



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.11.2000 Bulletin 2000/47

(51) Int. Cl.⁷: **F24F 9/00**

(21) Application number: **00660094.4**

(22) Date of filing: **19.05.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **21.05.1999 FI 991157**

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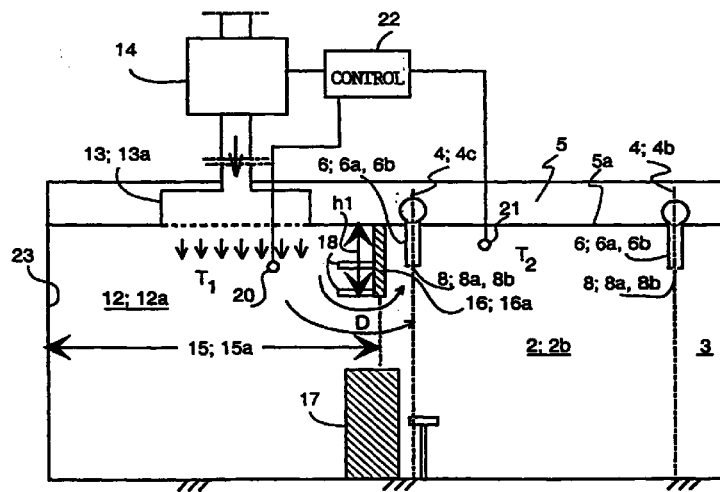
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(54) **Method for arranging ventilation and a ventilation arrangement**

(57) The invention relates to a method for arranging ventilation in a room space, particularly a restaurant space, and a respective ventilation arrangement. The room space is divided into areas designated for smokers and non-smokers. According to the invention, at the border (4; 4a) of said areas, in the ceiling structures (5), there is arranged a downwardly directed air flow stop (6;

6a, 6b), and the air exhaust from the room space is arranged to take place at least partly in the vicinity of said stop (6; 6a, 6b). In said stop (6; 6a, 6b), there is provided a number of exhaust air apertures (8; 8a, 8b), which are connected to an exhaust air apparatus.



B - B

FIG.5

Description

[0001] The invention relates to a method according to claim 1 for arranging ventilation in room facilities, particularly in restaurant facilities.

[0002] The invention also relates to a method according to the preamble of claim 13 for arranging ventilation in room facilities, particularly in restaurant facilities.

[0003] Moreover, the invention relates to an ventilation arrangement for room facilities, particularly restaurant facilities, according to the preamble of claim 16.

[0004] Further, the invention relates to an ventilation arrangement for room facilities, particularly restaurant facilities, according to the preamble of claim 27.

[0005] In the prior art there is known a method for providing ventilation in a room, such as a restaurant, wherein at a low input speed, air is fed into the room space in the vicinity of the floor, either from walls or from the middle section of the room, and air is generally exhausted near the ceiling structures. The described method aims at a substitute ventilation, where the incoming air and exhaust air are mixed as little as possible.

[0006] However, by means of this generally applied method, it is difficult to provide for ventilation in room facilities, particularly restaurant facilities, which are divided into separate areas designated for smokers and non-smokers. This is due to the fact that the thick cigarette smoke flows fairly easily from one or several areas designated for smokers to the areas designated for non-smokers, and particularly the border area is wide and flexible depending on the number of people present on the premises and on their movements. An obvious solution for the problem is to construct separate facilities altogether. Generally this is not, however, desirable, because the current trend is to keep the restaurant facilities as a uniform space where both the customers and the staff can move in a relatively free fashion.

[0007] Another remarkable problem in the ventilation of room facilities, particularly restaurant facilities, is caused by separate work stations, specially in areas designated for smokers. Cigarette smoke usually floats to the work station and disturbs particularly those employees who do not smoke. There has not been suggested any straightforward method for solving this problem. In general, the discussion of the whole issue has only just started.

[0008] The object of the invention is to eliminate the drawbacks connected to the ventilation method described above. Another object of the invention is to realize a novel method, advantageously two novel methods, for arranging ventilation in room facilities, particularly in restaurant facilities.

[0009] The method according to the invention for arranging ventilation in room facilities, particularly in restaurant facilities, is characterized by what is set forth in the appended claim 1.

[0010] Another method according to the invention for arranging ventilation in room facilities, particularly in restaurant facilities, is characterized by what is set forth in the appended claim 13.

5 [0011] The ventilation arrangement according to the invention for room facilities, particularly restaurant facilities, is characterized by what is set forth in the appended claim 16.

10 [0012] Another ventilation arrangement according to the invention for room facilities, particularly restaurant facilities, is characterized by what is set forth in the appended claim 27.

[0013] Preferred embodiments of the invention are set forth in the dependent claims.

15 [0014] According to the invention, in a method for arranging ventilation in room facilities, particularly restaurant facilities, divided into separate areas designated for smokers and non-smokers, at the borders of said areas, in the ceiling structures, there is arranged a downwardly directed air flow stop, advantageously a wall, and the air exhaust from the room facilities is arranged to take place at least partly in the vicinity of said stop.

20 [0015] According to the invention, the ventilation arrangement provided for room facilities, particularly restaurant facilities, said facilities being divided into areas designated for smokers and non-smokers, includes a downwardly directed air flow stop, advantageously a wall, which is arranged at the border of said areas, in the ceiling structures, and the air exhaust from the room facilities is arranged to take place by air exhaust means at least partly in the vicinity of said stop.

25 [0016] The basic principle of the invention is that at the border of said areas, there is provided an air flow stop, and that air exhaust is arranged to take place in connection with said stop. Warm air rises up and tends to move, in the vicinity of the ceiling structures, in parallel with said structures, and to mix. Now the flow stop restricts the passage of air between the separate areas, and particularly the floating of the cigarette smoke containing air from the smokers' area to the non-smokers' area. Air exhaust takes place at the air flow stop or in the immediate vicinity thereof.

30 [0017] The above described basic principle of the invention is likewise applied in the second method for arranging ventilation in room facilities, particularly restaurant facilities. Also in this case, there is utilized an air flow stop; by means of said stop, a work station is surrounded in the ceiling structures, and incoming air is brought at the same low speed from upwards to the work station. By applying this method, fresh incoming air flows out of the work station, wherefore it cannot be mixed with the stale air surrounding the work station. Air exhaust is arranged outside the work station.

35 [0018] It is an advantage of the invention that ventilation is now arranged in room facilities, particularly in restaurant facilities, which are divided into separate areas designated for smokers and non-smokers, so that

cigarette smoke or the like is prevented from floating to the areas designated for non-smokers. Such quantities of air impurities that happen to proceed to the non-smoker areas are minimal and remain under the set limit values. Owing to the invention, the quantities of harmful particles contained in the air in the room facilities, particularly in the vicinity of work stations, said impurities being mainly caused by smoking, are dropped to a fraction with respect to the current quantities contained in the air at the work stations.

[0019] Another advantage of the invention is that in areas designated for smokers, there can be arranged work stations where the quantities of cigarette smoke and other corresponding harmful particles remain below the set target level. In this fashion, for instance a bar in a restaurant can be divided, by conforming to the counter, into a smoking area and a non-smoking area designated for the employees. Respectively, for example gambling tables can be arranged to be separate smoke-free work stations even in the smokers' area.

[0020] The invention is described in more detail below, with reference to the accompanying drawings, where

- figure 1 illustrates a room space, particularly a restaurant space, seen from above, wherein the ventilation method and arrangement according to the invention are applied;
- figure 2A shows the air stop in cross-section and the room space of figure 1 in a cross-section along the line A-A;
- figure 2B illustrates an air stop according to figure 2A, seen from underneath;
- figure 2C illustrates an alternative of the air stop according to figure 2A, seen from underneath;
- figure 3A shows a third air stop in cross-section and an alternative cross-section along the line A-A;
- figure 3B illustrates the air stop of figure 3A, seen from the side;
- figure 3C illustrates an alternative of the air stop of figure 3A, seen from the side;
- figure 4 shows a fifth air stop in cross-section and an alternative cross-section along the line A-A;
- figure 5 illustrates an enlarged cross-section along the line B-B of one work station in the room space of figure 1; and
- figure 6 illustrates an enlarged cross-section along the line C-C of another work station in the room space of figure 1.

[0021] In figure 1, a room space 1, particularly a restaurant space, is divided into areas 2; 2a, 2b; 3, so that the first area 2; 2a, 2b is an area reserved for smokers, i.e. smoking area, and the second area 3 is an area

reserved for non-smokers, i.e. a smokeless area. In both areas 2; 2a, 2b; 3 in the restaurant space or the like, there are generally placed tables and chairs for customers. Thus the serving personnel and the customers can move relatively freely both in the smoking area and in the smokeless area.

[0022] According to the invention, ventilation is arranged in a room space 1, so that at the border 4; 4a, 4b, 4c of the areas 2; 2a, 2b; 3 designated for smokers and non-smokers, in the ceiling structures 5, there is arranged a downwardly directed and longitudinally uniform air flow stop 6, advantageously a wall that passes through the whole room space, from wall to wall. Further, according to the invention, in connection with said stop 6 or in the immediate vicinity thereof, there is arranged air exhaust from the room space 1.

[0023] The purpose of the stop 6 is to restrict and prevent the warm, polluted air rising up from the smokers' side 2; 2a, 2b from flowing to the smokeless area 3 in the vicinity of the ceiling structures 5. Thus, by means of said stop 6, the passage of essentially horizontal air currents in the vicinity of the ceiling 5 is strongly restricted. Air exhaust from the room facilities is arranged to take place at least partly by means of air exhaust means provided in connection with the stop 6.

[0024] Generally the ceiling structures in a room space 1, particularly in a restaurant space, include a lowered ceiling 5a. Between the ceiling proper and the lowered ceiling, there are placed, among others, ventilation ducts, lamps and electric wires. Thus the stop 6 is as a downwardly directed wall or the like that is suspended from the lowered ceiling 5a. The lowered ceiling 5a is also considered as at least a relatively air-tight structure.

[0025] The height h of the stop 6, measured in the downwardly direction from the ceiling structure 5, is arranged to be essentially longer than the room height. Generally the room height is of the order 250 - 270 cm. The height h of the stop 6 is advantageously within the range 15-70 cm. However, it is pointed out that the stop 6 is installed in the ceiling structure 5 so that the protruding end 7c of said stop 6, with respect to the ceiling structure 5, does not extend so far down that it should disturb people moving in the restaurant space 1 or the like. Thus the stop is generally not extended lower than to a distance of 200 cm from the floor level.

[0026] In the embodiments according to the drawings, the sides 7a, 7b of the stop 6 are vertical, but they can also be inclined or oblique with respect to the level of the ceiling, such as the lowered ceiling 5a.

[0027] The stop 6 can be realized of several different materials, for instance of transparent acrylic plate, wood, metal, cloth etc.

[0028] In the stop 6, there is provided a number of exhaust air apertures 8. Said exhaust air apertures are arranged essentially in the longitudinal direction of the stop 6, i.e. in parallel to the ceiling, such as a lowered ceiling 5a, and advantageously along the whole length

of the stop 6. The exhaust air apertures 8 are connected, with a suitable exhaust air duct 9 to the exhaust air apparatus 10. The stop 6 as such can be for example hollow, in which case the interior space thereof constitutes part of the exhaust air duct. The exhaust air apertures 8, the exhaust air duct or ducts 9 and the exhaust air apparatus 10 together form at least part of the ventilation means for the room space 1. Through the exhaust air apertures 8, at least part of the exhaust air is first conducted to the exhaust air duct 9 and further, via the exhaust air apparatus 10 proper, out of the room space 1.

[0029] The exhaust air apertures 8 can be arranged in the stop 6 in various different ways, as is illustrated in figures 2A, 2B, 2C, 3A, 3B and 3C.

[0030] The exhaust air apertures 8, 8a, 8b are most advantageously arranged in the protruding end 7c of the stop 6; 6a, 6b, as is illustrated in figures 2A, 2B and 2C. In that case both sides 7a, 7b of the stop 6; 6a, 6b are unbroken.

[0031] The sides 7a, 7b of the stop 6; 6a, 6b direct the air flow that hits the ceiling, such as the lowered ceiling 5a, in parallel direction with respect to said ceiling, downwardly towards the protruding end 7c positioned in the longitudinal direction of the stop 6; 6a, 6b, so that air is exhausted via the exhaust air apertures 8; 8a, 8b and discharged from the room space 1.

[0032] As an alternative, the exhaust air apertures 8; 8c, 8d are arranged at least on one side 7; 7a of the stop 6; 6c, 6d, said side being advantageously directed towards the area 2; 2a reserved for smokers, as is illustrated in figures 3A, 3B and 3C. The exhaust air apertures 8; 8c, 8d can be arranged on both sides 7; 7a, 7b of the stop 6; 6c, 6d, but exhaust air apertures on the side of the area reserved for non-smokers 3 (not illustrated) are not necessary. Naturally they can help in boosting the ventilation in the smokeless area 3. However, the essential point in this case is that especially in the smoking area 2; 2a, 2b, ventilation is carried out effectively in the vicinity of the stop 6; 6c, 6d.

[0033] In the embodiments illustrated above, the exhaust air apertures 8 are provided in connection with the stop 6. In the embodiment according to figure 4, a number of exhaust air apertures 8; 8e (and 8f) are arranged in the immediate vicinity of the stop 6; 6e (cf. the dotted line in figure 1). Advantageously the exhaust air apertures 8; 8e (and 8f) are provided adjacent to the stop 6; 6e, in the ceiling structure 5 and particularly in an exhaust air duct 9; 9b (and 9c) arranged therein. The exhaust air duct 9; 9b (and 9c), and at the same time the exhaust air apertures 8; 8e (and 8f) are essentially installed in the longitudinal direction of the stop, either in the immediate vicinity of the junction between the stop 6; 6c and the ceiling, or for example at a distance of 10 - 15 cm therefrom. The maximum distance of the exhaust air duct 9; 9b, 9c, including the exhaust air apertures 8; 8c, 8d, from the stop is for example 50 cm.

[0034] The exhaust air duct 9; 9b with exhaust air

apertures 8; 8c is advantageously provided only on one side of the border 4; 4a, and advantageously in the smoking area 2, 2a. However, it can also be arranged in the smokeless area 3, in the immediate vicinity of the stop 6; 6e, as is illustrated by dotted lines in fig 4. Also in this case the exhaust air apertures 8; 8c, 8d are connected, via the exhaust air duct 9; 9b, 9c, to the exhaust air apparatus 10; 10a proper, whereby at least part of the exhaust air is discharged from the room space 1.

[0035] In the above described embodiment of the stop 6, the exhaust air apertures 8 are separate apertures spaced apart, as is illustrated in figures 2B and 3B. In a preferred embodiment of the invention, the exhaust air apertures 8; 8b, 8d are arranged as an elongate, uniform air exhaust slot, as is illustrated in figures 2C and 3C.

[0036] In the method according to the invention, the input of fresh incoming air is preferably arranged in one or several smokeless areas 3; 3a. The feeding of incoming air is realized by means of an air input device 11, which is preferably fitted in the ceiling structures 5 of the smokeless area 3. In addition, the feeding of the incoming air is arranged to take place at a low flow speed, advantageously within the range 0.1 - 0.2 m/s. In that case the air input device is a low-speed air input device. The advantage of said device is that the air mixing ratio is low, i.e. the tiny air jets entering the room space do not carry along a lot of surrounding air.

[0037] Thus the feeding of incoming air is advantageously arranged to take place from the top to the room space 1. However, the incoming air can also be fed on the floor level, for instance beside one or several walls, or in the middle section 1 of the room space, for example by means of air input devices installed in connection with pillars arranged therein, said devices likewise being advantageously low-speed air input devices. Also in this case, the air input devices are particularly located in the smokeless area 3.

[0038] It was already pointed out that the air exhaust from the room space is arranged to take place at least through the exhaust air apertures 8; 8a, 8b, 8c, 8d of the stop 6; 6a, 6b, 6c, 6d. However, air exhaust from a room space 1, particularly a restaurant space, needs often to be boosted, and in that case the air exhaust from the room space is arranged to take place expressly from the smoking area 2; 2a, in addition to the exhaust air arrangement provided in connection with said stop 6. In that case it is advantageous to install one or several exhaust air apparatuses 10; 10b in the ceiling structures 5 of the smoking area 2; 2a, as is illustrated in figure 1. The placing of the exhaust air apparatus 10; 10b in the ceiling structures is most advantageous, because now the warm and smoke-polluted air rising upwardly is efficiently exhausted from the room space 1 and discharged therefrom.

[0039] In a room space 1, particularly in a restaurant space, there are often arranged separate service stations 12; 12a, 12b, such as a bar counter 12a for

serving drinks and a gambling table 12b, such as a card table, figure 1. Usually said stations 12; 12a, 12b are located in the smoking area 2; 2a, or they are at least partly or completely surrounded by the smoking area 2; 2b. The problem with said work stations is how to ensure the intake of fresh air for the employees, and to protect them from cigarette smoke.

[0040] According to the invention, said problem related to the work station is solved so that in each work station 12; 12a, 12b, figures 5 and 6, that is particularly located in the area reserved for smokers 2; 2a, 2b or in the immediate vicinity thereof, there is arranged the feeding of incoming air, which is realized at a low flow speed, preferably within the range 0.1 - 0.2 m/s, by means of a suitable air input device 13; 13a, 13b; that the feeding of incoming air is directed from top, i.e. from the ceiling structure 5 downwardly, in which case the air input device 13; 13a, 13b is installed in connection with the ceiling structure 5; and that the feeding of incoming air is arranged to take place within that area 15; 15a, 15b where people are working; and that the air input area 15; 15a, 15b thus defined is outlined by means of an air flow stop 16 arranged around said area and directed downwardly from the ceiling structures 5, said stop being advantageously a wall. Moreover, it is advantageous that the temperature of the incoming air is kept close to the room temperature, preferably so that the temperature difference does not surpass 5° C.

[0041] Ventilation arrangements according to the above described method are illustrated in figures 1, 5, 6 and 7. A low-speed air input device 13; 13a, 13b is fitted in the ceiling structures of a work station 12; 12a, 12b. Figure 5 illustrates the ventilation arrangement of a restaurant or a similar bar counter work station, whereas figure 6 illustrates the ventilation arrangement in a work station of for example a gambling table or a disc jockey. In the ceiling structures around the air input device 13; 13a, 13b, there is arranged a downwardly directed air flow stop 16; 16a, 16b, advantageously a wall. In addition, said air flow stop 16 can constitute part of the wall proper 23 or the like of said room space, as is illustrated in figure 5.

[0042] By means of the air flow stop 16; 16a, 16b, there is defined the air input area 15; 15a, 15b. The surface area of the air input area 15; 15a, 15b defined by the air flow stop 16; 16a, 16b is essentially equal to the employee's working space, i.e. the area where the employee mainly serves his customers. The area 15; 15a, 15b defined by the air flow stop 16; 16a, 16b is for example half of the space where the employee moves, advantageously about 70 - 80%, even as much as 100%. The surface area of the air input device 13; 13a, 13b itself, particularly the surface area of the feeding part fitted in the ceiling structure 5, is generally clearly smaller than the area outlined by the air flow stop 16. The surface area of the air input device 13; 13a, 13b is for example 30 - 60% of the area outlined by the air flow stop, but in some embodiments it can be even 100%

thereof.

[0043] The height h₁, h₂ of the air flow stop 16; 16a, 16b when seen downwardly from the ceiling is at least 150 mm and at most of the order 300-400 mm. However, in some cases part of the air flow stop 16 constitutes part of the wall 23 proper of the room, in which case it extends from top to bottom. Thus the air flow stop 16; 16a, 16b encompasses the air input device 13; 13a, 13b, and consequently there is created a clear incoming air area, where the input velocities are low, i.e. of the order 0.1 - 0.2 m/s. This prevents the mixing of impure air in the air of the work station, i.e. the floating of smoky air from the smoking area 2; 2a, 2b to the work station 12; 12a, 12b.

[0044] In the embodiment according to figures 5 and 6, the air flow stop 16; 16a is made for example of transparent acrylic plate, wood, metal, cloth etc. In a bar work station, one or several air input devices 13; 13a covers, when seen from the top, for instance 50% of the free working space of the employees working in the bar inside the counter 17. In connection with the air flow stop 16; 16a, there can also be arranged shelves 18 for glasses and other instruments needed in the bar work station. The air flow in the work station 12; 12a, 12b takes place out of the work station in the direction of the arrows D, E, as is illustrated in figures 5 and 6. Thus the smoke from the cigarettes of people smoking at the counter 17 or at the gambling table 19 does not float into the work station, but it is exhausted by an exhaust air device, out of the room space 1 for example by means of air exhaust means provided in connection with a stop 6; 6a, 6b arranged in the border area 4; 4a, 4b of areas designated for smokers and non-smokers, as is illustrated above.

[0045] The air flow stop 16; 16a, 16b can also be realized as an air flow stop 6 that is applied in the border area 4; 4a, 4b between the smoking area 2; 2a, 2b and the smokeless area 3, and in connection with which the air exhaust from the room space is at least partly arranged. In that case the stops 6; 6a, 6b, 6c, 6d, 6e illustrated in figures 2A, 2B, 2C; 3A, 3B, 3C and 4 can as such be provided around the air input device 13; 13a, 13b in order to outline the air input area 15; 15a, 15b.

[0046] According to what is set forth above, the stop 16; 16a can be replaced by the stop 6; 6a, 6b in the work station 12; 12a in figure 5, in which case also the ventilation in the border areas of the work station is improved and the ventilation system is simplified.

[0047] In a preferable embodiment, the ventilation arrangement provided in a work station includes two temperature sensors 20, 21 which are connected to an incoming air regulating unit 22, and this is further connected to an input air device 14, through which incoming air is brought to the air input device 13; 13a, 13b of the work station 12; 12a, 12b. The first temperature sensor 21 is installed in the work station, advantageously near the ceiling structures 5 of the work station, in order to measure the temperature T₁ of the work station, and

respectively another temperature sensor 21 in the smoking area 2; 2a, advantageously near the ceiling structures 5, in order to measure the room temperature T_2 . The temperatures T_1 , T_2 obtained from the temperature sensors 20, 21 are observed, and the required heating/cooling instructions of the incoming air are given, from the regulating unit 22 to the input air device 14 in order to feed input air with a suitable temperature from the air input device 13; 13a, 13b to the work station 12; 12a, 12b. The temperature T_1 of the input air to be fed in the work station, and the room temperature T_2 are attempted to be kept roughly the same, however so that the temperature difference $T_2 - T_1$ does not surpass 5°C . By following this procedure, the air flow D, E from the work station 12; 12a, 12b can efficiently be kept directed outwardly towards the smoking area 2; 2a, 2b, so that neither in said air flow nor between the work station 12; 12a, 12b and the smoking area 2; 2a, 2b, there is created a temperature difference that should mix said air flows and possibly make the smoky air float into the work station.

[0048] According to performed test measurements, in the work station 12; 12a, 12b, there is achieved an air impurity content (smoke, nicotine, dust etc.) that is even thirty times lower than in the surroundings, i.e. in the smoking area 2; 2a, 2b.

[0049] The invention is not restricted to the above described embodiment only, but many modifications are possible within the scope of the inventive idea set forth in the appended claims.

Claims

1. A method for arranging ventilation in a room space (1), particularly in a restaurant space, which is divided into areas (2; 2a, 2b; 3), designated for smokers and non-smokers, characterized in that at the border (4; 4a, 4b, 4c) of said areas, in the ceiling structures (5), there is arranged a downwardly directed air flow stop (6; 6a, 6b, 6c, 6d, 6e), advantageously a wall, and that air exhaust from the room space is arranged to take place at least partly in the vicinity of said stop (6; 6a, 6b, 6c, 6d, 6e).
2. A method according to claim 1, characterized in that the height (h) of the stop (6; 6a, 6b, 6c, 6d, 6e) is arranged to be essentially smaller than the room height, preferably within the range 15 - 70 cm.
3. A method according to claim 1 or 2, characterized in that in the stop (6; 6a, 6b, 6c, 6d), there is arranged a number of exhaust air apertures (8; 8a, 8b, 8c, 8d) which are connected to an exhaust air apparatus (10; 10a) and through which at least part of the exhaust air is discharged from the room space (1).
4. A method according to claim 3, characterized in that the exhaust air apertures (8; 8c, 8d) are arranged in the protruding end (7; 7c) of the stop (6; 6b).
5. A method according to claim 3, characterized in that the exhaust air apertures (8; 8c, 8d) are arranged at least on one side (7; 7a, 7b) of the stop (6; 6c), said side being preferably directed towards the area reserved for smokers (2; 2a).
6. A method according to claim 1 or 2, characterized in that in the immediate vicinity of the stop (6; 6e), preferably in the ceiling structure (5), there is arranged an exhaust air duct (9; 9b, 9c) provided with a number of exhaust air apertures (8; 8e, 8f), said exhaust air duct (9; 9b, 9c) being connected to an exhaust air apparatus (10; 10a), through which apertures at least part of the exhaust air is discharged from the room space (1).
7. A method according to claim 3, 4, 5 or 6, characterized in that the exhaust air apertures (8b, 8d) are arranged to be a uniform, elongate air exhaust slot which is essentially as long as the stop (6c, 6d).
8. A method according to any of the preceding claims, characterized in that the input (11) of incoming air is arranged in the area reserved for non-smokers (3; 3a).
9. A method according to claim 8, characterized in that the input (11) of incoming air is arranged to take place at a low flow speed, which is preferably within the range 0,1-0,2 m/s.
10. A method according to claim 8 or 9, characterized in that the input (11) of incoming air is arranged to take place from above to the room space (1).
11. A method according to any of the preceding claims, characterized in that the air exhaust from the room space (10b) is arranged to take place from the area reserved for smokers (2; 2a) in addition to the exhaust air arrangement (10a) provided in connection with the stop (6; 6a, 6b, 6c, 6d, 6e).
12. A method according to any of the preceding claims, characterized in that in a work station (12; 12a, 12b), which is particularly located in the smoking area (2; 2a, 2b), there is arranged the input (13; 13a, 13b; 14) of incoming air, so that:
 - air input (13; 13a, 13b) takes place at a slow flow speed, preferably within the range 0.1 - 0.2 m/s;
 - air input (13; 13a, 13b) is arranged from above; and
 - air input (13; 13a, 13b) is arranged to take

- place in an area (15; 15a, 15b), which essentially corresponds to the working range of an employee,
- the air input area (15; 15a, 15b) is outlined by means of a stop (16; 16a, 16b; 6; 6a, 6b, 6c, 6d, 6e), advantageously a wall, arranged around said area and directed downwardly from the ceiling structures (5).
- 13.** A method for arranging ventilation in a room space, particularly in a restaurant space, which is divided into areas designated for smokers and non-smokers, characterized in that in a work station (12; 12a, 12b), expressly located in the smoking area (2; 2a, 2b), there is arranged the input (13; 13a, 13b; 14) of incoming air, so that
- air input (13; 13a, 13b) takes place at a slow flow speed, preferably within the range 0.1 - 0.2 m/s;
 - air input (13; 13a, 13b) is arranged from above; and
 - air input (13; 13a, 13b) is arranged to take place in an area (15; 15a, 15b), which essentially corresponds to the working range of an employee,
 - the air input area (15; 15a, 15b) is outlined by means of a stop (16; 16a, 16b; 6; 6a, 6b, 6c, 6d, 6e), advantageously a wall, arranged around said area and directed downwardly from the ceiling structures (5).
- 14.** A method according to claim 12 or 13, characterized in that the incoming air temperature (T_1) is kept close to the room temperature (T_2) preferably so, that the difference in the temperatures does not surpass 5° C.
- 15.** A method according to claim 12 or 13, characterized in that air exhaust from the room space is arranged to take place at least partly in the vicinity of the air flow stop (6; 6a, 6b, 6c, 6d, 6e) of the work station (12; 12a, 12b).
- 16.** A ventilation arrangement in a room space (1), particularly in a restaurant space, which is divided into areas designated for smokers and non-smokers (2; 2a, 2b; 3), characterized in that a downwardly directed air flow stop (6; 6a, 6b, 6c, 6d, 6e), advantageously a wall, is installed at the border (4; 4a, 4b, 4c) of said areas, in the ceiling structures (5), and that air exhaust from the room space is arranged to take place by air exhaust means (8; 8a, 8b, 8c, 8d, 8e, 8f; 9; 9a, 9b, 9c; 10; 10a), at least partly in the vicinity of said stop (6; 6a, 6b, 6c).
- 17.** A ventilation arrangement according to claim 16, characterized in that the height (h) of the stop (6; 6a, 6b, 6c, 6d, 6e) is essentially smaller than the room height, preferably within the range 15 - 30 cm.
- 18.** A ventilation arrangement according to claim 16 or 17, characterized in that in the stop (6; 6a, 6b, 6c, 6d), there is provided a number of exhaust air apertures (8; 8a, 8b, 8c, 8d) which are connected to an exhaust air apparatus (10; 10a) and through which apertures at least part of the exhaust air is discharged out of the room space (1).
- 19.** A ventilation arrangement according to claim 18, characterized in that the exhaust air apertures (8; 8c, 8d) are provided in the protruding end (7; 7c) of the stop (6; 6b).
- 20.** A ventilation arrangement according to claim 18, characterized in that the exhaust air apertures (8; 8c, 8d) are provided at least on one side (7; 7a, 7b) of the stop (6; 6c), which is preferably directed towards the area reserved for smokers (2; 2a).
- 21.** A ventilation arrangement according to claim 16 or 17, characterized in that in the immediate vicinity of the stop (6; 6e), preferably in the ceiling structure (5), there is arranged an exhaust air duct (9; 9b, 9c) provided with a number of exhaust air apertures (8; 8e, 8f), said exhaust air duct (9; 9b, 9c) being connected to the exhaust air apparatus (10; 10a), and through which apertures at least part of the exhaust air is discharged out of the room space (1).
- 22.** A ventilation arrangement according to claim 18, 19, 20 or 21, characterized in that the exhaust air apertures (8b, 8d) are arranged as a uniform, elongate air exhaust slot which is essentially as long as the stop (6c, 6d).
- 23.** A ventilation arrangement according to any of the preceding claims 16 - 22, characterized in that the air input device (11) is arranged in the area reserved for non-smokers (3).
- 24.** A ventilation arrangement according to claim 23, characterized in that the air input device (11) is a low-speed ventilation device.
- 25.** A ventilation arrangement according to claim 23 or 24, characterized in that the air input device (11) is arranged in the ceiling structures (5).
- 26.** A ventilation arrangement according to any of the preceding claims 16 - 25, characterized in that in a work station (12; 12a, 12b) which is particularly located in the area reserved for smokers (2; 2a, 2b), there is arranged a low-speed air input device (13; 13a, 13b), fitted in the ceiling structures (5), around which air input device (13; 13a, 13b) there is pro-

vided a downwardly directed air flow stop (16; 16a, 16b; 6; 6a, 6b, 6c, 6d, 6e), advantageously a wall, which is arranged to encompass an area (15; 15a, 15b) that essentially corresponds to the working range of an employee.

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27. A ventilation arrangement in a room space (1), advantageously a restaurant space, which is divided into areas (2; 2a, 2b; 3) designated for smokers and non-smokers, characterized in that in a work station (12; 12a, 12b), which is particularly located in the area reserved for smokers (2; 2a, 2b), there is arranged a low-speed air input device (13; 13a, 13b), fitted in the ceiling structures (5), around which air input device (13; 13a, 13b) there is provided a downwardly directed air flow stop (16; 16a, 16b; 6; 6a, 6b, 6c, 6d, 6e), advantageously a wall, which is arranged to encompass an area (15; 15a, 15b) that essentially corresponds to the working range of an employee.

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28. A ventilation arrangement according to claim 26 or 27, characterized in that in connection with the air flow stop (6; 6a, 6b, 6c, 6d) of the work station (12; 12a, 12b), there is provided a number of exhaust air apertures (8; 8a, 8b, 8c, 8d), which are connected to an exhaust air apparatus (10; 10a), and through which apertures at least part of the exhaust air is discharged from the room space (1).

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29. A ventilation arrangement according to claim 26, 27 or 28, characterized in that the arrangement includes an incoming air temperature and room temperature sensor (20, 21) and a regulating unit (22) whereby the incoming air temperature (T_1) is maintained close to the room temperature (T_2), preferably so that the difference in temperatures does not surpass 5°C .

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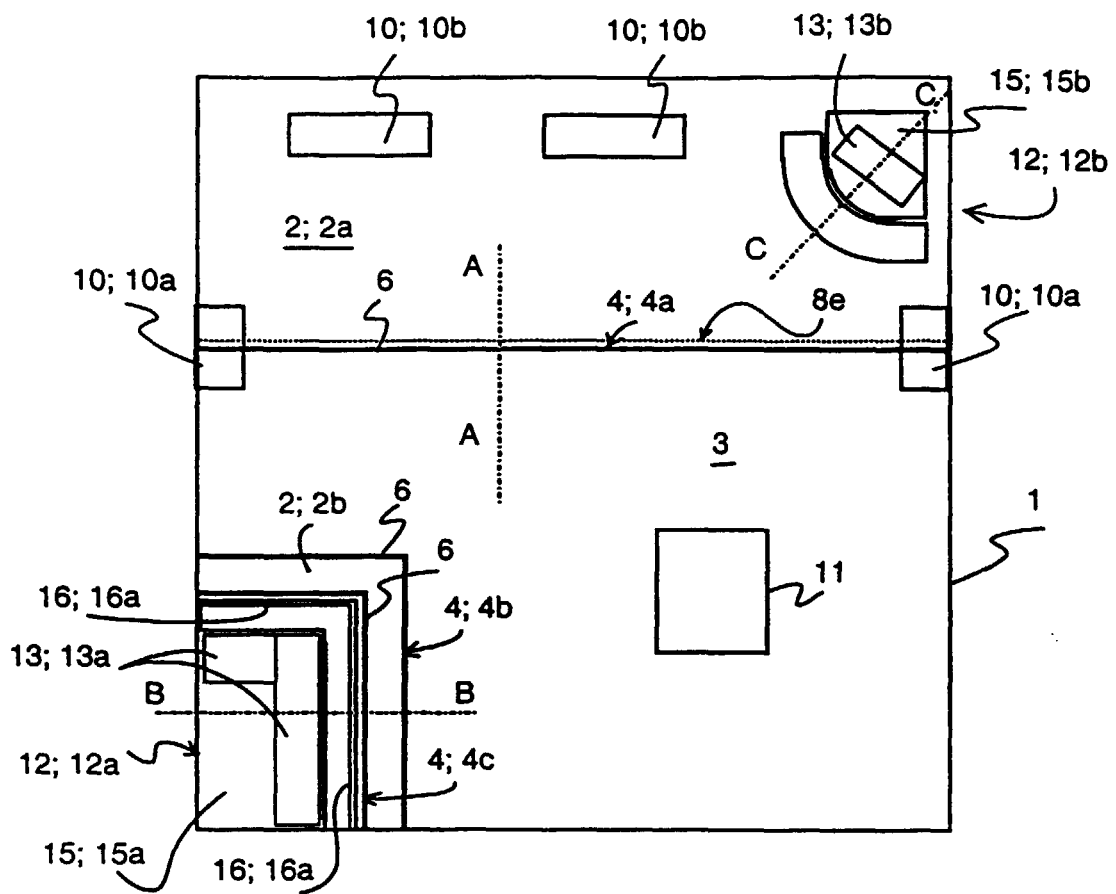


FIG. 1

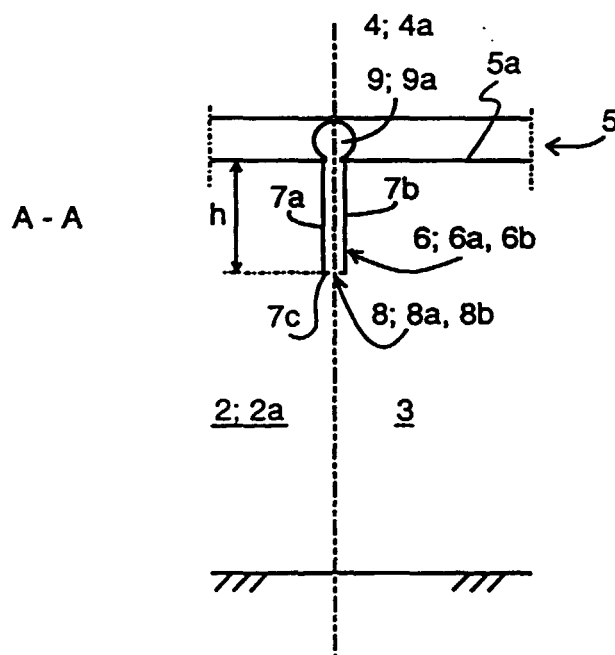


FIG. 2A

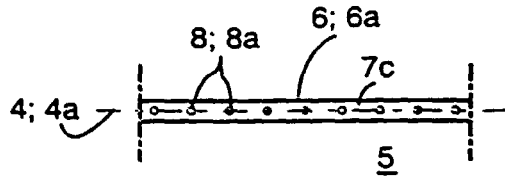


FIG. 2B

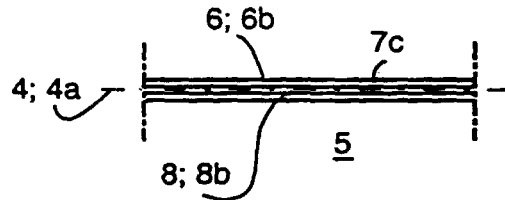


FIG. 2C

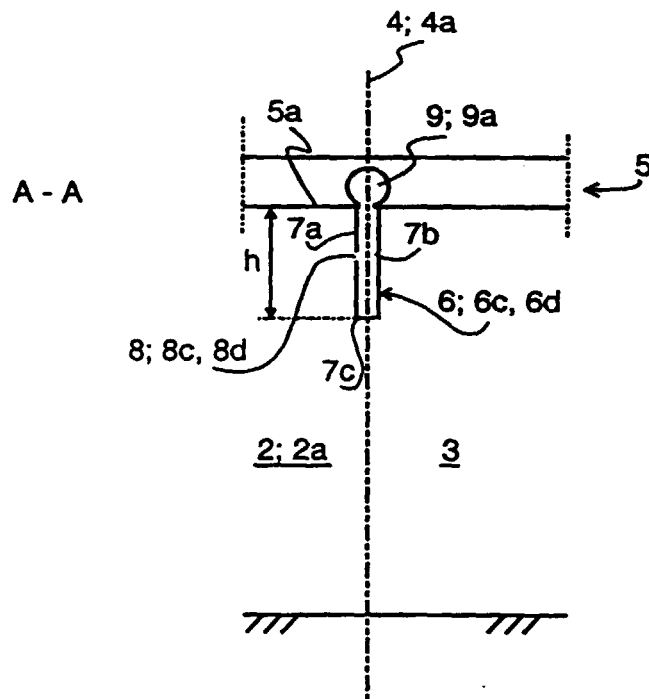


FIG. 3A

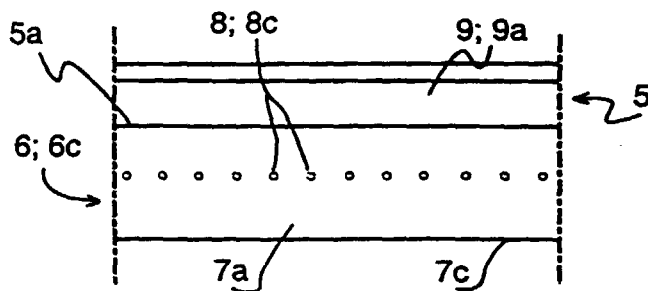


FIG. 3B

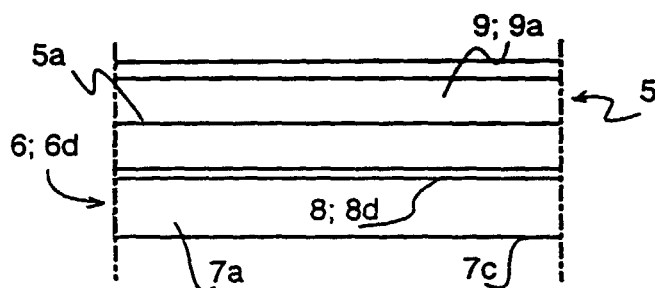


FIG. 3C

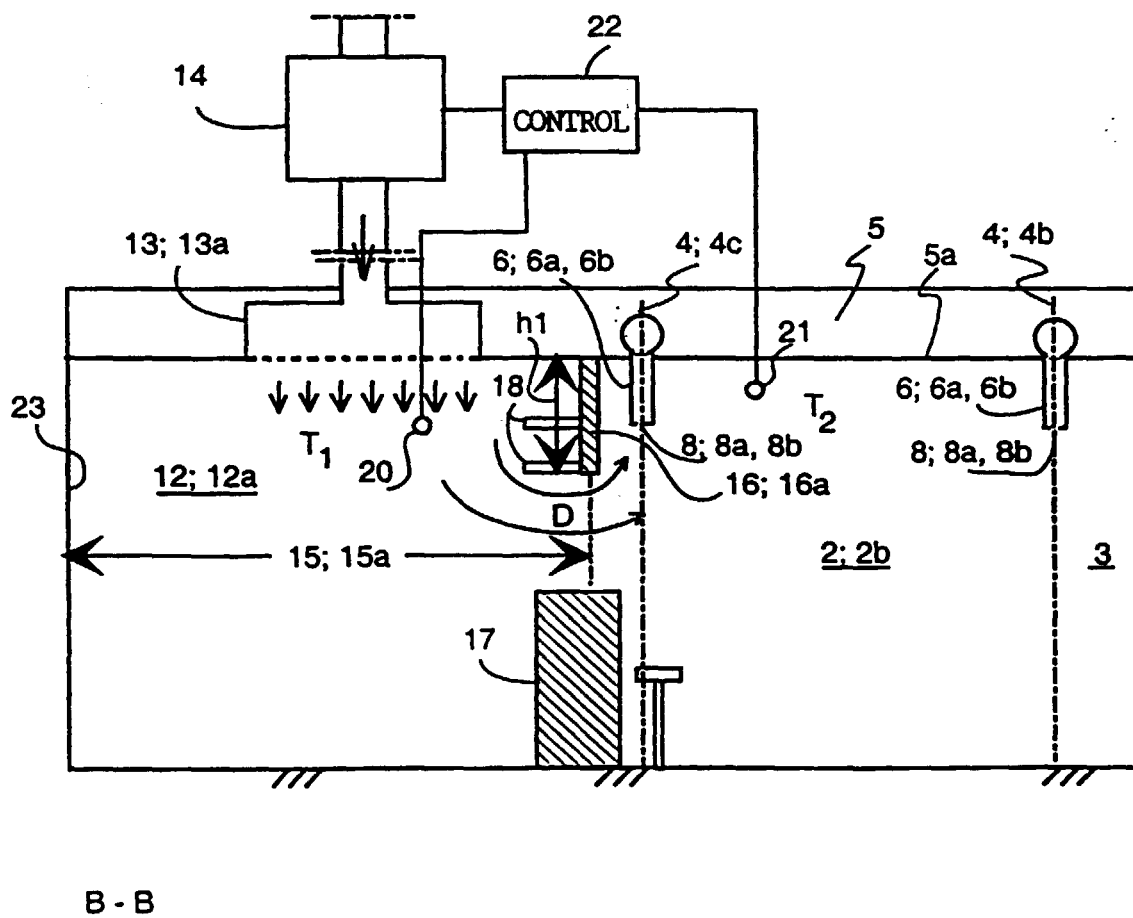
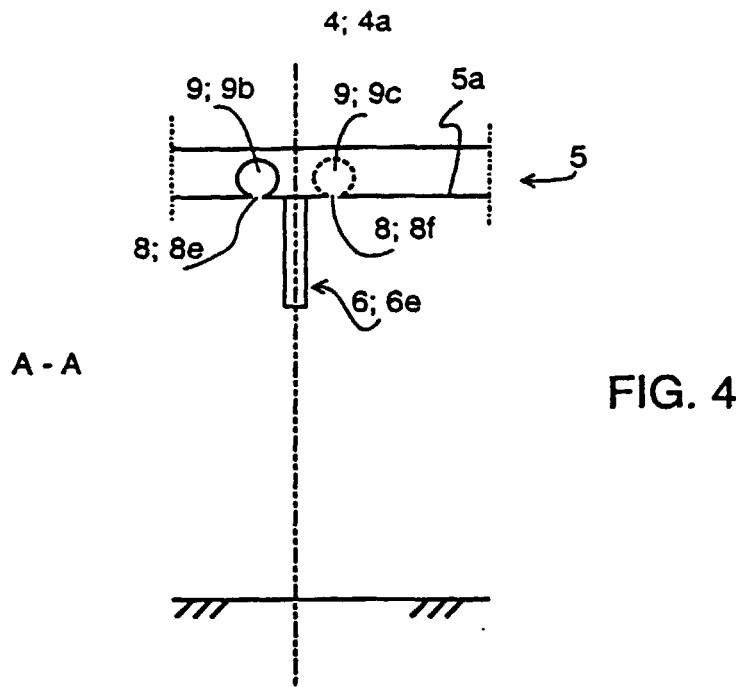


FIG.5

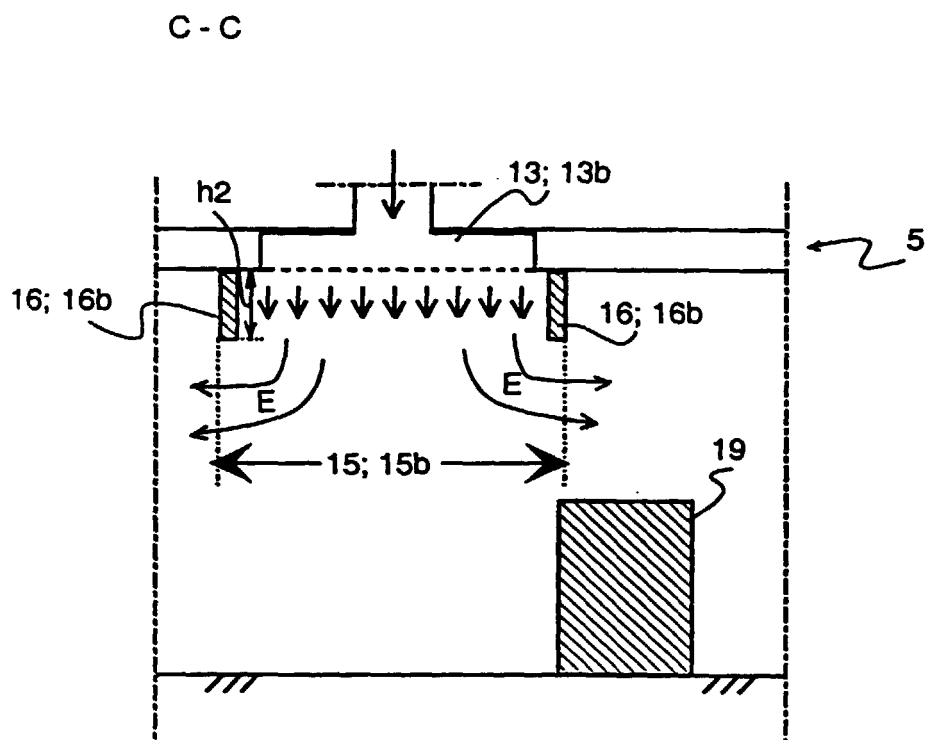


FIG.6



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 00 66 0094

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31 July 2000	Examiner CORREIA DOS REIS, I
CATEGORY OF CITED DOCUMENTS 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		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	

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The members are as contained in the European Patent Office EDP file on
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31-07-2000

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