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(54) PLANK TYPE FLOORING AND A PROFILE PLANK FOR SUCH FLOORING

(57) Disclosed is a plank type flooring (1) comprising a plurality of profile planks (20), each profile plank (20) being composed of a bent sheet metal, with a first sheet metal part (30) constituting an upper plane and having first perforations (33), a second sheet metal part (40), a third sheet metal part (50), and a fourth sheet metal part constituting a lower plane and having second perforations (63). The plurality of profile planks (20) are positioned adjacent to each other so that the second sheet metal part (40) and the third sheet metal part (50) of adjacent planks (20) are positioned adjacent to each other, and by that the next plank (20) bears against a former plank (20), such as the first sheet metal part (30) and the fourth sheet metal part (60) of adjacent planks (20) constituting a double sheet metal layer.

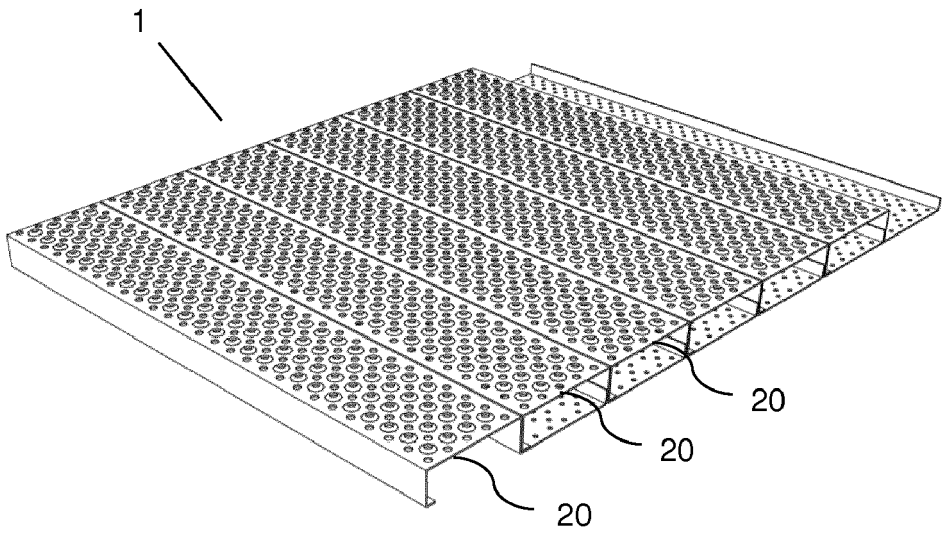

Fig. 2a

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Description

Technical field

[0001] The invention considers a plank type flooring and a profile plank for the plank type flooring. The profile plank is a sheet metal profile grating for use when small up to large span widths must be bridged. The invention particularly relates to a special field as non-flammable sheet metal profile planking for use as flame-retardant floor, suitable for example as a transformer tray cover, with high level of slip resistance but permeable for oil and other liquids and with flame-retardant characteristics.

Background art

[0002] It is well known to use profile planking as flooring for example at different types of industrial flooring, mezzanine floor structures, gang-ways, etc. Plank type flooring normally cross spans up to 2 meters, but larger span is possible. Known profile planks for plank type flooring is designed more or less with an upside-down U-form, with an upper plane used as a walking surface, normally with a width of 200-300 mm but also up to 500 mm, and two branches protruding perpendicularly downwards relative the upper plane. The two branches normally end with a short angled branch-end, protruding perpendicularly from the respective branch either both inwards or both in the same direction, for example pointing right, seen in the position of use of the plank. This is both to achieve a greater strength of the branch and also a smooth contact surface for the substrate. The plank type flooring is built up by placing such profile planks side-by-side, adjacent to each other for forming a complete flooring. When the design of the branches is with the angled short end pointing in the same direction, for example the right direction, the branches normally have a slightly different height. This is to provide a continuous and stronger flooring by placing of for example the left shank of the next plank on top of the short end of the right branch of the former/already positioned plank. In that way the plank type flooring is kept together, and loads are spread over the surface in a better way compared to individual profile planks.

[0003] An ordinary plank type flooring has a perforation with a hole pattern and design of the holes to cope with ordinary issues like providing a non-slippery surface and a perforation which allows a light plank without being too easy to look through, since many people feeling uncomfortable too see through the floor, especially high above the ground. The non-slippery surface normally is taken care of by making the perforation in such a way that a certain degree of the holes is punched from the underside of the upper plane of the plank, in a way to create an upwardly directed collar around the hole. The number of holes with this design, the height and design of the collar etc. is proven as well as the perforation pattern, to get the wanted anti-slip function. The rest of the holes normally is punched without a collar or a downwardly protruding collar. It is also to be mentioned that plank type flooring also may have planks without perforations.

[0004] A special field of use for plank type flooring is as flame-retardant plank type flooring for example at transformer trays. Since transformers are filled with a lot of mineral oil, there is a need to take care of leaking oil at any time and especially if a fire starts in the transformer station, and therefore a transformer tray of concrete must be positioned under the transformer according to standards. To allow service of the transformer, a plank type flooring is used as a walking surface on top of the tray. At a critical stage during a transformer fire almost all oil is released from the system and an explosion-like fire happens due to burning oil flowing out all over the plank type flooring. Using a plank type flooring with a perforation is positive compared to a solid flooring, because the burning oil may flow through the flooring and down into the tray. Since the oxygen in the tray is consumed, the fire stops after a while. But according to standards, the time from the oil "explosion" to that the fire stops, must be short, preferably under 10 seconds to cope with the highest standard.

[0005] There are only a few known special plank type floorings designed to be flame-retardant, i.e. with a proven design to cope with burning oil and other flammable fluids like petrol and the like. One known solution is designed with a normal profile, with an upper plane and two branches with short angled branch-ends, protruding perpendicularly from the respective branch in the same direction, for forming a continuous flooring while positioned side-by-side. This solution has a proven perforation at the upper plane to evacuate burning mineral oil and stop the fire in a transformer tray in about 10 seconds according to tests for this standard. A certain degree of the round holes has a small diameter and have the anti-slip design with upwardly directed collar, while the rest of the holes have greater diameter and a downwardly directed collars.

[0006] The known solution presented above is good, but not good enough so there is a need of reducing the time for stopping the fire, to get an even safer solution compared to prior art, and with a top level safety.

Summary of the invention

[0007] It is an object of the invention to address at least some of the problems and issues outlined above. It is possible to achieve these objects and others by a new type of plank type flooring with a profile plank as defined in the attached independent claims.

[0008] According to an aspect of the invention, a plank type flooring is disclosed. The plank type flooring comprises a plurality of profile planks, and each profile plank is composed of a bent sheet metal and has a length, a height and a width. Each plank comprises a first sheet metal part which constitutes an upper plane, and which has a length and about half the width of the plank. The first sheet metal part further comprises first perforations.

The profile plank further comprises a second sheet metal part, which extends from a first longside of the first sheet metal part, substantially perpendicular to the same, and extending a first distance, substantially corresponding to the height of the profile plank. The profile plank further comprises a third sheet metal part, which extends from a second longside of the first sheet metal part, opposite the first longside and substantially perpendicular to the first sheet metal part. The third sheet metal part extends a second distance, substantially corresponding to the height of the profile plank. The profile plank further comprises a fourth sheet metal part, which extends from a longside of the third sheet metal part, distal from of the first sheet metal part, and extends away from the second sheet metal part. The fourth sheet metal part has the length and half the width of the profile plank and the fourth sheet metal part comprises second perforations. The plank type flooring is constituted by that the plurality of profile planks are positioned adjacent to each other so that the second sheet metal part and the third sheet metal part of adjacent planks are positioned adjacent to each other. In that way the next plank bears against a former plank, such as the first sheet metal part and the fourth sheet metal part of adjacent planks constitutes a double sheet metal layer.

[0009] The double sheet metal layer and the planks forms a "cell" with a limited amount of oxygen, and the double sheet metal layer has the effect that during a fire, in for example mineral oil (transformer application), burning fluid penetrates the first perforation of the first sheet metal part and enters the "cells" of the double sheet metal layer. Burning fluid (oil) between the upper and lower planes consumes the oxygen in the double plane layer and the fire quickly stops due to lack of oxygen. The volume between the upper and lower plane is as said a cell with a limited amount of oxygen, and the double layer principle acts in the same way as covering the fire with a lid, which is very effective to stop the fire. Another aspect is that in prior art flame-retardant plank type flooring, there is an "end-leakage" which provides oxygen to the transformer tray during a fire. The end-leakage occurs in the ends of respective profile plank, between the upper plane and the substrate (concrete wall of the transformer tray). Therefore, in prior art solutions, one must accept this fact which lengthens the time for stopping the fire or seal the ends of each profile plank alternatively provide a separate sealing along the entire edge of the plank type flooring, which adds manufacturing complexity and cost to the product. In the present invention, this problem is not at hand since the double layer principle, the upper plane together with the lower plane, takes care of the problem by that the lower plane seals against the substrate (concrete wall of the transformer tray) and by that prevents oxygen to enter the tray. Thus, double sheet metal layer reduces the risk of an under-ventilated fire, as the air has difficulties to move in the cells. Tests with the new and inventive solution shows that the time from burning oil flows out over the flame-retardant plank type flooring to that the fire stops is around 3 seconds, which is less than half the time compared to the best prior art solutions. To summarize, flames arise when accessing oxygen and the double sheet metal layer create cells where oxygen is consumed more quickly than the total volume of oxygen present in the transformer tray.

[0010] According to an embodiment, the first perforations of the first sheet metal part is arranged to release more fluid per unit of area and per unit of time compared to the second perforations of the fourth sheet metal part. By such an arrangement, the burning fluid quickly penetrates the first perforation of the first sheet metal part due to the adopted perforation in terms of relation between the fluid characteristics and perforation degree/dimensions, and because of that the second perforation of the lower plane, that is the fourth sheet metal part, has characteristics which releases less fluid per unit of area and time, the oil stays in the double layer for some time and the oxygen is consumed quickly. Thereby the "lid" is created by the non-burning oil, and the fire stops quickly.

[0011] According to an embodiment, the first perforations of first sheet metal part has an opening degree which is greater than the opening degree of the second perforations of the fourth sheet metal part. The perforations thereby differ in terms of the open hole area to release the fluid quicker through the first sheet metal part compared to the fourth sheet metal part.

[0012] According to an embodiment, the first sheet metal part comprises slip-protection means by upwardly projecting collars around a determined number of holes of the first perforations.

[0013] According to an embodiment, the first perforations of the first sheet metal part comprises first round holes and the second perforations of the fourth sheet metal part comprises second round holes, wherein the first round holes of the first sheet metal part have a greater diameter than the second round holes of the fourth sheet metal part. The perforations thereby differ in terms of the size of the holes to release the fluid quicker through the first sheet metal part compared to the fourth sheet metal part

[0014] According to an embodiment, the second sheet metal part comprises an angled end extending from a longside of the second sheet metal part, distal from the first sheet metal part and extending in direction towards the third sheet metal part. By this angled end, a more robust profile plank is achieved as well as a good contact between the profile planks when positioned in the plank type flooring.

[0015] According to an embodiment, the fourth sheet metal part comprises an angled end extending from a longside of the fourth sheet metal part, distal from the third sheet metal part and substantially perpendicular to the fourth sheet metal part. By this angled end, a more robust profile plank is achieved.

[0016] According to another aspect of the invention, a profile plank for use at a plank type flooring as described above, is disclosed. The profile plank is composed of a

bent sheet metal and has a length, a height and a width. The profile plank comprises a first sheet metal part which constitutes an upper plane, and which has a length and about half the width of the plank. The first sheet metal part further comprises first perforations. The profile plank further comprises a second sheet metal part, which extends from a first longside of the first sheet metal part, substantially perpendicular to the first sheet metal part, and extending a first distance, substantially corresponding to the height of the profile plank. The profile plank further comprises a third sheet metal part, which extends from a second longside of the first sheet metal part, opposite the first longside and substantially perpendicular to the first sheet metal part. The third sheet metal part extends a second distance, substantially corresponding to the height of the profile plank. The profile plank further comprises a fourth sheet metal part, which extends from a longside of the third sheet metal part, distal from of the first sheet metal part, and extends away from the second sheet metal part. The fourth sheet metal part has the length and half the width of the profile plank and the fourth sheet metal part comprises second perforations.

[0017] According to an embodiment, the first perforations of the first sheet metal part is arranged to release more fluid per unit of area and per unit of time compared to the second perforations of the fourth sheet metal part. The advantanges compared to prior art are explained above.

[0018] According to an embodiment, the first perforations of first sheet metal part has an opening degree which is greater than the opening degree of the second perforations of the fourth sheet metal part.

[0019] According to an embodiment, the first sheet metal part comprises slip-protection means by upwardly projecting collars around a determined number of holes of the first perforations.

[0020] According to an embodiment, the first perforations of the first sheet metal part comprises first round holes and the second perforations of the fourth sheet metal part comprises second round holes, wherein the first round holes of the first sheet metal part have a greater diameter than the second round holes of the fourth sheet metal part.

[0021] According to an embodiment, the second sheet metal part comprises an angled end extending from a longside of the second sheet metal part, distal from the first sheet metal part and extending in direction towards the third sheet metal part.

[0022] According to an embodiment, the fourth sheet metal part comprises an angled end extending from a longside of the fourth sheet metal part, distal from the third sheet metal part and substantially perpendicular to the fourth sheet metal part.

[0023] The profile plank is also more production friendly compared to prior art solutions since the inventive profile plank is made of sheet metal in the form of format sized sheet metal, which is produced in a punching and shearing machine line followed by an edging press. Prior art solutions are produced from a sheet metal coil in a punching and roller bending machine line, followed by a cutting operation, which is not effective while producing this type of product, especially if different perforations is to be used as according to the invention.

[0024] According to a third aspect of the invention, a plank type flooring with an alternative design is disclosed. The plank type flooring comprises a plurality of profile planks, each composed of a bent sheet metal, with a length, a height and a total width of about half the plank described above. Each profile plank comprises a first sheet metal part which constitutes an upper plane with length and a width, and with first perforations. Further, the profile plank comprises a second sheet metal part, which extends from a first longside of the first sheet metal part, substantially perpendicular to the first sheet metal part and extending a first distance substantially corresponding to the height of the profile plank. Further, the profile plank comprises a third sheet metal part, which extends from a second longside of the first sheet metal part, opposite the first longside and substantially perpendicular to the same and extending a second distance substantially corresponding to the height of the profile plank. The plank type flooring further comprises a lower plane composed of a plane sheet metal having the length and a width corresponding to a predetermined number of profile planks to fit a total width or a number of profile planks. The lower plane comprises second perforations. The plurality of profile planks is positioned on top of the lower plane adjacent to each other so that the second sheet metal part and the third sheet metal part of adjacent planks are positioned adjacent to each other, and by that the profile planks bears against the lower plane, such as the first sheet metal part of the planks and the lower plane constitutes a double sheet metal layer. The first and second perforations may be varied in the ways described above in relation to the earlier presented embodiments. Such an alternative arrangement fulfils the inventive scope of the invention - to provide a double sheet metal layer, acting as a lid during a fire.

[0025] According to a fourth aspect of the invention, a plank type flooring with an alternative design is disclosed. The plank type flooring comprises an upper plane and a lower plane, wherein the upper plane comprises first perforations and the lower plane comprises second perforations. The upper plane is positioned above the lower plane and the planes are separated with a spacer, such as the upper plane and the lower plane constitutes a double sheet metal layer. The first and second perforations may be varied in the ways described above in relation to the earlier presented embodiments. Such an alternative arrangement fulfils the inventive scope of the invention - to provide a double sheet metal layer, acting as a lid during a fire.

[0026] Further possible features and benefits of this solution will become apparent from the detailed description below.

Brief description of drawings

[0027] The solution will now be described in more detail by means of exemplary embodiments and with reference to the accompanying drawings, in which:

Fig. 1a is showing a perspective view of a profile plank according to the invention.

Fig. 1b is showing a side view of the profile plank of Fig. 1a.

Fig. 2a is showing a perspective view of a plurality of profile planks according to the invention, forming a plank type flooring according to the invention.

Fig. 2b is showing a side view of the plank type flooring of Fig. 2a.

Fig. 3a is showing a width section through a transformer tray and one profile plank mounted on top of the tray.

Fig. 3b is showing a length section through the transformer tray and a complete plank type flooring at the top of the tray.

Fig. 4a is showing a starting plank according to the invention.

Fig. 4b is showing an ending plank according to the invention.

Fig. 5a is showing an alternative embodiment of a plank type flooring.

Fig. 5b is showing yet another alternative embodiment of a plank type flooring.

Detailed description

[0028] Briefly described, a plank type flooring and a profile plank are provided that gives a cost-efficient and well-functioning solution for flame-retardant flooring preferably for use as transformer tray flooring, functioning like a cover which chokes the fire.

[0029] Fig. 1a-b shows a perspective view and a side view of a profile plank 20 according to the invention. The profile plank 20 has a length l, a height h and a width w and is made of a bent sheet metal. In the detailed description below terms like upper and lower may be used, which refers to the position of use of the profile plank 20. The profile plank 20 is composed by a bent sheet metal and comprises a first sheet metal part 30, which constitutes an upper plane, and which has a first longside 31 and an opposite second longside 32, both with the length l. A distance between the longsides 31, 32 is substantially half the width w of the plank 20 as seen in the figures. The profile plank 20 further comprises a second sheet metal part 40, extending from the first longside 31 of the first sheet metal part 30, i.e. extending downwards, substantially perpendicular to the first sheet metal part 30. The second sheet metal part 40 comprises a lower longside 41, distal from the first sheet metal part 30, at a first distance h_1 from the first sheet metal part 30. Opposite the second sheet metal part 40, is a third sheet metal part 50 positioned, that is along the second longside 32 of the first sheet metal part 30. The third sheet metal part 50 extending downwards, substantially perpendicular to the first sheet metal part 30 and by that is parallel to the second sheet metal part 40. The third sheet metal part 50 comprises a lower longside 51 at a second distance h_2 from the upper plane 30, which second distance h_2 substantially is similar with the height h of the plank 20 (the total height h includes first and fourth sheet metal parts, see below). The second sheet metal part 40 comprises an angled end 42, which extends from the longside 41 of the second sheet metal part 40, distal from of the first sheet metal part 30, substantially perpendicular to the second sheet metal part 40, in direction towards the third sheet metal part 50. The first distance h_1 of the second sheet metal part 40 is slightly shorter than the second distance h_2 of the third sheet metal part 50, that is about a material thickness of a fourth sheet metal part 60 shorter (about 2 mm), which will be explained below. The total height h of the profile plank 20 includes the material thickness of both the first and fourth sheet metal parts 30, 60 and the second distance h_2 (the length of the third sheet metal part 50).

[0030] A clear difference compared to prior art is that the profile plank 20 comprises the fourth sheet metal part 60 mentioned above, which fourth sheet metal part 60 has a first longside 61 and an opposite second longside 62, both with the length l. A distance between the longsides 61, 62 of the fourth sheet metal part 60 is substantially half the width w of the plank 20 as seen in the figures. The fourth sheet metal part 60 is arranged along the lower longside 51 of the third sheet metal part 50, such as the fourth sheet metal part 60 extends substantially perpendicular from the third sheet metal part 50 in a direction "away" from the second sheet metal part 40. That is, such as the fourth sheet metal part 60 is positioned beside the first sheet metal part 30, but at a lower level, like a step from the fourth sheet metal part 60 to the first sheet metal part 30. The first sheet metal part 30 and the fourth sheet metal part 60 thereby together substantially forming the width w of the plank 20. The fourth sheet metal part 60 comprises angled end 65 extending from the second longside 62 of the fourth sheet metal part 60, distal from of the third sheet metal part 50 and substantially perpendicular to the fourth sheet metal part 60, i.e. protrudes upwards and is substantially perpendicular to the fourth sheet metal part 60, and thereby parallel to both the second and the third sheet metal parts 40, 50.

[0031] The height h of the profile plank 20 is, as mentioned above, more or less determined by the second

length h_2 of third sheet metal part 50, but also includes the thickness of the first and fourth sheet metal parts 30, 60 (upper and lower planes). The width w of the profile plank 20 is more or less the sum of the width of the first and fourth sheet metal parts 30, 60, but also includes the material thickness of the second and the third sheet metal parts 40, 50 and the angled end 65.

[0032] The first sheet metal part 30 comprises first perforations 33, which preferably comprises two types of punched first holes 34, 36 where a determined number of first holes 34 have upwardly projecting collars 35 around the holes 34, which collars 35 acts as slip-protection means. The rest of the first holes 36 are preferably punched holes with no collar or with a collar facing downwards. It is to be understood that within the scope of invention, different combinations of holes, with and without anti-slip protection, completely lack of anti-slip protection etc, is possible. The pattern of the perforations may of course also vary within the scope of invention. In the preferred embodiment, the holes 34, 36 of the first sheet metal part 30 has a diameter of 10 mm, and the perforation degree is 17.5 %. But of course, the two types of first holes 34, 36 may have different diameters as well.

[0033] The fourth sheet metal part 60 comprising second perforations 63 with holes 64, which perforations 63 differs from the first perforations 33 of the first sheet metal part 30. A certain perforation pattern or certain hole dimensions of the holes 34, 36 of the first sheet metal part 30 is not that important, but the first perforations 33 of the first sheet metal part 30 must have a perforation that provides a quick penetration of the fluid through the first sheet metal part 30, which depends on the viscosity of the fluid of the actual application (oil, mineral oil, petrol etc.). In the preferred application, an opening degree of the first sheet metal part 30 is as said above around 17.5 % and by that adapted to quickly release mineral transformer oil. Crucial for the invention is that a double plane layer is formed, which will be explained below in relation to fig. 2a-b, and another feature which even improves the function is that the first perforations 33 of the first sheet metal part 30 has an opening degree which is greater than the opening degree of the second perforations 63 of the fourth sheet metal part 60. This may be achieved by different patterns, perforation degree, hole size etc. The holes 64 of the fourth sheet metal part 60 has in the preferred embodiment a diameter of 6 mm and a perforation degree of 6.8 % compared to the first sheet metal part 30 with hole diameter 10 mm and a perforation degree of 17.5 % as mentioned above.

[0034] Fig. 2a-b shows a perspective view and a side view of a plurality of profile planks 20 when positioned together for forming a plank type flooring 1 according to the invention. The plank type flooring 1 is formed by placing a plurality of profile planks 20 side-by-side, adjacent to each other on for example two beams or walls or the like, which beams acts as support for the plank type flooring in an industrial flooring, mezzanine floor structures, gang-way etc., see Fig. 3a-b. When building up the plank type flooring 1, one starts with placing a first profile plank 20 on the supports and then placing a second plank 20 with its second sheet metal part 40 with its angled end 42 on the fourth sheet metal part 60 of the first profile plank 20, adjacent to the third sheet metal part 50 of the first profile plank 20. As mentioned, the second sheet metal part 40 is about 2 mm shorter than the third sheet metal part 50, which corresponds to the material thickness of the fourth sheet metal part 60. After that, a next profile plank 20 is positioned on the fourth sheet metal part 60 of the former profile plank 20, adjacent to the third sheet metal part 50 of the former profile plank 20, and this continues until the complete plank type flooring 1 is completed. The first and the last profile plank are special types (start and end plank) which constitutes only half the profile plank 20, see description in relation to Fig. 4a-b. By building up the plank type flooring 1 in this way, a double plane layer is formed by the first sheet metal part 30 of the next adjacent plank 20 positioned above the fourth sheet metal part 60 of an already laid plank 20. The double plane layer with perforated first and fourth sheet metal part 30, 60 is crucial for the invention, to create a "lid" during a fire, which will be explained below.

[0035] The effect of this design is that during a fire in for example mineral oil (transformer application), the burning mineral oil quickly penetrates the first perforations 33 of the first sheet metal part 30, and because of the second plane, and according to a most preferred embodiment, by that the second perforations 63 of the fourth sheet metal part 60 has a lower opening degree, burning oil between the first and fourth sheet metal parts 30, 60 (upper and lower planes) consumes the oxygen in the double plane layer, that is between the planes, and the fire quickly stops due to lack of oxygen. The volume between the first and fourth sheet metal parts 30, 60 is like a cell with a limited amount of oxygen, and the double layer principle, with quick penetration of the first layer and a slower penetration of the second layer (symbolized with the dotted arrows in Fig 2b), acts in the same way as covering the fire with a lid, where the non-burning oil in the cell becomes the "lid", which of course is very effective to stop a fire. As understood, a lot of different combinations of perforations may fit the inventive scope, and that is why possible combinations or hole size combinations other than the actual sizes and perforations is not described. It may work good enough even with the same perforations, where the first and fourth sheet metal parts 30, 60 have the same type of perforation, because the oxygen may be consumed in the middle part anyway and create the "lid-function". In the preferred embodiment, the first perforations 33 of the first sheet metal part 30 comprises first round holes 34, 36 and the second perforations 63 of the fourth sheet metal part 60 comprises second round holes 64, wherein the first round holes 34, 36 of the first sheet metal part 30 have a greater diameter than the second round holes 64 of the fourth sheet metal part 60, and also that the first sheet metal part 30 has a higher perforation degree compared to the

fourth sheet metal part 60.

[0036] Another aspect, which is not obvious at a start, is that in prior art solutions for flame-retardant plank type flooring, there is an "end-leakage" which provides oxygen to the transformer tray during a fire. The end-leakage occurs in the ends of respective profile plank, between the upper plane and the substrate (concrete wall of the transformer tray). Therefore, in prior art solutions, one must accept this fact which lengthens the time for stopping the fire or seal the ends of each profile plank or provide a separate sealing along the entire edge of the plank type flooring, which indeed adds manufacturing complexity and cost to the product. In the present invention, this problem is not at hand since the double layer principle, the first sheet metal part 30 together with the fourth sheet metal part 60, takes care of the problem by that the fourth sheet metal part 60 seals against the substrate (concrete wall of the transformer tray) and by that prevents oxygen to enter the tray.

[0037] Fig. 3a shows a width section through a transformer tray 100 and one profile plank 20 with the length l, mounted on top of the tray 100. An optionable mid-support is also visible, which may be needed for longer lengths l of the profile planks 20.

[0038] Fig. 3b shows a length section through the transformer tray 100 and a complete plank type flooring 1 at the top of the tray 100, which plank type flooring 1 comprises a plurality of profile planks 20. The function of the transformer tray 100 is to collect leaking oil from for example a transformer station, positioned above the transformer tray 100.

[0039] Fig. 4a shows a starting profile plank 120, which is a copy of the "second half" of the "standard" profile plank 20, described above. The starting profile plank 120 has the length l and half the width w of the above described profile plank 20 and comprises a similar fourth sheet metal part 160 as the standard profile plank 20. Thus, it comprises second perforations 163 with holes 164, which perforations 163 are the same as the lower perforation 63 of the fourth sheet metal part 60 of the standard profile plank 20. The starting profile plank 120 further comprising a similar angled end 165 as the angled end 65 of the standard profile plank 20. The starting profile plank 120 is used to make sure that the double layer principle is used all over the plank type flooring 1, which easily can be understood when viewing Fig. 2a-b, where the starting profile plank 120 is missing in the left side of the plank type flooring 1.

[0040] Fig 4b shows an ending profile plank 220, which is a copy of the "first half" of the "standard" profile plank 20, described above. The ending profile plank 220 has the length l and half the width w of the above described profile plank 20 and comprises a similar first sheet metal part 230 as the standard profile plank 20, and thus comprises first perforations 233 with holes 234, 236 (not visible), which perforations 233 are the same as the first perforations 33 of the first sheet metal part 30 of the standard profile plank 20. In the same way a determined number of holes 234 have upwardly projecting collars 235 around the holes 234, which collars 235 acts as slip-protection means. The ending profile plank 220 further comprising a similar second sheet metal part 240 with an angled end 242, as the second sheet metal part 40 of the standard profile plank 20. The ending profile plank 220 further comprises a third sheet metal part 250, which in this case is a mirror-copy of the second sheet metal part 240. The ending profile plank 220 is also used to make sure that the double layer principle is used all over the plank type flooring 1, which easily can be understood when viewing Fig. 2a-b, where the ending profile plank 220 is missing in the right side of the plank type flooring 1.

[0041] Fig 5a shows an alternative embodiment of a plank type flooring 10, comprising a plurality of profile planks 220 similar with the former described ending profile plank 220. Since the profile plank 220 may be similar with the ending plank it is not described further here and the profile plank 220 may in this embodiment be a "standard" and well known profile plank, with a known design. According to this embodiment, the plank type flooring 100 further comprises a lower plane 260 being composed of a plane sheet metal having the length l and a width xb which preferably corresponds to a predetermined number x of profile planks 220. The lower plane 260 comprises second perforations 263. The plurality of profile planks 220 are positioned on top of the lower plane 260 adjacent to each other so that the second sheet metal part 240 and the third sheet metal part 250 of adjacent planks 220 are positioned adjacent to each other, and by that the profile planks 220 bears against the lower plane 260. In this way, the inventive double sheet metal layer is formed by the first sheet metal part 230 of the planks 220 and the lower plane 260. The first perforations 233 of the first sheet metal part 230 and the second perforations 263 of the lower plane 260 in this embodiment may be as described in relation to the embodiments above.

[0042] Fig 5b shows yet another alternative embodiment of a plank type flooring 100, which comprises an upper plane 330 and a lower plane 360, wherein the upper plane 330 comprises first perforations 333 and the lower plane 360 comprises second perforations 363. The upper plane 330 is positioned above the lower plane 360 and the planes 330, 360 are separated with a spacer 340 such as the upper plane 330 and the lower plane 360 constitutes the inventive double sheet metal layer. The first perforations 333 of the upper plane 330 and the second perforations 363 of the lower plane 360 in this embodiment may be as described in relation to the embodiments above.

[0043] Although the description above contains a plurality of specificities, these should not be construed as limiting the scope of the concept described herein but as merely providing illustrations of some exemplifying embodiments of the described concept. Reference to an element in the singular is not intended to mean "one and only one" unless explicitly so stated, but rather "one or

more."

Claims

1. A plank type flooring (1) comprising a plurality of profile planks (20), each profile plank (20) being composed of a bent sheet metal, each profile plank (20) having a length (l), a height (h) and a width (w), each profile plank (20) comprising:

   a first sheet metal part (30) constituting an upper plane, having the length (l) and half the width (w), the first sheet metal part (30) comprising first perforations (33),
   a second sheet metal part (40) extending from a first longside (31) of the first sheet metal part (30), substantially perpendicular to the first sheet metal part (30), extending a first distance (h_1) substantially corresponding to the height (h) of the profile plank (20),
   a third sheet metal part (50) extending from a second longside (32) of the first sheet metal part (30), opposite the first longside (31), substantially perpendicular to the first sheet metal part (30), extending a second distance (h_2) substantially corresponding to the height (h) of the profile plank (20),
   a fourth sheet metal part (60) extending from a longside (51) of the third sheet metal part (50) distal from of the first sheet metal part (30) and extending away from the second sheet metal part (40), and having the length (l) and half the width (w), the fourth sheet metal part (60) comprising second perforations (63),

   and the plurality of profile planks (20) are positioned adjacent to each other so that the second sheet metal part (40) and the third sheet metal part (50) of adjacent planks (20) are positioned adjacent to each other, and by that the next plank (20) bears against a former plank (20), such as the first sheet metal part (30) and the fourth sheet metal part (60) of adjacent planks (20) constituting a double sheet metal layer.

2. Plank type flooring (1) according to claim 1, wherein the first perforations (33) of the first sheet metal part (30) is arranged to release more fluid per unit of area and per unit of time compared to the second perforations (63) of the fourth sheet metal part (60).

3. Plank type flooring (1) according to any of the preceding claims, wherein the first perforations (33) of the first sheet metal part (30) has an opening degree which is greater than the opening degree of the second perforations (63) of the fourth sheet metal part (60).

4. Plank type flooring (1) according to any of the preceding claims, wherein the first sheet metal part (30) comprises slip-protection means by upwardly projecting collars (35) around a determined number of holes (34) of the first perforations (33).

5. Plank type flooring (1) according to any of the preceding claims, wherein the first perforations (33) of the first sheet metal part (30) comprises first round holes (34, 36) and the second perforations (63) of the fourth sheet metal part (60) comprises second round holes (64), wherein the first round holes (34, 36) of the first sheet metal part (30) have a greater diameter than the second round holes (64) of the fourth sheet metal part (60).

6. Plank type flooring (1) according to any of the preceding claims, wherein the second sheet metal part (40) comprises an angled end (42) extending from a longside (41) of the second sheet metal part (40), distal from the first sheet metal part (30) and extending in direction towards the third sheet metal part (50).

7. Plank type flooring (1) according to any of the preceding claims, wherein the fourth sheet metal part (60) comprises an angled end (65) extending from a longside (62) of the fourth sheet metal part (60), distal from the third sheet metal part (50) and substantially perpendicular to the fourth sheet metal part (60).

8. A profile plank (20) for use at a plank type flooring (1) according to any of claims 1-7, the profile plank (20) having a length (l), a height (h) and a width (w), each profile plank (20) comprising:

   a first sheet metal part (30) constituting an upper plane, having the length (l) and half the width (w), the first sheet metal part (30) comprising first perforations (33),
   a second sheet metal part (40) extending from a first longside (31) of the first sheet metal part (30), substantially perpendicular to the first sheet metal part (30), extending a first distance (h_1) substantially corresponding to the height (h) of the profile plank (20),
   a third sheet metal part (50) extending from a second longside (32) of the first sheet metal part (30), opposite the first longside (31), substantially perpendicular to the first sheet metal part (30), extending a second distance (h_2) substantially corresponding to the height (h) of the profile plank (20),
   a fourth sheet metal part (60) extending from a longside (51) of the third sheet metal part (50) distal from of the first sheet metal part (30) and extending away from the second sheet metal

part (40), and having the length (l) and half the width (w), the fourth sheet metal part (60) comprising second perforations (63).

9. Profile plank (20) according to claim 8, wherein the first perforations (33) of the first sheet metal part (30) is arranged to release more fluid per unit of area and per unit of time compared to the second perforations (63) of the fourth sheet metal part (60).

10. Profile plank (20) according to any of claims 8 - 9, wherein the first perforations (33) of first sheet metal part (30) has an opening degree which is greater than the opening degree of the second perforations (63) of the fourth sheet metal part (60).

11. Profile plank (20) according to any of claims 8 - 10, wherein the first sheet metal part (30) comprises slip-protection means by upwardly projecting collars (35) around a determined number of holes (34) of the first perforations (33).

12. Profile plank (20) according to any of claims 8 - 11, wherein the first perforations (33) of the first sheet metal part (30) comprises first round holes (34, 36) and the second perforations (63) of the fourth sheet metal part (60) comprises second round holes (64), wherein the first round holes (34, 36) of the first sheet metal part (30) have a greater diameter than the second round holes (64) of the fourth sheet metal part (60).

13. Profile plank (20) according to any of claims 8 - 12, wherein the second sheet metal part (40) comprises an angled end (42) extending from a longside (41) of the second sheet metal part (40), distal from of the first sheet metal part (30) and extending in direction towards the third sheet metal part (50).

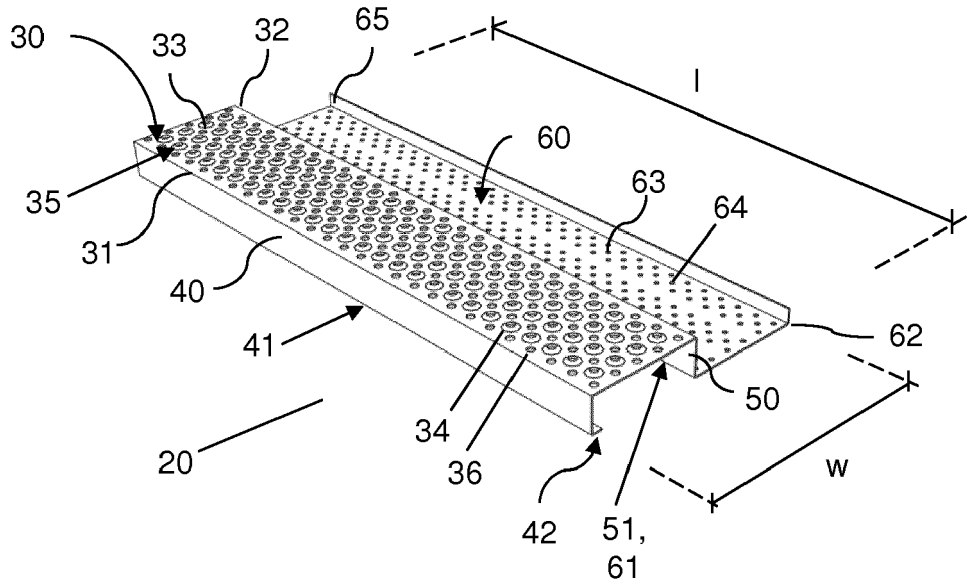
14. Profile plank (20) according to any of claims 8 - 13, wherein the fourth sheet metal part (60) comprises an angled end (65) extending from a longside (62) of the fourth sheet metal part (60), distal from of the third sheet metal part (50) and substantially perpendicular to the fourth sheet metal part (60).

15. A plank type flooring (10) comprising a plurality of profile planks (220), each profile plank (220) being composed of a bent sheet metal, each profile plank (220) having a length (l), a height (h) and a width (b), each profile plank (220) comprising:

a first sheet metal part (230) constituting an upper plane, having the length (l) and a width (b), the first sheet metal part (230) comprising first perforations (233),
a second sheet metal part (240) extending from a first longside (231) of the first sheet metal part (230), substantially perpendicular to the first sheet metal part (230), extending a first distance (h_1) substantially corresponding to the height (h) of the profile plank (220),
a third sheet metal part (250) extending from a second longside (232) of the first sheet metal part (230), opposite the first longside (231), substantially perpendicular to the first sheet metal part (230), extending a second distance (h_2) substantially corresponding to the height (h) of the profile plank (220),

and the plank type flooring (100) further comprising a lower plane (260) being composed of a plane sheet metal having the length (l) and a width (xb) corresponding to a predetermined number (x) of profile planks (220), the lower plane (260) comprising second perforations (263),
and the plurality of profile planks (220) are positioned on top of the lower plane (260) adjacent to each other so that the second sheet metal part (240) and the third sheet metal part (250) of adjacent planks (220) are positioned adjacent to each other, and by that the profile planks (220) bears against the lower plane (260), such as the first sheet metal part (230) of the planks (220) and the lower plane (260) constituting a double sheet metal layer.

16. A plank type flooring (100) comprising:
an upper plane (330) and a lower plane (360), wherein the upper plane (330) comprising first perforations (333) and the lower plane (360) comprising second perforations (363), and the upper plane (330) is positioned above the lower plane (360) and the planes (330, 360) are separated with a spacer (340) such as the upper plane (330) and the lower plane (360) constituting a double sheet metal layer.


30
33
32
65
l
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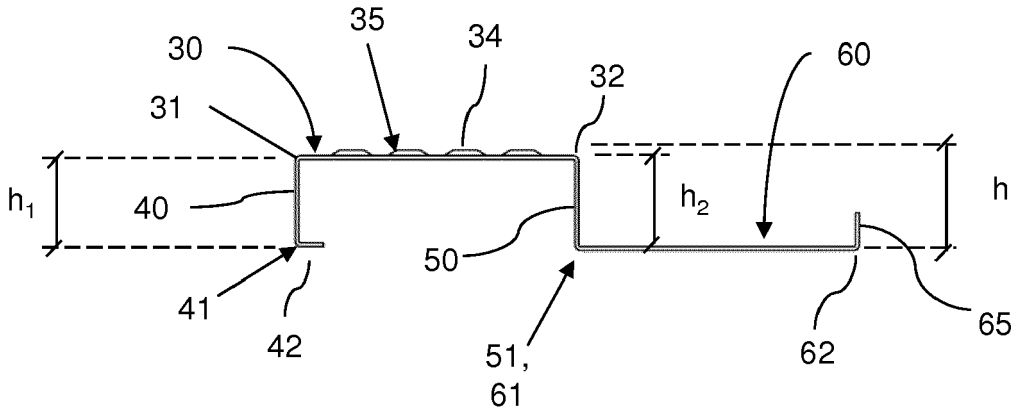
w
42
51,
61

Fig. 1a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30
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32
60
31
h1
40
h2
h
50
41
42
51,
61
62
65

Fig. 1b

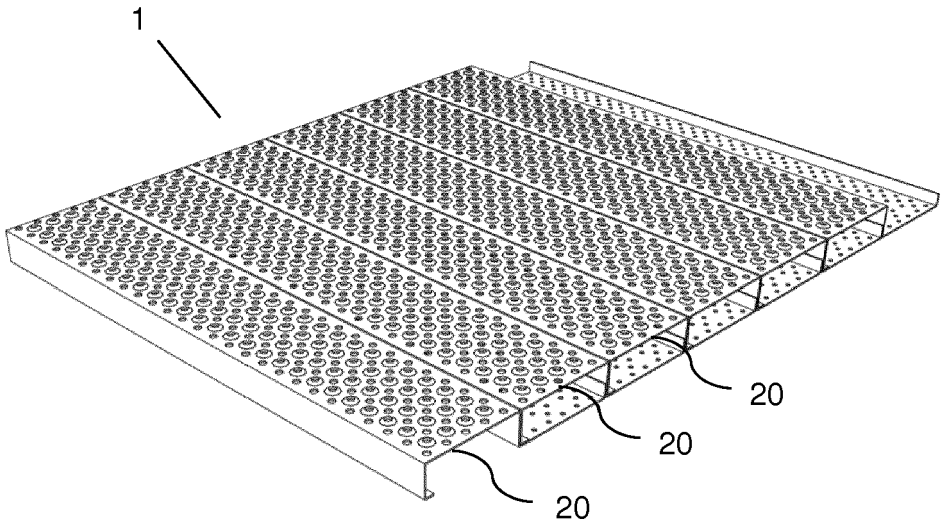


Fig. 2a

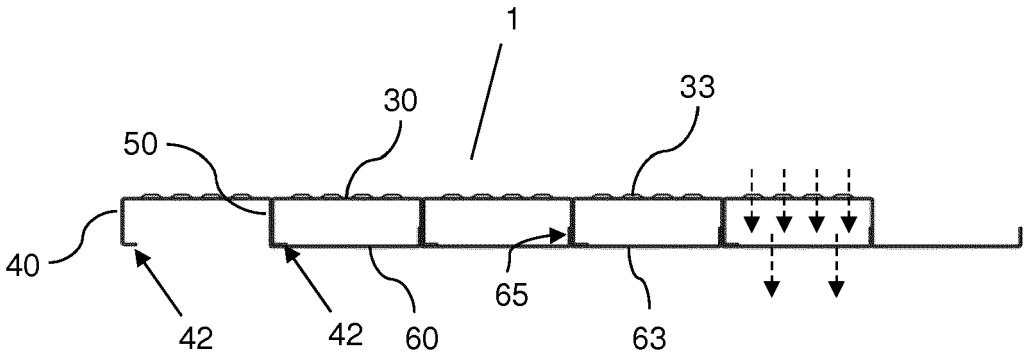


Fig. 2b

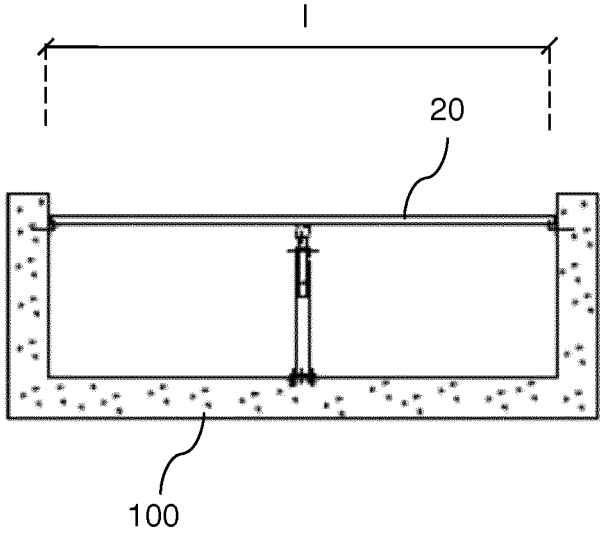


Fig. 3a

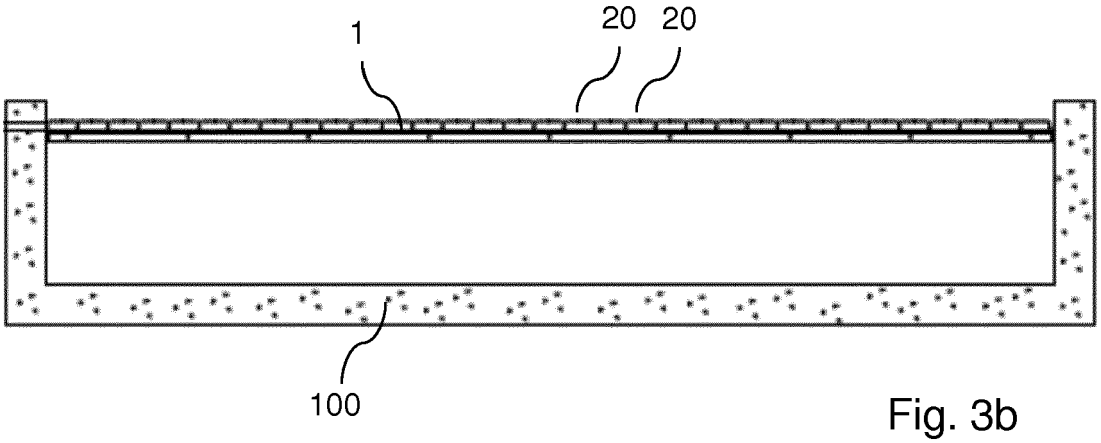


Fig. 3b

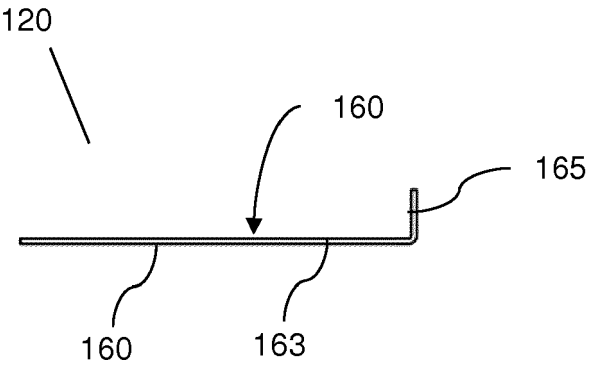


Fig. 4a

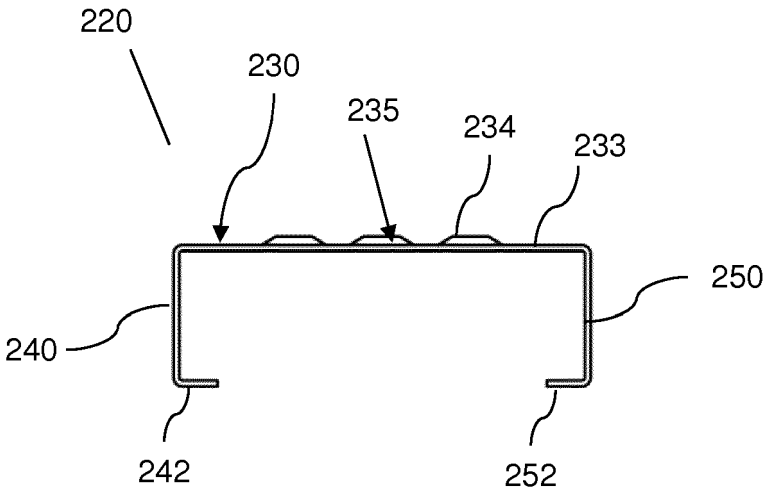
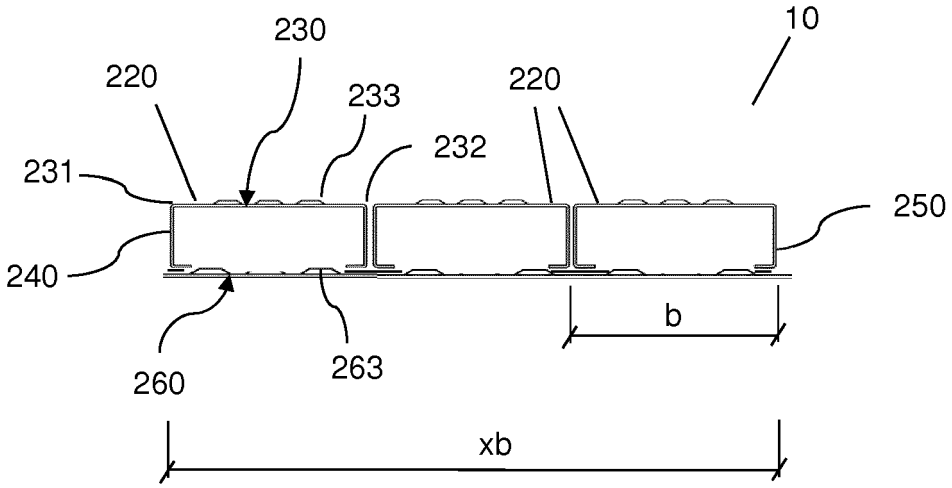


Fig. 4b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263
xb

Fig. 5a

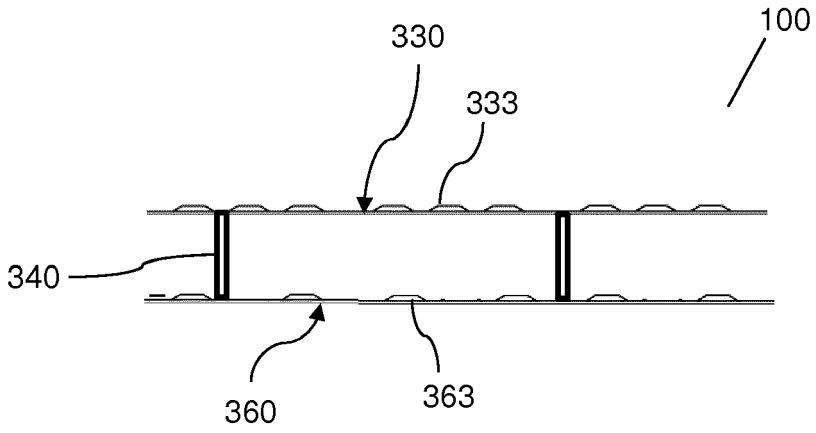
100
330
333
340
360
363

Fig. 5b

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EUROPEAN SEARCH REPORT

Application Number
EP 18 19 5722

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E04F
E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 December 2018	Topcuoglu, Sadik Cem

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