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(71) Applicant: **Polidoro S.p.A.**
36015 Schio VI (IT)

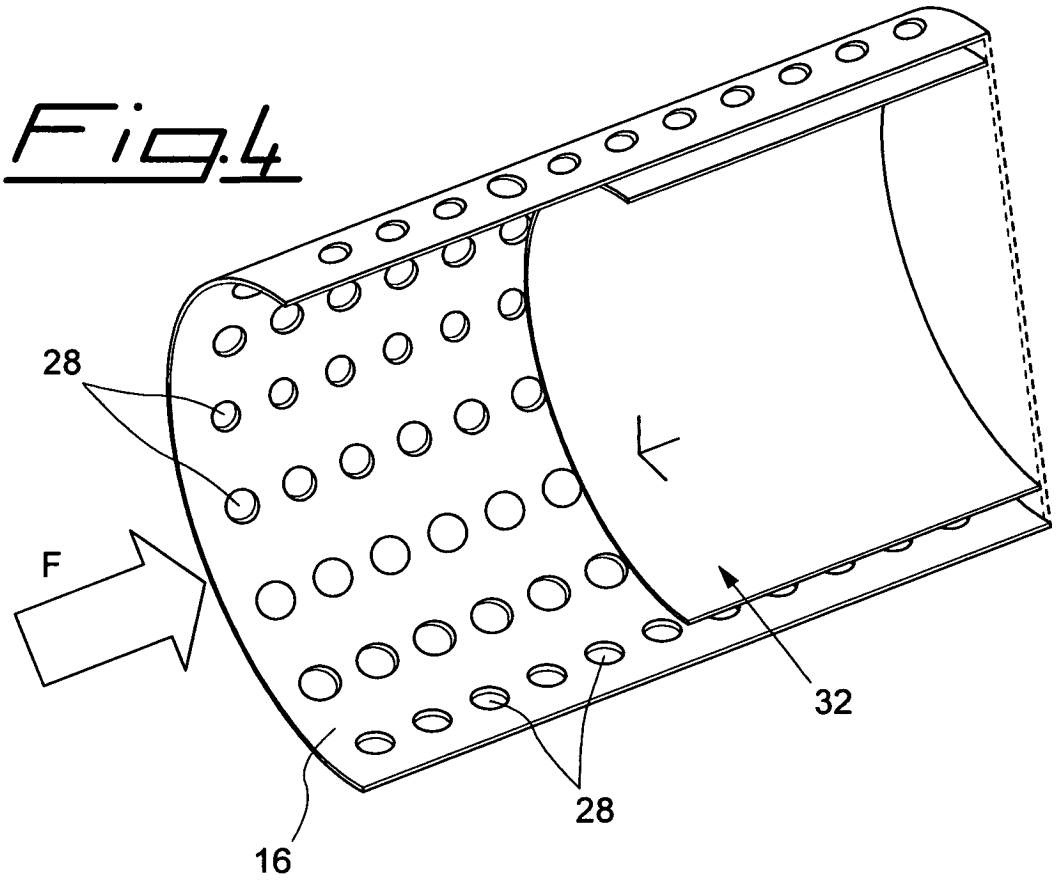
(72) Inventors:
- **Peserico, Domenico**
  36078 Valdagno (Vicenza) (IT)
- **Scribano, Gianfranco**
  20090 Settala (Milano) (IT)

(74) Representative: **Lecce, Giovanni**
Studio Nord Brevetti,
Via Verdi, 14
24121 Bergamo (IT)

(54) **Differentiated distributor, suitable for premixed gas burners**

(57) A differentiated distributor, especially suitable for premixed gas burners (10) equipped with a supply collector (12) and with a combustion head (18) housed in a container body (20) forming the combustion chamber with a flue (22), comprising a tubular body (16) provided with means (28-30) and/or (32) or (34) forming, along said body, at least two zones or sections having different load losses.

Fig.4



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Description

[0001] The present invention relates to a differentiated distributor, especially suitable for premixed gas burners.

[0002] More in particular, the present invention relates to a differentiated distributor having different sections or areas for the passage of air-gas fuel mixtures or having different load loss zones.

[0003] It is known that, currently, in the construction of new boilers, there is a growing need to increase the performance in yield terms, and to reduce the size of the boiler at the same time. For this reason compact combustion apparatus have been designed and constructed with sealed combustion chambers. With particular reference to premixed gas burners however, considerable drawbacks have arisen with these new solutions, especially in relation to the presence of noise and resonance under different operating conditions, as well as difficulties with ignition in particular situations.

[0004] These drawbacks are due to fluidodynamic effects that occur in the boiler system and which, for premixed gas burners, are related to the reduced size and the pressurised combustion chamber. In said chamber, operating conditions are also linked with the methods for evacuating fumes and for supplying the mixture.

[0005] During the combustion process two types of slight oscillation occur causing noise. In fact there are mixture oscillations of both the total delivery and the air-gas ratio, due to the type of supply, which also influence the heat release; other fluctuations consist of pressure oscillation inside the combustion chamber, linked with the combustion itself, the type of combustion chamber and with the fume evacuation.

[0006] When the heat release and pressure oscillations are in phase, there is an increase in noise levels.

[0007] In an attempt to obviate these drawbacks a solution was provided which foresees the use of a converging or Venturi pipe, positioned inside the burner and upstream of the internal distributor.

[0008] Such solution does solve, or at least substantially reduce the problems linked with noise levels and ignition difficulty to a large extent, since two zones having different mixture passage speeds on the burner head are created, and therefore the oscillations have different stages and intensity. When two flame zones are present with non-simultaneous oscillations, the noise is eliminated or, at least, considerably reduced. Ignition is also improved because the flame is stabilised on the combustion head along the low speed zone. However, the use of a converging pipe does provoke drawbacks that cannot be ignored.

[0009] Firstly, the need to use said converging pipe means that this must be manufactured specifically, thus causing extra cost, which leads to a considerable increase in the total price of the burner; furthermore, the installation of the converging pipe involves more complex burner construction and maintenance.

[0010] Object of the present invention is to solve the drawbacks described above.

[0011] More precisely, the object of the present invention is to provide a differentiated distributor, especially for premixed gas burners, and suitable for preventing noise and rumbling under different operating conditions.

[0012] A further object of the invention is to provide a differentiated distributor to allow optimal and constant ignition of the mixture in all operating conditions.

[0013] By no means the last object of the invention is to provide a differentiated distributor that does not require the use of additional components such as converging pipes to eliminate noise and to optimise mixture ignition.

[0014] A further object of the invention is to provide users with a differentiated distributor, especially for premixed gas burners, suitable for guaranteeing high resistance and reliability levels for a long time and in a manner which is easy and economical to construct.

[0015] These and other objects are achieved by a differentiated distributor according to the present invention that is especially suitable for premixed type gas burners equipped with a supply collector and with a combustion head housed in a container body forming the combustion chamber with flue, basically characterised in that it comprises a tubular body provided with means forming different load loss zones or sections along the said body.

[0016] The constructive and functional features of the differentiated distributor of the present invention will be better understood from the following detailed description, wherein reference is made to the appended drawings, which illustrate a non-limiting preferred embodiment wherein:

figure 1 shows a schematic enlarged view in perspective of a pre-mix burner equipped with a differentiated distributor according to the present invention;

figure 2 shows a schematic view in perspective of the differentiated distributor according to the present invention;

figure 3 shows a schematic side view of the same distributor;

figure 4 shows a partial schematic view in perspective of the differentiated distributor according to the present invention in an alternative embodiment;

figure 5 shows a partial schematic perspective view of the differentiated distributor according to the present invention according to a further possible embodiment.

[0017] With reference to the aforesaid figures, the differentiated distributor of the present invention is integrated with a gas burner, typically a premixed type gas burner, identified throughout by the numeral 10 shown in figure 1.

[0018] Said burner comprises a collector 12 with the opening set at the base 14 for the supply of the fuel mixture, a distributor 16 and a combustion head 18 housed in a container body 20, provided with a flue 22, which

defines the combustion chamber together with the relative heat exchanger (not illustrated).

[0019] The upper end opposite the base 14 of the collector 12 comprises an outlet 24 for the mixture which is conveyed into the distributor 16, partially inserted into the combustion head 18 having a circular section, provided as an example.

[0020] According to the invention, the distributor 16, advantageously produced in metal such as stainless steel, and preferably having a circular section similar to the combustion head 18, consists of a tubular body equipped with means suitable for creating different load loss zones or sections by means of pass-though openings of differing sizes for the fuel mixture. The arrow "F" in figures 2, 4 and 5, indicates the inlet zone for the fuel into the distributor 16.

[0021] In the embodiment provided as an example shown in figures 2 and 3, said means suitable for creating different load loss zones consist of a plurality of through-holes or openings having different diameters and/or distance spacing, positioned along the total surface, or a part thereof, of the tubular body forming the distributor 16. Figure 2 shows a schematic example of said tubular body, whose surface is provided with a plurality of holes 28 and 30 having different diameters from one another, positioned respectively along two zones of the side surface of the distributor 16, practically equal in length. In addition, the holes 30 having a larger diameter, are also positioned at a larger distance from one another, at least in the longitudinal direction relative to the holes 28 having a smaller diameter; figure 3 schematically shows this embodiment, wherein the holes 28 are set at a distance from one another with a constant step "P", while the holes 30 are set at a distance from one another having a constant step "P_1". Holes 28 or 30 can however be positioned at any step whatsoever, also in the direction of the circumference around the distributor 16.

[0022] It should also be understood that the holes 28 and 30 having different diameters from one another, could be positioned at the same distance from each other along the total side surface, or part thereof, of the distributor 16. In any position whatsoever, since the holes 28 and 30 are different from one another in both diameter and/or distance, they create at least two distinct zones with different passage areas for the mixture and therefore also with differing load loss. Furthermore, the zones with differing load loss can also be more than two in number, according to type and/or dimension and/or the distance between the holes positioned along different zones of the distributor 16.

[0023] Figures 4 and 5 show schematic views of alternative embodiments of the distributor 16, however, having the same object to provide thereon, at least two distinct zones with different passage areas for the mixture and therefore also with differing load loss.

[0024] In these embodiments, the tubular body forming the distributor 16 is, as an example, provided with a plurality of holes 28 along the total side surface having the same diameter and the same distance between one another, but on the internal side surface of the same distributor 16, an element is attached which acts to form a throttle in the mixture passage. Said throttle or deflector element is identified by numeral 32 in figure 4 and comprises a sleeve having a diameter which is narrower than that of distributor 16, inside which it is inserted and fixed using conventional means such as metal distancers, welded, drawn or by means of interference fit. The deflector 32 presents a longitudinal extension which is shorter than the distributor 16; for example, the deflector 32 presents a longitudinal extension equal to approximately half of the tubular body forming the distributor 16, inside which it is fixed in such a manner that one of its ends is aligned with the end of the said distributor.

[0025] Figure 5 shows a variant embodiment of the deflector 32, which, in this case, is composed of an annular element identified by numeral 34. Said annular element, having a limited height, for example between 0.5 and 20 mm, is fixed by welding or some equivalent means to the internal side surface of the distributor 16, in a position that is practically central in relation to the overall longitudinal development.

[0026] Both in the case of the use of the deflector 32 as well as the use of the annular element 34, at least two distinct zones having different load loss are created along the distributor 16. Considering the aforesaid, the advantages gained by the invention are clear.

[0027] In the various alternatives described herein, with holes 28, 30 having a different diameter and/or distance and with defectors 32 or 34, the different load loss zones created in the distributor 16 eliminate or at least reduce the noise and the rumbling to a large extent during burner operation, and at the same time, they prevent flame oscillation, guaranteeing optimal and constant ignition.

[0028] The aforesaid embodiments, that foresee holes 28, 30 and/or deflectors 32, 34 on the distributor 16 have resulted as being particularly efficient during the tests performed by the Applicant; However this does not exclude the possibility of realising at least part of the aforesaid holes or slots of any form whatsoever on the combustion head 18.

[0029] Although the invention has been disclosed above with particular reference to a certain embodiment, provided exclusively as a non-limiting example, numerous changes and variants will appear clear to those skilled in the art, considering the aforesaid description. Therefore, the present invention intends to include all the changes and variants within the context and ambit of the following claims.

Claims

1. A differentiated distributor especially suitable for premixed gas burners (10), equipped with a supply collector (12) and a combustion head (18) housed

in a container body (20) forming the combustion chamber with flue (22), **characterised in that** it comprises a tubular body (16) equipped with means (28-30) and/or (32) or (34) forming at least two different load loss zones or sections along the said body.

2. Distributor according to claim 1, **characterised in that** said means (28-30) are composed of a plurality of pass-through holes or openings, having different diameters and/or distances from one another, positioned along the side surface or part thereof of said tubular body (16) and forming fuel mixture passage areas having different sizes.

3. Distributor according to the previous claims, **characterised in that** the tubular body (16) presents a circular section and holes (28-30) having different diameters from one another and having any form and/or size whatsoever, positioned along the respective zones of said body.

4. Distributor according to one or more of the previous claims, **characterised in that** said means (32), (34) are composed of mixture passage throttle elements, forming deflectors fixed inside said tubular body (16).

5. Distributor according to one or more of the previous claims, **characterised in that** the deflector (32) is composed of a sleeve having a diameter that is narrower than that of the distributor (16) wherein it is fixed along the internal surface by means of welded or drawn metal distancers, or by means of interference fit, said deflector (32) presenting a longitudinal extension which is shorter than that of the distributor (16).

6. Distributor according to one or more of the previous claims, **characterised in that** the deflector (34) is composed of an annular element having a limited height, fixed to the internal side surface of the distributor (16) through welding or an equivalent means.

7. Distributor according to claim 6, **characterised in that** the deflector (34) is fixed in the central zone of the distributor (16).

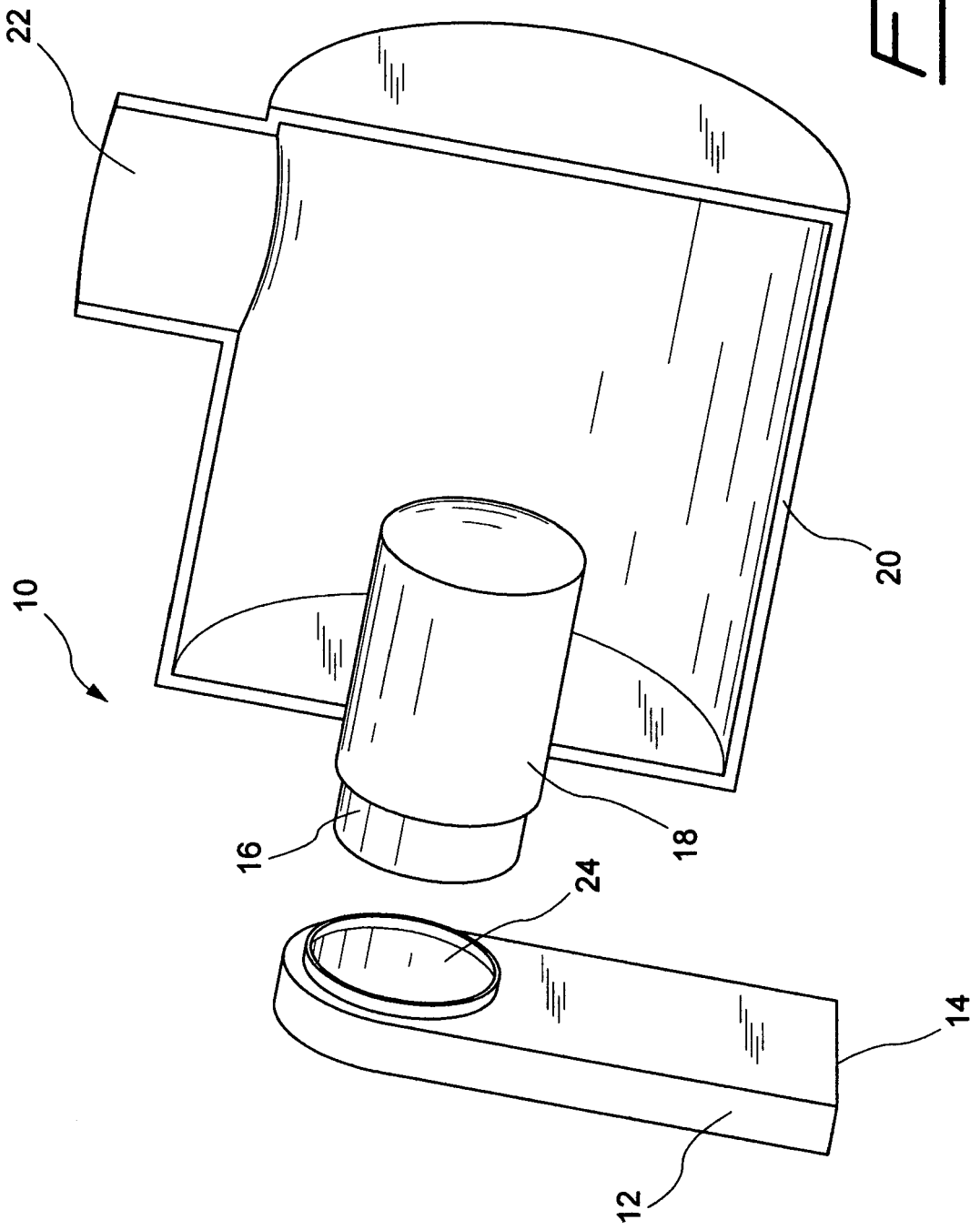

Fig.1

Fig.2

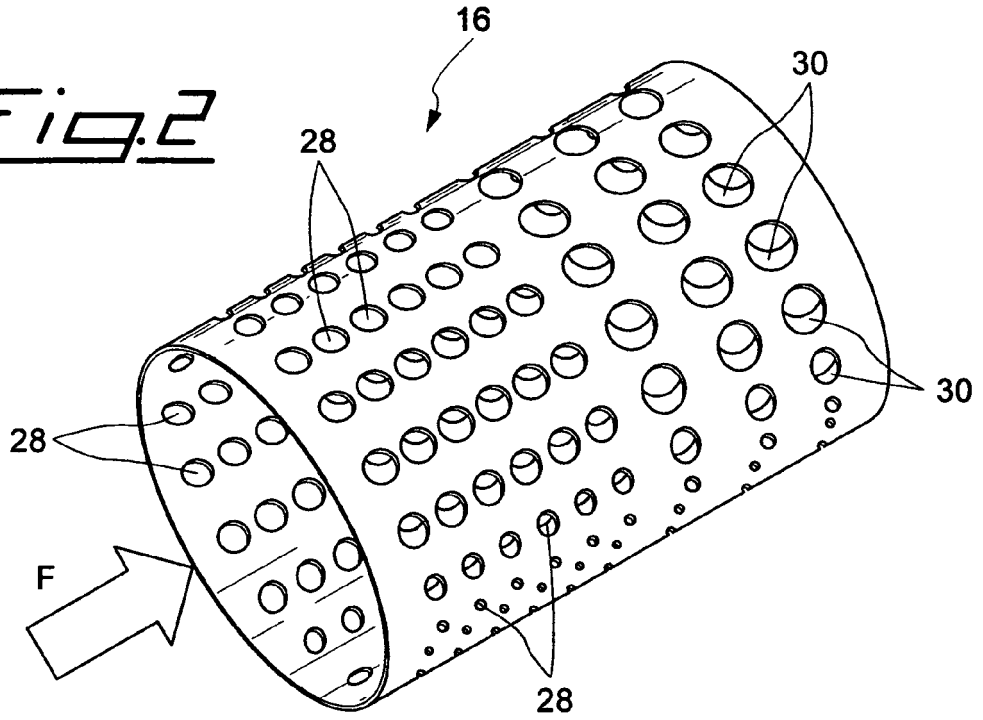

Fig.3

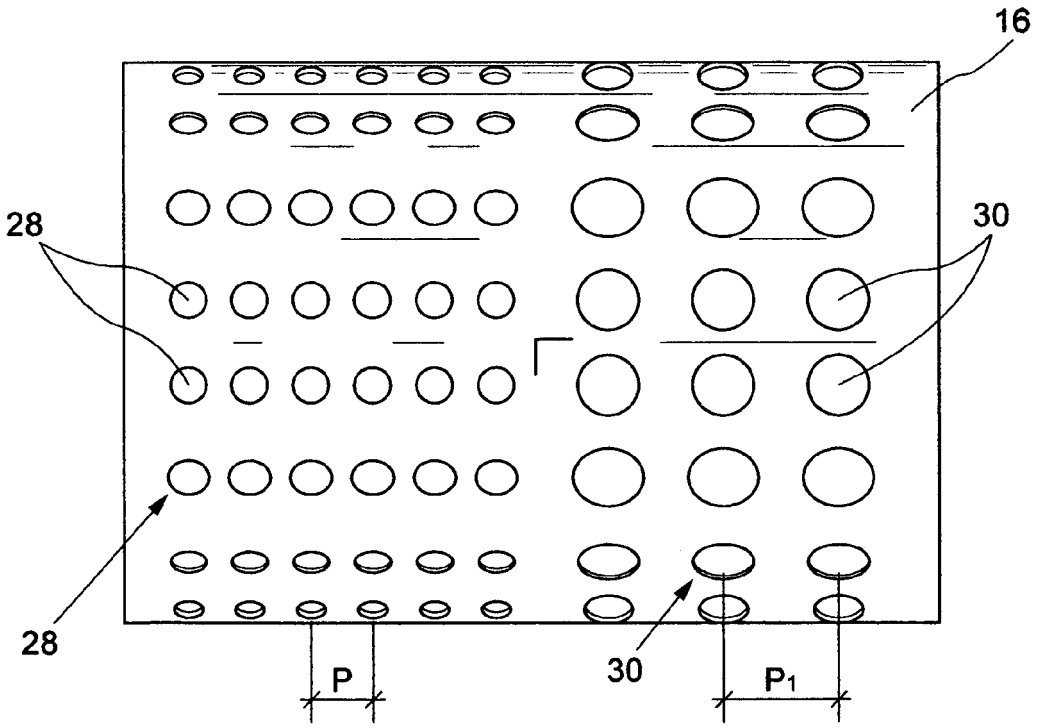

Fig.4

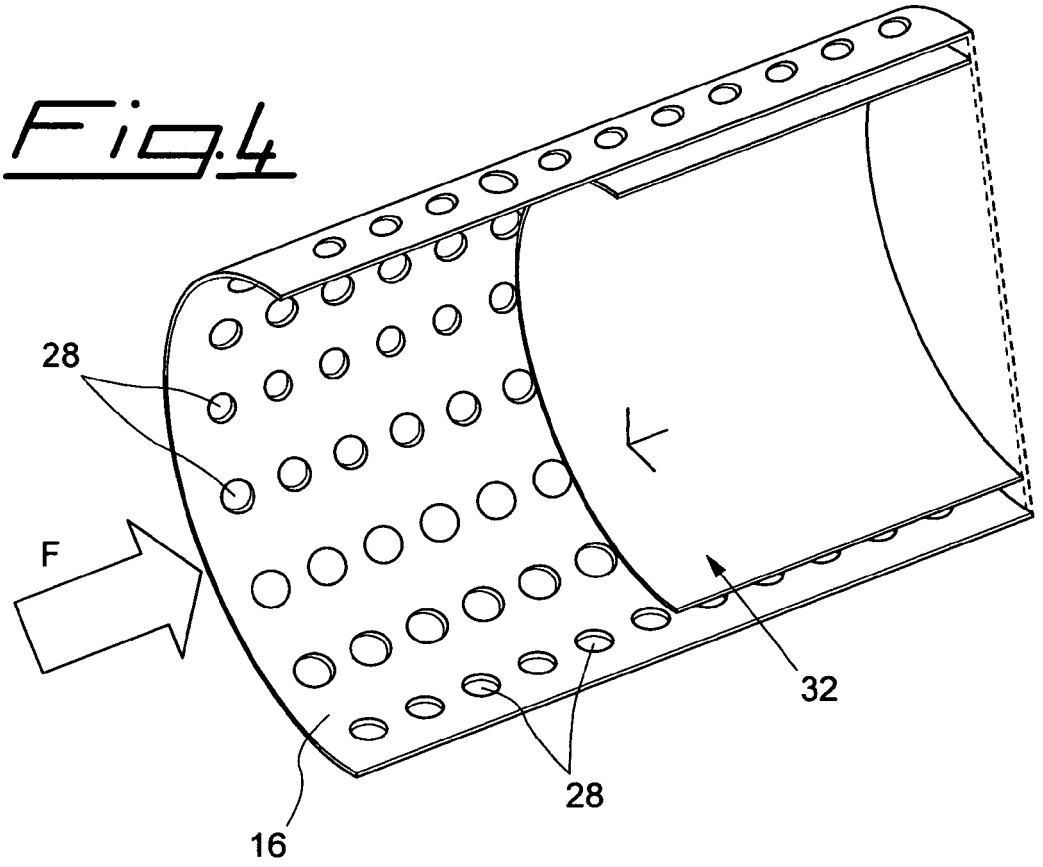

Fig.5