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(71) Applicant: **Aeromatix Limited**
Beverley,
East Yorkshire HU17 9BZ (GB)

(72) Inventor: **Whitaker, Allan**
c/o Aeromatix Limited
Ripley, Derbyshire, DE5 JH (GB)

(74) Representative: **Swindell & Pearson**
48 Friar Gate
Derby DE1 1GY (GB)

(54) **End cap for a gas burner**

(57) An end cap (40), for use with a gas burner (10) including a substantially cylindrical burner wall (16) defining an internal cavity (20), is substantially circular and includes a circumferential attachment region (44). The circumferential attachment region (44) is deformable to permit attachment of the end cap (40) to one end of the cylindrical burner wall (16) to close one end of the internal cavity (20), and the end cap (40) includes a discontinuity (54), and possibly a plurality of discontinuities (54) in the form of slots (56), in the circumferential attachment region (44).

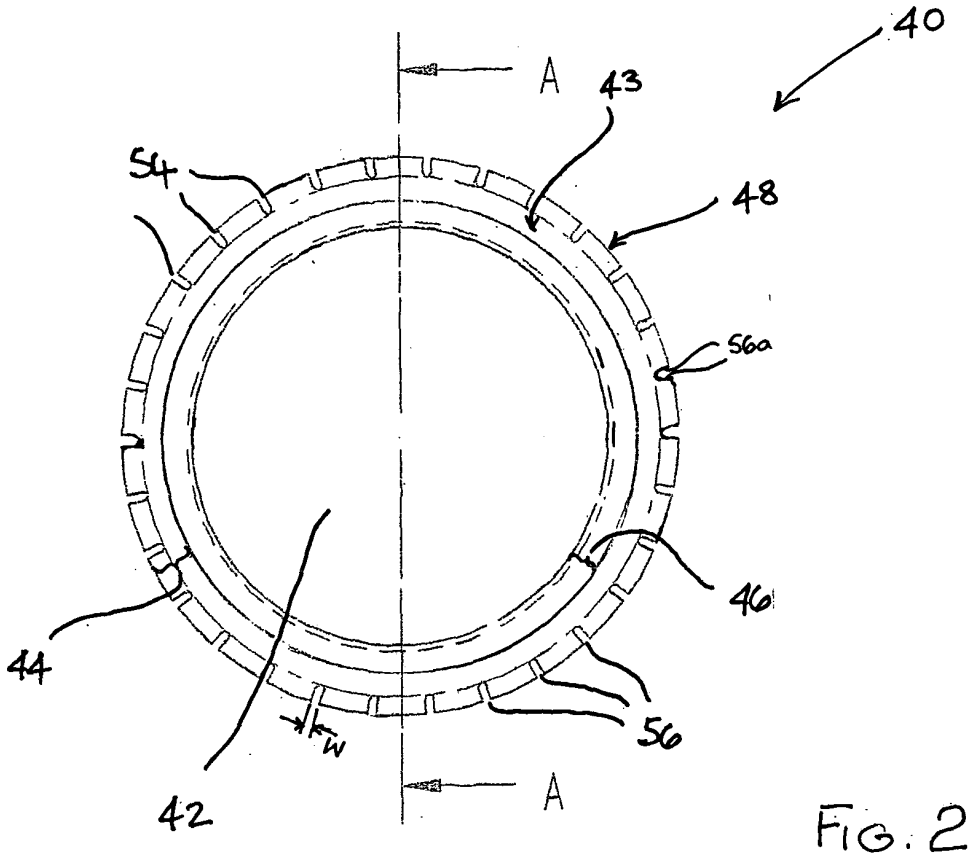

FIG. 2

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Description

[0001] The present invention relates to an end cap for a gas burner, and particularly but not exclusively to an end cap for a gas burner for use in domestic heating appliances. The gas burner may be of the 'premix' type, meaning that all of the air required for complete combustion is mixed with the fuel gas prior to combustion.

[0002] Conventional premix burners include a cylindrical burner wall defining an internal cavity for receiving a gas and air mixture, and the gas and air mixture passes through apertures in the cylindrical wall for combustion. The gas and air mixture is fed into the internal cavity through an open end of the burner wall and the other end is closed using an end cap.

[0003] It would be desirable to provide an improved end cap for use with gas burners of this type.

[0004] According to a first aspect of the present invention, there is provided an end cap for use with a gas burner including a substantially cylindrical burner wall defining an internal cavity, the end cap being substantially circular and including a circumferential attachment region which is deformable to permit attachment of the end cap to one end of the cylindrical burner wall to close one end of the internal cavity, characterised in that the end cap includes a discontinuity in the circumferential attachment region.

[0005] The end cap may define a circumferential outer edge, and the circumferential attachment region may be generally annular and may extend in a radially inwards direction from the circumferential outer edge.

[0006] The discontinuity may extend across the circumferential attachment region, and may extend across the circumferential attachment region radially inwardly from the circumferential outer edge.

[0007] The discontinuity may extend radially inwardly across a portion of the annular circumferential attachment region. The discontinuity may extend radially inwardly across between approximately 40% and 60% of the annular circumferential attachment region. The discontinuity may extend radially inwardly across approximately 50% of the annular circumferential attachment region.

[0008] The discontinuity may be defined by the absence of material in the circumferential attachment region, and may be in the form of a slot or a notch.

[0009] The end cap may include a plurality of said discontinuities in the circumferential attachment region, and the discontinuities may be circumferentially spaced, possibly circumferentially equispaced, around the circumferential attachment region.

[0010] According to a second aspect of the present invention, there is provided a gas burner including a substantially cylindrical burner wall defining an internal cavity and a substantially circular end cap including a circumferential attachment region, wherein the end cap is attached to one end of the burner wall via the circumferential attachment region to close one end of the internal cavity, characterised in that the end cap includes a discontinuity in the circumferential attachment region.

[0011] The end cap may be as defined above.

[0012] According to a third aspect of the present invention, there is provided a heating appliance including a gas burner according to the second aspect of the present invention.

[0013] An embodiment of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:-

Fig. 1 is a diagrammatic perspective view of a gas burner, including a known form of end cap, in place within a heating appliance;
Fig. 2 is a diagrammatic top view of an end cap according to the invention for use with the gas burner of Fig. 1;
Fig. 3 is a diagrammatic cross-sectional view along the line A-A of Fig. 2;
Fig. 4 is a diagrammatic cross-sectional view of the end cap of Figs. 2 and 3 attached to a gas burner; and
Fig. 5 is a diagrammatic perspective view of the end cap of Figs. 2 and 3 attached to a gas burner.

[0014] Fig. 1 illustrates a gas burner 10 located within a heating appliance including a combustion zone 12 and a heat exchanger 14. The gas burner 10 is of a known design and is described here to facilitate understanding of the present invention, described later with reference to Figs. 2 to 5.

[0015] The gas burner 10 includes a cylindrical burner wall 16 and a concentric inner baffle 18, enclosing an internal cavity 20. An end cap 22 of a known design is attached to one axial end of the burner wall 16 and closes one end of the internal cavity 20. A mounting flange 24 is attached to the other axial end of the burner wall 16 and extends radially outwardly therefrom. The gas burner 10 is attached to a housing 26 of the heating appliance via the mounting flange 24.

[0016] The burner wall 16 is provided with apertures in the form of flame ports 32, just a few of which are illustrated in Fig. 1. The flame ports 32 are about 0.8mm in diameter and their centres are about 2 to 3mm apart. The flame ports 32 may be arranged evenly over the whole of the burner wall 16. The inner baffle 18 is provided with larger apertures 28.

[0017] In use, a gas and air mixture is fed into the internal cavity 20 and passes through the apertures 28 in the baffle 18, through the flame ports 32 in the burner wall 16 and into the combustion zone 12 where combustion takes place. The heat thereby produced is utilised via the heat exchanger 14, with the flue products passing out of the unit as indicated by the arrow A.

[0018] Figs. 2 and 3 illustrate an end cap 40 according to one embodiment of the invention. The end cap 40 is intended for use with a gas burner, such as the gas burner 10 of Fig. 1, to replace the known end cap 22 illustrated in Fig. 1.

[0019] The end cap 40 is generally circular in plan and

includes a central region 42 for closing one end of the internal cavity 20, a circumferential attachment region 44, located radially outwardly of the central region 42, and a connecting region 46 between the central region 42 and the circumferential attachment region 44. The configuration of the end cap 40, and in particular the connecting region 46, is such that it allows the concentric inner baffle 18 to float inside the cylindrical burner wall 16, for example by moving axially and/or radially relative to the cylindrical burner wall 16.

[0020] The end cap defines a circumferential outer edge 48 and the circumferential attachment region 44, which is annular, extends radially inwardly away from the circumferential outer edge 48 and merges with the connecting region 46.

[0021] In order to attach the end cap 40 to the burner wall 16, the end cap 40 is located at one of the axial ends of the burner wall 16 and the circumferential attachment region 44 is deformed, for example by a spinning operation, so that part of the circumferential attachment region 44 defines a securing lip 50 (see Figs. 4 and 5). The securing lip 50 co-operates with a circumferentially extending securing formation 52 provided by the burner wall 16 to thereby securely attach the end cap 40 to the burner 10.

[0022] As can be seen most clearly in Fig. 2, the end cap 40 includes a plurality of discontinuities 54 in the circumferential attachment region 44. In the illustrated embodiment, each of the discontinuities 54 is in the form of a slot 56, and these are circumferentially equispaced around the circumferential attachment region 44.

[0023] As can be seen in Fig. 5, the slots 56 generally close up as a result of the deformation of the circumferential attachment region 44 which secures the end cap 40 to the burner wall 16. When the slots 56 close up, opposing inner edges 56a thereof contact each other. This closure of the slots 56 ensures that there are no gaps between the end cap 40 and burner wall 16 and consequently no unwanted leakage of gas and air mixture from the internal cavity 20.

[0024] In order to ensure that the slots 56 close up, the width 'w' of the individual slots 56 needs to be carefully selected, and may vary according to the thickness of the material from which the end cap 40 is formed. Purely by way of example, for an end cap 40 including thirty slots 56 and having a material thickness of approximately 0.80mm, the width 'w' of each slot 56 may be between 1.10 and 1.30mm.

[0025] In the illustrated embodiment, thirty slots 56, each spaced apart by 12 degrees, are provided in the circumferential attachment region 44. However, this is merely an exemplary embodiment and it should be understood that any number of slots 56 may be provided.

[0026] The provision of discontinuities 54, such as slots 56, in the circumferential attachment region 44 is advantageous as it reduces the force required to deform the circumferential attachment region 44 and reduces the residual stresses in the end cap 40 after deformation. Minimisation of residual stresses induced as a result of the deformation process is advantageous as this reduces the likelihood of failure during thermal cycling of the burner 10 in use. The discontinuities 54 also provide a reduction in the cyclic stresses in the end cap 40 as it expands and contracts between operating cycles.

[0027] Referring again to Fig. 2, each slot 56 extends in a radially inwards direction from the circumferential outer edge 48 of the end cap 40, partially across the circumferential attachment region 44. In the illustrated embodiment, each slot 56 extends across approximately 50% of the circumferential attachment region 44, radially inwardly from the circumferential outer edge 48. This is advantageous as it ensures that an adequate seal is formed between a continuous, uninterrupted, radially inner portion 43 of the circumferential attachment region 44 and the securing formation 52.

[0028] The formation of an adequate seal is important to prevent leakage of the gas and air mixture from the internal cavity 20 through the end cap 40, as this could result in the formation of a local flame when the burner 10 is in use, resulting in locally high material temperatures and consequent premature failure of the burner 10.

[0029] There is thus provided an end cap 40 for a gas burner 10 which can be readily attached to the burner 10 in a reliable manner. The life of a burner 10 incorporating an end cap 40 according to the invention has been found to be significantly greater than the life of a burner 10 incorporating a conventional end cap, such as the end cap 22 illustrated in Fig. 1.

[0030] Although embodiments of the invention have been described in the preceding paragraphs with reference to various examples, it should be appreciated that various modifications to the examples given may be made without departing from the scope of the present invention, as claimed.

[0031] For example, the discontinuities 54 may be of a form other than slots 56, and may have any suitable shape or configuration. The discontinuities 54 may extend across the entirety of the circumferential attachment region 44 or may extend across only a portion thereof by any suitable amount, for example across between approximately 40% and approximately 60% of the circumferential attachment region 44, radially inwardly away from the circumferential outer edge 48.

Claims

1. An end cap (40) for use with a gas burner (10) including a substantially cylindrical burner wall (16) defining an internal cavity (20), the end cap (40) being substantially circular and including a circumferential attachment region (44) which is deformable to permit attachment of the end cap (40) to one end of the cylindrical burner wall (16) to close one end of the internal cavity (20), **characterised in that** the end cap (40) includes a discontinuity (54) in the circum-

ferential attachment region (44).

2. An end cap according to claim 1, wherein the end cap (40) defines a circumferential outer edge (48), the circumferential attachment region (44) being generally annular and extending in a radially inwards direction from the circumferential outer edge (48).

3. An end cap according to claim 2, wherein the discontinuity (54) extends across the circumferential attachment region (44), radially inwardly from the circumferential outer edge (48).

4. An end cap according to claim 3, wherein the discontinuity (54) extends radially inwardly across a portion of the annular circumferential attachment region (44).

5. An end cap according to claim 4, wherein the discontinuity (54) extends radially inwardly across between approximately 40% and 60% of the annular circumferential attachment region (44).

6. An end cap according to claim 5, wherein the discontinuity (54) extends radially inwardly across approximately 50% of the annular circumferential attachment region (44).

7. An end cap according to any of the preceding claims, wherein the discontinuity (54) is in the form of a slot (56).

8. An end cap according to any of the preceding claims, wherein the end cap (40) includes a plurality of said discontinuities (56) in the circumferential attachment region (44).

9. An end cap according to claim 8, wherein the discontinuities (56) are circumferentially spaced around the circumferential attachment region (44).

10. An end cap according to claim 9, wherein the discontinuities (56) are circumferentially equispaced.

11. A gas burner (10) including a substantially cylindrical burner wall (16) defining an internal cavity (20) and a substantially circular end cap (40) including a circumferential attachment region (44), wherein the end cap (40) is attached to one end of the burner wall (16) via the circumferential attachment region (44) to close one end of the internal cavity (20), **characterised in that** the end cap (40) includes a discontinuity (54) in the circumferential attachment region.

12. A gas burner according to claim 11, wherein the end cap (40) is as defined in any of claims 2 to 10.

13. A heating appliance including a gas burner (10) according to claim 11 or claim 12.

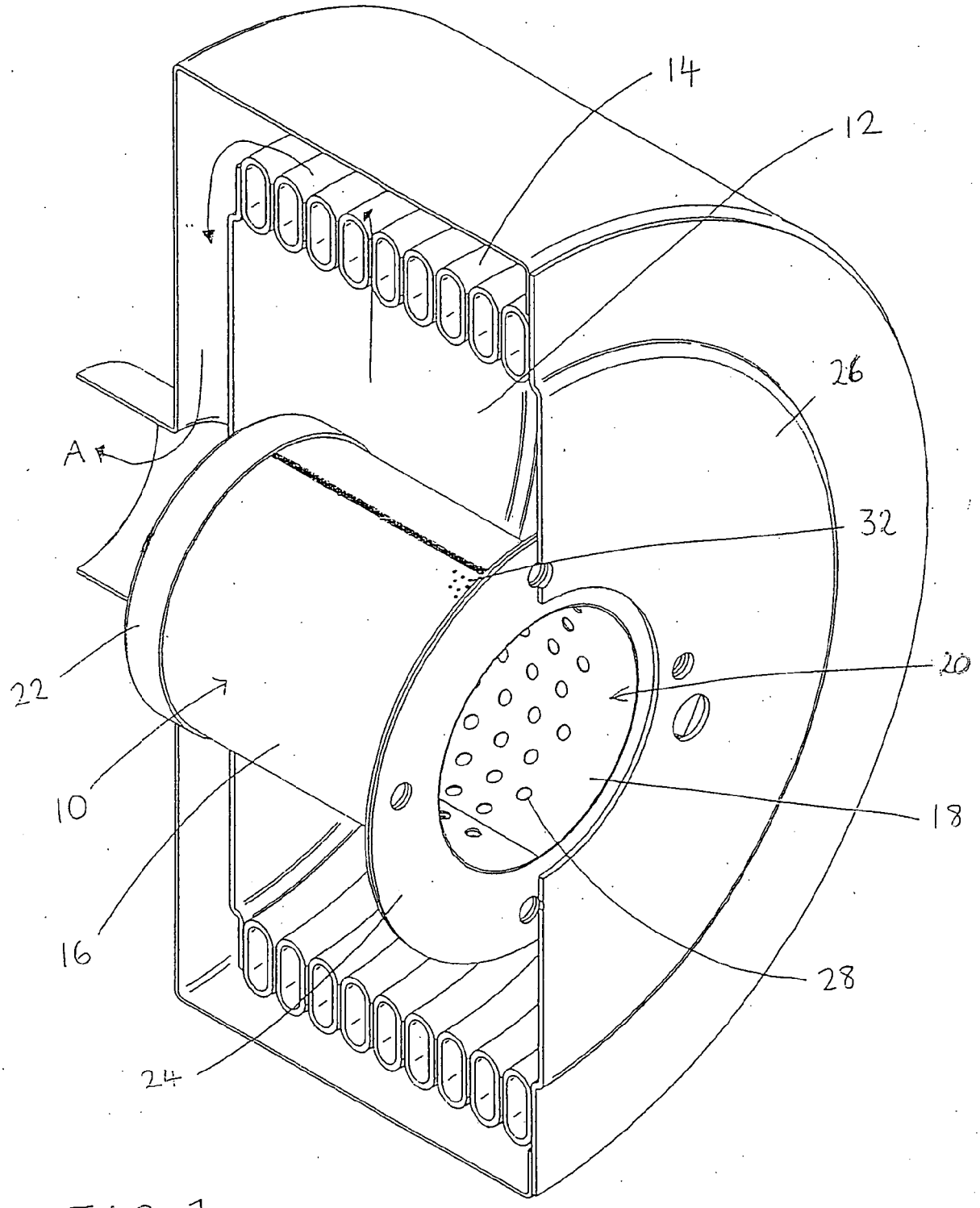

FIG 1

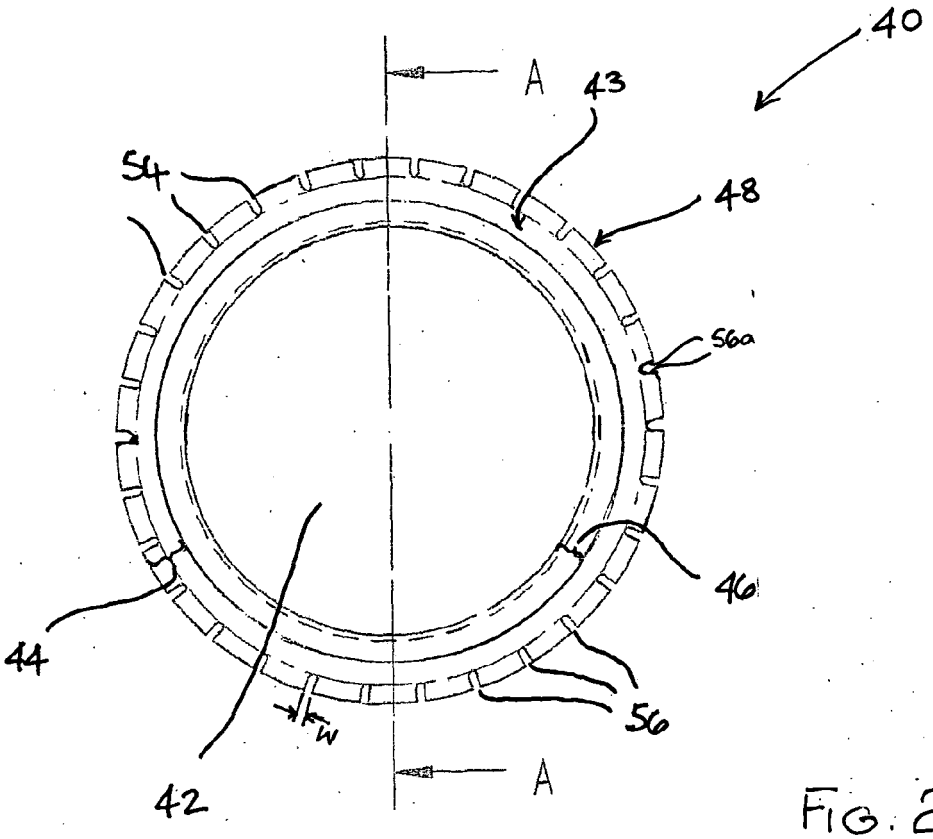

FIG. 2

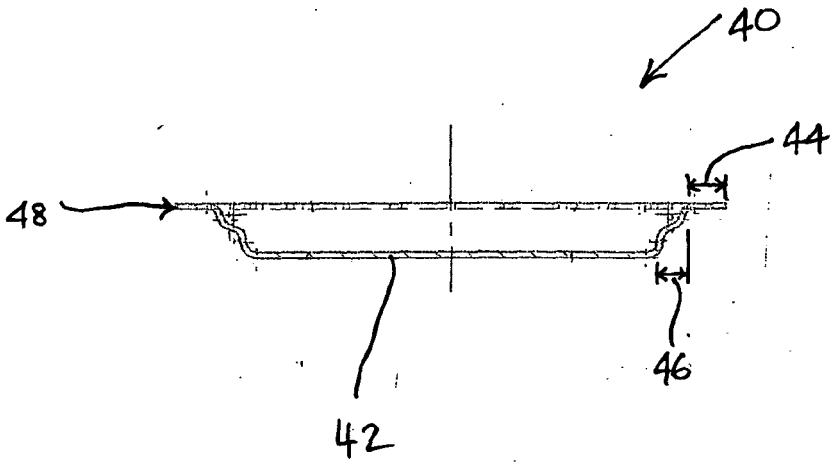

FIG. 3

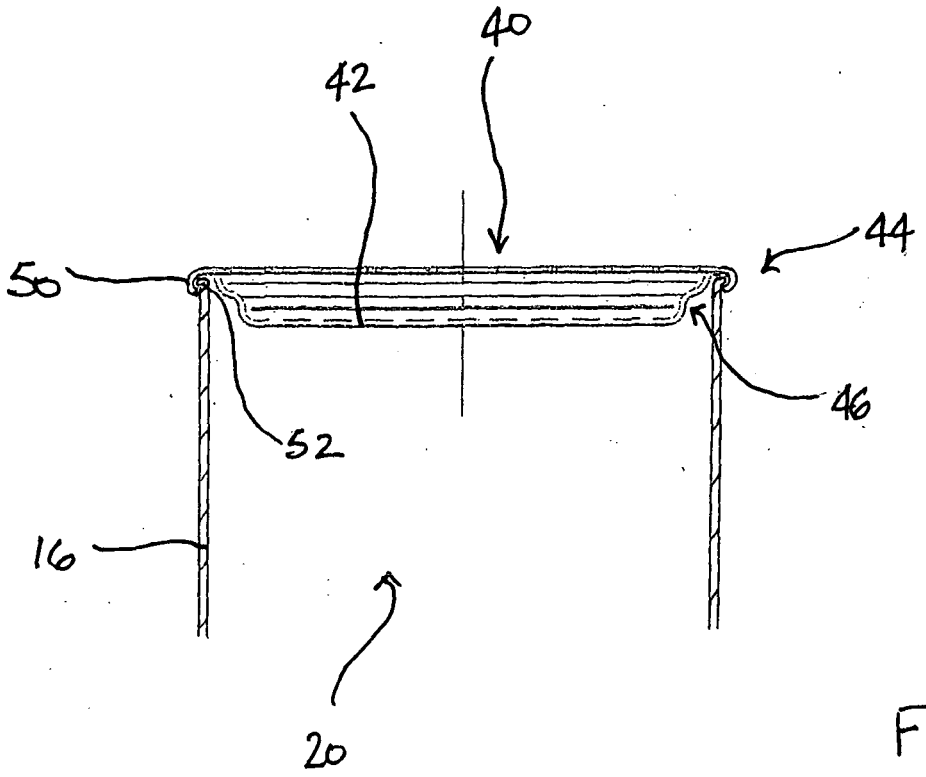

FIG. 4

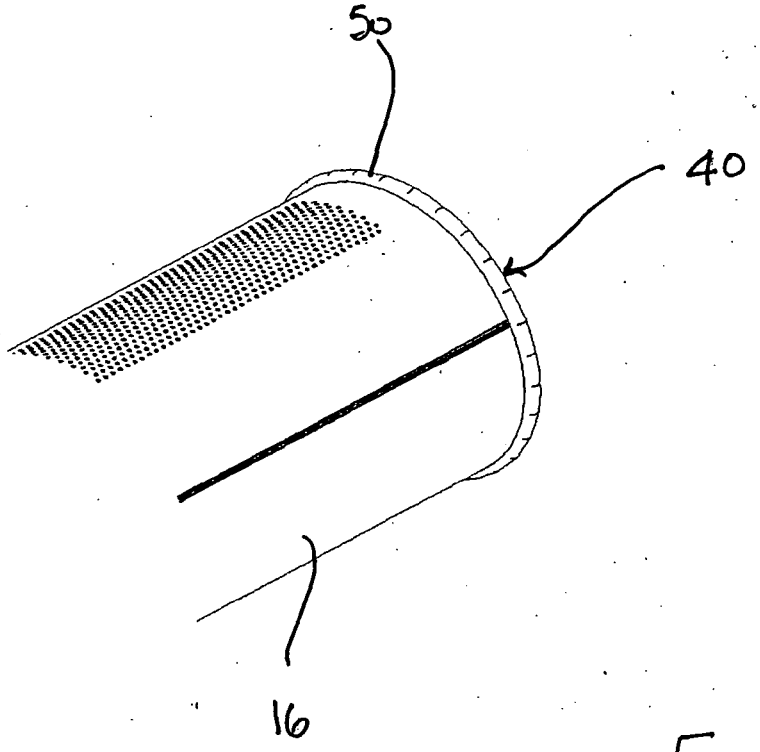

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 06 25 1696

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 September 2006	Coquau, Stéphane

CATEGORY OF CITED DOCUMENTS

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