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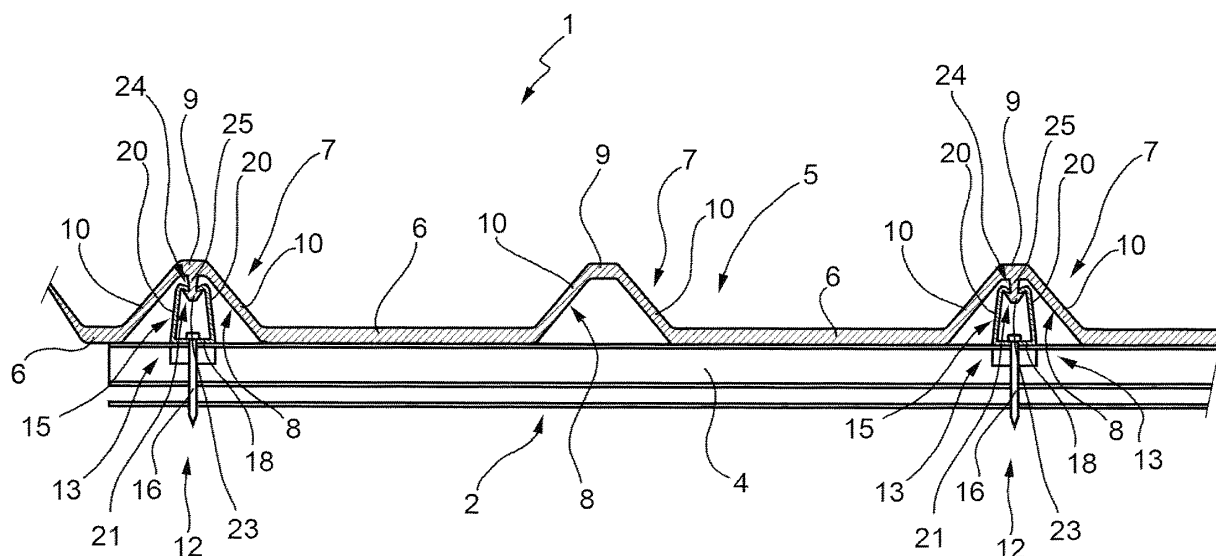
A request for addition claim 27 has been filed pursuant to Rule 139 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(54) **A roofing system having fretted slab-shaped elements, and a fretted slab-shaped element for said roofing system**

(57) In a roofing system (1), at least one fretted slab-shaped element (5) resting on a resting and fixing structure (2) is connected to the structure (2) itself by means of at least one snapping retaining assembly (15), which

is interposed between a side surface (8) internally delimiting a concave rib (7) of the slab-shaped element (5) and the resting and fixing structure (2), and comprises at least one connecting element (20;24) integrally made with the slab-shaped element (5).

FIG. 1



Description

[0001] The present invention relates to a roofing system having fretted slab-shaped elements.

[0002] Specifically, the present invention relates to a roofing system for making roofs of buildings or industrial facilities, to which the following description will explicitly refer without therefore losing in generality.

[0003] In the building roofing field, it is known the use of fretted slabs made of thermoplastic or thermosetting material, which rest on supporting and fixing structures, and are connected to the supporting and fixing structures themselves by means of screws inserted into appropriate circular holes previously obtained in waved parts of the slabs and screwed into the structure underneath.

[0004] Although universally used, the known mode of connecting fretted slabs is poorly satisfactory from the functional point of view, firstly because the holes are breaking triggers, from which fractures and/or cracks originate and propagate due to the stresses transmitted to the slabs and to the thermal gradients to which the slabs themselves are normally subjected, which over time compromise the slab efficiency and stability.

[0005] Again due to thermal and mechanical stresses transmitted to the slabs and because of the presence of the screws placed in direct contact with the slabs, the slabs themselves are locally crushed in the screw-slab contact area, with the consequence that the original circular holes gradually take a slotted shape, thus severely compromising the resistance of the slabs and, consequently, the quality of the whole roof.

[0006] It is the object of the present invention to provide a roofing system having fretted slabs which allows to simply and cost-effectively solve the aforesaid problems, while having an efficiency and a functional reliability at least comparable to those of the known solutions.

[0007] According to the present invention, a roofing system having fretted slab-shaped elements comprising a stationary fixing structure is made; at least one slab-shaped element made of thermoplastic material having at least one concave portion, the concavity facing said fixing structure, and means for connecting said slab-shaped element to said fixing structure, **characterized in that** said connecting means are interposed between a side surface internally delimiting said concave portion and said fixing structure.

[0008] In the above-described system, at least part of said connecting means are preferably integral with said slab-shaped element.

[0009] The present invention further relates to a fretted slab-shaped element.

[0010] According to the present invention, a fretted slab-shaped element made of thermoplastic material for implementing a roofing system according to claim 1 is provided; the slab-shaped element comprising at least one concave portion delimited by an internal side surface thereof, and being **characterized in that** is further comprises first connecting means to a fixing structure; said

first connecting means projecting so as to protrude from said internal side surface, and being conveniently integrally made with said concave portion.

[0011] The invention will now be described with reference to the accompanying drawings illustrating some nonlimiting embodiments thereof, in which:

figure 1 diagrammatically shows a section of a preferred embodiment of a roofing system according to the present invention; and

figures from 2 to 5 show on a magnified scale a section of four different variants of a detail of figure 1.

[0012] In figure 1, numeral 1 indicates, as a whole, a roofing system comprising a resting and fixing structure 2 (intrinsically known) and comprising a plurality of resting and fixing crosspieces 4 parallel to and spaced from one another, only one of which is shown in the accompanying drawings. Furthermore, system 1 comprises one or more fretted slab-shaped elements 5 made of thermoplastic or thermosetting material, e.g. polycarbonate.

[0013] In the specific described example, each slab-shaped element 5 comprises a plurality of plate-like portions 6 resting to the structure 2 and a plurality of concave ribs or longitudinal waves, indicated at 7, which are alternated between the plate-like portions 6 and have a concavity facing the resting and fixing structure 2.

[0014] Again in the specific described example, each of the ribs 7 is flared in shape towards the structure 2, is delimited by an internal side surface 8 and comprises a bottom wall 9 facing, and spaced from, structure 2 and parallel to the plate-like portions 6, and two inclined flat side walls 10 converging towards each other and towards the bottom wall 9.

[0015] With reference to figure 1, each slab-shaped element 5 is connected to the structure 2 by means of a snap device 12 for a quick connection which comprises, for each of the ribs 7, a snap assembly 13 for a quick fixing accommodated in the corresponding rib 7 itself. Each assembly 13 comprises a fastening body 15 firmly connected to structure 2 by means of screws 16 and protruding into the corresponding rib 7. The fastening body 15 is conveniently made of bent harmonic steel and comprises a flat base or fixing portion 18 resting on the structure 2 and connected to the structure itself by means of screws 16, and two elastic hook-like side appendixes 20, which protrude towards the slab-shaped element 2 from the base portion 18 in reciprocally facing positions and converge towards each other and towards the corresponding wall 9 in order to define a retaining seat 21 therebetween. In the variant shown in figure 2, the side appendixes 20 extend reciprocally parallel.

[0016] Seat 21 holds a head 23 of a fastening element 24, which is part of the corresponding assembly 15, is arrow-like and has a shank 25 extending from the corresponding bottom wall 9, integrally with the bottom wall 9 itself. The element 24 is made of the same material as the slab-shaped element 5 and, along with the slab-

shaped element 5 itself, is part of an integrally made body.

[0017] In the variant shown in figure 5, the fastening element 24 is integrally connected to a fixing plate 27 connected to the structure by means of screws 28, while the hook-like side appendixes 20 are made of the same material as the slab-shaped element 5 and are integral therewith, extending towards structure 2 from the bottom wall 9.

[0018] The variant in figure 3 shows a fastening body 30, which differs from body 15 in that the hook-like side appendixes 20 extend reciprocally parallel in opposite positions and each delimits respective retaining seats 32 spaced from each other. Each of the side appendixes 20 cooperates with a corresponding fastening portion 34, which is part of the corresponding assembly 15, extends so as to protrude into the corresponding rib 7 from the corresponding plate-like portion 6, of which it is a corresponding extension, and ends with a segment 35 which is curved towards the corresponding bottom wall 9 and engaged into the corresponding seat 32.

[0019] In the variant shown in figure 4, each of the fastening portions 34 is replaced by a corresponding appendix 37 projecting so as to protrude from an intermediate portion of the corresponding side wall 10. Appendixes 37 converge towards each other and towards the bottom wall 9 to each positively engage a corresponding seat 32.

[0020] From the above it is apparent that the described roofing system 1 and slab-shaped element 5 are very efficient and functionally reliable, but especially so as to keep the original constructional features virtually unchanged. The above is essentially the consequence of the particular mode of manufacturing the connecting device 12, which avoids any drilling of the slab-shaped element, thus consequently eliminating all the problems of the known solutions caused by drilling, and the use of connecting screws passing through the slab-shaped element itself.

[0021] The snap connection enabled by the assemblies 15 thus allows an easy, rapid, firm connection of the slab-shaped elements 5 to structure 2, whereas manufacturing a part of the assemblies 15 themselves integrally with the slab-shaped element allows to reduce the number of details and therefore the manufacturing and assembling costs.

[0022] From the above it is apparent that the described system 1 and slab-shaped element 5 may be used either for making covers such as roofs or terraces, or for closing or coating side walls of buildings or general facilities. Indeed, the hook-like coupling allows to hold the used slab-shaped elements both when they are arranged in horizontal or inclined position and when they are arranged in vertical position.

[0023] Finally, from the above it is apparent that changes and variations may be made to the described system 1 and slab-shaped element 5 without therefore departing from the scope of protection defined by the claims.

[0024] Specifically, in system 1 the resting and fixing

structure could be different from that indicated by way of example, as well as the slab-shaped elements 5 could be different, particularly slab-shaped elements 5 could comprise a different number of ribs and the ribs themselves could be geometrically different from those shown and, for example, with curved waves.

[0025] With regards to the groups 15, they could comprise fastening elements geometrically and/or dimensionally different from those shown. Specifically, hook-like portions 20 could be replaced by differently shaped portions and/or provided with appendixes or backings adapted to prevent longitudinal movements of the slab-shaped elements 5.

Claims

1. A roofing system having fretted slab-shaped elements comprising a stationary fixing structure; at least one slab-shaped element made of thermoplastic material having at least one concave portion, the concavity facing said fixing structure, and means for connecting said slab-shaped element to said fixing structure, **characterized in that** said connecting means are interposed between a side surface internally delimiting said concave portion and said stationary fixing structure.
2. A system according to claim 1, **characterized in that** at least part of said connecting means is integral with said slab-shaped element.
3. A system according to claim 2, **characterized in that** at least part of said connecting means is integrally made with said slab-shaped element.
4. A system according to any one of the preceding claims, **characterized in that** said connecting means comprise quick connecting means.
5. A system according to any one of the preceding claims, **characterized in that** said connecting means comprise snap connecting means.
6. A system according to any one of the preceding claims, **characterized in that** said connecting means comprise at least a fastening portion carried by one of either said slab-shaped element or said fixing structure, and at least one retaining seat carried by the other of either said slab-shaped element or said fastening structure, and is positively engaged by said fastening portion.
7. A system according to claim 6, **characterized in that** said connecting means comprise at least one hook-like element at least partially delimiting said retaining seat.

8. A system according to claim 7, **characterized in that** said connecting means comprise a pair of said opposite hook-like elements, each defining a corresponding retaining seat for a respective fastening portion.
9. A fastening system according to any one of the claims from 6 to 8, **characterized in that** said fastening portion protrudes into the concave portion from a resting portion of said slab arranged in contact with said fixing structure, substantially being an extension of the resting portion itself into the concave portion.
10. A system according to claim 9, **characterized in that** said fastening portion has an edge curved towards the inside of the concave portion.
11. A fastening system according to any one of the claims 6 from 8, **characterized in that** said fastening portion protrudes into the concave portion from a side wall of said concave portion.
12. A system according to any one of the claims from 8 to 11, **characterized in that** said hook-like elements are connected to a common support anchored to the structure by means of screws.
13. A system according to claim 7, **characterized in that** said connecting means comprise a pair of said hook-like elements facing each other to define a retaining seat therebetween; said fastening portion comprising an arrow-like element inserted into said seat and cooperating with both said hook-like elements.
14. A system according to claim 13, **characterized in that** said arrow-like element integrally extends from a bottom wall of the concave portion.
15. A system according to claim 13 to 14, **characterized in that** said hook-like elements are connected to a common support anchored to the supporting structure by means of screws.
16. A system according to claim 13, **characterized in that** the hook-like elements are integral with said slab-shaped element and extend from a bottom wall of said concave portion towards said fixing structure.
17. A fretted slab-shaped element made of thermoplastic material for making a roofing system according to any one of the preceding claims; the slab-shaped element comprising at least one concave portion delimited by an internal side surface thereof, and being **characterized in that** it further comprises first means for the connection to a fixing structure; said first connecting means projecting so as to protrude from said internal side surface.
18. An element according to claim 17, **characterized in that** at least said first connecting means are integrally made with said concave portion.
19. An element according to claim 17 or 18, **characterized in that** said first connecting means comprise snap connecting means.
20. An element according to any one of the claims from 17 to 19, **characterized in that** said first connecting means comprise at least one hook-like element.
21. An element according to claim 20, **characterized in that** said first connecting means comprise a pair of said hook-like elements facing each other to define a retaining seat therebetween, which is snap-engaged in use by an arrow-like element inserted into said seat and cooperating with both said hook-like elements.
22. An element according to any one of the claims from 17 to 19, **characterized in that** said first connecting means comprise an arrow-like element integrally extending from a bottom wall of said concave portion.
23. An element according to any one of the preceding claims, **characterized in that** said first connecting means comprise a fastening portion projecting so as to protrude into the concave portion.
24. An element according to claim 23, **characterized in that** said fastening portion extends from a resting portion of said slab-shaped element arranged in contact with said fixing structure, thus substantially being an extension of the resting portion itself into said concave portion.
25. An element according to claim 23 or 24, **characterized in that** said fastening portion has an edge curved towards the inside of the concave portion.
26. An element according to claim 23, **characterized in that** said fastening portion protrudes into the concave portion from a side wall of said concave portion.

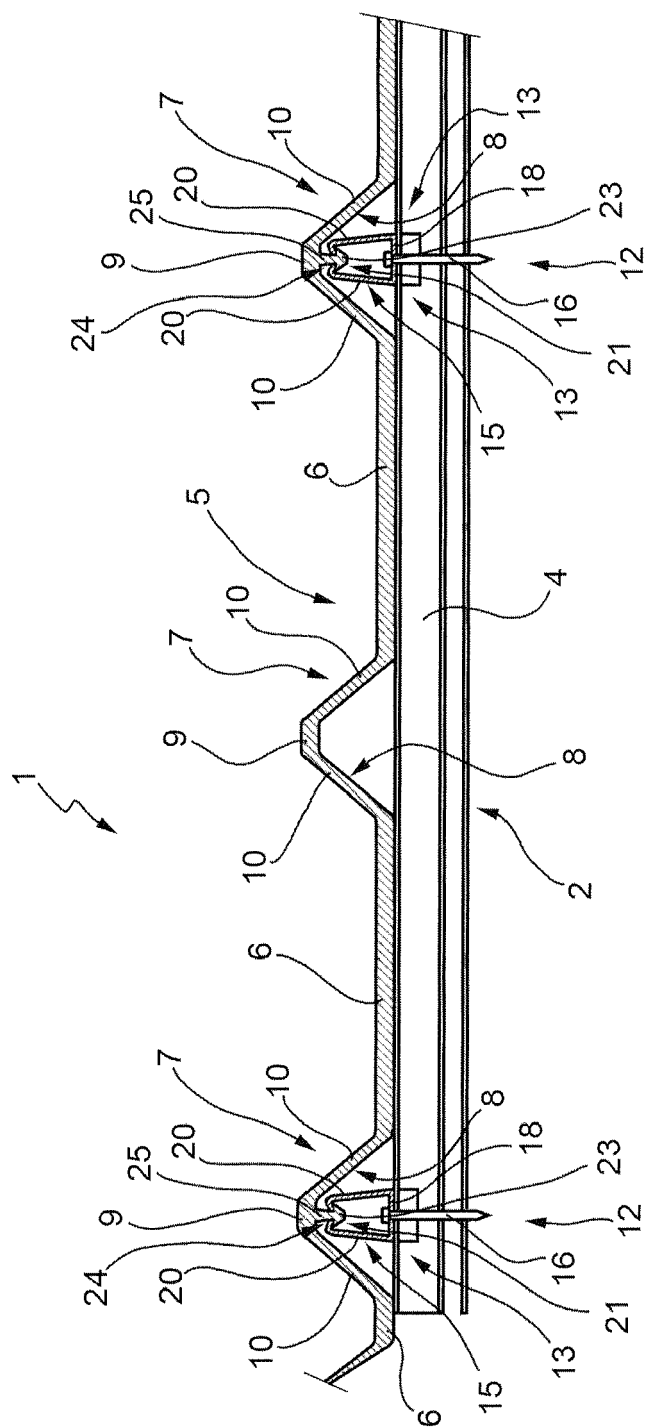


Fig. 1

FIG. 2

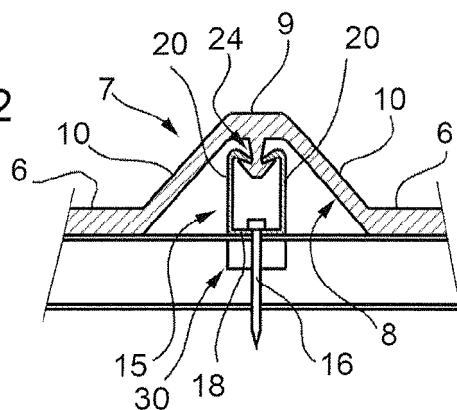


FIG. 3

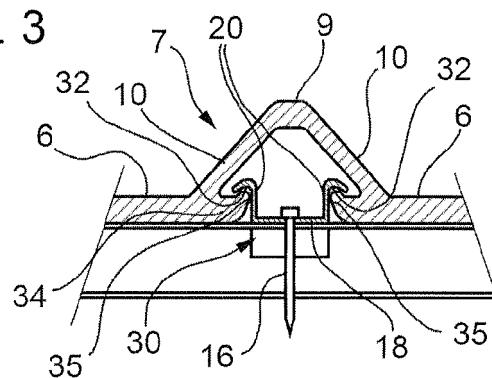


FIG. 4

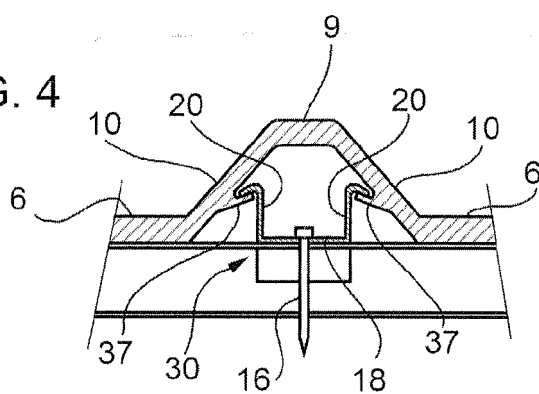
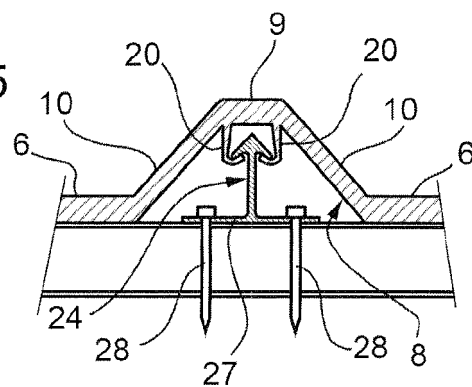


FIG. 5





EUROPEAN SEARCH REPORT

Application Number
EP 09 15 4471

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Place of search The Hague		Date of completion of the search 17 June 2009	Examiner Demeester, Jan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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