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(71)(72) Applicant and Inventor: WEGLER, George [SE/SE]; Hästhagsvägen 1, S–185 94 Vaxholm (SE).

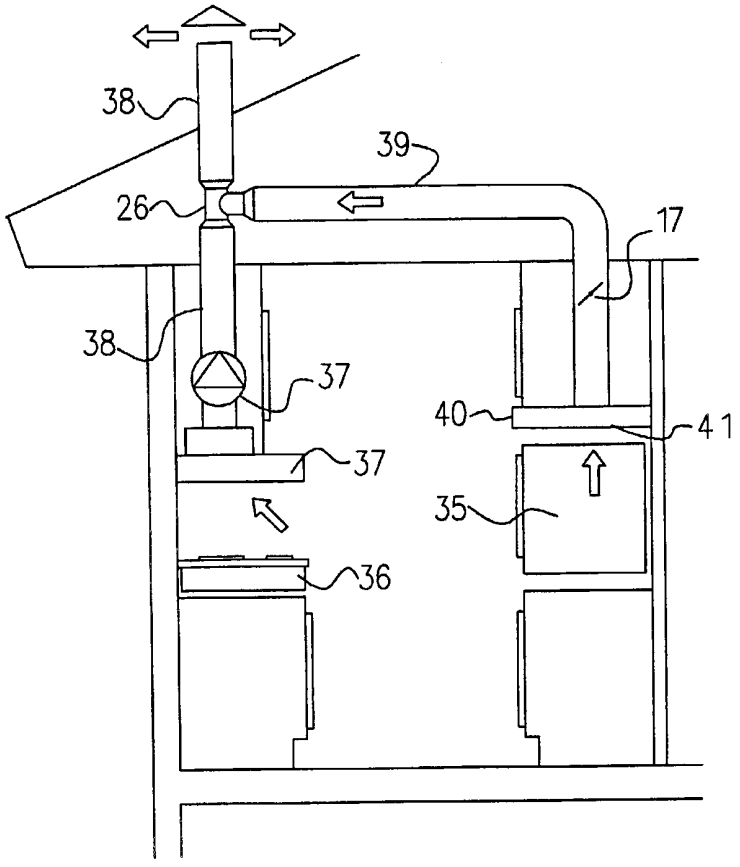
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(54) Title: ARRANGEMENT FOR AIR EVACUATION

(57) Abstract

An arrangement for air evacuation in a building, comprising an evacuation duct, an exhaust air duct (38), from a first evacuation place, wherein the duct comprises an evacuation fan (37) and wherein the building comprises a second evacuation duct (39) which extends from a second evacuation place and that the first duct (38) comprises a smaller cross section, a contraction (26), and that the second duct emerge into the contration, to admit air evacuation from the second place with help of a vacuum, occasioned by increased velocity, so–called venturieffect, generated with help of the fan of the first duct (38).



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ARRANGEMENT FOR AIR EVACUATION

This invention relates to an arrangement for air evacuation of the kind defined in the preamble of the Claim 1.

THE PROBLEM:

To allow comfortable working conditions in a correct level an oven in a modern kitchen is often located in an other place than below the stove.

In an oven very often strong roast smelling by meet approaches. If you do not arrange for separate evacuation above the oven the smell will easily be spread into all other living rooms.

When using air transported heating system the effects will be specially evident, because the more effective air circulation outfit of the living rooms, the faster spreading of the odours.

Because of fire technical reasons the exhaust air duct from the stove fun unit used to be lead off straight outdoors from the kitchen.

The kitchen stove fun has also a considerable capacity avoiding smell of cooking from the kitchen to penetrate the living rooms.

KNOWN TECHNOLOGY:

It is well-known from Bernoulli's equations that if the air velocity increases in a continuous flow, i.e. in a sealed duct system, the pressure decreases, because energy balance always prevails. With other words: if the velocity energy increases the pressure energy will decrease. Higher velocity gives lower pressure (or a vacuum).

THE SOLUTION:

A solution according to the invention is to provide the exhaust air duct from the stove (a first evacuation duct) with a contraction and into that contraction inlet an

additional duct (a second evacuation duct) into a evacuation above the oven, or from a hood above the oven. The hood also can include a filter.

When you want to ventilate above the oven. or both the oven and the stove, you simply starts the kitchen fun.

The stove exhaust air creates a vacuum inside the contraction which vacuum can be used to evacuate air above the oven.

The need for the evacuation above the stove, where the handling is open i.e. roasting in a frying pan, is mush bigger than the need for evacuation above the oven. In an oven the roasting is done closed inside. Therefore it is not so important if the evacuation capacity is less above the oven than above the stove.

If the fire regulations do not permit the exhaust air duct from the stove to be made tighter locally, you can insert the evacuation duct easily dismantled inside the stove exhaust air duct instead. The contraction is created by the evacuation air duct from the oven intruding upon the area of the stove exhaust air duct.

In spite of the arrangement is made of local evacuation spots, a vacuum in the whole kitchen occurs and as the supply air to the kitchen comes from the living rooms you avoid the smell from the stove as well as from the oven to penetrate the residence.

With a damper, with a possibility to shut close, in the exhaust air duct from the oven, unintentional draught is avoided when the kitchen fun is not used. As is well known, the kitchen fun is equipped with a backspace locker, so there is no need for an action for that.
The invention gives a possibility to get new effects with common standard ventilation material by joining the material in a new way "the correct way".

Consider a continuous round-shaped steel duct a so-called spiro duct.

During the assumption that the air density is not changed, according to Bernoulli's equation, a change of the dimension size from a standard diameter Φ 125 mm into Φ 100 mm, gives the pressure relationship:

$$(p2 / p1) = (c1 / c2)^2 \Rightarrow (p2 / p1) = (d2 / d1)^4$$
$$(p2 / p1) = (100 / 125)^4 = 0,41$$

Where p = pressure; c = air velocity; d = diameter.
This gives in the example the pressure rate p2 to be 41% of the pressure p1.

When mixing of exhaust air from the oven inside the small spaced section of the evacuation duct, this pressure difference will naturally be influenced, but an efficient suction effect come up.

There are several other applications to the use of a contraction to evacuate air from a different place. I.e. if you from a house furnished with natural ventilation, which is not so effective, want to evacuate air from a tumble drier or a drying cupboard, an evacuation duct can be connected to the contraction on the exhaust air duct from the stove fun. Both the oven and the tumble drier connected at the same time is also possible.

The invention will now be described with reference to exemplifying embodiments thereof and also with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig 1 shows how, inside a kitchen 34, with an oven 35 situated on a different place than below the stove 36, a contraction 26 according to the invention can be used, to evacuate air above said oven with help of the exhaust air flow generated by the kitchen fun 37 above the stove. The exhaust air duct 38 (a first evacuation duct (38)) from the stove has a contraction 26 and to that contraction an evacuation duct 39 (a second evacuation duct (39)) is connected, which evacuates air above the oven, or from a hood 40 above the oven. The hood can also include a filter

41. A tight-fitting damper 17 feasible to shut in the exhaust duct 39 from the oven, will be sealed when not used.

Fig 2 shows in vertical section a detail of the connection between the exhaust air duct 38 and the evacuation duct 39 according to fig 1. A contraction 26 on the exhaust air duct 38 creates a vacuum. The evacuation air 39 inlet 22 emerge into the contraction 26.

Fig 3 shows in detail the evacuation air 39 inlet 22 situated inserted inside the exhaust air duct 38. The evacuation air duct 39 reduces area from the exhaust air duct 38 wherein a contraction 26 with increased air speed comes up. The central position of the inlet 22 in the exhaust air duct gives favourable conditions for the evacuation air to flow into the exhaust air duct.

Fig 4 shows in detail in a cross section how the evacuation air duct 39 in the example fig 3 has been furnished with a tightening 27 in the end and apertures 28 in the walls of the duct 39 in the length inside the exhaust air duct 38.

The location of the apertures 28 for the exhaust air gives outflow inside the contraction 26 which has formed between the walls of the ducts 38 and 39 respectively.

Fig 5 shows a detail of a contraction 26 with bigger cross section areas 29, 29′ on each sides and the connection of the evacuation air duct 39 to the exhaust air duct 38. A piece of the evacuation duct 39 has been inserted and been furnished with an aperture 28 in the duct wall facing downstream.
Fine adjustment achieves with a turn 31 of the evacuation duct 39 in order to make the openings 28 take up different positions for correct suction effectiveness result.

Fig 6 shows a detail of the ending 22 of the evacuation air duct 39 in eligible inserted position 32 inside the evacuation duct attaining certain separate layers of air with different velocity, for adjustment of correct suction effectiveness result.

Fig 7 shows an additional detail of the evacuation air duct 39 ending 22, with slanted ending 33, in eligible inserted position 32 inside the evacuation duct attaining certain separate layers of air with different velocity, and in eligible turn 31, for adjustment of correct suction effectiveness result.

Fig 8 shows a further detail of how a contraction with insignificant air friction has been created by inserting of a spray nozzle shaped inset of sheet material 45 situated inside a T-duct 46. The evacuation air duct 39 from the oven connects to the side opening duct. I the contraction part 26 of the nozzle shaped inset 45 has apertures 28 been made to allow oven exhaust air to flow around the nozzle shaped inset into the space 47 which has been formed between the wall of the exhaust air duct and the wall of the nozzle shaped inset and further on flow through the apertures 28 into the stove exhaust air duct 38.

DESCRIPTION OF EXEMPLIFYING EMBODIMENTS

Fig 1 shows how a stove kitchen fun over the stove can be used inside a kitchen 34 with an oven 35 situated on a different place than below the stove 36. A contraction 26 according to the invention can be used, to evacuate air above said oven with help of the exhaust air flow generated by the kitchen fun 37 above the stove.

The exhaust air duct 38 (a first evacuation duct (38)) from the stove has a contraction 26 and to that contraction an evacuation duct 39 (a second evacuation duct (39)) is connected, which evacuates air above the oven, or from a hood 40 above the oven. The hood can also include a filter 41. A closely tight-fitting damper 17 in the exhaust duct 39 from the oven, will be shut when not used.

Arrangements according to the figures below can be used in the connection between the ducts. Also in a dismounting design for i.e. cleaning at chimney-sweeping.

You can also evacuate air from i.e. a tumble drier with an evacuation air duct 39 which connects to the exhaust air duct 38 from the stove fun.

Fig 2 shows in vertical section a detail of the connection between the exhaust air duct 38 and the evacuation duct 39 according to fig 1. A contraction 26 on the exhaust air duct 38 creates a vacuum. The evacuation air duct 39 inlet 22 emerge into the contraction 26.

Fig 3 shows in detail the evacuation air duct 39 inlet 22 situated inserted inside the exhaust air duct 38. The evacuation air duct 39 reduces area from the exhaust air duct 38 wherein a contraction 26 with increased air speed comes up. The central position of the inlet 22 in the exhaust air duct gives favourable conditions for the exhaust air to flow into the exhaust air duct.

Fig 4 shows in detail in a cross section how the evacuation air duct 39 in the example fig 3 been furnished with a tightening 27 in the end and apertures 28 in the walls of the duct 39 in the length inside the exhaust air duct 38.
The location of the apertures 28 for the exhaust air gives outflow inside the contraction 26 which has formed between the walls of the ducts 38 and 39 respectively.

Fig 5 shows a detail of a contraction 26 with bigger cross section areas 29, 29′ on each sides and the connection of the evacuation air duct 39 to the exhaust air duct 38. Too increase the suction effectiveness a piece of the evacuation duct 39 has been inserted and been furnished with an aperture 28 in the duct wall facing downstream. The aim for that is to inlet the exhaust air in the duct centre where the air speed is maximum.

Fine adjustment achieves with a turn 31 of the evacuation duct 39 in order to make the openings 28 take up different positions for correct suction effectiveness result.

Fig 6 shows a detail of the ending 22 of the evacuation air duct 39 in eligible inserted position 32 inside the evacuation duct attaining certain separate layers of air with different velocity, for adjustment of correct suction effectiveness result.

Fig 7 shows an additional detail of the evacuation air duct 39 ending 22, with slanted ending 33, in eligible inserted position 32 inside the evacuation duct attaining certain separate layers of air with different velocity, and in eligible turn 31, for adjustment into correct suction effectiveness result.

Fig 8 shows a further detail of how a contraction with insignificant air friction has been created by inserting of a spray nozzle shaped inset of sheet material 45 situated inside a T-duct 46.

The evacuation air duct 39 from the oven connects to the side opening duct. In the contraction part 26 of the nozzle shaped inset 45 apertures 28 has been made to allow the evacuation air from the oven to flow around the nozzle shaped inset into the space 47 which has been formed between the wall of the exhaust air duct and the wall of the nozzle shaped inset and further on flow through the apertures 28 into the stove exhaust air duct 38. The resistance in the exhaust air duct will not increase worth mentioning with the insert of a streamlined spray nozzle.

Adjustment of the suction effectiveness achieves with different area dimensions of the contraction 26 and the size and amount of the apertures 18. Cleaning of the ducts facilitates if the spray nozzle inset 45 is made dismantled.

Although the invention has been described and illustrated with reference to exemplifying embodiments of the invention, it will be understood that the invention is not restricted to these embodiments, but solely by the scope of the following Claims.

C L A I M E S

1. An arrangement for air evacuation in a building, comprising a first evacuation duct (38) from a first evacuation place, wherein the duct comprises an evacuation fan (37), and wherein the building comprises a second evacuation duct (39) which extends from a second evacuation place
c h a r a c t e r i s e d i n,
that the first duct (38) comprises a smaller cross section a contraction (26) and that the second duct emerge into the contraction, to admit air evacuation from the second place with help of a vacuum, occasioned by increased velocity, so-called venturieffect, generated with help of the fun of the first duct (37).

2. An arrangement according to claim 1,
c h a r a c t e r i s e d i n
that the first evacuation place is a stove hood (37) in a kitchen in the building.

3. An arrangement according to claim 1 or 2,
c h a r a c t e r i s e d i n
that the second evacuation place is situated in the kitchen at a from the stove (36) separated cooking unit such as a separate oven (35).

4. An arrangement according to claim 1 or 2,
c h a r a c t e r i s e d i n
that the second evacuation place is situated in an other part of the building than the first evacuation place.

5. An arrangement according to claim 1 or 4,
c h a r a c t e r i s e d i n
that the second evacuation place is situated in a wet premise at a drying unit such as a tumble drier or a drying cupboard.

6. An arrangement according to any of the preceding Claims,
c h a r a c t e r i s e d i n
a adjustable damper (17) for adjustment of flow from the second evacuation place.

7. An arrangement according to any of the preceding Claims,
c h a r a c t e r i s e d i n
that the second evacuation duct (39) is coaxially inserted inside the first duct (38) wherein a contraction (26) is formed between the duct walls.

8. An arrangement according to any of the preceding Claims,
c h a r a c t e r i s e d i n
means for varying of the dimension of the outlet openings (22, 28) of the second duct.

9. An arrangement according to any of the preceding Claims,
c h a r a c t e r i s e d i n
that the contraction of first duct and the second duct outlet aperture (22) are in the main concentric.

10. An arrangement according to any of the preceding Claims,
c h a r a c t e r i s e d i n
that the second aperture (22) emerge laterally into a venturi shaped length part (26) of the first duct (38).

11. An arrangement according to any of the preceding Claims,
c h a r a c t e r i s e d i n
a spray nozzle shaped inset (45) with its ends in tightened connection to the first duct wall (46), and that evacuation air from the second duct (39) can flow between the first duct wall and the inset wall around the contraction part (26) of the inset and further through apertures (28) in the nozzle wall into the air flow of the first duct (38).

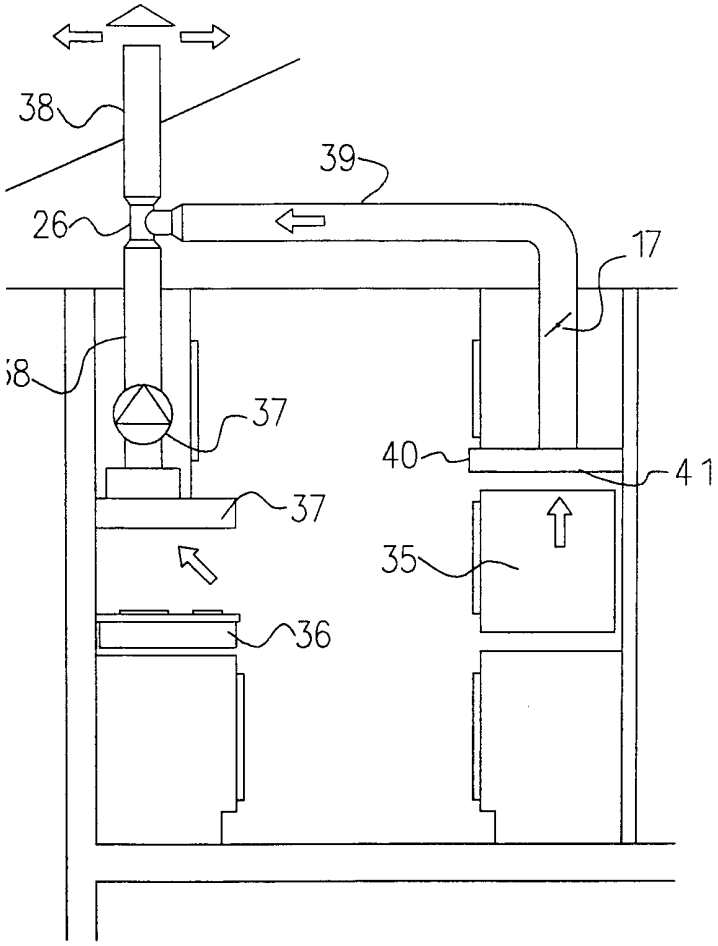


FIG 1

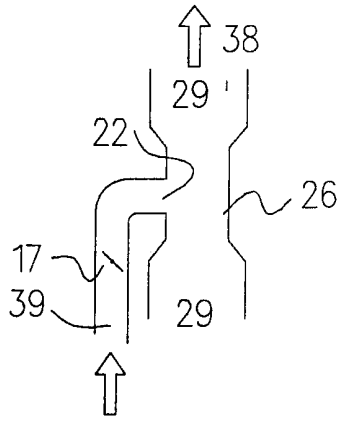


FIG 2

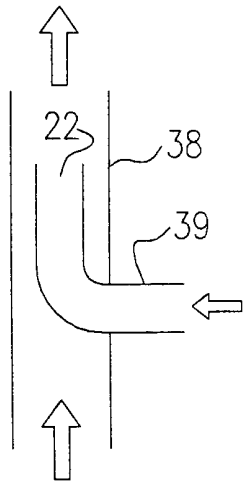


FIG 3

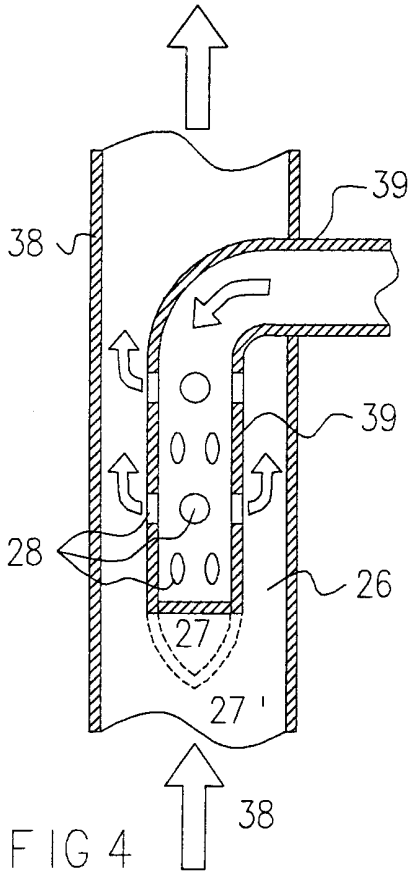


FIG 4

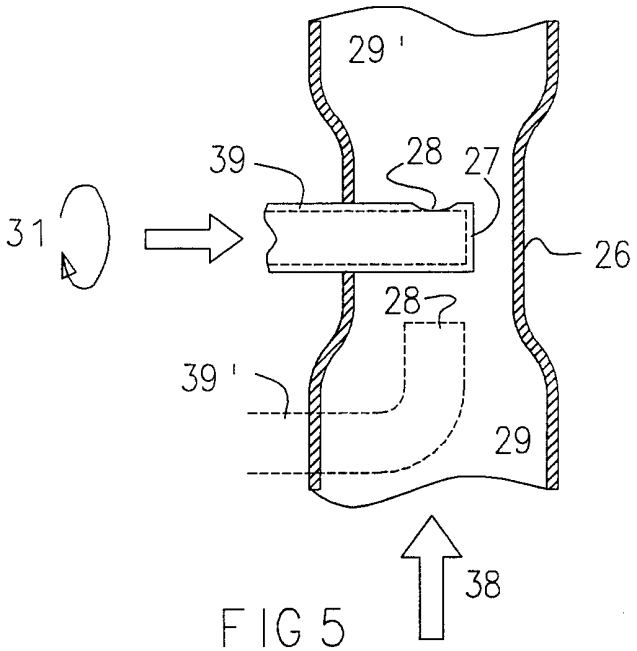


FIG 5

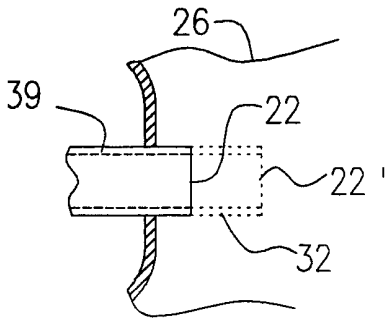


FIG 6

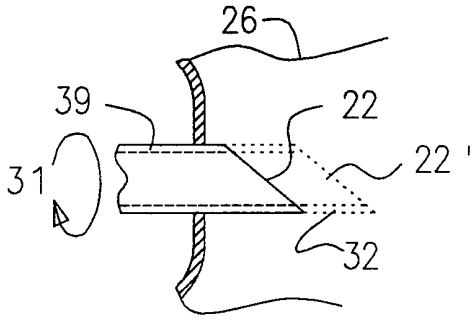


FIG 7

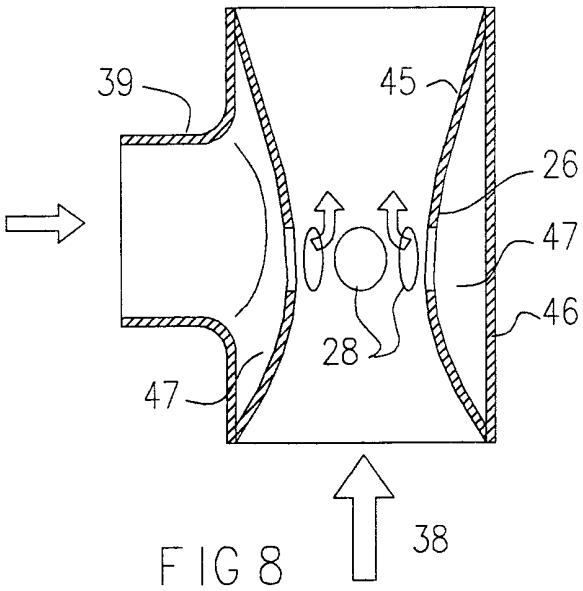


FIG 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00119

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B08B 15/02, F24C 15/20, F24F 7/06
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 99/00119

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

07/04/99

International application No.
PCT/SE 99/00119

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