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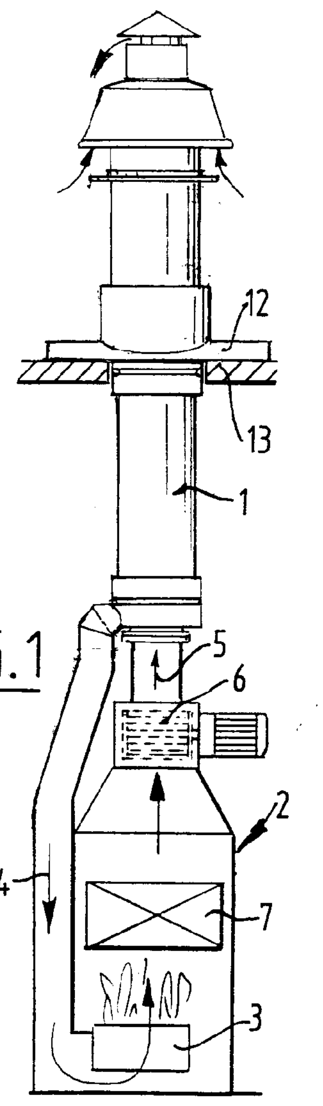
(54) Combined burner air supply and combustion gas exhaust.

(57) The invention relates to a combined burner air supply and combustion gas exhaust, comprising an air supply pipe and a combustion gas exhaust pipe received therein. These are provided on one end with connections closed off relative to one another for connecting respectively to the air supply and the combustion gas exhaust of a burner. The opposite outer ends debouch on either side of a partition wall extending transversely of the combustion gas exhaust pipe and respectively form an air inlet opening and a gas exhaust opening wherein a pressure equalizing channel is formed extending from close to the air inlet opening to a position close to the gas exhaust opening.

FIG.1



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The invention relates to a supply and exhaust combination for respectively combustion air and combustion gas of a burner.

Such combinations are generally used as wall or roof passage in combination with for instance a central heating boiler. The combustion gas exhaust pipe is received in the air supply pipe. The air therefore flows towards the burner through the space of substantially annular section between the exhaust pipe and the supply pipe.

Supply and exhaust combinations of the present type are frequently used in so-called closed systems, wherein the whole channel of the air supply pipe is closed via the burner and the gas exhaust pipe. Because of the relatively high flow resistance a fan is generally incorporated into the heating apparatus.

Good operation of the burner depends on the extent to which the air flow through the system is constant. It has been found that the thermal draught in the exhaust system has only very little influence on this flow. The wind at the location of the ends of the supply and exhaust pipes does have a great influence in known systems. According to the requirements applying in The Netherlands it is permissible at the location of the burner of a central heating boiler to have a negative pressure (suction) of 50 Pascal and a counter-pressure of 20 Pascal as a result of the exhaust system's own resistance and an additional counter-pressure of 20 Pascal as a result of the effect of wind. A total range of 90 Pascal is therefore accepted.

The object of the invention is to provide a supply and exhaust combination of the type described above which under normal conditions of use results in a smaller difference between the maximum and minimum pressure at the location of the burner.

This object is achieved with a combined burner air supply and combustion gas exhaust according to the invention as characterized in claim 1.

When, in a particular situation, as a result of a particular air flow a marked pressure difference occurs between the positions on either side of the partition wall, which can be formed for example by a hood screening the air inlet opening, a pressure compensating air flow occurs via the pressure equalizing opening, so that the pressure difference at the position of the air inlet opening and gas exhaust opening only has a limited effect in the vicinity of the burner.

A very favourable further development of the invention is characterized in claim 2. A permanently drawing hood is per se known and has the effect that an underpressure is generated therewithin irrespective of the wind direction. This underpressure therefore prevails both at the gas exhaust opening and at the end of the pressure equalizing channel. An air flow hereby occurs through the air channel in the direction towards the permanently drawing hood. In the locally smaller section of the air channel a pressure fall occurs due to this flow. A strong underpressure in the hood results in a relatively strong air flow through the air channel and thus a relatively large pressure fall at the point of the smaller section. A corresponding lower pressure consequently prevails at the location of the air inlet. With suitable dimensioning a pressure difference between the air inlet and the gas outlet virtually independent of wind influence can be achieved in this manner.

A favourable embodiment with a symmetrical structure which therefore has an operation independent of the wind direction is characterized in claim 3.

A further favourable embodiment is herein characterized in claim 4. The smaller section or constriction can be adjusted in a simple manner by shifting the partition wall relative to the outer edge of the air supply pipe. At a particular dimensioning of gas exhaust pipe, air supply pipe, permanently drawing hood and pressure equalizing channel, a situation can simply be created thereon wherein a maximum pressure insensitivity is obtained.

Another favourable embodiment of the invention is characterized in claim 5.

The constriction and opening operating as venturi provide equalization of the pressure difference in the supply pipe and exhaust pipe. As soon as the pressure difference over the burner increases and a larger quantity of gas is therefore transported, a lowering of pressure will occur in the air supply pipe due to the stronger venturi action at the point of the constriction, whereby the pressure difference over the burner therefore decreases again and the correct conditions at that location thus furthered. When the pressure in the exhaust pipe increases due to wind attack on the outer end of the exhaust pipe, this raised pressure will progress via the opening in the wall thereof into the supply pipe so that the final pressure difference over the burner is only slightly affected.

Use of the step from claim 6 further reinforces this latter effect. When the wind in the exhaust pipe blows inward it will be immediately guided through the openings partly into the exhaust pipe, whereby any pressure build-up occurs simultaneously in the exhaust pipe and the supply pipe and the pressure difference over the burner is therefore affected only slightly.

If the air flow should increase in the supply channel as a result of the wind, the above mentioned compensation effect of the increased suction occurs at the location of the opening close to the constriction.

The placing of the constriction close to the outer end of the exhaust pipe has the advantage that the combustion gases there are already partially cooled and have thereby obtained a greater density and lower flow speed. The flow resistance caused by the constriction, which is related to the square of the flow speed, is thus of little significance.

An additional advantage of the device according to the invention is that the combustion gases are mixed with relatively dry outside air, whereby the dewpoint is raised and formation of ice deposit on the normally arranged fall wind plate remains limited.

The embodiment as characterized in claim 7 is favourable because the flow resistance for the combustion gas in the direction towards the outside is hereby markedly smaller than the flow resistance to which the wind is subjected in the opposite direction. It is possible to speak here of a certain one-way valve action.

The invention is further elucidated in the following description with reference to the annexed figure of an embodiment.

Fig. 1 shows a schematic view of a supply and exhaust combination according to the invention, as applied in a combustion boiler.

Fig. 2 shows in partially broken away perspective view the supply and exhaust combination in more detail.

Fig. 3 shows a cross section according to **III-III** in fig. 2.

Fig. 4 shows a longitudinal section of the upper part of a supply and exhaust combination according to another embodiment of the invention.

Fig. 1 shows schematically a central heating combustion boiler 2 which comprises a burner 3 and to which is connected a combustion air supply 4 and a combustion gas exhaust 5. This supply and exhaust are combined in an air supply and combustion gas exhaust combination 1. This combination 1 is carried through a roof 13 in sealed manner by means of a roof passage 12. A closed system is thus obtained in which the gas flow is substantially maintained by a fan 6. The air supplied through the supply 4 combusts together with gas in the burner 3 and the heat thereby released is given off in the boiler 2 in a heat exchanger 7 to a heat transport fluid such as water.

Fig. 2 shows the structure of the supply and exhaust combination 1 in more detail.

This combination 1 consists of an exhaust pipe 10 which in the present embodiment takes a double-walled form and is received in a supply pipe 11. Close to the bottom end the pipes 10 and 11 are provided with connections 14 and 15 respectively which are closed off relative to one another. Use is made for this purpose of an adaptor part 16 which forms a closed connection between the cylinder wall-shaped channel between the pipes 10 and 11 and the connection 15.

In the embodiment shown the outer end of the exhaust pipe 10 extends slightly further than the outer end of the supply pipe 11. Arranged on the end of the exhaust pipe 10 is a hood 17 which screens the outer end of the supply pipe from the rain. The hood 17 forms a partition wall which extends transversely of the exhaust pipe 10 and mutually separates the gas exhaust opening and the air inlet opening at the respective ends of the exhaust pipe 10 and the supply pipe 11. This partition wall formed by the hood 17 prevents combustion gas entering the air inlet. Arranged round the supply pipe 11 close to the outer end is another plate 18 so that between the lower edge of the hood 17 and the plate 18 a supply opening remains free through which the combustion air can flow inside into the supply pipe 11. This is indicated with arrow 25.

A hood 19 is likewise arranged on top of the exhaust pipe 10 which prevents rain entering.

According to the invention a pressure equalizing channel is formed that extends from close to the air inlet opening to a position close to the gas exhaust opening. The pressure equalizing channel is formed in this embodiment by openings 20 formed in the wall of the exhaust pipe 10. As shown, the openings 20 are defined in that the wall of the pipe 10 is pressed inward under two cuts. Constrictions 21 are formed in the gas exhaust pipe 10 by these inwardly pressed portions. This constriction 21 with opening 20 forms a venturi in the pipe 10 so that due to the gas flow 22 through the pipe 10 a suction occurs at the point of the openings 20.

When a higher pressure develops in the supply pipe 11, in particular through the influence of wind, this higher pressure will literally progress via the openings 20 into the exhaust pipe 10 whereby a certain compensation occurs. Another compensating effect can be that at an increased gas exhaust speed, designated with arrow 22, an extra suction occurs through the openings 20 whereby the pressure in the supply pipe 11 falls, which thus gives a compensating effect.

Another favourable action of the device according to the invention is that when as a result of wind pressure air flows inside the exhaust pipe 10 according to arrow 23, a portion of this air will be diverted directly through the openings 20 to the supply pipe 11 so that the pressure rise due to this wind attack is evenly distributed over the supply and exhaust pipe, whereby the pressure difference over the burner will remain substantially the same.

It has been found during tests of the embodiment of the supply and exhaust combination according to the invention shown in the figures that in the normal situation of use the difference between the minimum pressure and the maximum pressure can lie in the order of magnitude of only 20 Pascal.

The supply and exhaust combination 30 partially shown in figure 4 corresponds in significant measure with the embodiment described with reference to the preceding figures. Only the manner in which the pressure equalizing channel is formed differs, and only the parts of this embodiment 30 relating to this difference will therefore be discussed.

The supply and exhaust combination 30 likewise comprises an air supply pipe 31 with a combustion gas exhaust pipe 32 received therein. The pipes 31 and 32 both have a double-walled form. An air inlet opening 34 is defined at the top end of the air supply pipe 31 and a gas exhaust opening 35 is defined at the top end of the gas exhaust pipe 32. Arranged round the gas exhaust opening 35 is a per se known permanently drawing hood 36 which generates an underpressure irrespective of the angle of the wind, thus also in the case of fall wind. Fixed round the gas exhaust pipe above the air inlet opening 34 is a hood 33 which forms the partition wall between the gas exhaust opening 35 and the air inlet opening 34. Further fixed to the bottom end of the hood 33 is a plate 37 which leaves open only a relatively narrow annular opening around the pipe 31. This plate 37 thus forms a wind barrier. Arranged above the inlet opening 34 around the gas exhaust pipe 32 is a pipe portion 38 that forms an annular pressure equalizing channel 39 that extends from close to the gas exhaust opening 35 to a position close to the air supply opening 34. The hood 33 is fixed to this pipe portion 38.

As a result of the underpressure inside the hood 36 occurring through the action of this permanently drawing hood 36 an air flow will occur through the air channel that extends from the annular opening 40 in the plate 37, along the air inlet 34, through the pressure equalizing channel 39 to inside the hood 36. This air flow is indicated by arrows. The air flow will be stronger when there is a strong underpressure inside the hood 36 than when there is a slight underpressure. The portion of this air channel that lies in the flow direction before the air inlet 34 has a smaller section locally than the air inlet 34 itself. This smaller section is formed in the embodiment shown between the end rim of the air supply pipe 31 and the top surface of the hood 33. As a result of this smaller section, which forms a constriction in the channel, a pressure fall occurs in the air flow which becomes stronger as the air flow becomes stronger. As noted earlier, the strength of the air flow depends on the underpressure inside the hood 36 so that a relationship therefore exists between the underpressure in the hood 36, i.e. the pressure at the location of the gas exhaust opening 35, and the pressure at the location of the air supply opening 34. By suitable adjustment of the constriction, which can be achieved simply by shifting the hood 33 towards and away from the upper rim of the air supply pipe 31, a maximum insensitivity to pressure differences resulting from wind can be achieved. It has been found in practice that an almost complete insensitivity can be achieved.

The annular opening 40 in the plate 37 already forms a constriction of the above described air channel which improves adjustability.

Due to the use of the permanently drawing hood 36 an air flow will always occur through the pressure equalizing channel 39 in the direction of the arrows so that no combustion gas from the gas exhaust opening 35 can enter the inlet opening 34 via the pressure equalizing channel 39.

The invention can be embodied in many different ways. The embodiments shown in the figures are only given by way of example.

Claims

1. Combined burner air supply and combustion gas exhaust, comprising an air supply pipe and a combustion gas exhaust pipe received therein which are provided on one end with connections closed off relative to one another for connecting respectively to the air supply and the combustion gas exhaust of a burner and the opposite outer ends of which debouch on either side of a partition wall extending transversely of the combustion gas exhaust pipe and which respectively form an air inlet opening and a gas exhaust opening wherein a pressure equalizing channel is formed extending from close to the air inlet opening to a position close to the gas exhaust opening.

2. Supply and exhaust combination as claimed in claim 1, wherein a per se known permanently drawing hood is arranged on the outer end of the gas exhaust pipe and the pressure equalizing channel forms part of an air channel which extends from a position in the flow direction before the inlet opening to inside the permanently drawing hood and which in the portion before the inlet opening has at least locally a smaller section than the air inlet opening.

3. Supply and exhaust combination as claimed in claim 1 or 2, wherein the pressure equalizing channel is formed by a pipe portion which is arranged concentrically around the end of the gas exhaust pipe and which extends from a position close to the air inlet opening to a position close to the gas exhaust opening and wherein the partition wall extends transversely of this pipe portion.

4. Supply and exhaust combination as claimed in claim 2 or 3, wherein the smaller section is determined between the outer edge of the air supply pipe and the transverse partition wall.

5. Supply and exhaust combination as claimed in claim 1, wherein the gas exhaust pipe is provided at the position of the air inlet opening with a constriction forming a venturi with at least one opening in the pipe wall forming the pressure equalizing channel.

6. Supply and exhaust combination as claimed in claim 5, wherein the opening in the pipe wall, as seen in the exhaust pipe, is turned towards the outer end thereof.

7. Supply and exhaust combination as claimed in claim 6, wherein the constriction and the opening are formed in that a wall portion of the exhaust pipe is pressed inward beneath a transverse cut extending over a part of the periphery.

8. Supply and exhaust combination as claimed in claim 6 or 7, with two openings arranged diametrically opposite one another.

9. Supply and exhaust combination as claimed in any of the foregoing claims, wherein the partition wall is a hood screening the air inlet opening.

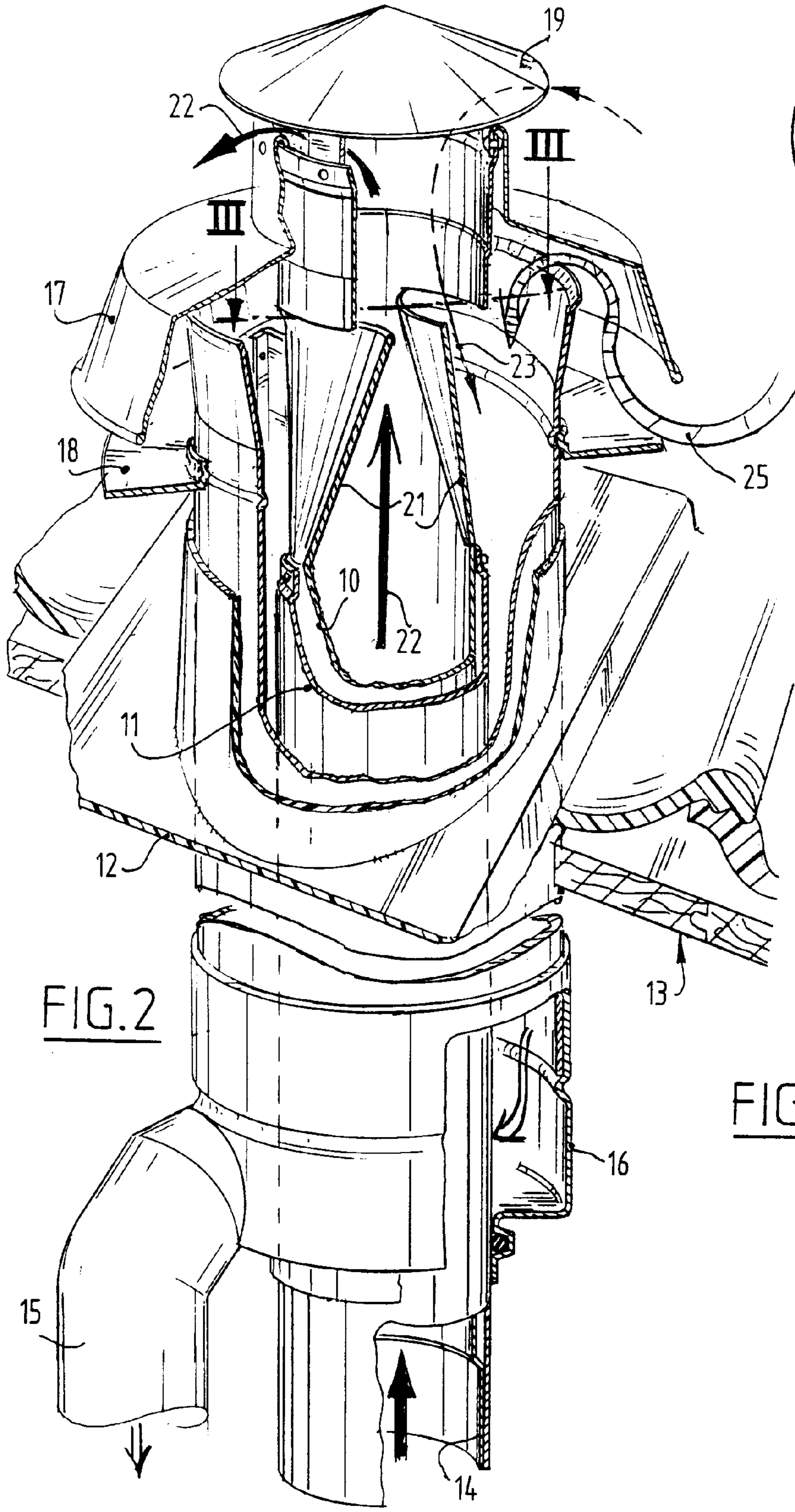

FIG.2

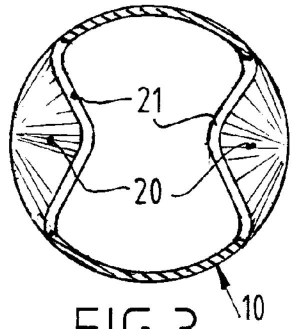

FIG.3

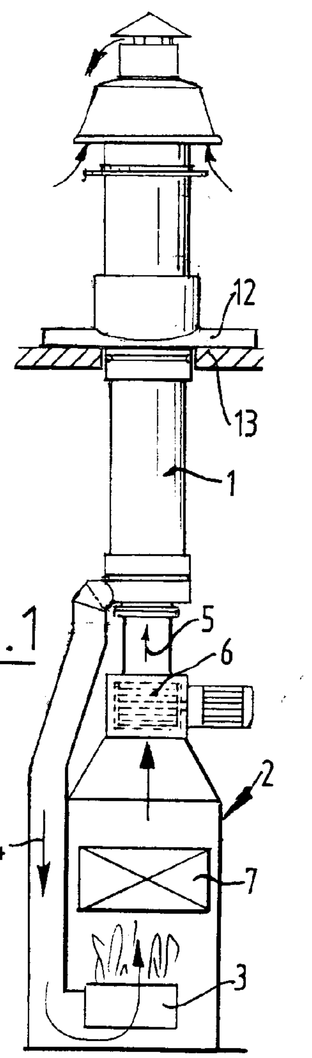

FIG.1

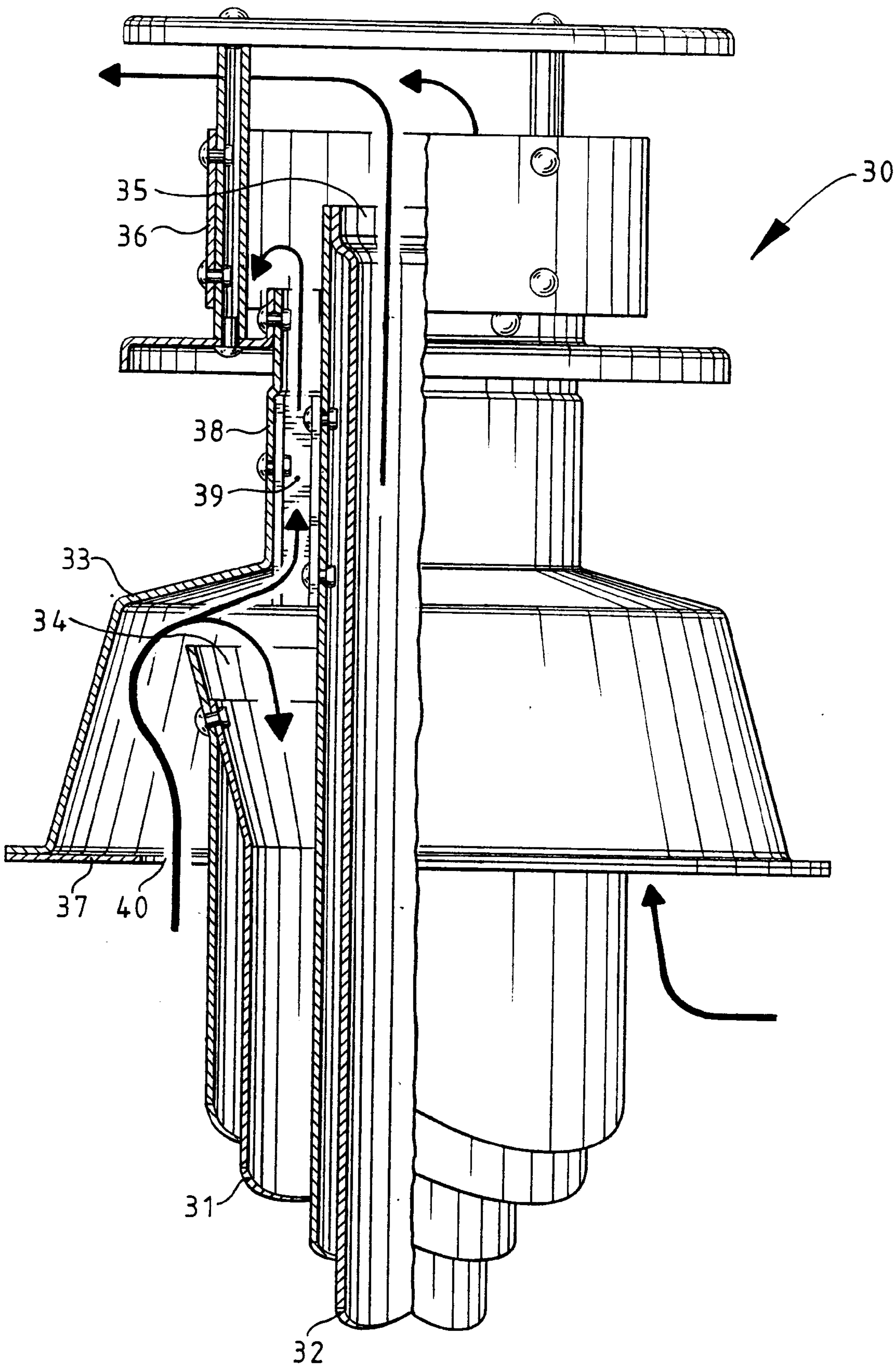

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number

EP 91 20 3330

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.5)
A	NL-A-8 700 395 (COX GELEEN) * claim 1; figure * -----	1	F23L17/04
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F23L F23J F24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 MARCH 1992	PESCHEL G.

CATEGORY OF CITED DOCUMENTS

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