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(54) **Terminal unit**

(57) The terminal unit (100) comprises an air chamber (10), a fresh air inlet (11) in the upper part of the air chamber (10), whereby an outdoor fresh inlet air flow (L1) is blown into the air chamber (10) through said fresh air inlet (11), a circulated air inlet (12) in the upper part of the air chamber (10) near the ceiling (H1) of the space (H) to be ventilated, an air outlet (13) in the lower part of the air chamber (10) near the floor (H2) of the space (H) to be ventilated. The terminal unit (100) further comprises a smoke damper (30) in the circulated air inlet (12), said smoke damper (30) closing the circulated air inlet (12) in a fire situation.

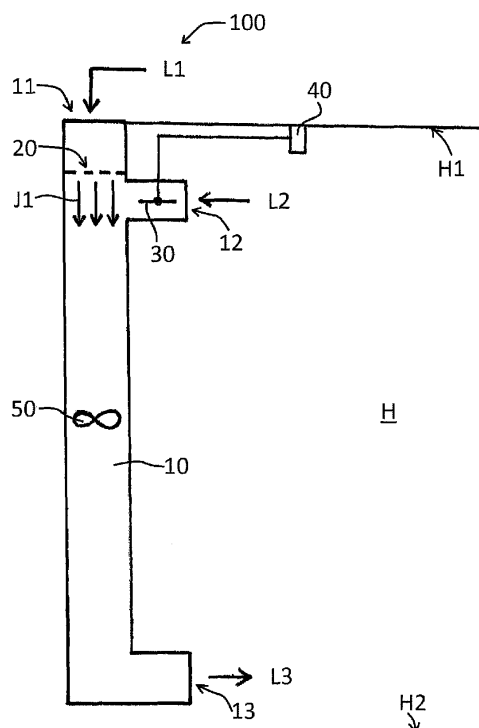


FIG. 1

Description

FIELD OF INVENTION

[0001] The invention concerns a terminal unit according to the preamble of claim 1.

PRIOR ART

[0002] Prior art smoke ventilation strategies in buildings, ships or oil platforms with human residence are based on the principle of isolating the fire cell, such as a bedroom, a cabin, a hotel room or a patient room, thus preventing the smoke from escaping from the fire cell to other housing cells or to escape routes. The isolation is typically made with smoke dampers that are used to close the airway out of the fire cell.

[0003] Furthermore there exist systems in certain European countries for separate smoke ventilation of escape routes. Separate smoke ventilation is also proposed for individual fire cells, but not applied in housing cells due to its cost. There is no cost efficient way to use an existing ventilation system of a housing cell to aid people in escaping out of the housing cell.

[0004] The displacement ventilation principle is known to be an optimal way to discharge fresh air close to the floor level in a housing cell. Especially in a fire situation it creates stratified conditions and a fresh air zone close to the floor allowing the smoke from the fire to collect at the upper zone. This fresh air zone can be used to evacuate people safely from the housing cell. However, during normal use of the building traditional displacement ventilation has too limited cooling capacity for many applications, because the temperature difference in displacement ventilation has to be limited in order not to create draft into the room.

SUMMARY OF INVENTION

[0005] The terminal unit according to the invention is characterised by the features presented in the characterising part of claim 1.

[0006] The terminal unit according to the invention comprises an air chamber, a fresh air inlet in the upper part of the air chamber, whereby an outdoor fresh inlet air flow is blown into the air chamber through said fresh air inlet, a circulated air inlet in the upper part of the air chamber near the ceiling of the space to be ventilated, an air outlet in the lower part of the air chamber near the floor of the space to be ventilated. The terminal unit comprises further a smoke damper in the circulated air inlet, said smoke damper closing the circulated air inlet in a fire situation.

[0007] The circulation of the room air can be accomplished by the induction principle. Fresh air is supplied through a nozzle plate situated inside the terminal unit, whereby high-speed fresh air jets are formed in the nozzle plate which create an under pressure inside the terminal

unit. The under pressure in circulated air inlet sucks air into the terminal unit from the room. The circulated room air is then mixed with the fresh air flow in the terminal unit after which the combined airflow is introduced into the room through the air outlet.

[0008] Another possibility to arrange the circulation of the room air is to use a fan that circulates room air inside the terminal.

[0009] The terminal unit is additionally equipped with a smoke damper in the circulated air inlet, which smoke damper closes the circulation air path in a fire situation. The smoke damper can be connected to a smoke sensor or some other type of fire alarm that causes the activation of the smoke damper. If a fan is used to circulate room air, then also the fan is stopped in the case of a fire alarm.

[0010] The closure of the circulation air path in a fire situation prevents mixing of the fresh air and the room air. Fresh air is in this situation supplied with a low velocity to the floor level of the room where the fresh air creates a fresh air zone, which helps in evacuating the room safely.

[0011] The invention will be described in the following by referring to some advantageous embodiments of the invention, which are shown in the figures of the appended drawings, but there is no intention to restrict the invention to these alone.

BRIEF DESCRIPTION OF FIGURES

[0012] Figure 1 is a schematic cross-sectional view of a terminal unit according to the invention.

DESCRIPTION OF ADVANTAGEOUS EMBODIMENTS

[0013] Figure 1 is a cross-sectional view of a terminal unit according to the invention.

[0014] The terminal unit 100 comprises an air chamber 10 extending from the upper part of the space to be ventilated e.g. a housing cell H to a lower part of the housing cell H. The cross-section of the air chamber 10 can be of any format e.g. rectangular, circular, elliptic, polygonal etc. The upper part of the air chamber 10 comprises a fresh air inlet 11, whereby a fresh air flow L1 is blown to the air chamber 10 through said fresh air inlet 11. The upper part of the air chamber 10 also comprises an induction unit i.e. a nozzle plate 20 through which the fresh air flow L1 is blown downwards in the air chamber 10. The fresh air flow L1 is formed into downwards directed high-speed air jets J1 in the nozzle plate 20.

[0015] The air chamber 10 comprises further a circulated air intake 12, whereby a circulated air flow L2 from the housing cell H is introduced into the air chamber 10 through said circulated air intake 12. The circulated air intake 12 comprises a smoke damper 30 by which it is possible to close the circulated air intake 12 in a fire situation. The smoke damper 30 is controlled by a smoke detector 40. The downward directed air jets J1 induce circulated air to flow from the housing cell H into the air

chamber 10 through the circulated air intake 12. The circulated air flow L2 is then mixed with the fresh air flow L1 in the air chamber 10 forming a downward directed combined air flow L3 in the air chamber 10. The circulated air intake 12 is situated in the upper part of the housing cell H near the ceiling H1 of the housing cell H.

[0016] The air chamber 10 comprises further an air outlet 13, whereby the combined air flow L3 is blown to the housing cell H through said air outlet 13. The air outlet 13 is situated in the lower part of the housing cell H near the floor H2 of the housing cell H.

[0017] The circulation of the room air is accomplished by the induction principle produced by the high-speed air jets J1 in the air chamber 10. The circulation of the room air could also be accomplished by a fan 50 in the air chamber 10. The fan 50 could be mounted in the circulated air inlet 12 or somewhere else in the air chamber 10. The nozzle plate 20 is naturally not needed in such a situation.

[0018] The smoke damper 12 closes the circulated air inlet 12 in a fire situation, which stops the circulation of room air L2 into the air chamber 10. Fresh outdoor air L1, is, however, still blown into the housing cell H through the air outlet 13. This fresh outdoor air that is blown into the housing cell H from the fresh air outlet 13 near the floor H2 of the housing cell H helps in the evacuating of the room cell H.

[0019] The above was only a presentation of some advantageous embodiments of the invention, and it is obvious to a person skilled in the art that numerous modifications can be made to these within the scope defined in the appended claims.

Claims

1. Terminal unit (100) comprising:

- an air chamber (10),
- a fresh air inlet (11) in the upper part of the air chamber (10), whereby an outdoor fresh inlet air flow (L1) is blown into the air chamber (10) through said fresh air inlet (11),
- a circulated air inlet (12) in the upper part of the air chamber (10) near the ceiling (H1) of the space (H) to be ventilated,
- an air outlet (13) in the lower part of the air chamber (10) near the floor (H2) of the space (H) to be ventilated,

characterised in that:

- a smoke damper (30) is situated in the circulated air inlet (12), said smoke damper (30) closing the circulated air inlet (12) in a fire situation.

2. Terminal unit (100) according to claim 1, **characterised in that** the air chamber (10) comprises an in-

duction unit (20) that forms high-speed air jets of the fresh inlet air flow (L1), said high-speed air jets (J1) inducing a circulated air flow (L2) to flow from the space (H) to be ventilated into the air chamber (10) through the circulated air inlet (12).

3. Terminal unit (100) according to claim 1, **characterised in that** the air chamber (10) comprises a fan (50), which circulates air from the space (H) to be ventilated into the air chamber (10) through the circulated air inlet (12).

4. Terminal unit (100) according to any of claims 1-3, **characterised in that** the terminal unit (100) comprises a smoke detector (40) by which the smoke damper (30) in the circulated air inlet (12) is controlled.

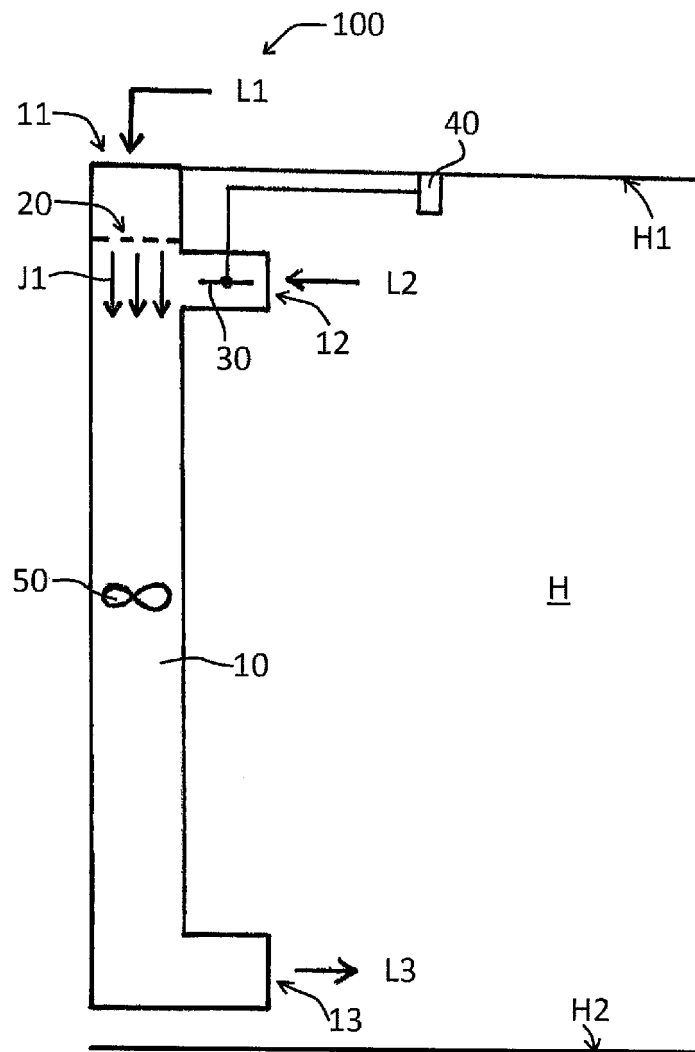


FIG. 1



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 0972

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Y	* paragraph [0032]; figures 4,4a *	1-4	F24F1/01
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Y	US 2006/150644 A1 (WRUCK RICHARD A [US]) 13 July 2006 (2006-07-13)	1-4	
	* paragraph [0054] - paragraph [0068]; figure 1 *		

			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 August 2011	Examiner Valenza, Davide
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 16 0972

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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