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(71) Applicant: **Garbacz, Piotr**
21-030 Motycz (PL)

(72) Inventor: **Garbacz, Piotr**
21-030 Motycz (PL)

(74) Representative: **Lampart, Jerzy**
Kancelaria Patentowa
Ul. Wyzwolenia 1b
42-624 Ossy (PL)

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(54) **ROOFING WITH RETRACTABLE CANOPY**

(57) Roofing with retractable canopy, mounted in the frame of a supporting structure, supported on two extreme straight beams, one of which permanently fixed and the other sliding, and between the extreme beams the canopy is also supported on sliding central beams 6. The central beam is formed of longitudinal profiles 5 coupled at an angle less than 180°, and the ends of the beams are provided with hangers 7 which are fastened

to two located opposite to each other, parallel supporting structure guides 8. To the lower edge of the supporting structure guide is mounted a gutter profile. Between the supporting structure guide and the gutter profile from the internal side of the supporting structure is a gap and when the roof is closed and the canopy stretched tightly, the edges of a roof waterproof canopy 4 are inserted into the gap.

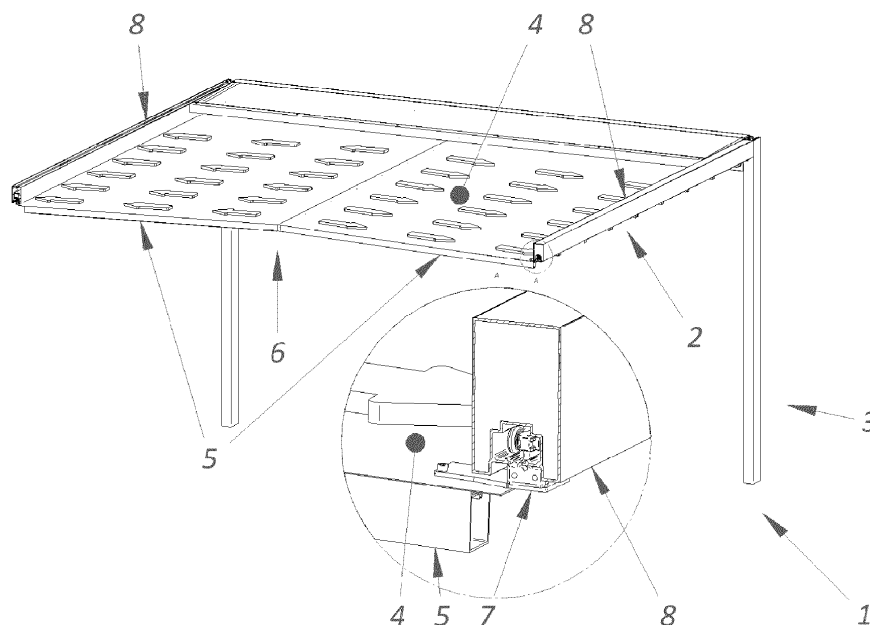


Fig.2

Description

[0001] The present invention relates to roofing with retractable canopy, which is provided to protect a selected place against solar radiation and rainfall.

[0002] Roofs are known on the market, wherein sections of waterproof canopy in the shape of an isosceles trapezium, when two longer, opposite to each other, non-parallel edges of the canopy fastened to the beams on one side, constitute an overhang. Rainwater via the overhang is drained to a gutter profile, and the gutter profile is located in a short distance below the edge of the overhang, and is located in such a manner that all the water falling down the overhang enters the gutter profile. Then, the water via the drains located at the end of the gutter profiles and further via the chamber in the leg is evacuated outside the roof.

[0003] Another known solution is to use rectangular sections of waterproof canopy, where when the roof has been closed the canopy sections are not tightly stretched and form a little overhang via which the water from the roofing is drained to the gutter profile. Typically, roofing comprises a load-bearing structure formed by a rectangular or square frame supported on one or a plurality of legs. Some roofs, instead of a fixed roof, are provided with waterproof canopy divided into sections and by the ends of longer sections suspended over longitudinal profiles (beams). The longitudinal profiles (beams), where to by two longer, opposite to each other sides are mounted the waterproof canopy sections, may move along the longer, perpendicular to the beams, located opposite to each other parallel frame profiles, hereinafter referred to as guides, and in this manner, by moving in one direction, form tight roofing. Moving in the other direction, uncover the roof and allow solar radiation on the protected area.

[0004] From the technical solution description ES1163638 known is a flat awning or pergola with guiding profiles supported on pillars and with profiles mounted on canopy. The supporting profiles are provided with hangers on one side coupled with the support and on the other side comprising wheels or bearings slid into the guiding profile. Similarly, from the patent description DE102004055746 known is a flexible sunshield, for example for conservatories or sun deck. Said flexible canopy shield in a form of a coat is mounted on the profiles by means of mounted to the coating with clips sliding by two parallel lashings or lines. The clips are coupled by flexible joints which are shorter than the width of the panel and form pleats of the coat.

[0005] In the constructions known on the market, in order to close the roof, to enable increasing due to beam moving water overhangs of the roof canopy, the gutter profiles are located in a significant distance from the edge of the canopy overhang. When tightly closing the roof, said distance must be larger than the maximum height of the overhang when opening the roof. It results in the water flowing from the overhang edges falls from a significant height causing drops splashing and the water

entering under the roofing. Moreover, the splashing causes single droplets remaining on the internal side of the waterproof canopy accumulating over time into larger drops that flow along slightly bent under gravitation and weight canopy and fall down outside of the area protected by the gutter profile. Minimal amounts of water remaining after rain in the gutter profiles evaporate, and then due to a difference in temperature inside and outside of the roof, condense on the internal surface of the waterproof canopy having an adverse impact on visual effect perceived by the roofing user, and additionally resulting in detaching the drops outside of the area protected by the gutter profile. Another disadvantage of current solutions is the fact that the height of the gutter profile must be large enough to include the maximum height of the overhang, which results in the disproportionate external view of the roofing - the profiles of the load-bearing structure where the gutter profiles are mounted create an impression of a single high profile which in comparison to the profiles (legs) supporting the supporting structure seem disproportionately large.

[0006] The aim of the present invention is to eliminate the above disadvantages, by accurate and complete evacuation of water into the gutters without remaining water noticeably splashing, to prevent overhangs and water collected in the roof canopy pleats. Both condensate water and mechanisms not visible under the waterproof roof is another eliminated problem out of those advantageous but secondary visual and aesthetic effects.

[0007] An object of the present invention is roofing with retractable canopy, mounted in a frame of a supporting structure, supported on two straight extreme beams, one of which permanently fixed and the other sliding, and on sliding central beams located between the extreme beams, comprising two aluminum profiles of the same length coupled such that the beam has a shape of a letter "V" of a large, as near as 180°, opening angle and said angle is always less than 180°. The ends of the central beams are provided with the hangers which are fastened to two located opposite to each other, parallel profiles of the supporting structure. To the lower edge of said two profiles of the frame is mounted a gutter profile, and between said profiles of the supporting structure and gutter profiles from the internal side of the supporting structure a gap is formed. When the roof is closed and the canopy stretched tightly, the stretched canopy edges are entered into the gap guaranteeing the roof water tightness, and when the roof is being open the canopy is loosened and the canopy edges leave said gap. The supporting structure profiles parallel to the beams sliding direction are provided with the integrated gutter. Thus, the location of the central beam and position of the extreme beams when the canopy has been stretched tight shape the sloping surfaces of the roof which ends are located in the region of the gutter profile and the gutter. To the central beam in the shape of the inverted "V" letter an additional beam can be mounted in such a manner that the whole has the shape of an isosceles triangle and the mounting

elements of the additional beam make the whole to become a plane truss of the increased strength. The roof central beam and auxiliary roof profiles by means of a threaded rod, nuts and mounting element form said plane truss additionally allowing bend deflection adjustment of the auxiliary roof profiles. The auxiliary roof profile has advantageously a chamber provided for linear lightening.

[0008] Due to the main roof canopy wider than the internal width of the frame, when collapsing the roof, creases may appear on the canopy, which can stay visible after re-closing the roof and stretching the canopy. Therefore, as an alternative, an additional auxiliary roof can be mounted, which is slightly narrower than the internal width of the frame and mounted below the main roof, with the objective to cover the creased main roof canopy and to cover mounting elements such that the user under the roof can see a flat surface of the roof.

[0009] Due to the flat extreme beams and central beams forming an isosceles triangle figure, the roof canopy, when the roof is closed, is stretched forming a hipped roof, with slopes towards the four edges of the canopy, due to which rainwater does not remain on the roof and is evacuated to the chambers in the frame profiles and further via the chambers in the legs to the ground. Stretching the canopy is necessary to prevent formation of local canopy indentations where rainwater could gather and form, with time of the rainfall, increasing indentations due to water weight. In the extreme cases, such overhang may reach uncontrolled size, which would even cause the collapse of the structure. Due to the slopes and the roof relevantly stretched, all the rainwater is evacuated from the canopy and there is no risk of overhang formation.

[0010] The subject of the present invention in its preferred embodiment is illustrated in the drawings, where the figures show:

Fig. 1 Overview of roofing and the manner the water flows from the locked and stretched roof,

Fig. 2 Manner the water is evacuated from the canopy roof,

Fig. 3 Construction of main roof beam,

Fig. 4 Idea the water is evacuated from the main roof to the gutter profile,

Fig. 5 How to fold/unfold the canopy of the main roof and roof water tighten,

Fig. 6 Construction of the roof with double canopy,

Fig. 7 Construction of the beam with additional aluminum roof profile,

Fig. 8 Roofing cross-section along the axis parallel to the canopy slide.

[0011] Roofing comprising a load-bearing structure 1 formed with a rectangular or square supporting structure 2 supported on one or a plurality of legs 3, or without legs, and coupled with a load-bearing structure of an existing building, or having from one to a plurality of legs and mounted into the load-bearing structure of the existing building. The roofing is provided with a retractable roof comprising one section of canopy 4 in the shape of a rectangle, said canopy stretched on a plurality of central beams 6 and two straight extreme beams 19 located on two parallel to guides 8 edges of a roof waterproof canopy 4. The central beams 6 are constructed such that consisting two equal aluminum sections of a longitudinal profile 5, coupled by a connecting element (hereinafter referred to as connector) 9 in such a manner that the α angle between the aluminum profiles is less than 180° (Fig. 3). Furthermore, the two straight extreme beams 19 make a pitch between both extreme beams 19 and the central beam 6, second and second to last in the direction parallel to the guides 8. Due to that, when the roof is locked and the canopy 4 stretched a pitch is made towards four edges of the canopy preventing rainwater from remaining on the canopy. Both ends of the beam 6, similar to the ends of the extreme beams 19, by means of hangers 7, are hanged onto the two, located opposite to each other, parallel profiles of the supporting structure - the guides 8. The guides are provided with a mechanism sliding the hangers 7, and as a result, the beams 6 on which the waterproof canopy 4 is stretched. To the roofing guides from below are mounted gutter profiles 10 of a "C" cross-section where one arm of the "C" letter is longer, wherein said longer arm is always located at the external edge of the roofing, the shorter arm of the "C" letter is located at the interior of the roofing supporting structure, due to which at the interior of the supporting structure a little gap 11 is formed, due to which and by means of the hangers 7 is possible to mount the canopy 4 to the guides 8 of the supporting structure. The canopy is slightly wider than the width of the beam 6, and as a result, wider than a profile connecting guides of supporting structure 21 and mounted to the beams in such a manner that both ends extending over the outline of the beam are equal in relation to each other and the total width of the canopy is larger than the internal width of the roofing supporting structure (Fig. 4). Due to that, when locking the roof, the canopy 4 is stretched forming pitches towards the gutter profiles and preventing water from remaining on the canopy surface, and the canopy sections extending over the outline of the beam 6 enter the gap between the guide and with the shorter wall of the gutter profile 11. The extreme beams 19 are mounted such that one of the beams as the only one is fixed and the edge thereof corresponding to the edge of the canopy 4 is located in such position that directly below is located a gutter 20, integrated with the profile 21 connecting the guides 8 of the supporting structure 2. The other, movable, extreme beam 19, due to suitably selected length of the roof canopy, when the roof is locked, is located di-

rectly above the gutter 20 integrated with the profile connecting the guides of the supporting structure 21, located opposite the fixed profile connecting the profiles of the supporting structure. It provides absolute tightness of the roof, as the water flowing down the roof sloping surfaces reaches the edge of the canopy 4 and from the canopy edge flows into the gutter profile 10 (Fig. 4) and the gutter 20, where via the openings at the ends thereof is evacuated to the ground via the chamber in the supporting profile (leg). When opening the roof, the canopy is loosened, causing overhangs, and the stretched edges of the canopy are also loosened and leave said gap 11 folding slightly, however allowing the roof to be opened entirely and the protected area to be uncovered. The difference in the width of the canopy 4 (Fig. 4 dimension Y) in relation to the width of the aluminum profile 5 (Fig. 4 dimension X) forming the beam 6 is selected such that when opening the roof despite the width larger than the internal width of the supporting structure and the canopy folding at the edges the roof can be easily opened uncovering the protected area. On the other hand, when closing the roof, to enable straightening the canopy edges and entering the gap 11 between the guide and the shorter edge of the gutter profile 8, providing roofing tightness. Such solution provides that despite closing the roof and stretching the canopy, creases 12, as a result of folding when opening the roof, may remain on the canopy, which can adversely affect aesthetical appearance. The problem has been solved by adding below the main roof canopy 4 an auxiliary roof 13 which is slightly narrower than the internal width of the roof supporting structure and which cover the main roof and prevent the main roof creased canopy from being visible. The auxiliary roof has a form of rectangular sections of the waterproof canopy 14 which is mounted to the additional aluminum profiles 15 mounted to the beams 6 of the main roof canopy 4, wherein the length of the shorter, parallel, located opposite to each other canopy edges is selected such that when the main roof 4 is entirely closed and the canopy is stretched, the sections of the canopy of the auxiliary roof 13 are not stretched and form slight overhangs. It is necessary for the main roof canopy 4 to be stretched following the closing of the roof, and the edges thereof be entered into the gap 11 between the guide 8 and the gutter profile 10, and the inaccuracies in the lengths of the shorter, located opposite each other parallel edges of the rectangular sections of the canopy of the auxiliary roof 13 do not cause problems with stretching the main roof canopy. Additional profiles 15, to which mounted are the rectangular sections of the canopy of the auxiliary roof 13, are mounted to the beams 6 of the main roof in such a manner that the whole has a shape of the isosceles triangle. Furthermore, in the center of said profiles is mounted a threaded rod 16 which from the other side is mounted by means of two nuts 17 to the mounting element 18 of the auxiliary roof, and said element is mounted to the ends of the longitudinal profiles 5 of the beam 6 from the side of the connector 9. Due to that, the whole constitutes a plane

truss that advantageously affect rigidness and reduces bend deflection of said beam. Additionally, by means of the threaded rod 16, nuts 17 and mounting element 18, bend deflection of the aluminum profile 15 can be controlled until eliminated, which advantageously affect the roofing aesthetical appearance. The auxiliary roof profile 15 is provided with the chamber for LED linear lighting, which can have a form of a single section of a length equal the length of the auxiliary roof or may have a form of shorter sections.

[0012] Advantageously, a pergola constructed in said manner, due to a double roof and space between the roofs, has better insulation characteristics, due to which thermal comfort improves due to the warmth moved upwards by convection faces insulation in a form of the double roof.

Designations:

[0013]

1. Load-bearing structure
2. Supporting structure
3. Legs
4. Waterproof roof canopy
5. Longitudinal profile
6. Roof beam
7. Main roof beam hanger
8. Supporting structure guides
9. Beam connector
10. Gutter profile
11. Gap between supporting structure guide and gutter profile
12. Roof waterproof canopy creases
13. Auxiliary roof
14. Auxiliary roof waterproof canopy sections
15. Auxiliary roof profiles
16. Threaded rod
17. Nuts
18. Mounting element of auxiliary roof
19. Roof extreme beams
20. Gutter
21. Profile connecting guides of supporting structure

Claims

1. Roofing with retractable canopy, mounted in a frame of a supporting structure, supported on two straight extreme beams, one of which permanently fixed and the other sliding, and between the extreme beams the canopy is also supported on sliding central beams, **characterized in that** the central beam (6) is formed of longitudinal profiles (5) coupled at an angle less than 180° and the ends of the central beams are provided with hangers which are fastened to two located opposite to each other, parallel supporting structure guides (8), and to the lower edge

of the supporting structure guide (8) is mounted a gutter profile(10), and between the supporting structure guide and the gutter profile from the interior side of the supporting structure is a gap (11) and when the roof is closed and the canopy stretched tightly, the edges of a roof waterproof canopy (4) are inserted into the gap. 5

2. The roofing according to Claim 1, **characterized in that** the width of the main roof canopy (4) is larger than the internal width of a roof supporting structure (2). 10
3. The roofing according to Claim 1, **characterized in that** the shape of a beam (6) and location of extreme beams (19), when the canopy is stretched, form a shape of sloping surfaces of the roofing which ends are located in the region of the gutter profile (10) and a gutter (20). 15
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4. The roofing according to Claim 1, **characterized in that** is provided with an additional auxiliary roof (13) mounted under the room waterproof canopy (4).
5. The roofing according to Claim 1, **characterized in that** the roof central beam (6) and auxiliary roof profiles (15) with a threaded rod (16), nuts (17) and mounting element (18) form a plane truss with bend deflection adjustment of the auxiliary roof profiles (15). 25
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6. The roofing according to Claim 1, **characterized in that** the auxiliary roof profile (15) have a chamber provided for linear lightening. 35

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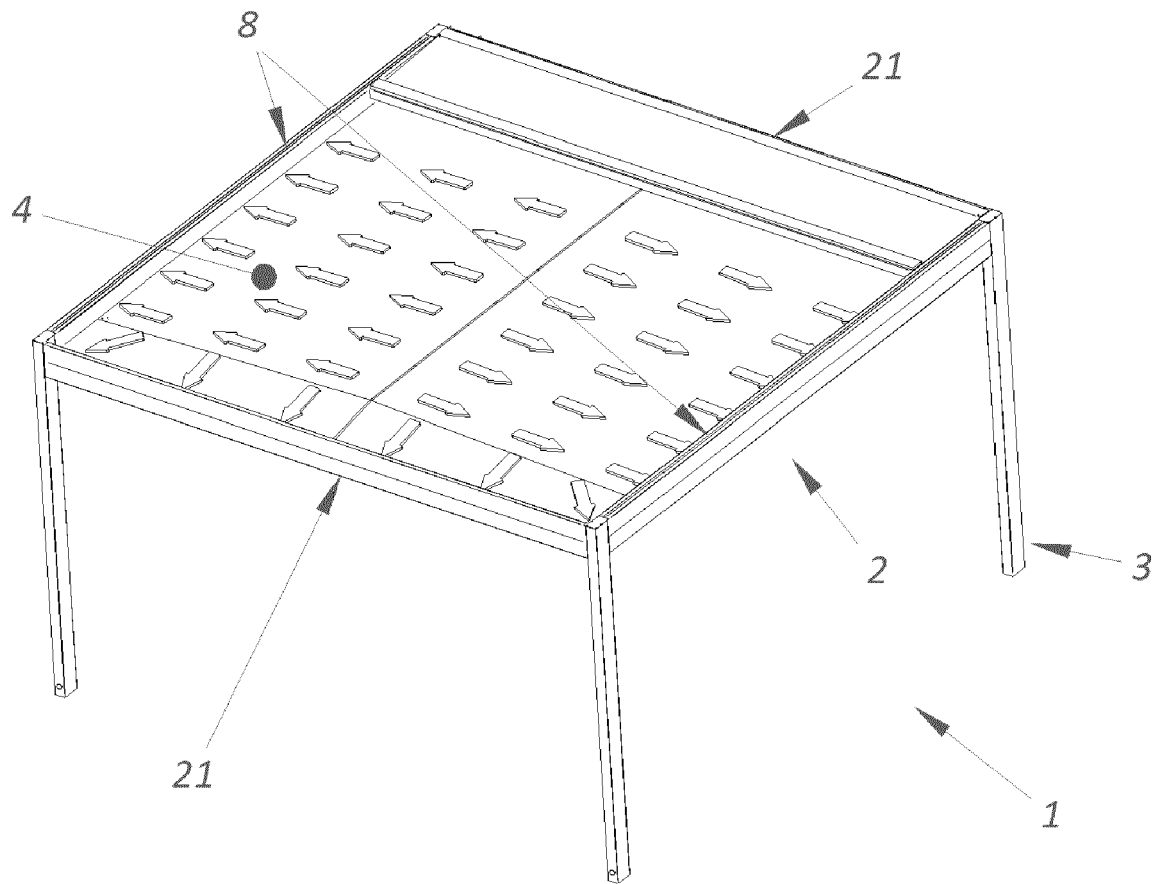


Fig.1

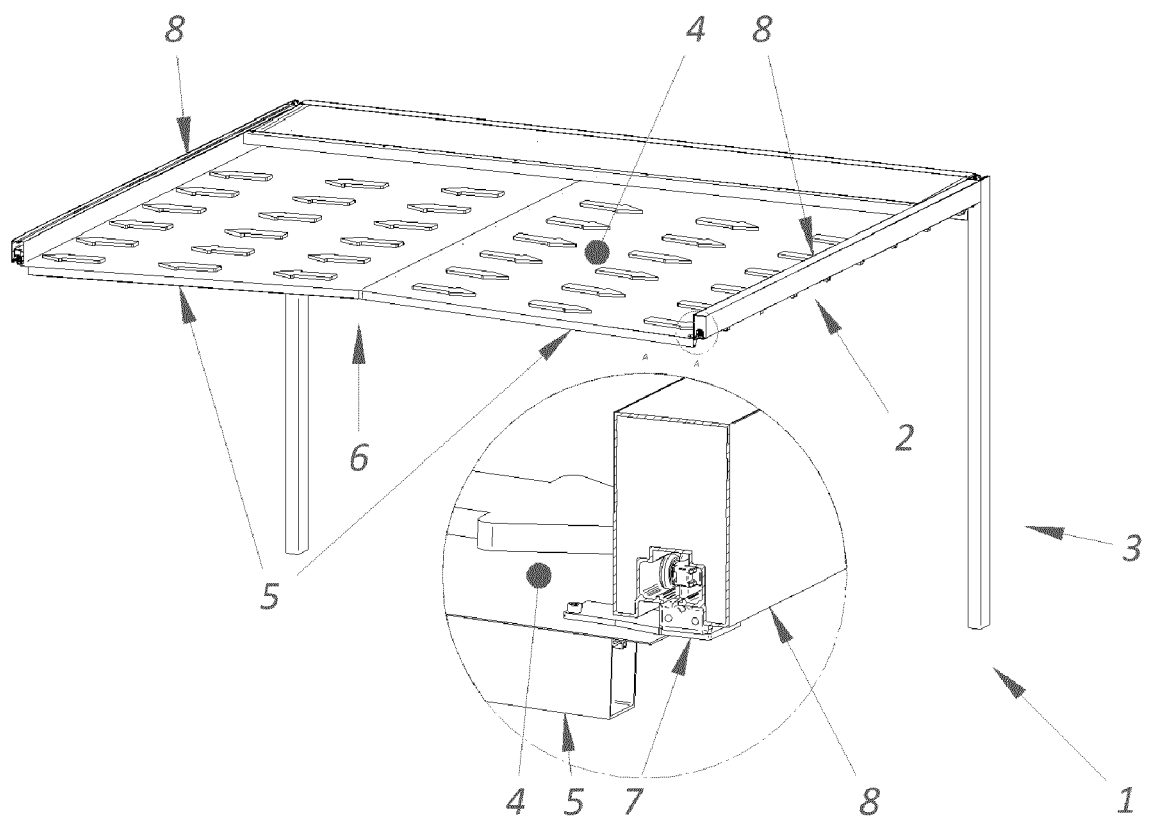


Fig.2

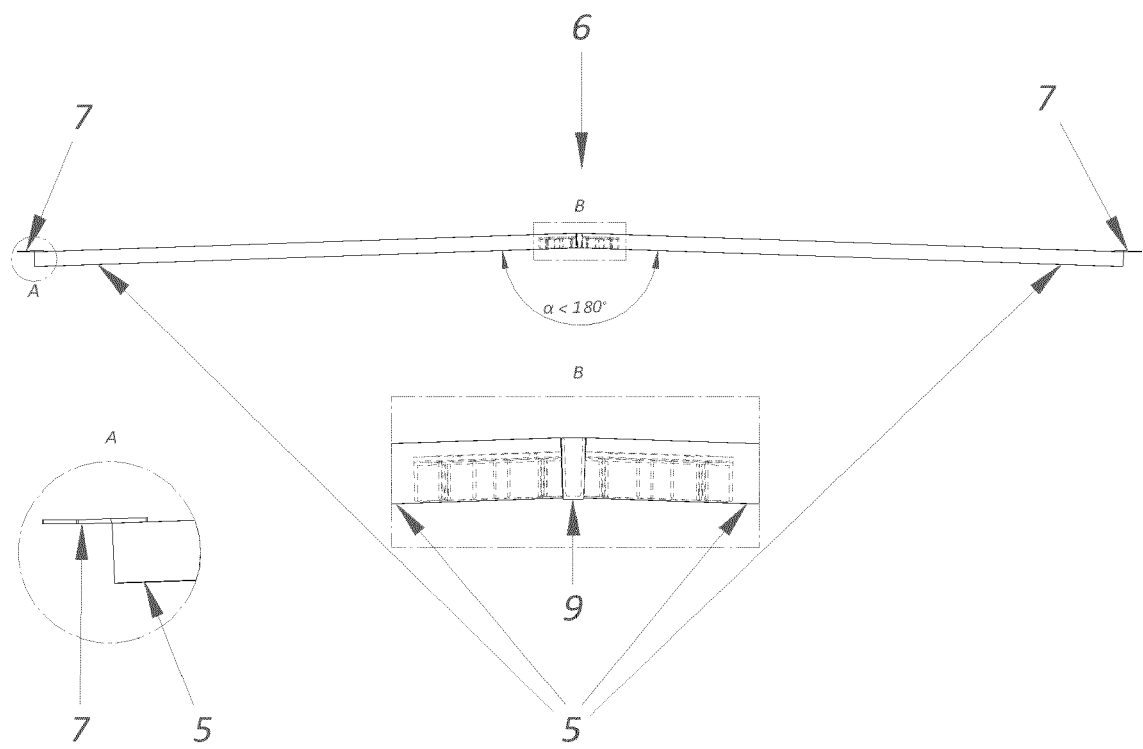


Fig. 3

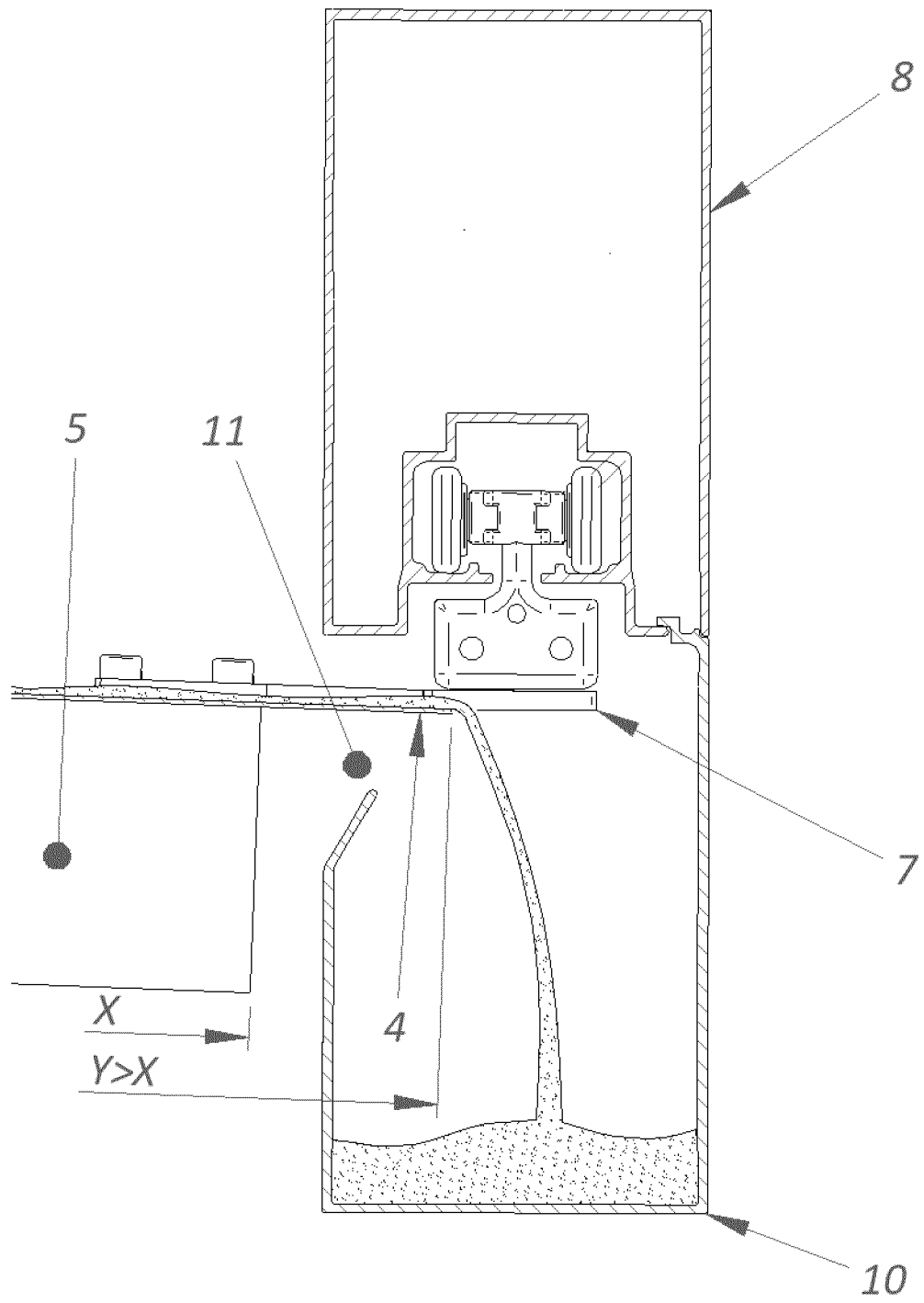


Fig. 4

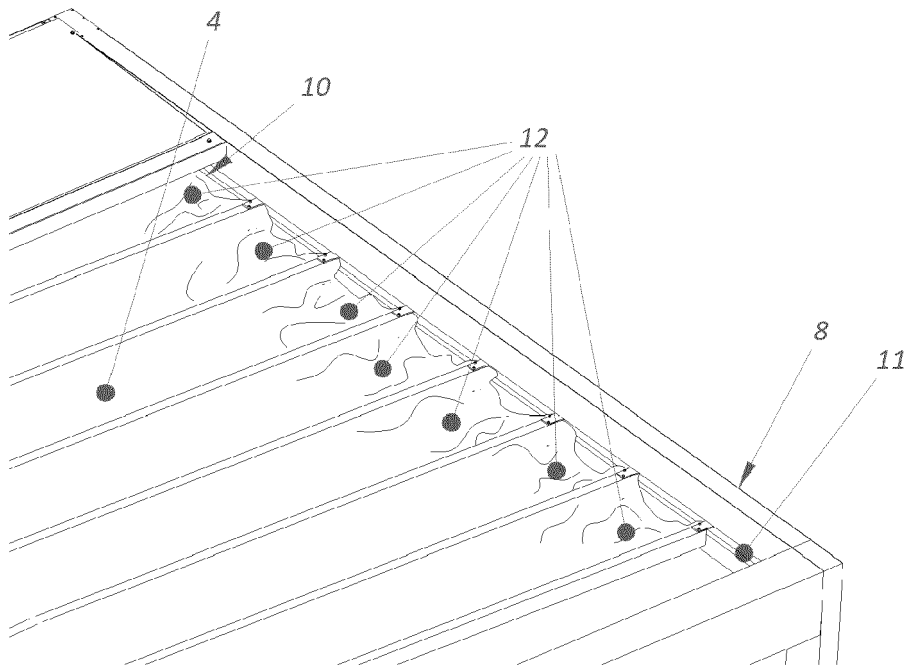


Fig. 5

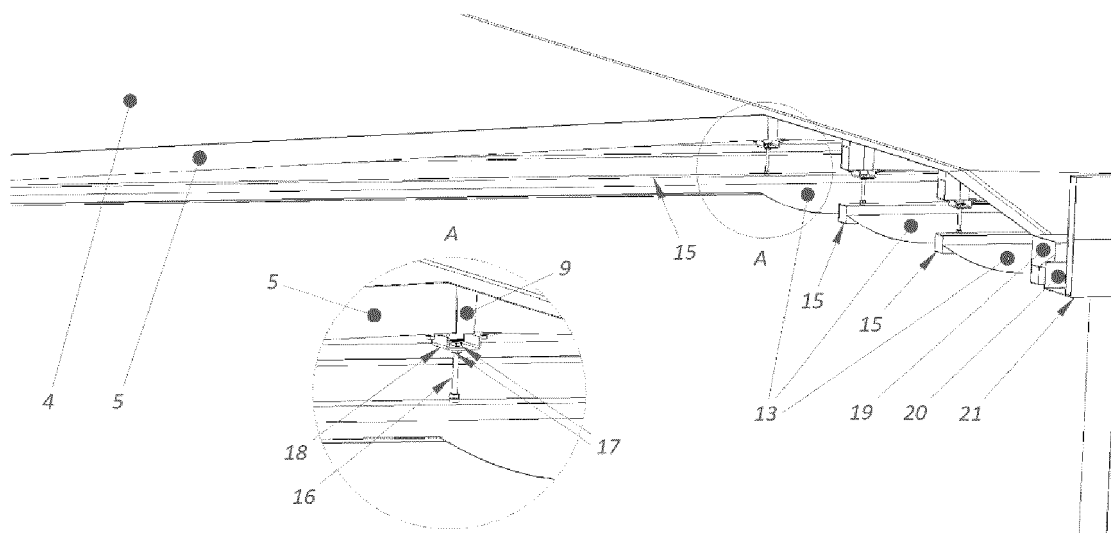


Fig. 6

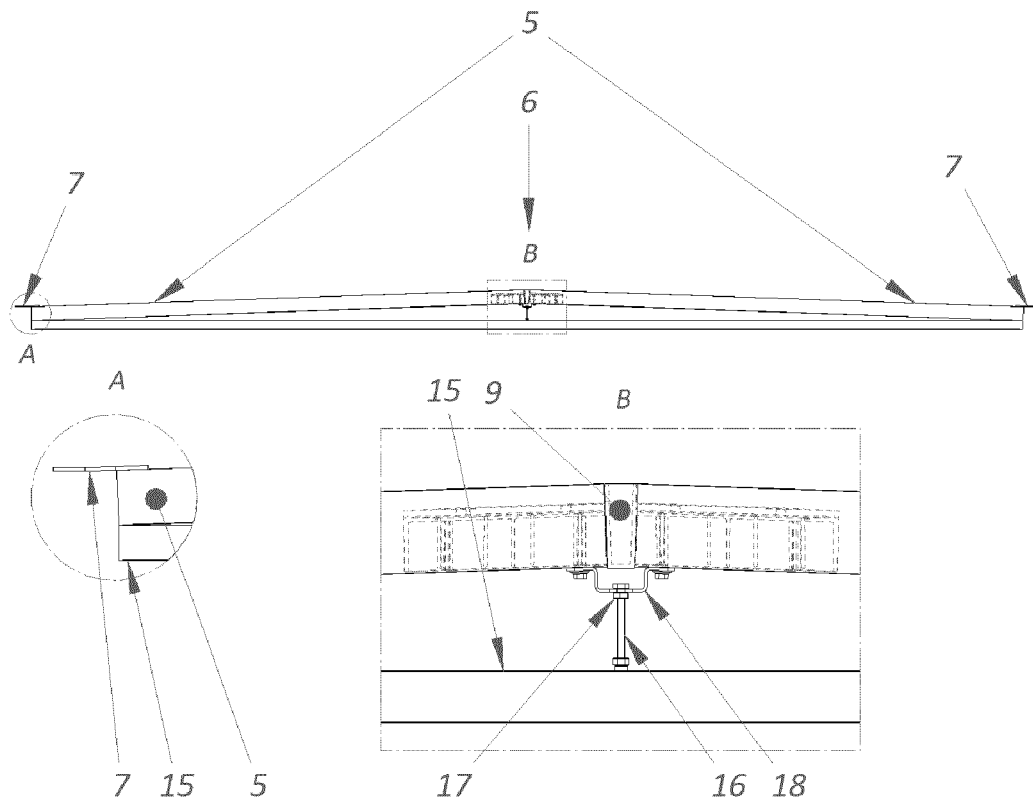


Fig.7

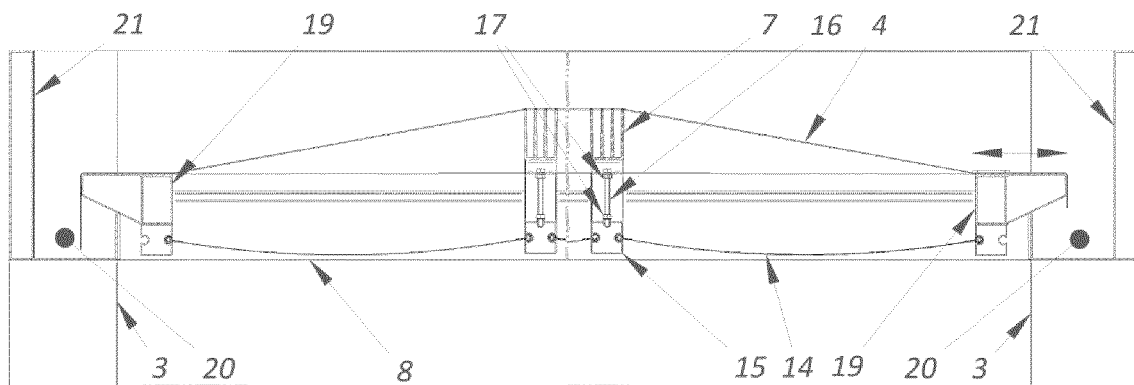


Fig. 8



EUROPEAN SEARCH REPORT

Application Number

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A	WO 2013/121448 A1 (CORRADI S P A [IT]; BIAGI GIANMARCO [IT]) 22 August 2013 (2013-08-22) * page 3, lines 26-29; figures 3,4 * * page 5, line 28 - page 6, line 9 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 4 July 2023	Examiner Cornu, Olivier
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REFERENCES CITED IN THE DESCRIPTION

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