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Installation for fighting fire

5 The present invention relates to an installation for fighting fire, in particular for comparatively small spaces, such as ship cabins and hotel rooms, with at least one releasing means to initiate a fire extinguishing process.

10 Especially by fires in passenger ships and hotels, the smoke gases present a serious danger; the majority of the victims usually die of smoke gas poisoning. With a fire set on, arsonists often leave the cabin door or the hotel room door open, with the desired result that both fire and especially smoke spread very rapidly, with a devastating effect.

15 The object of the invention is to provide a new installation for fighting fire, which is effective also in difficult situations as just mentioned.

20 The installation according to the invention is mainly characterized in that said releasing means is arranged to produce a barrier of a fog-like spray near the door of the respective space. The releasing means is generally either a spray head with a release ampoule or bulb, or a smoke detector producing a signal to activate one or several spray heads.

25 In a preferred embodiment of the invention at least one releasing spray head is arranged in the respective space and at least one spray head is arranged near the door of the space, and the releasing spray head is arranged to activate said at least one spray head near the door to produce a barrier of fog-like spray.

30 The spray head or heads near the door of a hotel room or ship cabin is preferably positioned outside the door and is preferably of a releasing type, as the spray head inside the room or cabin, and both spray heads are interconnected to upon release of

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either one of the spray heads activate the other spray head e.g. by distributing extinguishing liquid to it.

5 In a further preferred embodiment of the invention the releasing means is a spray head mounted on the wall above the door inside the room or the cabin and arranged to produce a barrier of fog-like spray inside the cabin or room, in front of the door. This embodiment needs in principle no co-operating spray head in the corridor and is easy to install, 10 which is of significance especially when a fire-fighting installation shall be provided in a previously ready-built ship.

15 A barrier or curtain of fog-like spray near the door of a room or a cabin effectively prevents a fire and the smoke generated by it from spreading, and as the fire sucks in air along the floor, this air brings with it water-fog into the fire seat.

20 The spray heads, their individual nozzles and the mutual arrangement of the nozzles are preferably made according to what is presented in the international patent applications PCT/FI91/00060, PCT/FI92/00155 and PCT/FI92/00156, to produce a fog-like spray of a high operating pressure and having a good penetration power.

25 By a fog-like spray is meant a spray of small droplets having a diameter typically 30 to 100 microns and preferably set in a strong whirling motion. By a high operating pressure is here in general meant from about 50 bar up to about 300 bar, as compared to an operating pressure of generally 2 to 10 bar in 30 conventional sprinkler installations, which produce a rain-like spray. It shall be noted, however, that the values given above are not absolute; definite limiting values are difficult to present.

35 The invention shall in the following be described in more detail, with reference to

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exemplifying preferred embodiments shown in the attached drawing.

Figure 1 shows a first preferred embodiment of the invention, in connection with a longitudinal section of a ship cabin and an adjacent corridor.

Figure 2 shows the same cabin, as seen from above.

Figure 3 shows a longitudinal section of a preferred embodiment of a releasing spray head useful in the arrangements of figures 1 and 2.

Figure 4 shows a second preferred embodiment of the invention, in connection with a block of eight cabins seen from above.

Figures 5 and 6 show a third preferred embodiment of the invention, in activated state, in connection with a longitudinal section of a ship cabin and the cabin from above, respectively.

Figure 7 shows a preferred embodiment of a spray head useful in the arrangement of figures 5 and 6, as seen from the front.

Figures 8 and 9 show the spray head of figure 7 in longitudinal section, in inactive and activated state, respectively.

In figures 1 and 2, the reference numeral 1 indicates a ship cabin, and an adjacent corridor is indicated by 2. A spray head arranged in the ceiling of the cabin 1 is indicated by 3 and a spray head arranged in the ceiling of the corridor 2 is indicated by 4.

The cabin spray head 3 is can be positioned near that end of the cabin, which is opposite to the cabin door, and the corridor spray head 4 is preferably positioned in the middle of the corridor, to serve two or maybe four cabins. A main feed line for extinguishing liquid, running along the corridor 2, is indicated by 5, a branch feed line to the cabin

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spray head 3 is indicated by 6 and a connection line between the cabin spray head 3 and the corridor spray head 4 is indicated by 7. The cabin beds are indicated by 8, the bathroom of the cabin is indicated by 9 and the cabin door by 10. A cabin on the opposite side of the corridor 2 is indicated by 11.

A preferred embodiment of a cabin spray head 3 or a corridor spray head 4 is shown in figure 3. Reference numeral 16 indicates a liquid inlet and an outlet to the connection 7 to the corridor spray head 4 is indicated by 17. A release ampoule is indicated by 20.

The spray heads 3 and 4 are preferably of a structure described in the international patent application PCT/FI92/00060 (WO 92/15370), with an axially movable spindle 21 loaded by a spring 22 and having an axial channel 23 in connection with an annular space 24 with an axial, pressure compensating end surface 25 which makes it possible to utilize a drive pressure of extraordinary magnitude, even up to about 300 bar, in the installation.

Figure 3 shows the spray head in an inactivated state of rest. Upon the ampoule 20 being released, e.g. by melting or crushing, the spring 22 presses the spindle 21 downwards in the figure, whereat connection is opened from the inlet 15 to the branch outlet 16 and to the obliquely downwards directed nozzles 26 of the spray head. The nozzles 26 are preferably of a structure and in a mutual arrangement as described in the international patent applications PCT/FI92/00155 and PCT/FI92/00156.

When a fire has started in the cabin 1, the spray head 3 is released. The corridor spray head 4 is also activated, due to the branch connection 16 - 6; as can be seen in figure 3, the passage from the connection 16 (6 in figures 1 and 2), in the direction

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opposite to the arrows, to the obliquely downwards directed nozzles 26 of the spray head is open in spite of the ampoule 20 being intact and the connection to the inlet 15 is closed.

5 The fire in the cabin 1 is mainly extinguished by the cabin spray head 3. The corridor spray head 4 participates in extinguishing the fire and, more important, provides a barring curtain in the door opening. This curtain prevents in a decisive way smoke
10 gases as well as the fire from penetrating into the corridor 2. In addition, as the fire in the cabin sucks in air along the floor, this air brings water-fog from the "curtain" into the cabin and into the fire.

15 In the embodiment of figures 1 and 2, the corridor spray head 4 also serves the opposite cabin 10. Preferably a group activation according to what has been described in the international patent application PCT/FI92/00316 is employed e.g. in such a
20 way, that extinguishing to at least a lesser extent, for cooling, is initiated also in neighbouring cabins and passages of the corridor. If the corridor 2 is wide, like in hotels, it is recommendable to position a spray head 4 directly outside each door 10.

25 Figure 4 shows a block of eight cabins, four on each side of a corridor. Two cabins to the left of the corridor are indicated by 31, and their neighbouring mirror images by 31a. The cabins to the right of the corridor are correspondingly indicated by
30 41 and 41a. The corridor is indicated by 32. Cabin spray heads are indicated by 33, 33a and 43, 43a, respectively, and corridor spray heads are indicated by 34. The cabin spray heads and the corridor spray heads are preferably of the same kind as shown in
35 figures 1, 2 and 3, with interconnecting lines 37, 37a, 47, 47a and 57, respectively.

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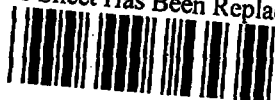
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A main feed line for extinguishing liquid, running along the corridor 32, is indicated by 35, and branch feed lines to the cabin spray heads are indicated by 36, 36a and 46, 46a, respectively, and
5 branch feed lines to the corridor spray heads are indicated by 56. Switch check valves in the connections from the cabin spray heads to the corridor spray heads are indicated by 51 and 52, 52a, and are e.g. of so-called ball (53, 54) type. In figure 4, the
10 valve 52 serves two cabin spray heads 33 and 43 on opposite sides of the corridor 32 and is connected to the valve 51 through a line 55 but is not connected to the adjacent valve 52a serving the cabin spray heads 33a and 43a of the neighbour cabins 31a and 41a.

15 If a fire starts in the upper left cabin 31, the spray head 33 is activated and it passes pressurized liquid further through the line 37 to the valve 52, the ball 54 of which is pushed from the position shown in figure 4 to the right, closing the
20 connection to the line 47 leading to the cabin spray head 43 in cabin 41, and further through the line 55 to the valve 51, the ball 53 of which is pushed from the position shown in figure 4 upwards to open the connection to the corridor spray head 34 via the line
25 57. The corridor spray head 34 is thus activated by the cabin spray head 33 and produces a curtain barrier of fog-like spray outside the door 40 of the cabin 33 and outside the door 50 of the opposite cabin 41, as well as across the corridor 32 and outside the doors
30 40a and 50a of neighbour cabins not shown (upwards) in figure 4. Ordinary check valves can be used instead of the ball valves 51, 52. The corridor spray heads 34 are preferably positioned in the middle of the corridor 32, although drawn to the right in figure 4.

35 Figures 5 and 6 show a further embodiment of the invention. A cabin is indicated by 61, a corridor

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is indicated by 62, a cabin spray head is indicated by 63 and a spray head in the corridor is indicated by 64. A main feed line for extinguishing liquid is indicated by 65 and a branch feed line therefrom to the cabin spray head 63 is indicated by 66. A lower bed in the cabin 61 is indicated by 68 and the cabin door by 70.

A fire 72 has started in the bed 68 and the cabin spray head 63 has been activated and produces a fog-like spray indicated by grey colour 73. The cabin spray head 63 is positioned on the cabin wall above the door 70 and can have a main spray direction obliquely downwards as indicated in figure 5. A curtain-like barrier at the door opening is indicated by dotted lines in darker grey and by numeral 74.

The spray head 63 need not produce the barrier 74 at once. The fire produces a rather strong flow of hot air and smoke along the ceiling towards the spray head and this flow of air and smoke presses the fog-like spray downwards to form the barrier 74. Thus, the main spray direction of the spray head 63 need not necessarily be initially inclined downwards but can be close to horizontal, or even horizontal.

Thanks to its position above the door 70 the single spray head 63 can effectively both reach a fire at the opposite end of the cabin, in a lower bed, which is to be considered as the worst place for a fire to start, and produce a barrier at the door. In addition, the embodiment of figures 5 and 6 is easy to install, which is of significance especially when a fire-fighting installation shall be provided in a previously ready-built ship or hotel.

A preferred embodiment of a cabin spray head 63 is shown in more detail in figures 7 to 9. The spray head has a release ampoule or bulb 81, one nozzle 82 directed obliquely downwards, two nozzles 83

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and 84 directed obliquely to the sides, in relation to the wall that the spray head is mounted on, and a central nozzle 85 directed straight out from the wall. A liquid inlet is indicated by 86 and a fourth nozzle
5 directed obliquely upwards is closed by a plug 87. By a nozzle arrangement as presented in the international patent applications PCT/FI92/00155 and PCT/FI92/00156 and employing a high operating liquid pressure is achieved a concentrated fog-like spray which, under
10 the influence of the nozzle 82, has a main direction obliquely downwards and is capable of reaching, i.e. penetrating through rising hot air and smoke to a fire seat at a distant corner of a ship cabin or a hotel room. It is of course also possible to mount the spray
15 head on a wall in such a way that the central nozzle 85, and thus the side nozzles 83 and 84, are directed to some extent downwards.

Although it can be considered preferable to arrange the spray head 63 to have its main spray
20 direction inclined at least to some extent downwards, it is not necessary to do so, because, as earlier mentioned, the fire itself tends to press down the spray to produce the desired barrier at the door. Thus, it would be possible to remove the plug 87 and
25 use all nozzles of the spray head. It would further be possible to employ a spray head without a central nozzle.

As will appear from figures 8 and 9, the spray head 63 preferably comprises a spindle structure
30 similar to the one shown in figure 3, with an axially movable spindle 88 loaded by a spring 89 against the release ampoule 81 and having an axial channel 90 leading to an annular chamber 91 with an end face 92 which balances the liquid pressure force acting
35 through the inlet 86 on the spindle end; the end face 92 has an area equal to the one of the spindle end at

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the inlet 86.

In figure 8, the spray head is inactive, i.e. the ampoule 81 is intact and there is no connection from the inlet 86 to the nozzles 82-85. In figure 9, the ampoule 81 has been broken, the spring 89 has pressed the spindle 88 downwards to make free a connection from the inlet 86 to a side channel leading to a distribution chamber 93 and therefrom to the nozzles 82-85. A major part of the liquid flows to the side channel along a helical path 94 between the slings of the spring 89.

A plate for mounting the spray head on the wall is indicated by 95. The spray head can be mounted in inclined position in relation to the wall e.g. if the plate 95, instead of being of generally even thickness as in figures 8 and 9, has a thicker upper portion.

An essential feature of the invention is the so-called barrier or curtain effect at the door of a ship cabin or a hotel room, or other room. Such barriers can be produced in alternative ways.

In figures 1 and 2 for instance, the single corridor spray head 4 can be replaced by two spray heads, one on each side of the opposite doors, lengthwise in the corridor. One such spray head could be positioned approximately at the point where the branch feed line 6 has been drawn to start from the main feed line 5 and the other approximately in level with the reference numeral 2. If the corridor 2 is wide, a separate spray head 4 can be arranged for each opposite cabin or room door.

A similar modification could be made in the embodiment of figure 4, where each corridor spray head 34 alone serves a group of four cabin doors. Instead, the cabin spray heads could be positioned approximately at the pair of switch check valves 52,



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5 52a to be activated pairwise to produce barrier curtains in the corridor on both sides of the door of that cabin in which a fire has broken out. Further can be contemplated a group activation of several cabin and corridor spray heads, as presented in the international patent application PCT/FI92/00316, to provide precautionary cooling in the neighbourhood of a fire.

10 In the embodiment shown i figures 5 and 6, the cabin spray head 63 could be connected to one or several corridor spray heads 64 in the same way as shown in figures 1 and 2. One possibility would be to use the "surplus" nozzle, blocked by the plug 87 in figures 7-9, for such a connection, or to have a wall
15 spray head with a preformed branch connection according to figures 1-3.

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Claims:

1. Installation for fighting fire, in particular for comparatively small spaces, such as ship cabins and hotel rooms, with at least one releasing means to initiate a fire extinguishing process, characterized in that said releasing means (3; 33, 33a, 43, 43a; 63) is arranged to produce a barrier of a fog-like spray near the door (10, 40, 40a, 50, 50a; 70) of the respective space (1; 31, 31a, 41, 41a; 61).

2. Installation according to claim 1, characterized in that at least one releasing spray head (3; 33, 33a, 43, 43a) is arranged in the respective space (1; 31, 31a, 41, 41a), that at least one spray head (4; 34) is arranged near the door (10; 40, 40a, 50, 50a) of the space, and that the releasing spray head (3; 33, 33a, 43, 43a) is arranged to activate said at least one spray head (4; 34) near the door to produce a barrier of fog-like spray.

3. Installation according to claim 2, characterized in that the spray head (4) near the door (10) is of releasing type and that release of either one of the spray heads (3, 4) is arranged to activate the other spray head (4, 3).

4. Installation according to claim 3, characterized in that the spray head (3) in the respective space (1) and the spray head (4) near the door (10) are arranged to, upon release of either of them, distribute extinguishing liquid to the other spray head (4, 3) through an interconnecting branch line (7).

5. Installation according to claim 2, characterized in that the spray head (4; 34) arranged near the door (10; 40, 40a, 50, 50a) is positioned outside the door.

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5 6. Installation according to claim 5, in particular for ship cabins, characterized in that the spray head (4; 34) arranged outside the door (10; 40, 40a, 50, 50a) is positioned in the middle of a cabin corridor (2, 32).

10 7. Installation according to claim 2, characterized in that the spray head (3; 33, 33a, 43, 43a) arranged in the respective space (1; 31, 31a, 41, 41a) is positioned at that end of the space, which is opposite to the door (10; 40, 40a, 50, 50a).

15 8. Installation according to claim 1, characterized in that said releasing means is a spray head (63) mounted on the wall above the door (70) inside the respective space (61) and arranged to produce a barrier of fog-like spray (73, 74) inside said space, in front of the door (70).

20 9. Installation according to claim 8, characterized in that the spray head (63) comprises two nozzles (83, 84) directed obliquely to the sides, one nozzle (82) directed obliquely downwards and one central nozzle (85) directed essentially straight out from the wall, one nozzle directed obliquely upwards being closed by a plug (87).

25 10. Installation according to claim 1, characterized in that said releasing means is a smoke detector arranged to produce a signal to activate at least one spray head near the door of the respective space.

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