the form of a joint that extends along a generator of the regulating element 9 and is provided with a recess 16, which is positioned at the junction of the body 2 of the burner 1.

Figure 10 shows a second embodiment of the further distributing element according to the invention.

In this second embodiment, the regulating element 9a is provided with slits 18 arranged in a direction parallel to the generatrices of the surface of the regulating element 9a. In this case, the corresponding movement of the regulating element 9a in relation to the body 2 of the burner will be a rotation movement around a longitudinal axis of the body 2, rather than a translation movement.

Figures 10A-10D show the operation of the regulating element 9a. In particular, Figures 10B, 10C and 10D show three different positions of the regulating element 9a in relation to the body 2 of the burner. Figure 10B refers to a position of the regulating element 9a in relation to a low-power operating condition of the burner 1, Figure 10C refers to a position of the regulating element 9a in relation to a medium-power operating condition of the burner 1 and Figure 10D refers to a position of the regulating element 9a in relation to a maximum-power operating condition of the burner 1..

A third embodiment 9b of the regulating element is shown in Figure 11. This third embodiment is similar, in terms of the arrangement and distribution of the slits 10, to the embodiment shown in Figure 9, but differs from the latter inasmuch as it is provided with a series of seal rings 19, which are distributed at a substantially constant pitch along the entire length of the regulating element 9b and serve to prevent leaks of mixture between the regulating element 9b and the internal surface of the body 2 of the burner 1.

Figures 12 to 17 show a third embodiment of a burner 101 according to the invention comprising a body 102 with a cylindrical shape, subdivided into a plurality of sections 103 each one of which comprises a sector of a cylindrical surface. In each of the sections 103 openings 104 are made, for example in the form of slits, through which a mixture of air and fuel delivered into the body 102 of the burner 101 can exit.

Inside the body 102 of the burner 101 a distributing element 105 is arranged, having a function that is

similar to that of the distributing element 4 disclosed above. The distributing element 105 also has a cylindrical shape and is arranged concentrically in relation to the cylindrical body 102 of the burner 101. Also the distributing element 105 is subdivided into a plurality of sections 106, each of which comprises a sector of a cylindrical surface and corresponds to one of the sections 103 of the body 102 of the burner 101. In each of the sections 106 of the distributing element 105 openings 107 are made for the transit of the mixture of air and fuel.

The sections 103 of the body 102 of the burner and the sections 106 of the distributing element 105 are fixed to a series of radial baffles 108, that lead away from a central hollow cylindrical support 109. The radial baffles 108 are preferably distributed at a substantially constant angular pitch.

The radial baffles 108, the sections 106 of the distributing element 105 and the sections 103 of the body 102 of the burner 101 define a plurality of burner sectors 110, separated from one another.

The sections 103 of the body 102 of the burner 101 are provided at their ends with edges 111 folded towards the inside of the body 102 (Figure 16). Pairs of edges 111 of adjacent sections 103 are inserted into grooves 112 made at the external end of each radial baffle 108 to fix the sections 103 of the body 102 to the radial baffles 108. The grooves 112 extend in a direction substantially parallel to the longitudinal axis of the hollow cylindrical support 109.

Each radial baffle 108 (Figure 15) is furthermore provided on both its sides, at a certain distance

from its external end, with a pair of fins 113, 114 protruding in a substantially perpendicular direction from the baffle 108 and defining between them a corresponding groove 115, 116, in which an end of a section 106 of the distributing element 105 is insertable and immobilisable. In this way, the sections 106 of the distributing element 105 are fixed to the baffles 108. The fins 113, 114 and the grooves 115, 116 extend in a direction substantially parallel to the longitudinal axis of the hollow cylindrical support 109.

The central hollow cylindrical support 109 is provided with groups of openings 117, for the transit of the mixture of air and fuel. Each group of openings 117 communicates with one of the burner sectors 110: the number of groups of openings 117 therefore coincides with the number of sectors 110 in which the body 102 of the burner 101 is subdivided. The openings 117 have for example the shape of slits, the greater side of which extends in a direction parallel to the generatrices of the cylindrical support 109.

Inside the cylindrical support 109 there is inserted a regulating element 118 through which the mixture of air and fuel is delivered into the body 102 of the burner 101. The regulating element 118 comprises a hollow cylindrical body, in the surface of which openings 119 are made, for example in the shape of slits, the greater side of which extends in a direction substantially parallel to the generatrices of the regulating element 118.

The regulating element 118 may rotate in relation to the cylindrical support 109, the rotation of the regulating element 118 in relation to the cylindrical

body 109 being achieved by rotating actuating means that is not shown.

The slits 119 of the regulating element 118 are arranged in such a way that, depending on the angular position of the regulating element 118 in relation to the cylindrical support 109, they coincide with one or more groups of slits 117 of the cylindrical support 109. In this way, the mixture delivered into the regulating element 118 supplies one or more sectors 110 of the body 102 of the burner. The operating power of the burner 101 can therefore be adjusted by varying the number of the sectors 110 supplied by the mixture of air and fuel.

At maximum nominal operating power, the angular position of the distributing element 118 in relation to the cylindrical support 109 will be chosen in such a way that all the sectors 110 of the burner 101 are supplied whilst at operating power below nominal maximum power the angular position of the distributing element 118 will be chosen in such a way that only one part of the sectors 110 of the burner 101 is supplied.

For example, if the body 102 of the burner 101 is subdivided into six sectors, as shown in Figures 12 to 14, it is possible to provide three basic operating conditions: a first condition with maximum power deliverable by the burner 101 the same as the nominal power of the burner, in which all six sectors 110 are supplied, a second condition with maximum deliverable power corresponding to 2/3 of nominal power, in which four sectors 110 are supplied, whilst the remaining two sectors 110 are not supplied, and a third condition, with maximum deliverable power corresponding to 1/3 of nominal power, in which only

two sectors 110 are supplied, whilst the other four sectors 110 are not supplied. Within these operating conditions, the power delivered by the burner 101 can be modulated by adjusting the fuel supply until the power delivered is reduced to about half the maximum power deliverable by the burner 101 in that condition, i.e. without the risk that flattening of the flames on the surface of the body 102 of the burner 101 occurs.

In this way, owing to the invention, it is possible to modulate the power delivered by the burner 101 from nominal maximum power to about 1/6 of nominal maximum power without this involving the risk of flattening of the flames on the surface of the body 102 of the burner with consequent overheating thereof.

In one version that is not shown of the third embodiment of the burner according to the invention disclosed above the sections 110 are supplied independently of one another with the mixture of air and fuel, by respective supply means. This mixture of air and fuel is delivered into each of the sections 110 in the space defined between the hollow cylindrical support 109, a pair of radial baffles 108, a respective section 106 of the distributing element 105 and a respective section 103 of the body 102.

In the practical embodiment, the materials, dimensions and parts may be different from those shown but be technically equivalent to them without thereby falling outside the legal scope of the present invention.

CLAIMS

1. Burner (1) suppliable with a mixture of air and fuel, comprising a burner body (2) provided with a diffuser in the surface of which openings (3) are made for the exit of said mixture delivered into the body (2) of the burner (1), distributing means (4; 9, 9a, 9b) inserted inside said body (2) of the burner, characterised in that said distributing means (4; 9, 9a, 9b) comprises a regulating element (9, 9a, 9b) provided with further openings (10, 18) for the transit of said mixture, said regulating element (9, 9a, 9b) being movable inside said body (2) of the burner.

2. Burner (1) according to claim 1, wherein said body (2) of the burner has a substantially cylindrical shape and said regulating element (9, 9a, 9b) has a substantially cylindrical shape and is provided, on its side surface, with said further openings (10; 18).

3. Burner according to claim 1, or 2, wherein said regulating element (9, 9b) is movable in an axial direction with respect to said body (2) of the burner.

4. Burner (1) according to claim 1, or 2, wherein said regulating element (9a) is angularly movable with respect to said body (2) of the burner.

5. Burner (1) according to any preceding claim, wherein said regulating element (9, 9a, 9b) is associated with moving means (13).

6. Burner (1) according to claim 5, when appended to claim 3, wherein said regulating element (9, 9b) is connected by means of a plurality of arms (11) to the shaft (12) of a linear actuator (13).

7. Burner (1) according to claim 5, when appended to claim 4, wherein said regulating element (9a) is connected by means of a plurality of arms (11) to the shaft (12) of a rotating actuator (13).

8. Burner (1) according to any one of claims 5 to 7, wherein said actuator (13) is driven by a stepping motor.

9. Burner (1), according to any one of claims 2, 3, 5, 6, wherein said further openings (10) have the shape of slits with the greater side placed in a direction substantially perpendicular to the generatrices of said substantially cylindrical regulating element (9, 9b).

10. Burner (1), according to any one of claims 2, 4, 5, 7, wherein said further openings (18) have the shape of slits with the greater side placed in a direction substantially parallel to the generatrices of said substantially cylindrical regulating element (9, 9b).

11. Burner according to any one of claims 2, 3, 5, 6, 8, 9, wherein said substantially cylindrical regulating element (9, 9b) is provided with seal means (19).

12. Burner (1) according to claim 11, wherein said seal means comprises seal rings (19) arranged on the surface of said regulating element (9b).

12. Burner (1) according to any one of claims 2 to 10, wherein said regulating element (9, 9a, 9b) is provided with an anti-stopping means (14, 15, 16).

13. Burner (1) according to claim 12, wherein said anti-stopping means comprises an opening (14) that extends along a generatrix of said regulating element (9, 9a).

14. Burner according to claim 12, wherein said anti-stopping means comprises a recess (15) of the surface of said regulating element (9, 9a), said recess extending along a generatrix of said surface.

15. Burner according to claim 12, wherein said anti-stopping means comprises a joint, which extends along a generatrix of said regulating element (9, 9a) and is provided with a recess (16).

16. Burner (1) according to any preceding claim, wherein said distributing means comprises a distributing element (4), arranged inside said regulating element (9, 9a, 9b).

17. Burner (1) according to claim 16, wherein said distributing element (4) is coupled with the body (2) of the burner (1) by means of mechanical interference fit.

18. Burner (1) according to claim 16, or 17, wherein the body (2) of the burner (1) comprises an upper projection (7) and a lower projection (8) that protrude inside the body (2) and respectively constitute an upper base and a lower base of the body (2), said lower projection (8) is provided with a central opening (8a) for the passage of a Venturi tube (6).

19. Burner (1) according to claim 18, wherein said distributing element (4) is coupled mechanically with interference with one of said two lower (7) or upper (8) projections, the other of said two projections acting as a centering element for said distributing element (4).

20. Burner (101) suppliable with a mixture of air and fuel, comprising a burner body (102) in the surface of which openings are made (104) for the exit of said mixture delivered into said body (102), characterised in that said body (102) is subdivided into a plurality of sectors (110), each one of which is suppliable independently of the other sectors.

21. Burner (101) according to claim 20, wherein said body (102) has a substantially cylindrical shape and said sectors (110) each have substantially the shape of a cylindrical sector.

22. Burner (101) according to claim 21, wherein said sectors (110) all have substantially the same angular width.

23. Burner (101) according to any one of claims 20 to 22, wherein said body (102) comprises a plurality of sections (103), each one of which corresponds to a respective sector (110).

24. Burner (101) according to claim 23, wherein each of said sections (103) is provided with openings (104) for the transit of said mixture of air and fuel.

25. Burner (101) according to any one of claims 20 to 24, further comprising a distributing element (105) arranged within said body (102).

26. Burner (101) according to claim 25, wherein said distributing element (105) has a substantially cylindrical shape and is substantially concentric to said body (102).

27. Burner (101) according to claim 24, or 25, wherein said distributing element (105) comprises a plurality of sections (106), each one of which corresponds to a respective sector (110) of said body (102).

28. Burner (101) according to claim 27, wherein each of said sections (106) is provided with openings (107) for the transit of said mixture of air and fuel.

29. Burner (101) according to any one of claims 23 to 28, wherein said sections (103) of the body (102) and said sections (106) of the distributing element (105) are fixed to a series of radial baffles (108),

that lead away from a central hollow cylindrical support (109).

30. Burner (101) according to claim 29, wherein said radial baffles (108) are distributed at a substantially constant angular pitch.

31. Burner (101) according to claim 29, or 30, wherein each of said radial baffles (108) is provided at its external end with a groove (112) extending in a direction substantially parallel to the longitudinal axis of said hollow cylindrical support (109).

32. Burner (101) according to claim 31, wherein each of said sections (103) of said body (102) is provided with edges (111) folded towards the inside of the body (102), said edges (111) being insertable into said grooves (112).

33. Burner (101) according to any one of claims 29 to 32, wherein each radial baffle (108) is provided on both sides, at a certain distance from its external end, with a pair of fins (113, 114) protruding in a substantially perpendicular direction from the baffle (108) and defining between them a corresponding groove (115, 116).

34. Burner (101) according to claim 33, wherein said fins (113, 114) and said grooves (115, 116) extend in a direction substantially parallel to the longitudinal axis of the hollow cylindrical support (109).

35. Burner (101) according to claim 33, or 34, wherein said grooves (115, 116) are suitable for receiving an end of a respective section (106) of the distributing element (105).

36. Burner (101) according to any one of claims 29 to 35, wherein each of said sectors (110) is defined by a pair of adjacent radial baffles (108), by a respective section (103) of the body (102) fixed to said pair of radial baffles (108) and by a respective section (106) of the distributing element (105) also fixed to said pair of radial baffles (108).

37. Burner (101) according to any one of claims 29 to 36, wherein said hollow cylindrical support (109) is provided with groups of openings (117) for the transit of said mixture of air and fuel, each group of openings (117) corresponding to one of said sectors (110) of the body (102).

38. Burner (101) according to claim 37, wherein said openings (117) have the shape of slits the greater side of which extends in a direction parallel to the generatrices of the cylindrical support (109).

39. Burner (101) according to any one of claims 29 to 38, wherein inside said cylindrical support (109) there is inserted a regulating element (118) through which said mixture of air and fuel is delivered into said body (102), said regulating element (118) being provided with openings (119) for the transit of said mixture.

40. Burner (101) according to claim 39, wherein said regulating element (118) comprises a hollow cylindrical body, in the surface of which said openings (119) are made, said hollow cylindrical body being able to rotate in relation to said hollow cylindrical support (109).

41. Burner (101) according to claim 40, wherein said openings (119) have the shape of slits, the greater side of which extends in a direction substantially parallel to the generatrices of the regulating element (118).

42. Burner (101) according to claim 40, or 41, wherein said openings (119) are arranged in such a way that, depending on the angular position of the regulating element (118) in relation to the hollow cylindrical support (109), they come to coincide with one or more groups of openings (117) of the cylindrical support (109).

43. Burner (101) according to any one of claims 39 to 42, wherein the angular position of said regulating element (118) in relation to said hollow cylindrical support (109) determines the number of sections (110) of the body (102) that are supplied with said mixture of air and fuel.

44. Burner (101) according to any one of claims 20 to 36, wherein the sections (110) of said body (102) are supplied independently of one another with said mixture of air and fuel, by respective supply means.

45. Burner (101) according to claim 44, wherein said mixture of air and fuel is delivered into each of said sections (110) in a space defined between said hollow cylindrical support (109), a pair of radial baffles (108), a respective section (106) of the distributing element (105) and a respective section (103) of the body (102).

46. Burner (1) suppliable with a mixture of air and fuel, comprising a burner body (2) provided with a diffuser in the surface of which openings (3) are made for the exit of said mixture delivered into the body (2) of the burner (1), distributing means (4) inserted inside said body (2) of the burner, said distributing means being provided with further openings (5) for the transit of said mixture, characterised in that said distributing means (4) is coupled with the body (2) of the burner (1) by means of a mechanical interference fit.

47. Burner (1) according to claim 46, wherein said body (2) comprises an upper projection (7) and a lower projection (8) that protrude inside the body (2) and respectively constitute an upper base and a lower base of the body (2), said lower projection (8) is provided with a central opening (8a) for the passage of a Venturi tube (6).

48. Burner (1) according to claim 47, wherein distributing means (4) is mechanically coupled by means of an interference fit with one of said two lower (7) or upper (8) projections, the other of said two projections acting as an aligning element for said distributing means (4).

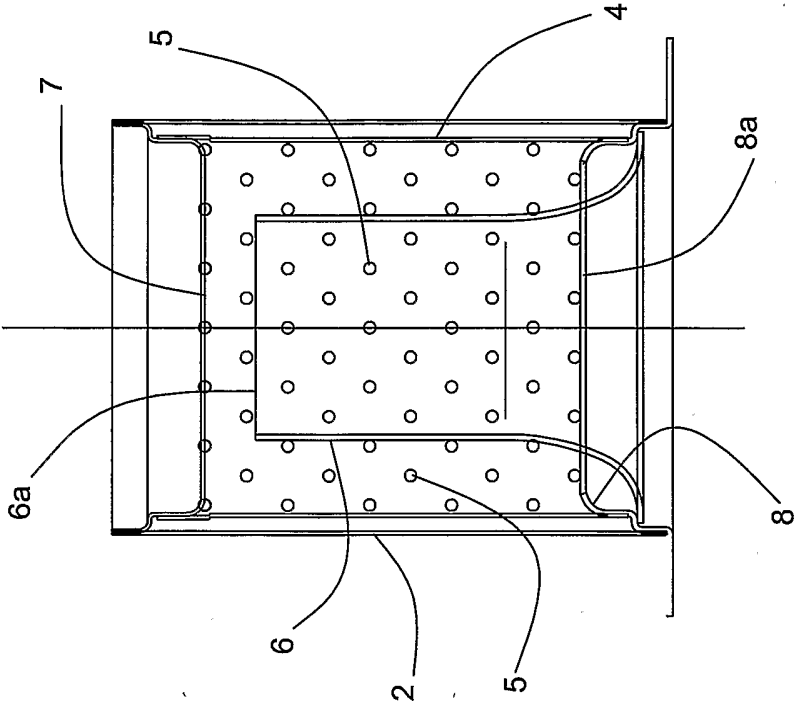


Fig. 2

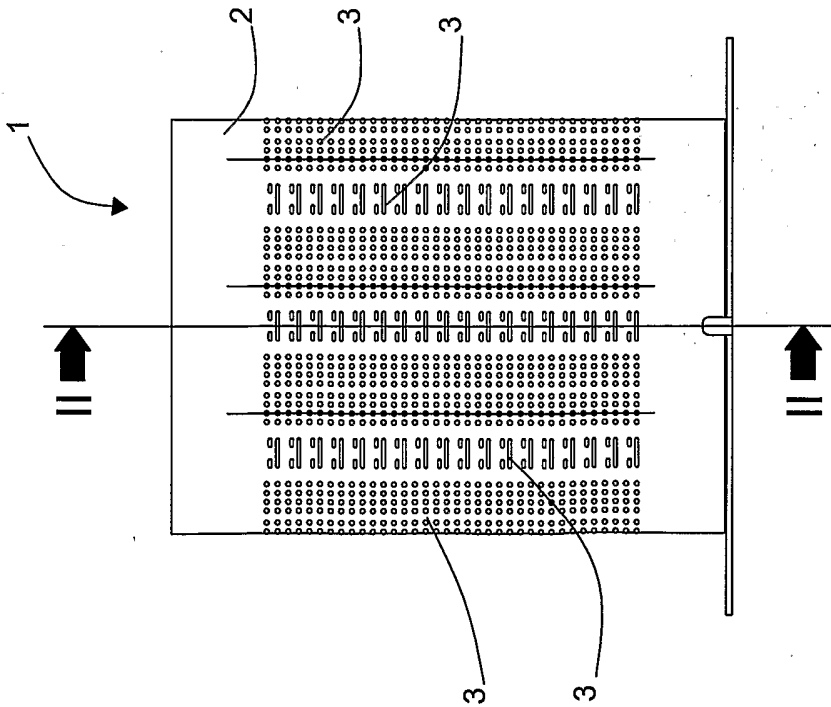


Fig. 1

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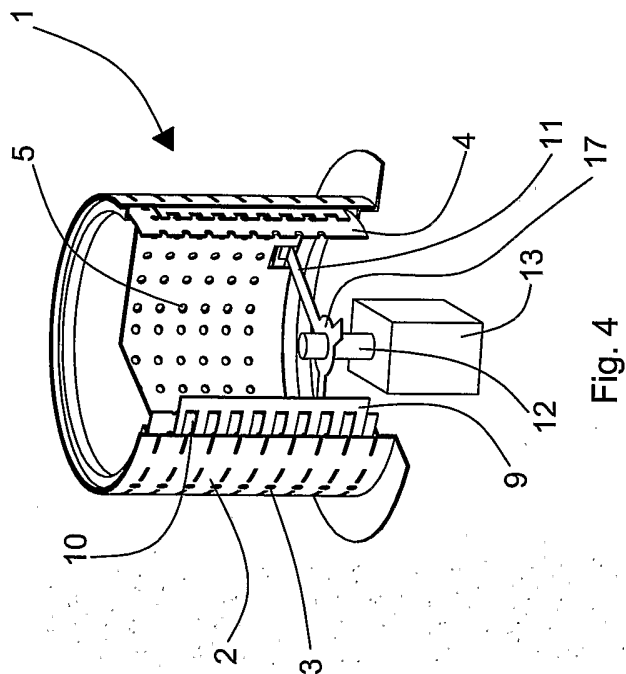
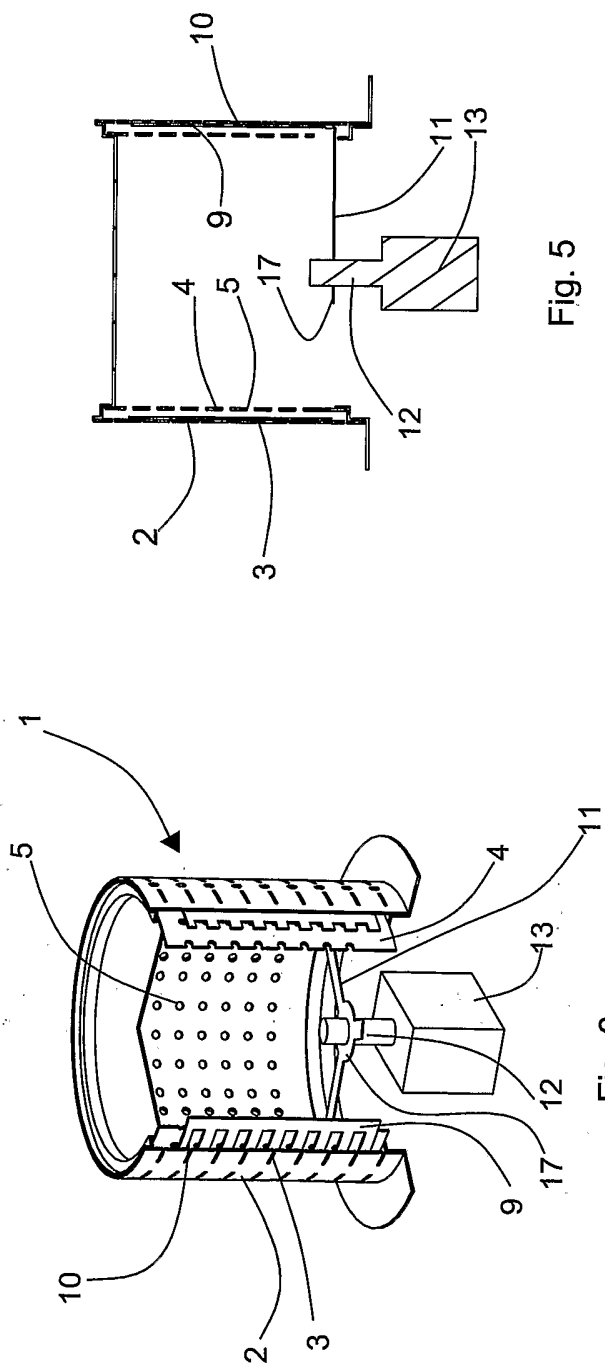
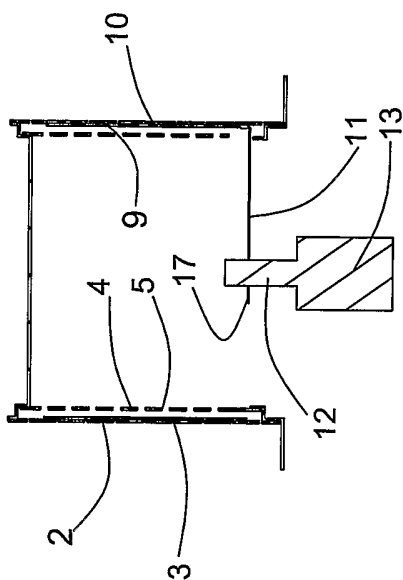


Fig. 5



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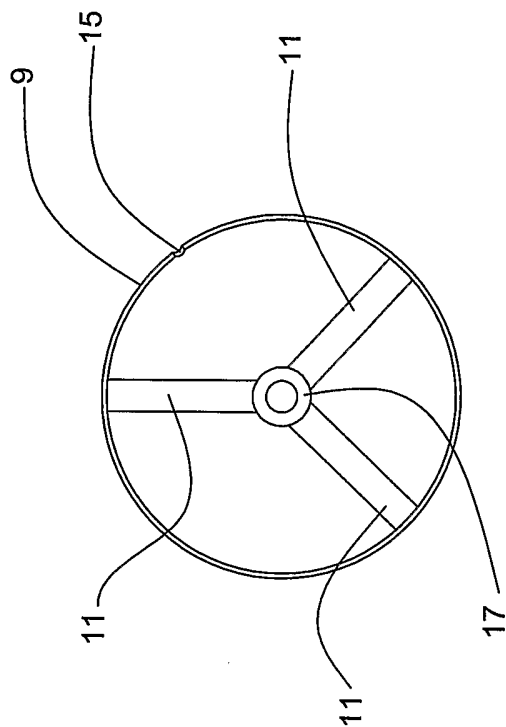


Fig. 7

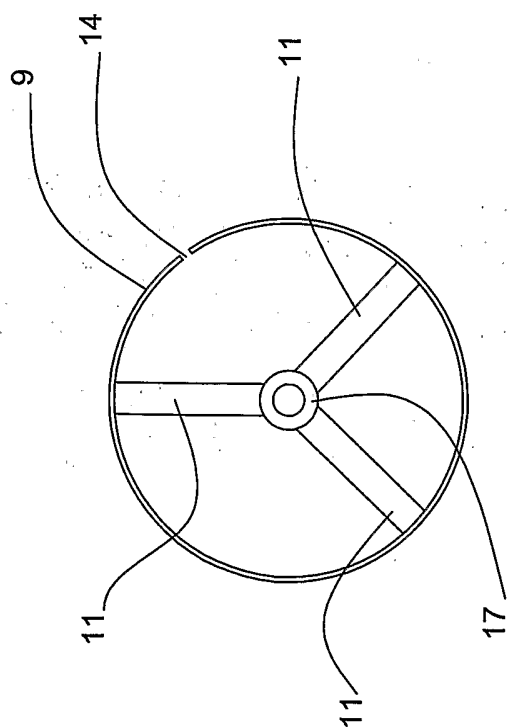


Fig. 6

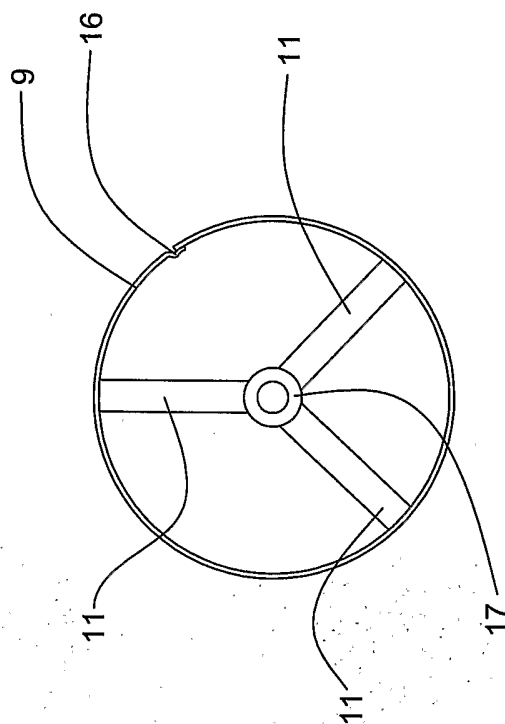


Fig. 8

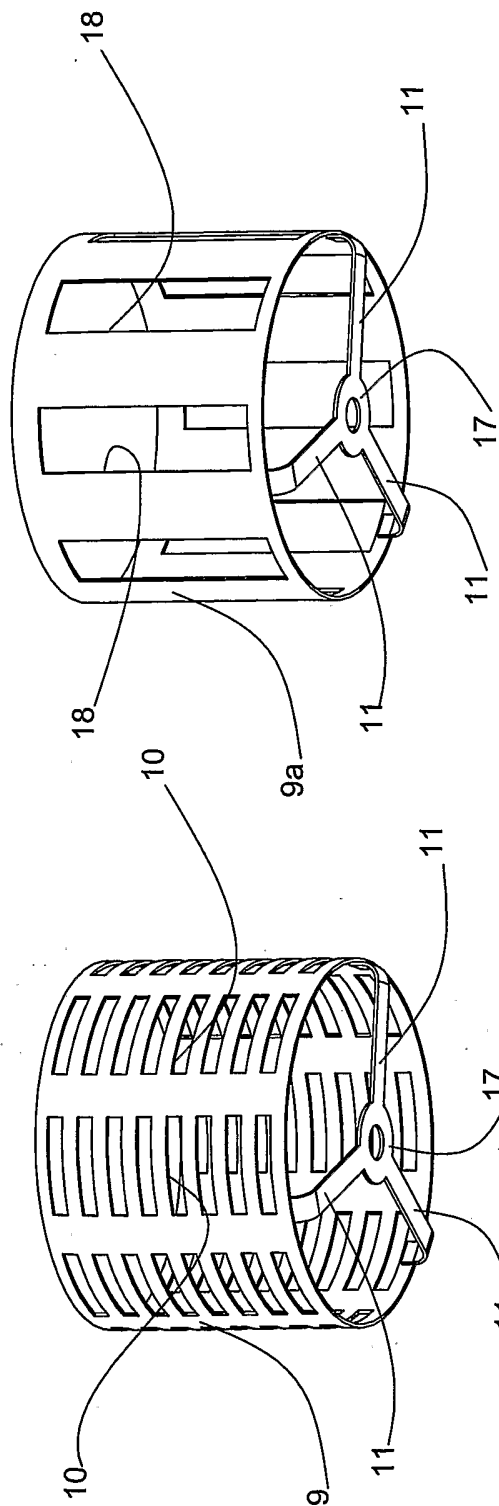


Fig. 10

Fig. 9

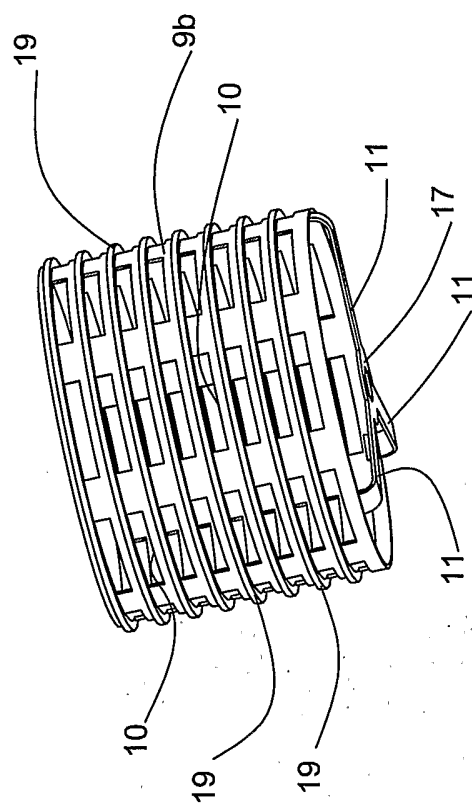


Fig. 11

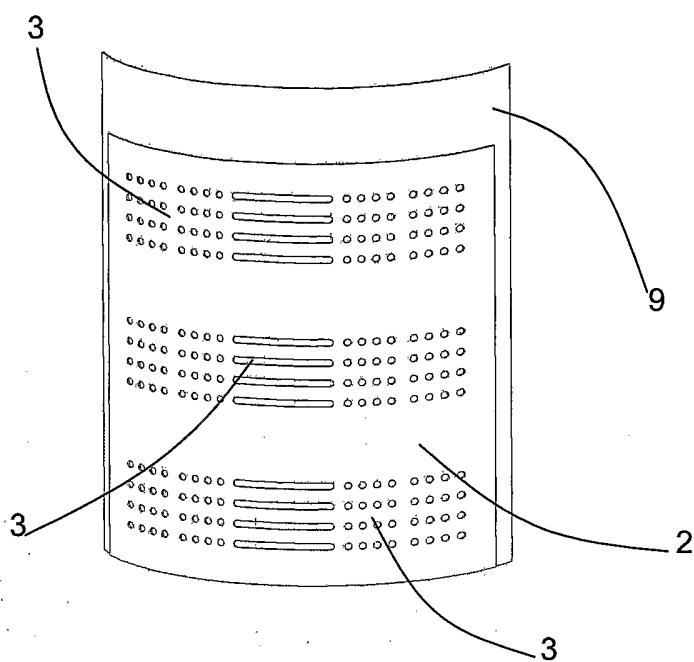


Fig. 9A

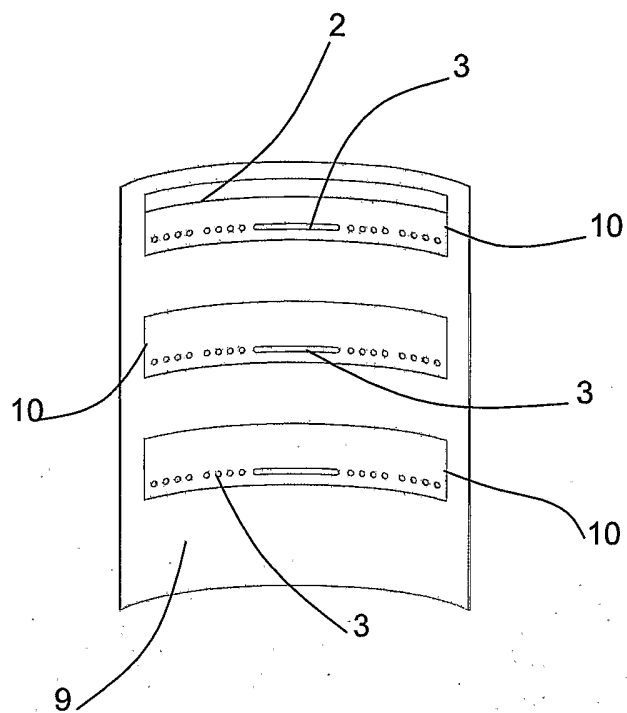


Fig. 9B

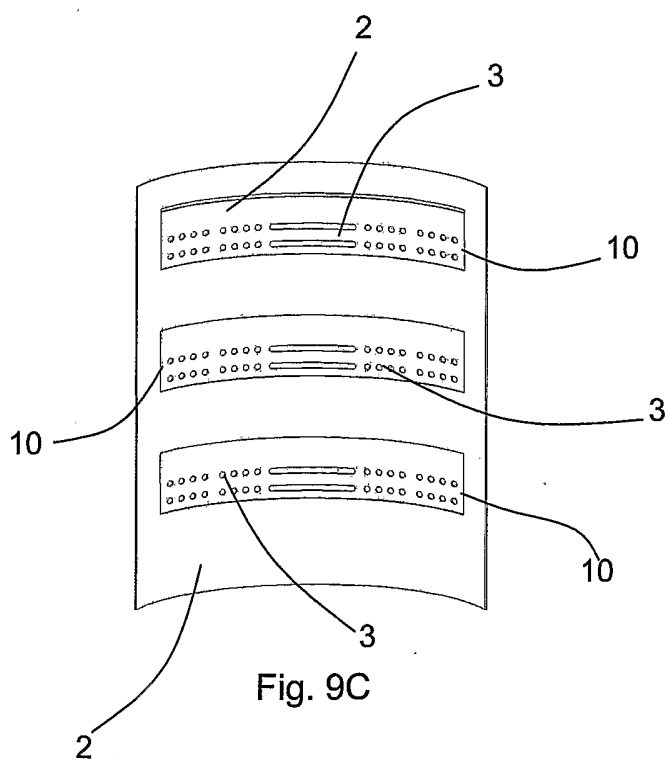


Fig. 9C

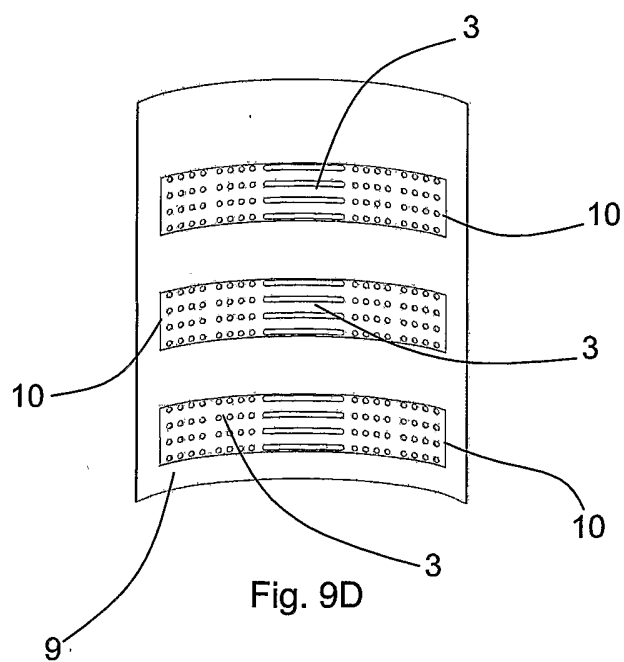


Fig. 9D

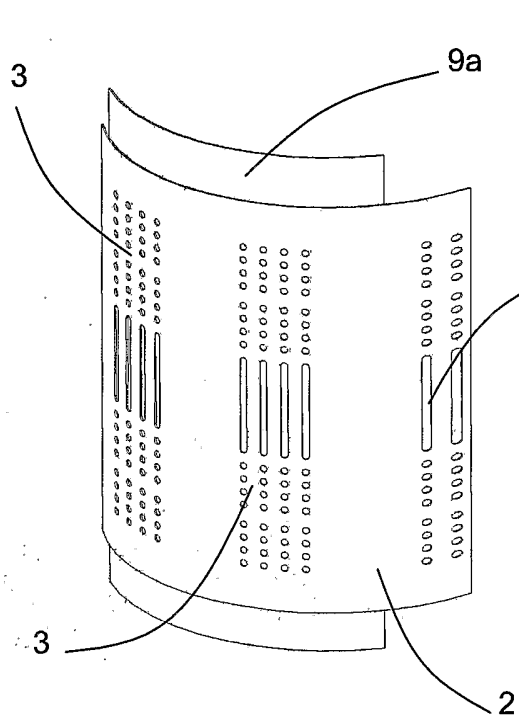


Fig. 10A

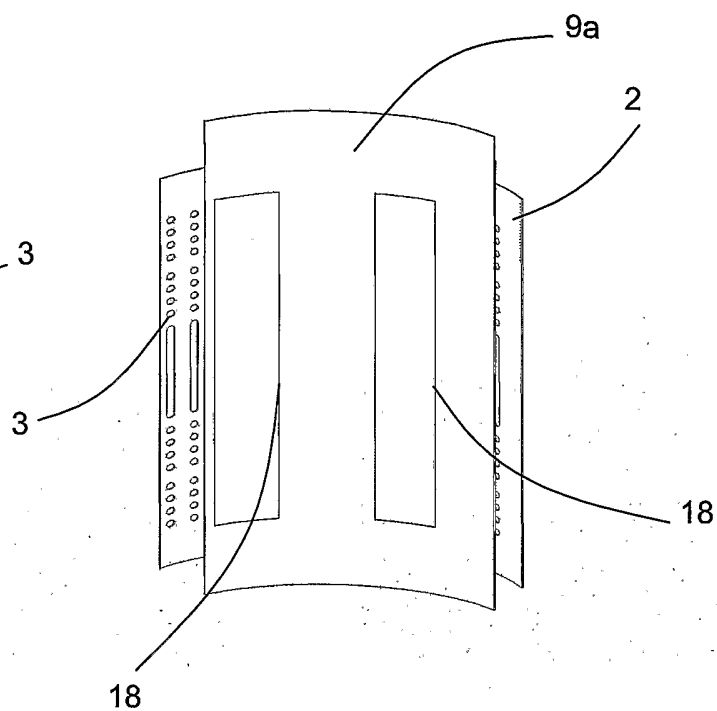


Fig. 10B

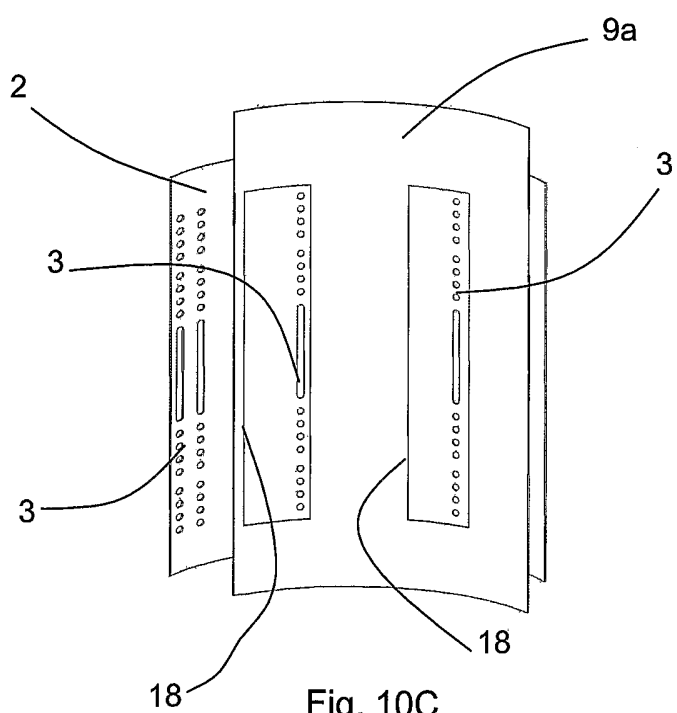


Fig. 10C

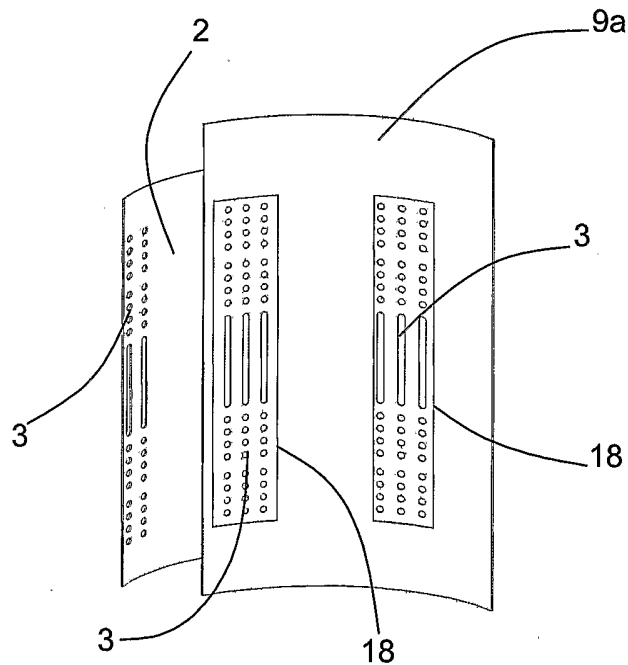


Fig. 10D

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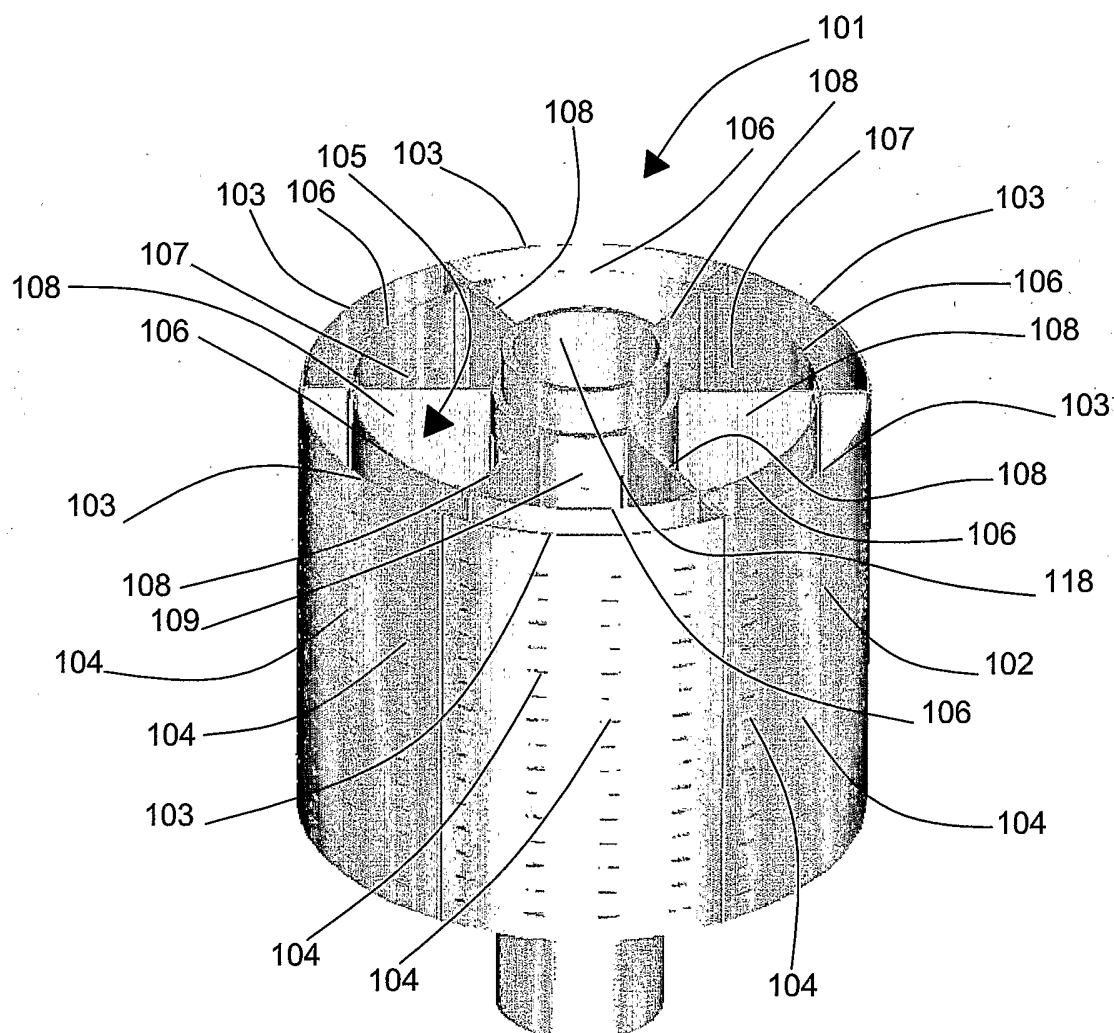


Fig. 12

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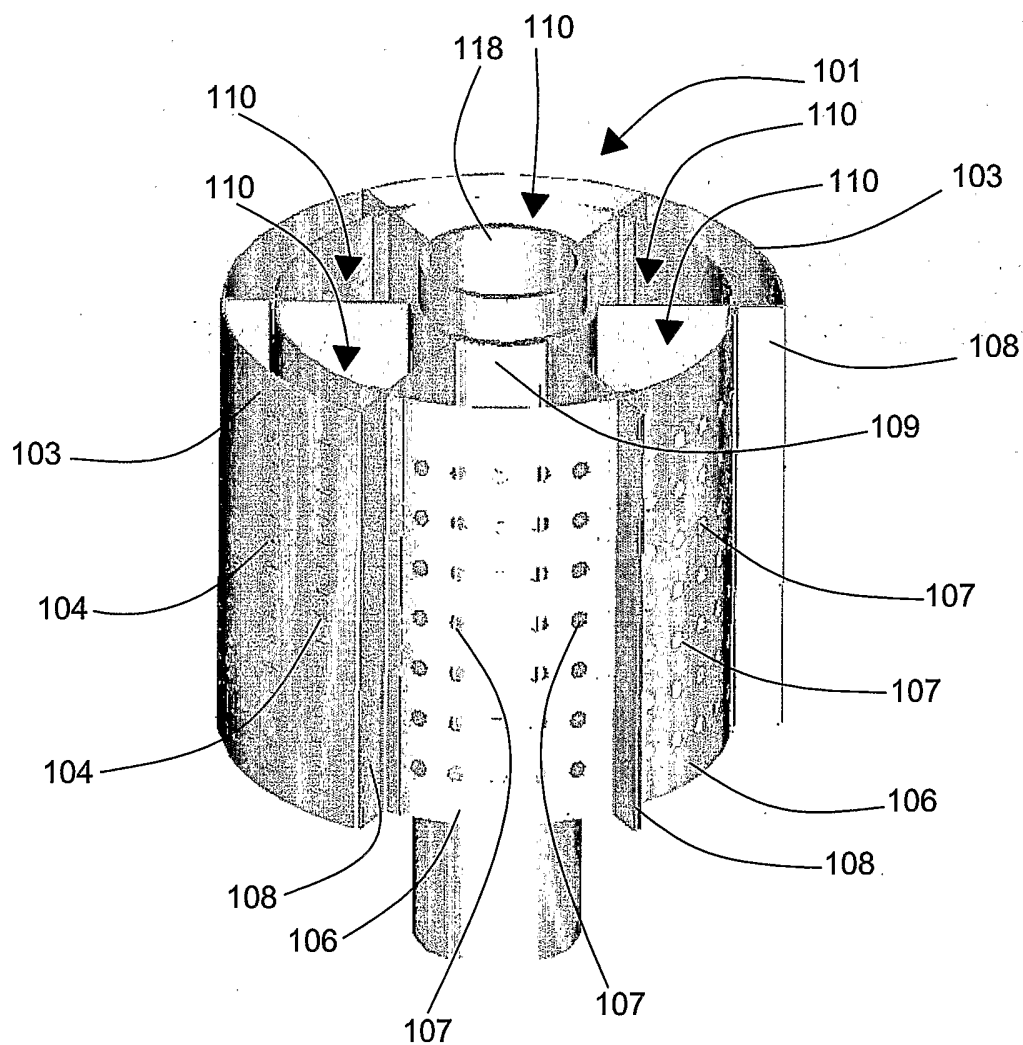
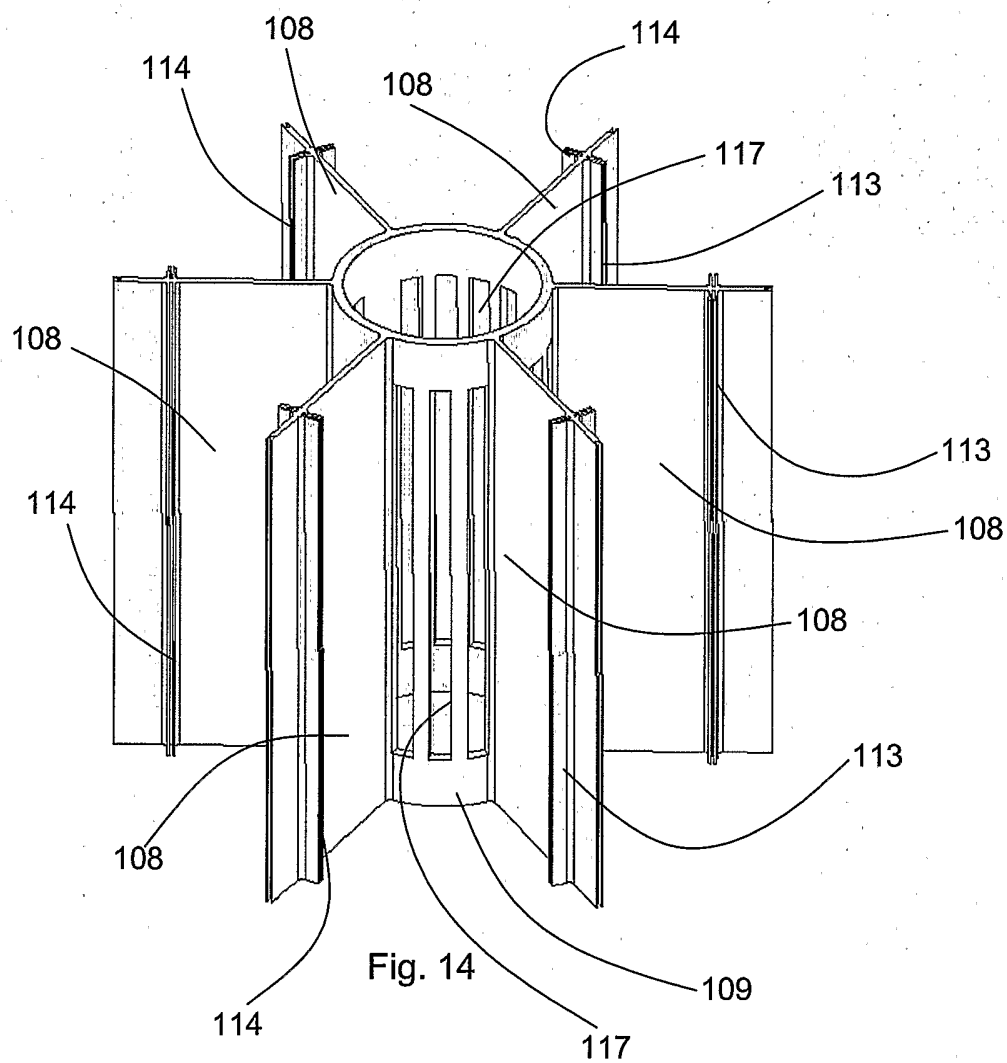
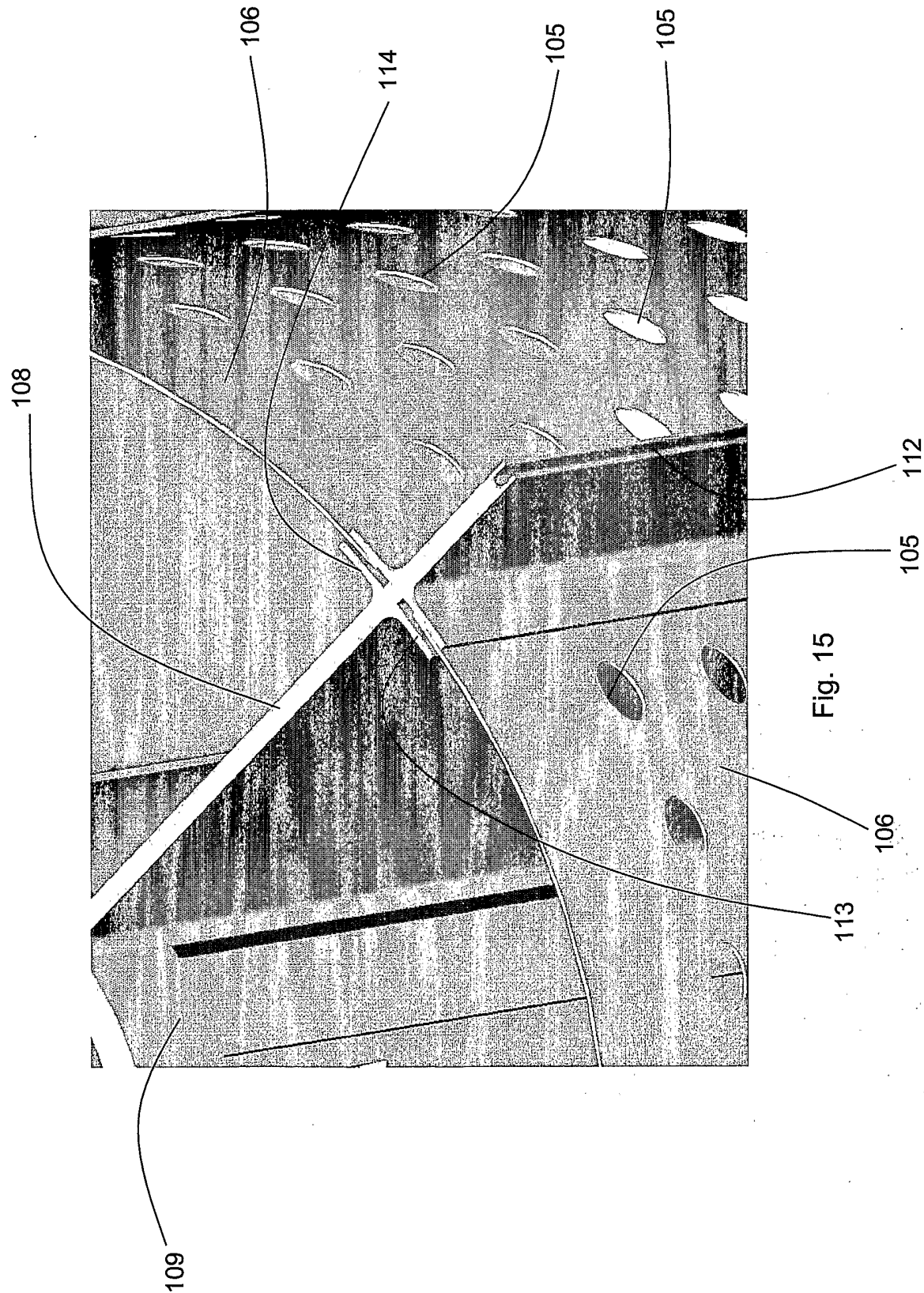
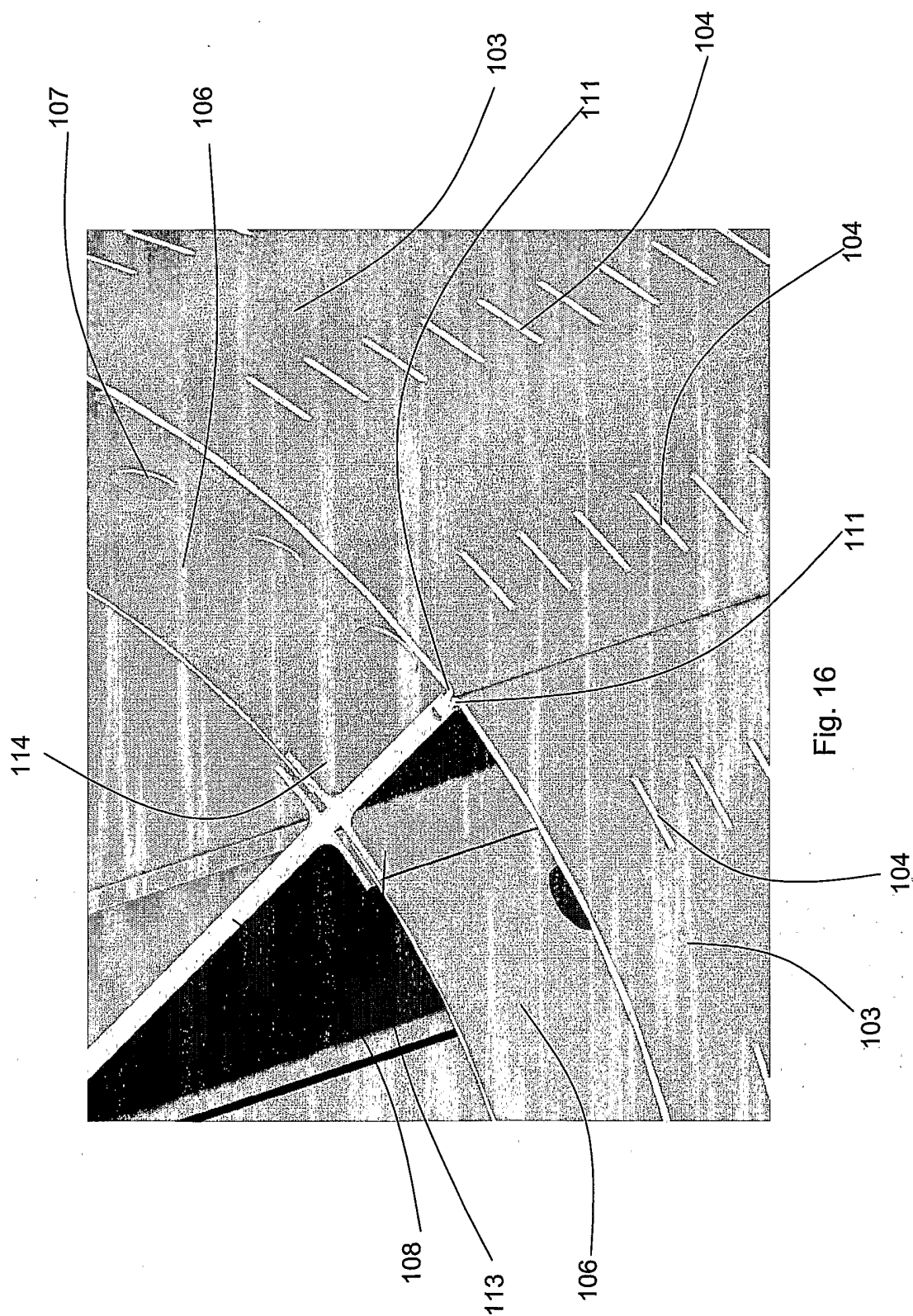


Fig. 13





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CONFIRMATION COPY

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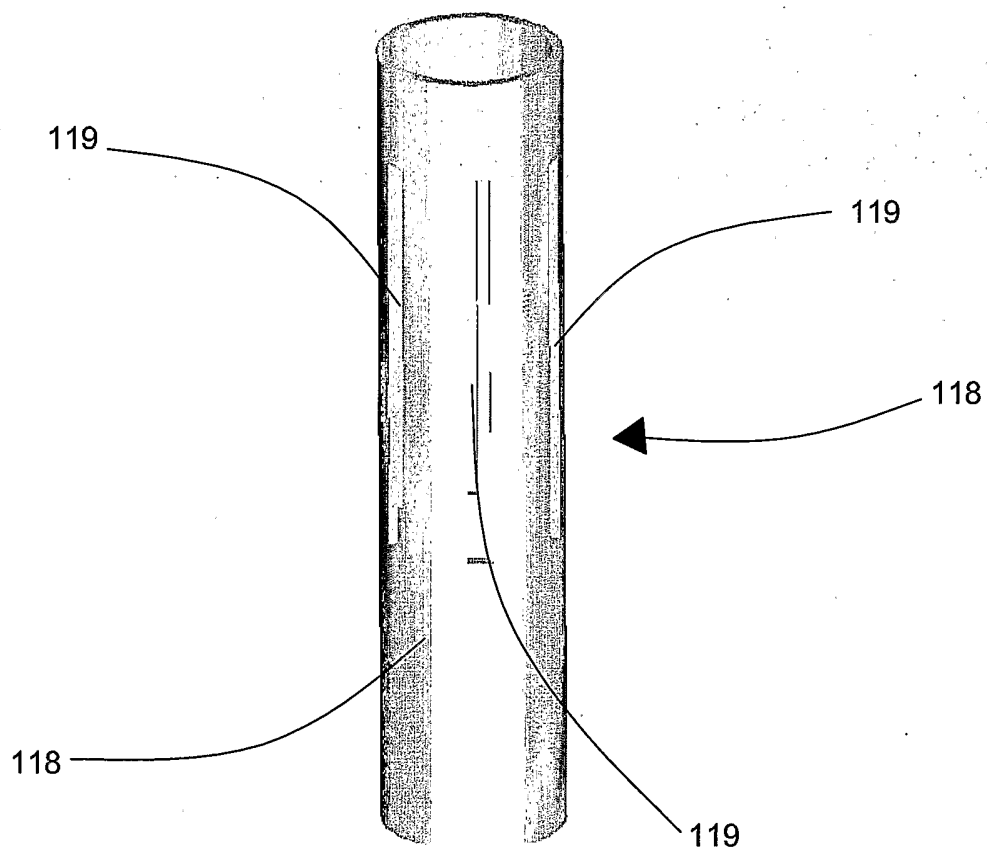


Fig. 17

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/005475

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F23D14/10 F23D14/58

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F23D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	DE 197 44 564 C (TAVIRA HOLDINGS LTD) 21 January 1999 (1999-01-21) column 2, line 7 - line 30 column 2, line 58 - line 66 column 3, line 30 - line 41; claim 1; figures 1,2 --- X DE 196 14 098 A (BUDERUS HEIZTECHNIK GMBH) Y 16 October 1997 (1997-10-16) column 2, line 31 - column 3, line 2; figure 3 --- -/--	1,2,4,5, 16,17,46 3,25-30, 36 20-24 25-30,36

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

13 August 2004

Date of mailing of the international search report

30/08/2004

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/005475

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 2 177 245 A (DENNIS EDWIN L) 24 October 1939 (1939-10-24) page 1, left-hand column, line 55 -right-hand column, line 34; figures 1-3 -----	1,20,46

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