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(54) **Premixed burner**
Vormischbrenner
Brûleur à prémélange

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Description

[0001] The present invention relates to a premixed burner.

[0002] More in particular, the present invention relates to a premixed burner, typically of cylindrical shape and especially suitable for combustion boilers.

[0003] As is known, premixed burners comprise a header along which a fan conveys the air-gas mixture. Said burners are traditionally provided with an inner liner or distributor, provided with suitable through openings and that lead the mixture to the burner surface; the latter is also provided with multiple holes or slits having much smaller size than that of the header to prevent backfires. While this known solution is functional, it shows some considerable drawbacks.

[0004] In the first place, the need of using an inner liner for distributing and delivering the air-gas mixture to the burner implies a considerable cost, both for making the burner itself and for the relative perforations and for assembling the same to the burner body.

[0005] Moreover, the inner liner or distributor causes considerable unevenness of temperature on the burner surface; this is due to the fact that the mixture that flows from the inner distributor holes directly impinges the outer body, cooling it in correspondingly localised zones and thereby creating thermal gradients with consequent cyclical endurance stress, caused by the same boiler cycle. Due to the high temperatures reached, even higher than 700°C, microfissures may occur on the burner surface that over time, cause real and extended breakage; in these cases, the burner must be replaced in full, as it cannot be repaired anymore, but there is also a concrete risk of explosion due to backfire.

[0006] Document EP1840460 A1 discloses a premixed burner according to the preamble of claim 1.

[0007] EP 1813864 discloses a burner with a double-wall diffuser. The diffuser comprises a plate-like body with two opposite diffusion surfaces facing the outside of the formed plate-like body, with the upstream end of the diffuser closed by a further diffuser with openings peripherally located to admit the mixture between the diffusion surfaces.

[0008] The object of this invention is to obviate the drawbacks mentioned hereinabove.

[0009] More in particular, the object of this invention is to provide a premixed burner which should not require setting up and coupling an inner distributor of the air-gas mixture to the burner itself.

[0010] A further object of the invention is to provide a premixed burner the surface whereof should show a substantial temperature evenness in operation, preventing or at least reducing in a substantial manner the risk of formation of microfissures and backfires.

[0011] A further object of the invention is to provide the users with a premixed burner suitable for ensuring high level of resistance and reliability over time, also such as to be easily and inexpensively constructed.

[0012] < EP 1 813 864 discloses a burner with a double-wall diffuser. The diffuser comprises a plate-like body with two opposite diffusion surfaces facing the outside of the so formed plate-like body, such as to allow a combustion to take place on two

These and other objects are attained by a premixed burner according to claim 1.

[0013] The construction and functional features of the premixed burner of the present invention shall be better understood from the following detailed description, wherein reference is made to the annexed drawing tables showing a preferred and non-limiting embodiment thereof, wherein:

- figure 1 shows a schematic exploded perspective view of the premixed burner of this invention;
- figure 2 shows a schematic perspective view of the same burner assembled in the various components thereof;
- figure 3 shows a schematic perspective view of a half part of the same burner;
- figures 4 and 5 show a schematic perspective view of further embodiments referred to the shape of the through openings or holes of distribution head of the same burner.

[0014] With reference to the above figures, the premixed burner of the present invention, globally indicated with 10 at figure 2 and by way of an example with cylindrical or optionally truncated-cone shape, comprises a tubular body 12, generally of steel, closed on a head by a welded or crimped plate 24. The side surface of the tubular body 12 is provided with a plurality of small through openings or slits and holes of any shape, indicated with 14; by way of an example, said holes and slits are only represented on limited parts of body 12, it being understood that they may be made along the entire side surface of said body according to any configuration and/or size. According to the invention, the head of the tubular body 12 opposite plate 24 is closed by at least one disk 16 provided with flange 18 with circumferential lowering 18' for coupling with the inlet indicated with 20; disk 16 is made in a single body with flange 18 and is provided with a plurality of holes 22, having by way of an example a circular shape and even diameter.

[0015] Said holes 22, which extend almost by the entire surface of disk 16, in any case may have any diameter or shape and optionally be made in groups with different diameters and/or shapes, also distributed randomly on said surface of disk 16. Diameter, shape and distribution of holes 22 along disk 16 are, in the practice, defined upon the system calibration and vary according to the different types of burners, since such calibration is specifically intended for optimising the efficiency thereof.

[0016] According to this advantageous embodiment, disk 16 with holes 22 replaces the traditional inner distributor; flange 18 is coupled in a known manner to the conventional header that feeds the air-gas mixture and

the latter, as a consequence, enters frontally rather than circumferentially, into body 12 constituting the burner. In the practice, disk 16 defines the distribution head of burner 10, thus making the inner distributor unnecessary. Experimental tests carried out by the applicant have enabled checking that the burner according to this invention ensures the same levels of efficiency of the known solutions that envisage the use of the inner distributor, with the further advantage of preventing lack of homogeneity in the heat distribution on the tubular body 12. A solution of this type is also suitable for burners of the combustion type on fabric, wherein the side surface is covered by a metal or ceramic fabric layer. Disk 16 with flange 18 is constrained by welding or crimping to the tubular body 12 and preferably has a planar development; it is also to be provided for said disk to have non-planar configuration, for example concave or convex according to specific requirements. Moreover, it is possible to provide for the distribution head of burner 10 to be composed of two disks 16, suitably spaced from one another, respectively provided with holes, slots or through openings of different shape and/or extension, or for disk 16 to be spaced from flange 18 for creating one or more circumferentially open zones for the passage of mixture. Further embodiments of disk 16, as detailed above, can be referred to the through openings or holes 22; with regard to such aspect, figures 4 and 5, show respectively a solution in which the openings 22 are bounded by an embossed collar 26 and in which the same through openings or holes 22 are obtained by partial cutting and folding of portion of disk 16, to form embossed tongues developing towards the inner part of the tubular body 12 and are alternated to the same openings 22.

[0017] As can be noticed from the above, the advantages achieved by the invention are clear.

[0018] In the premixed burner of this invention, disk 16 with holes 22 that closes one of the heads of the tubular body 12 integrally and effectively replaces the inner distributor used on the conventional burners, with clear advantages in terms of production and assembly cost saving.

[0019] The absence of the inner distributor, moreover, prevents the localised overheating of zones of the tubular body 12 along which the flame develops, preventing the onset of breakage phenomena and above all, excluding the risk of dangerous backfires.

[0020] Even if the invention has been described hereinbefore with particular reference to an embodiment thereof made by way of a non-limiting example, several changes and variations will appear clearly to a man skilled in the art in the light of the above description. This invention therefore is intended to include any changes and variations thereof falling within the scope of protection of the following claims.

Claims

1. A premixed burner (10), especially for condensation boilers, comprising:

a tubular body (12), the side surface of which is provided with a plurality of holes and slits (14), the tubular body (12) having one head constituting an inlet (20),
and at least one disk (16), fixed to said head of said tubular body (12) and constituting the distribution head of the air-gas mixture into the same body (12),
wherein the at least one disk (16) is provided with through openings or holes (22)
and said tubular body (12) is closed on the other head by a plate (24), said plate (24) being welded or crimped along the said side surface of the tubular body (12),
wherein the disk (16) with holes (22) which closes one of the ends of the tubular body (12) is provided with a flange (18) with circumferential lowering (18') for coupling with the inlet (20) of the tubular body (12) opposite the head closed by said plate (24),

characterized in that

the premixed burner (10) does not comprise an internal distributor for distributing the air-gas mixture into the burner (10), the disk (16) with holes (22) performing the function of the internal distributor for distributing the air-gas mixture,
and
the at least one disk (16) is made integrally with the flange (18).

2. The premixed burner according to claim 1, **characterized in that** said holes (22) extend almost by the entire surface of said disk (16).
3. The premixed burner according to claim 1, **characterized in that** the through openings or holes (22) are bounded by an embossed collar (26) oriented towards the inner part of the tubular body (12).
4. The premixed burner according to claim 1, **characterized in that** the through openings or holes (22) are obtained by partial cutting and folding of portion of disk (16) to form embossed tongues developing towards the inner part of the tubular body (12) and are alternated to the same openings (22).
5. The premixed burner according to claim 4, **characterized in that** the disk (16) with the flange (18) is constrained by welding and/or crimping to the head of the tubular body (12).

6. The premixed burner according to claim 5, **characterized in that** the disk (16) has a non planar development.
7. The premixed burner according to one or more of the previous claims, **characterized in that** the through openings or holes (22) have heterogeneous diameter or surface.
8. The premixed burner according to claim 7, **characterized in that** said through openings or holes (22) are made on two disks (16) spaced from one another.

Patentansprüche

1. Vormischbrenner (10), insbesondere für Brennwertkessel, umfassend:

einen rohrförmigen Körper (12), dessen Seitenfläche mit mehreren Löchern und Schlitz (14) versehen ist, wobei der rohrförmige Körper (12) einen Kopf aufweist, der einen Einlass (20) bildet,

und zumindest eine Scheibe (16), die an dem Kopf des rohrförmigen Körpers (12) befestigt ist und den Verteilerkopf zum Verteilen des Luft-Gasgemisches in den Körper (12) hinein bildet, wobei die mindestens eine Scheibe (16) mit Durchgangsöffnungen oder Löchern (22) versehen ist und der rohrförmige Körper (12) auf dem anderen Kopf durch eine Platte (24) geschlossen ist, wobei die Platte (24) entlang der Seitenfläche des rohrförmigen Körpers (12) geschweißt oder gefalzt ist,

wobei die Scheibe (16) (16) mit Löchern (22), welche eines der Enden des rohrförmigen Körpers (12) schließt, mit einem Flansch (18) mit umlaufender Absenkung (18') zur Kopplung mit dem gegenüber dem durch die Platte (24) verschlossenen Kopf angeordneten Einlass (20) des rohrförmigen Körpers (12) versehen ist,

dadurch gekennzeichnet, dass

der Vormischbrenner (10) keinen inneren Verteiler zur Verteilung des Luft-Gas-Gemisches in den Brenner (10) hinein umfasst, wobei die Scheibe (16) mit Löchern (22) die Funktion des internen Luft-Gasgemisch-Verteilers zur Verteilung des Luft-Gas-Gemisches ausführt, und

die mindestens eine Scheibe (16) einstückig mit dem Flansch (18) ausgebildet ist.

2. Vormischbrenner nach Anspruch 1, **dadurch gekennzeichnet, dass** die Löcher (22) sich fast über die gesamte Oberfläche der Scheibe (16) erstrecken.

3. Vormischbrenner nach Anspruch 1, **dadurch gekennzeichnet, dass** die Durchgangsöffnungen oder Löcher (22) durch einen geprägten Kragen (26) gebunden sind, der sich zum inneren Teil des rohrförmigen Körpers (12) hin erstreckt.

4. Vormischbrenner nach Anspruch 1, **dadurch gekennzeichnet, dass** die Durchgangsöffnungen oder Löcher (22) durch teilweises Schneiden und Falten eines Abschnitts der Scheibe (16) erhalten sind, um geprägte Zungen auszubilden, die sich zum inneren Teil des rohrförmigen Körpers (12) hin entwickeln und sich mit den Öffnungen (22) abwechseln.

5. Vormischbrenner nach Anspruch 4, **dadurch gekennzeichnet, dass** die Scheibe (16) mit dem Flansch (18) durch Schweißen und/oder Falzen an dem Kopf des rohrförmigen Körpers (12) gehalten ist.

6. Vormischbrenner nach Anspruch 5, **dadurch gekennzeichnet, dass** die Scheibe (16) eine nicht-planare Entwicklung aufweist.

7. Vormischbrenner nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Durchgangsöffnungen oder Löcher (22) heterogene Durchmesser oder Oberflächen aufweisen.

8. Vormischbrenner nach Anspruch 7, **dadurch gekennzeichnet, dass** die Durchgangsöffnungen oder Löcher (22) auf zwei Scheiben (16) hergestellt sind, die voneinander beabstandet sind.

Revendications

1. Brûleur à prémélange (10), spécialement pour chaudières à condensation, comprenant :

un corps tubulaire (12), dont la surface latérale est dotée d'une pluralité de trous et de fentes (14), le corps tubulaire (12) comportant une tête constituant une entrée (20),

et au moins un disque (16), fixé à ladite tête dudit corps tubulaire (12) et constituant la tête de distribution du mélange air-gaz dans le même corps (12), l'au moins un disque (16) étant doté de trous passants ou perforations (22)

et ledit corps tubulaire (12) étant fermé sur l'autre tête par une plaque (24), ladite plaque (24) étant soudée ou sertie le long de ladite surface latérale du corps tubulaire (12),

le disque (16) à perforations (22) qui ferme l'une des extrémités du corps tubulaires (12) étant doté d'une collerette (18) présentant un abais-

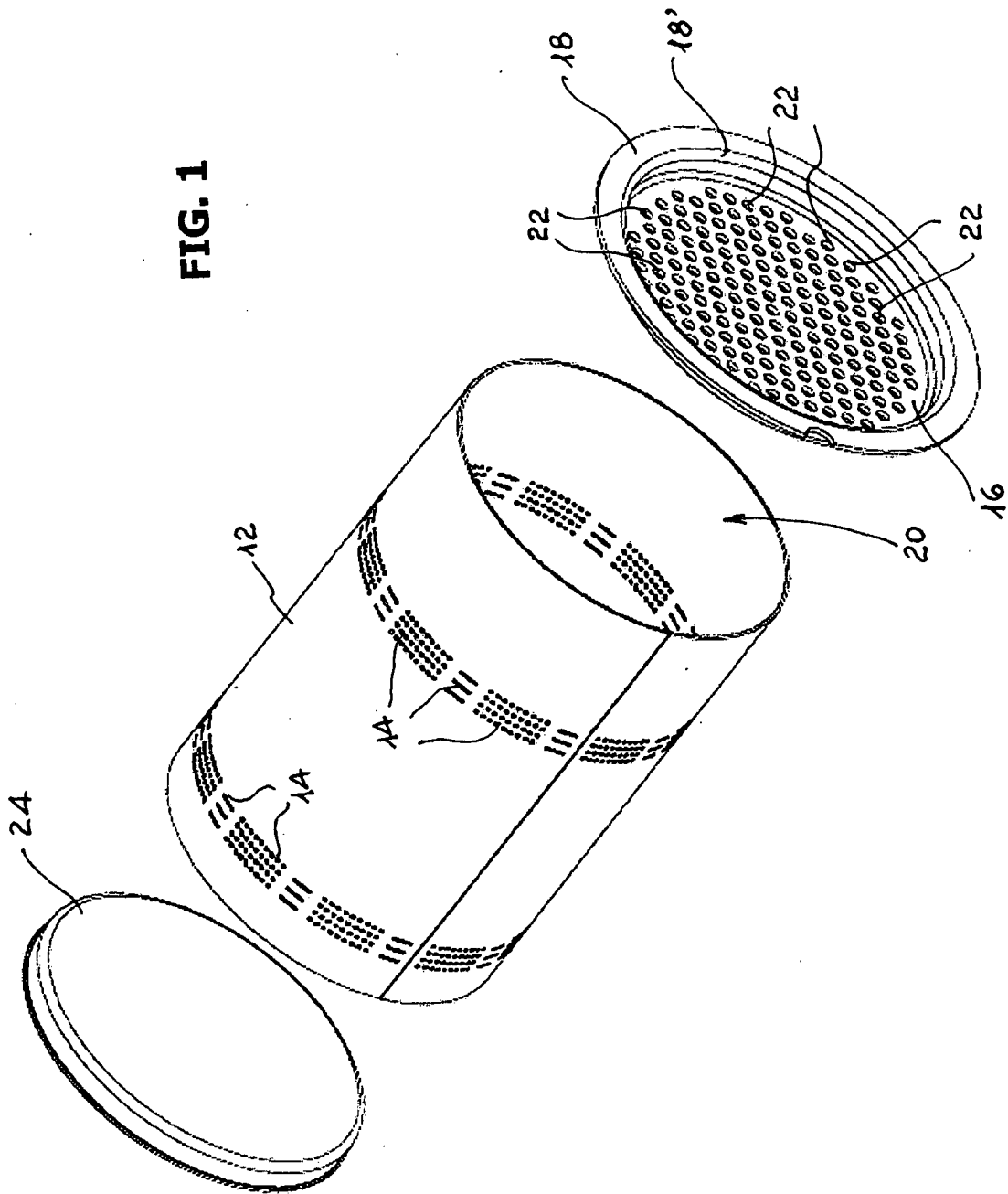
sement circonférentiel (18') pour l'accouplement avec l'entrée (20) du corps tubulaire (12) en face de la tête fermée par ladite plaque (24),
caractérisé en ce que

le brûleur à prémélange (10) ne comprend pas un distributeur interne pour distribuer le mélange air-gaz dans le brûleur (10), le disque (16) à perforations (22) réalisant la fonction du distributeur interne pour distribuer le mélange air-gaz,
 et
 l'au moins un disque (16) est fait d'une seule pièce avec la collerette (18).

2. Brûleur à prémélange selon la revendication 1, **caractérisé en ce que** lesdites perforations (22) s'étendent presque sur toute la surface dudit disque (16). 5
3. Brûleur à prémélange selon la revendication 1, **caractérisé en ce que** les trous passants ou perforations (22) sont délimités par un collet estampé (26) orienté vers la partie interne du corps tubulaire (12). 20
4. Brûleur à prémélange selon la revendication 1, **caractérisé en ce que** les trous passants ou perforations (22) sont obtenus par découpe partielle et pliage d'une portion de disque (16) pour former des languettes estampées se développant vers la partie interne du corps tubulaire (12) et alternées avec les mêmes trous (22). 25
30
5. Brûleur à prémélange selon la revendication 4, **caractérisé en ce que** le disque (16) avec la collerette (18) est contraint par soudure et/ou sertissage à la tête du corps tubulaire (12). 35
6. Brûleur à prémélange selon la revendication 5, **caractérisé en ce que** le disque (16) a un développement non planaire. 40
7. Brûleur à prémélange selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** les trous passants ou perforations (22) ont un diamètre ou une surface hétérogène. 45
8. Brûleur à prémélange selon la revendication 7, **caractérisé en ce que** les trous passants ou perforations (22) sont pratiqués sur deux disques (16) espacés l'un de l'autre. 50

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FIG. 1



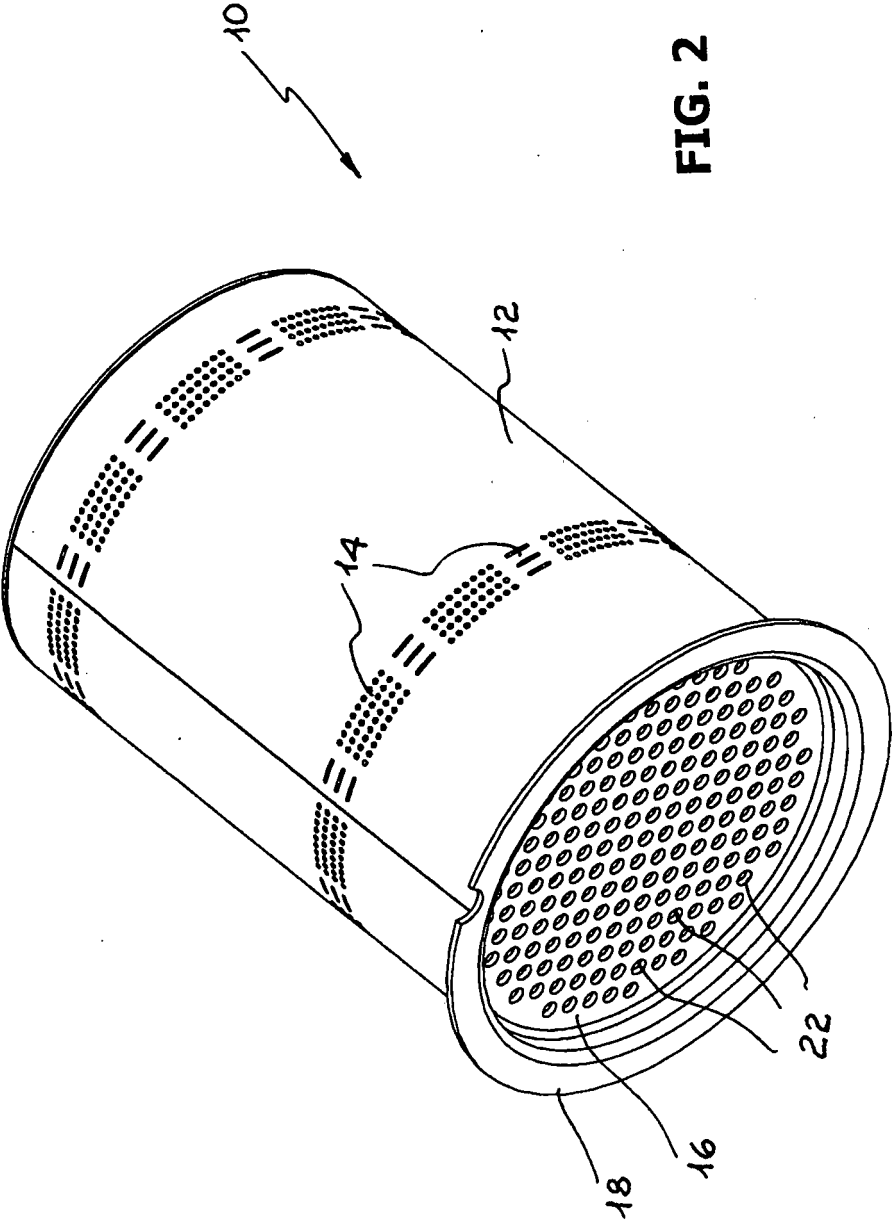
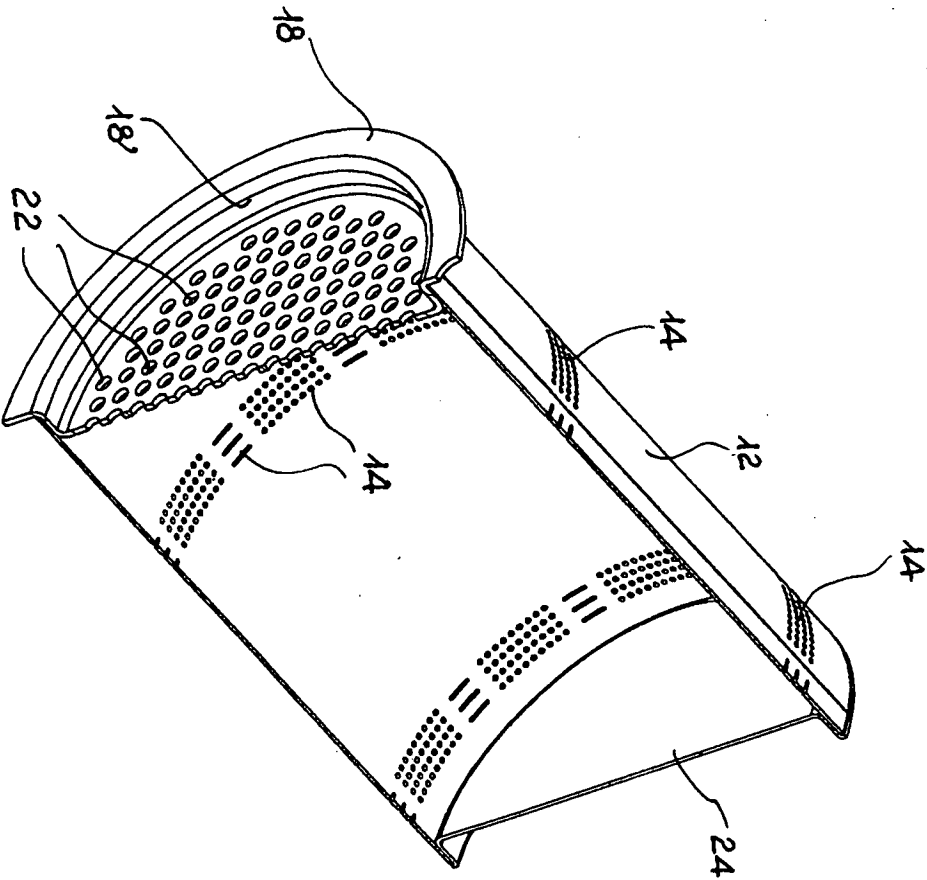


FIG. 3



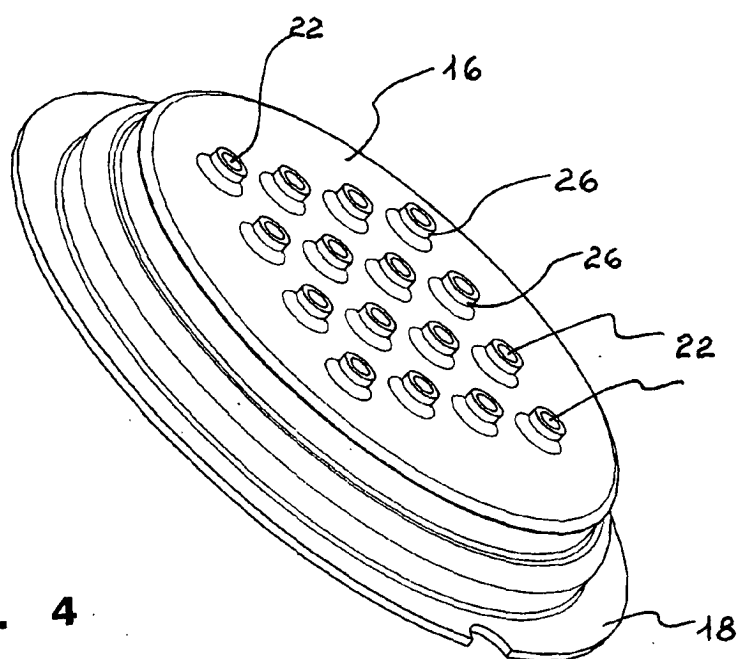


FIG. 4

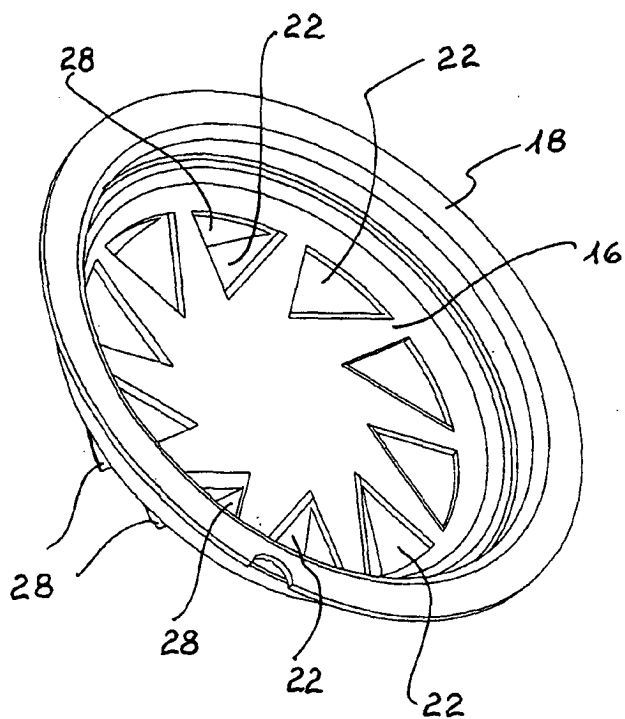


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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