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(71) Applicant: **GASTEC N.V.**
NL-7327 AC Apeldoorn (NL)

(72) Inventors:
• **Visser, Johannes Cornelis**
7322 PM Apeldoorn (NL)

• **Klokman, Marcel**
7322 PS Apeldoorn (NL)

(74) Representative: **Smulders, Theodorus A.H.J., Ir.**
et al
Vereenigde Octrooibureaux
Nieuwe Parklaan 97
2587 BN 's-Gravenhage (NL)

(54) Draught limiting and injection device

(57) A draught limiting and injection device for supplying combustion air to a combustion appliance and discharging combustion gases of the combustion appliance to a discharge device arranged on the outside of a building. The draught limiting and injection device comprises an outer tube (14) for connection to the combustion appliance and the discharge device. The device further comprises an inner tube (20) for connection to the combustion appliance and functioning as injector (24). The inner tube opens into the outer tube, and a wall of the outer tube is provided with a first air supply opening (12) for supplying combustion air to the combustion appliance. The wall of the outer tube is further provided with a second air supply opening (32) for possibly supplying air to the discharge device to limit the draught.

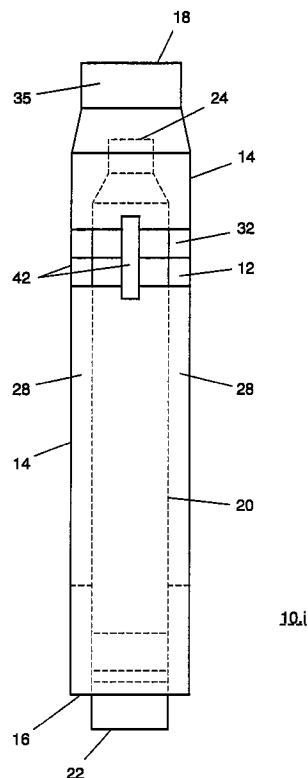


FIG. 2

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Description

This invention relates to a draught limiting and injection device for supplying combustion air to a combustion appliance and discharging combustion gases of the combustion appliance to a discharge device arranged on the outside of a building, based on injection action.

This invention also relates to a system comprising at least one draught limiting and injection device and a discharge device arranged on the outside of a building, with the draught limiting and injection device connected to the discharge device.

One of the purposes of this device is to reduce the large pressure differences that may be present as a result of thermal draught and wind loads.

In the past years, the gas industry has been increasingly confronted with social resistance to facade outlets. This applies in particular to facade outlets in multi-storey buildings. Reasons for such resistance are the nuisance that residents experience on account of the combustion gases and the alleged harmful consequences of combustion gases for one's health. These negative developments for facade appliances were already anticipated a number of years ago. To be able yet to employ closed appliances, there is a need for a universal air supply and combustion gas discharge system to which one or more appliances can be connected on each floor. In this so-called CLV system, the air is passed from the roof to the appliances and the combustion gases enter the atmosphere above the roof. CLV systems have been used on a large scale in the past years.

However, CLV systems occupy relatively much space. In renovation construction, such space is often not present. Applicant has made it its aim to develop a compact shared discharge system which, using bypass systems, has substantially the same properties as the CLV system. Such a system is known, for instance, from Dutch patent application 9500223. This patent relates to both internal and external shared discharge systems. This patent describes a universal shared discharge device for the purpose of multi-storey construction, which discharge device can be arranged on the outside of a building. In this discharge device, the combustion air is individually passed from the facade to the appliances. As a result of thermal draught and wind, large pressure differences can arise across the appliances. As a result, the safety and operational reliability of the appliances are jeopardised and their efficiency decreases. To meet this problem, the above Dutch patent application describes two universal bypass devices for internal and external application, respectively. 'Universal' in this context means that all closed appliances with a fan, with a load of up to 30 kilowatts, can be connected to these bypass devices. In the known device, outside air is supplied to the appliance through a tube which passes through an opening in the wall of a building. The combustion gases are discharged to the

shared discharge device through a second tube, which passes through a second opening through a wall of the building. Further, a non-return valve is present to prevent the above-mentioned backflow of combustion gases. The non-return valve mentioned is located on the inside of the building.

The object of the invention is to further improve the known device and contemplates the provision of a device which does not comprise any moving parts and which moreover can be made of a more compact design than the known system.

Accordingly, the draught limiting and injection device according to the invention is characterized, in accordance with the invention, in that the device comprises an outer tube with a first open end for connection to the combustion appliance and a second open end for connection to the discharge device, and an inner tube with a first open end for connection to the combustion appliance and a second open end which functions as injector, while the inner tube extends within the outer tube, in such a manner that the second open end of the inner tube opens into the outer tube, and further a wall of the outer tube is provided with at least one first air supply opening at a position located between the first and second open end of the inner tube, for supplying combustion air to the combustion appliance through a space formed between the outside of the inner tube and the inside of the outer tube, and the wall of the outer tube is further provided with at least one second air supply opening at a position located between the first and second open end of the inner tube for possibly supplying air to the discharge device to limit the draught.

Owing to the fact that the device according to claim 1 does not comprise any moving parts, its reliability in operation will be optimal. Owing to the fact that moreover the inner and the outer tube are concentrically arranged, the draught limiting and injection device can be passed through a single opening in a wall of a building. This means not only that the device is compact, but also that it can be easily installed in a building. The invention will now be further elucidated with reference to the drawings, in which:

Fig. 1 shows a system consisting of an assembly of a discharge system arranged on the outside of a building and three draught limiting and injection devices which are connected to the discharge system;

Fig. 2 is a transparent side view of a possible embodiment of a draught limiting and injection device according to the invention;

Fig. 3 is a transparent perspective view of the draught limiting and injection device shown in Fig. 2;

Fig. 4 is a transparent view of an alternative embodiment of a draught limiting and injection device according to the invention.

In Fig. 1 reference numeral 1 designates a system

comprising a universal discharge device 2 which is arranged on the outside of a building 4 for discharging combustion gases. In the building, on a number of floors 6.1, 6.2 and 6.3, combustion appliances 8.1, 8.2 and 8.3 are arranged. Each combustion appliance 8.i (i = 1, 2, 3) is connected to the discharge device 2 through a draught limiting and injection device 10.i (i = 1, 2, 3). The purpose of each draught limiting and injection device 10.i is to supply combustion gases of a combustion appliance 8.i to the central discharge device 2. A further purpose of the draught limiting and injection device 10.i is to supply combustion air from outside the building to the combustion appliance 8.i. To that effect, each draught limiting and injection device 10.i is provided with an air supply opening 12, as will be further explained with reference to Figs. 2 and 3.

Figs. 2 and 3 show a possible embodiment of a draught limiting and injection device 10.i of the system 1 according to Fig. 1. In the drawings following below, corresponding parts have been provided with the same reference numerals. The device comprises an outer tube 14 with a first open end 16 and a second open end 18. In use, the second open end 18 is connected to the discharge device 2 according to Fig. 1. The device 10.i further comprises an inner tube 20 with a first open end 22 and a second open end 24. The inner tube 20 extends within the outer tube 14, with the second open end 24 of the inner tube 20 opening into the outer tube 14. The second open end of the inner tube here functions as an injector. In the wall of the outer tube, a first air supply opening 12 is provided at a position which, viewed in axial direction, is located between the first 22 and second 24 open end of the inner tube 20. Through the air supply opening 12, combustion air 26 can be supplied to the combustion appliance via a space 28 located between the outside of the inner tube and the inside of the outer tube. Viewed in axial direction, the space 28 extends between the first open end 16 of the outer tube and the air supply opening 12 in the outer tube. The first open ends of the inner tube and the outer tube thus form a concentric connection for the combustion appliance, with the space 28 being connected to the combustion appliance in such a manner that the combustion air 26 can be supplied to the combustion appliance.

Combustion gases 30 coming from the appliance are fed to the inside of the inner tube 20.

The draught limiting and injection device 10 further comprises a second air supply opening 32 which is located in the wall of the outer tube 14. The second air supply opening 32 communicates with the second open end of the outer tube via a space 34 which, viewed in radial direction, is located outside the inner tube 20 and inside the outer tube 14. Accordingly, viewed in axial direction, the space 34 extends between the second air supply opening 32 and the second open end of the outer tube 14. As will be set out in more detail hereinafter, the portion of the outer tube located between the second open end of the inner tube and the second open end of the outer tube functions as a mixing chamber 35,

in which outside air 37 can be mixed with the combustion gases injected into this chamber via the inner tube 20. In the present exemplary embodiment, the first and second air supply opening 12, 32 are adjacent to each other and each extend in tangential direction along the circumference of the outer tube. In this example, the first and second air supply opening extend through a full circle in tangential direction along the outer tube. The first and second air supply openings are mutually separated through a collar 36 which extends in radial direction between the outside of the inner tube and the inside of the outer tube.

The operation of the draught limiting and injection device is as follows. If upon a demand for heat at least one of the CH appliances 8.i becomes operative, a fan in the appliance 8.i draws in air 26 via the air supply opening 12. This air flows via the space 28 to the appliance 8.i. After a burner of the appliance 8.i has become operative, the combustion gases 30 flow via the inner tube 20 in the direction of the injector, that is, to the second open end 24 of the draught limiting and injection device 10.i. With the aid of the injector, the combustion gases 30 are blown into the mixing chamber 35 at a relatively high speed. This prevents leakage of combustion gases via the air supply opening 12 or 32. The diluted combustion gases are thereupon passed via the mixing chamber 35 to the shared discharge device 2.

When hereinafter mention is made of 'facade pressure', this is meant to refer to the difference between the static pressure on the facade 38 of the building 4 and the pressure in the shared discharge device 2. This difference results from wind and thermal draught.

If the reduced pressure in the shared discharge device 2 starts to increase as a result of wind and/or thermal draught, the combustion gases in the mixing chamber 35 are admixed with additional air 37 via the second air supply opening 32, so that the reduced pressure in the discharge device 2 decreases. As a result, the pressure difference across the appliances 8.i remains limited. The aerodynamic properties of the draught limiting and injection device 10.i are such that any wind load always gives rise to a small excess pressure in the draught limiting device in relation to the shared discharge device 2. This prevents combustion gases 30 from egressing in case of wind loads. If the appliance 8.i is not in operation, any wind load always gives rise to a small excess pressure in the air supply pipe of the appliance 8.i with respect to the flue pipe of the appliance 8.i. As a result, there is always a small air stream in the proper direction through the appliance, which prevents a pilot flame, if any is present, from going out. In appliances 8.i in which condensation of heat vapour occurs, this prevents humid air from flowing in the direction of the burner and hence in the direction of the space 28 connected to the appliance in question. However, in case of wind load, these so-called 'co-pressures' remain so small that the operational reliability and the safety of the appliance 8.i are not jeopardised. If by some particular cause or other, adjacent an outlet

40 of the discharge device 2 an excess pressure with respect to the facade 38 should arise temporarily or protractedly, so that the combustion gases 30 egress from the draught limiting and injection device 10.i via the second air supply opening 32, then the annular collar 36 arranged in the draught limiting and injection device 10.i ensures that the appliance 8.i draws in substantially no combustion gases 30 through the first air supply opening 12.

The invention is not in any way limited to the embodiment outlined above. As can be seen in Figs. 2 and 3, the outer tube 14 consists of a first outer tube 14.1 and a second outer tube 14.2, which are fastened to each other through connecting pieces 42. Of course, it is also possible to manufacture the first outer tube 14.1 and the second outer tube 14.2 from a single tube and subsequently to provide the first and second air supply opening therein. In the example of Figs. 2 and 3, the first and second supply openings extend fully around the circumference of the outer tube 14, with the collar 36 practically precluding the possibility that combustion gases egressing, for whatever reason, via the second air supply opening 32 are drawn in by the appliance via the air supply opening 12. This possibility can be further reduced when the first and second air supply opening extend at least substantially on radially opposite parts of the outer tube 14. Such an example is outlined in Fig. 4.

In Fig. 4 the air supply opening 12 extends through an angle of 180° along the circumference of the outer tube 14. The second air supply opening 32 also extends through an angle of 180° along the circumference of the outer tube 14, the arrangement being such that the first and second air supply opening are situated on mutually different sides of the outer tube. Such variants are considered to fall within the scope of the invention.

Claims

1. A draught limiting and injection device for supplying combustion air to a combustion appliance and discharging combustion gases of the combustion appliance to a discharge device arranged on the outside of a building, based on injection action, characterized in that the device comprises an outer tube with a first open end for connection to the combustion appliance and a second open end for connection to the discharge device, and an inner tube with a first open end for connection to the combustion appliance and a second open end which functions as injector, while the inner tube extends within the outer tube, in such a manner that the second open end of the inner tube opens into the outer tube, and further a wall of the outer tube is provided with at least one first air supply opening at a position located between the first and second open end of the inner tube, for supplying combustion air to the combustion appliance through a space formed between the outside of the inner tube and the inside of the outer tube, and the wall of the outer tube is further provided with at least one second air supply opening at a position located between the first and second open end of the inner tube for possibly supplying air to the discharge device to limit the draught.
2. A draught limiting and injection device according to any one of the preceding claims, characterized in that the second air supply opening, viewed in axial direction, is located between the first air supply opening and the second open end of the outer tube.
3. A draught limiting and injection device according to claim 1 or 2, characterized in that the first and second air supply opening are adjacent to each other and each extend in tangential direction along the circumference of the outer tube.
4. A draught limiting and injection device according to claim 3, characterized in that the first and second air supply opening each extend through a full circle in tangential direction along the outer tube.
5. A draught limiting and injection device according to claim 3 or 4, characterized in that the first and second air supply opening are mutually separated by a collar which extends in radial direction between an outside of the inner tube and an inside of the outer tube.
6. A draught limiting and injection device according to any one of the preceding claims, characterized in that the first and second air supply opening extend at least substantially on radially opposite parts of the outer tube.
7. A draught limiting and injection device according to claim 1, characterized in that the first and second air supply opening are adjacent to each other and form a common opening.
8. A system comprising at least one draught limiting and injection device according to any one of the preceding claims and a discharge device arranged on the outside of a building, with the at least one draught limiting and injection device being connected to the discharge device.
9. A system according to claim 8, characterized in that the at least one draught limiting and injection device extends through an opening in a wall of a building, with the first open ends of the inner and outer tube being located on the inside of the building, and the first and second air supply opening in the wall of the outer tube being located on the outside of the building.

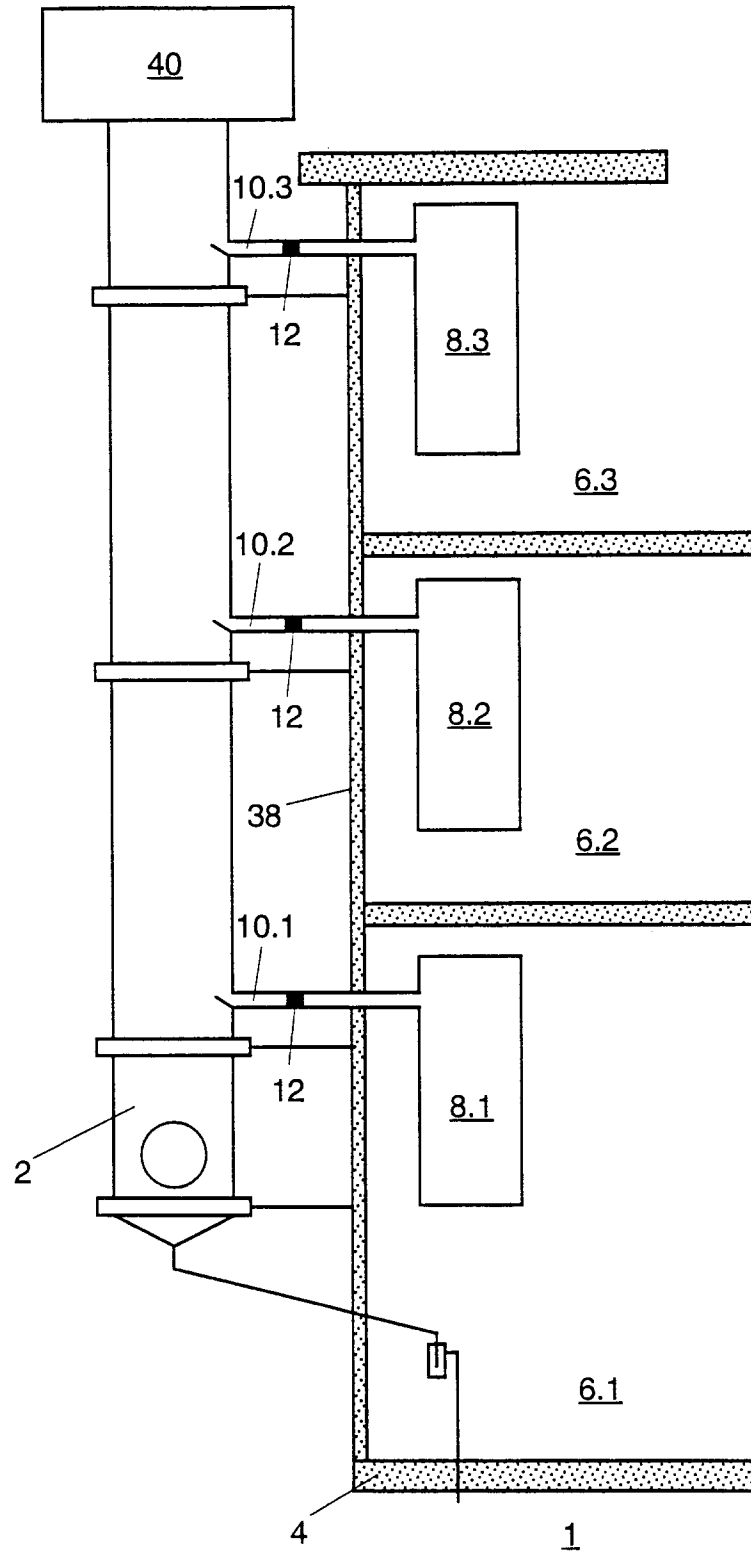


FIG. 1

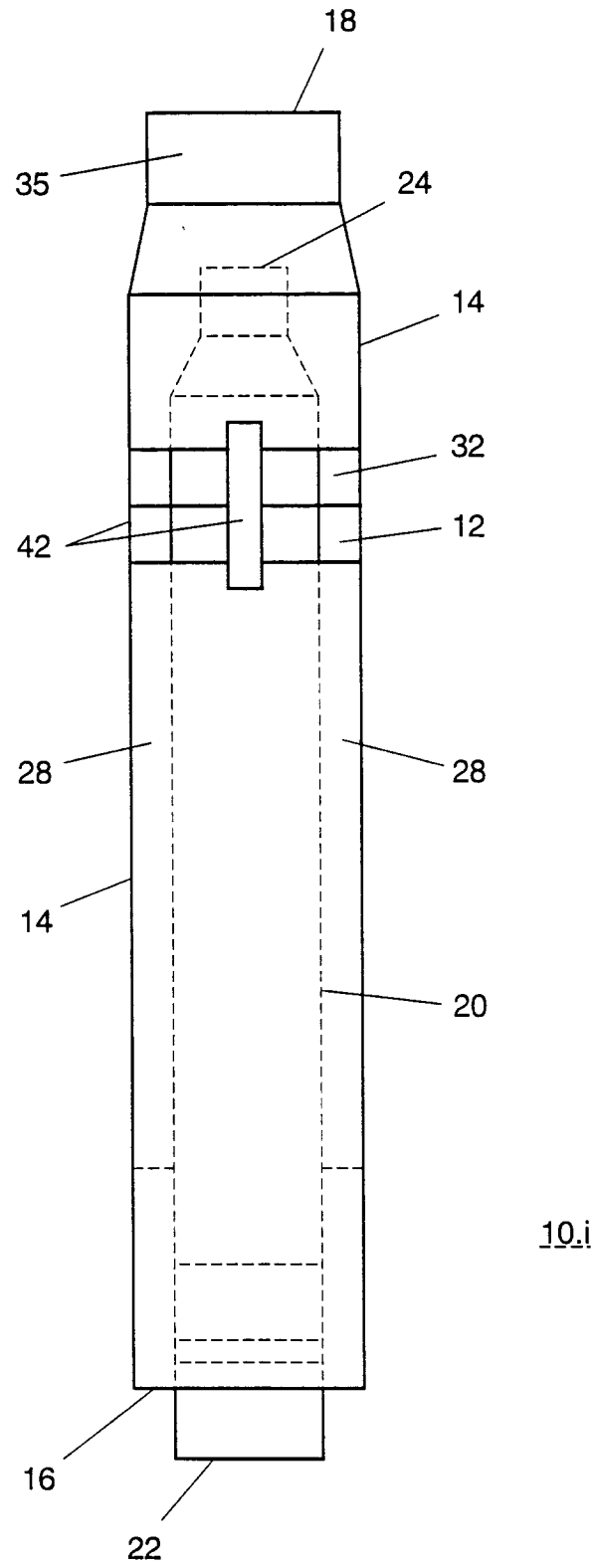
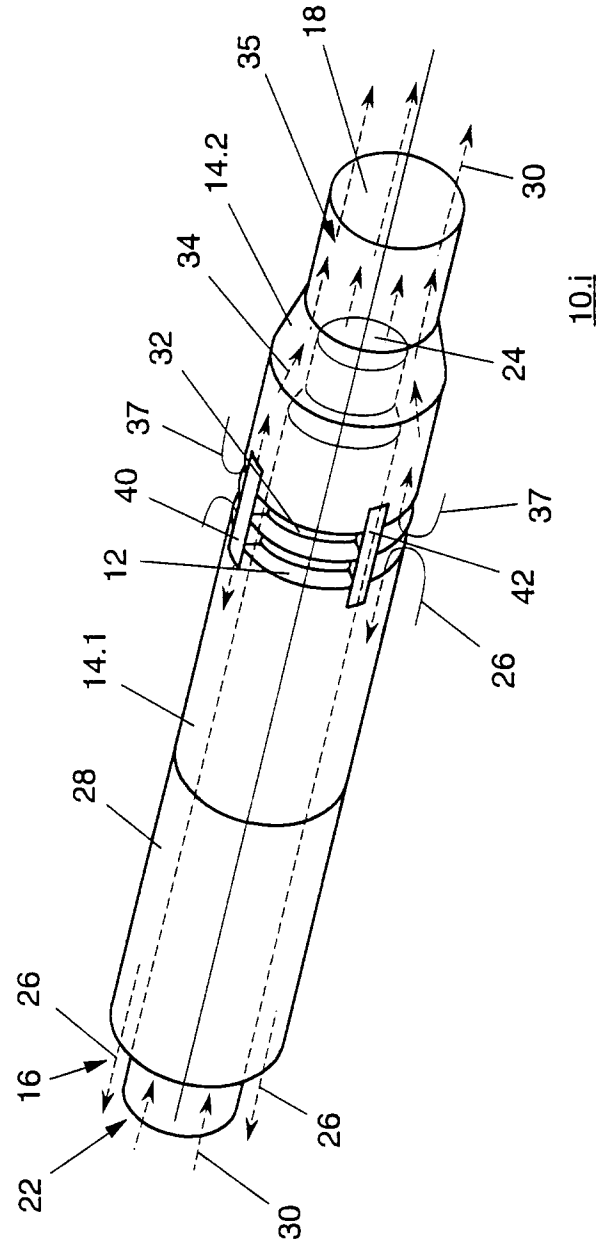


FIG. 2



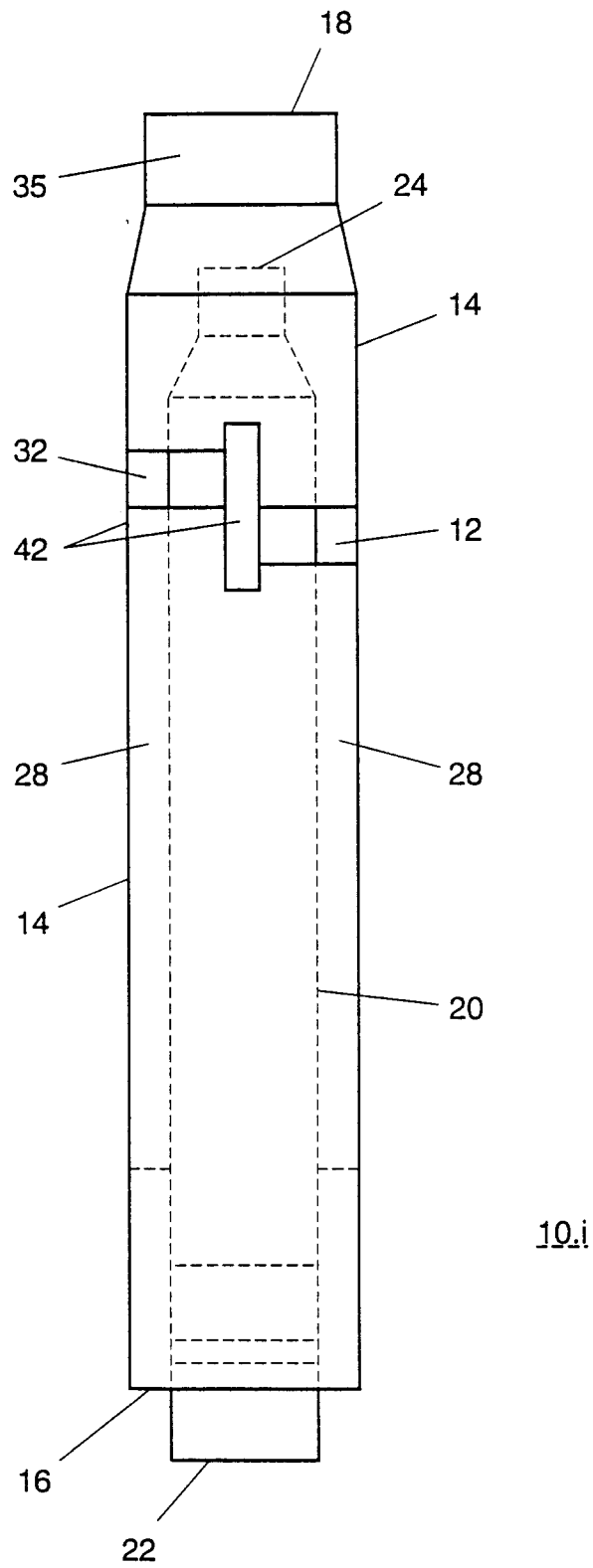


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 2363

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP-A-0 483 075 (CARBOFUEL OFFICINE MECCANICHE S.P.A) * column 2, line 23 - column 2, line 48; figures 1,2 *	1	F23J11/12 F23M9/00
A	FR-A-2 554 911 (AUER S.A.) * page 4, line 20 - page 5, line 9 * * page 5, line 30 - page 6, line 7 * * figures 2-4 *	1	
A	EP-A-0 418 976 (UBBINK NEDERLAND B.V.)		
A	GB-A-2 180 058 (ECONOSTO)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			F23J F23M F23L
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 November 1996	Examiner Phoa, Y
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