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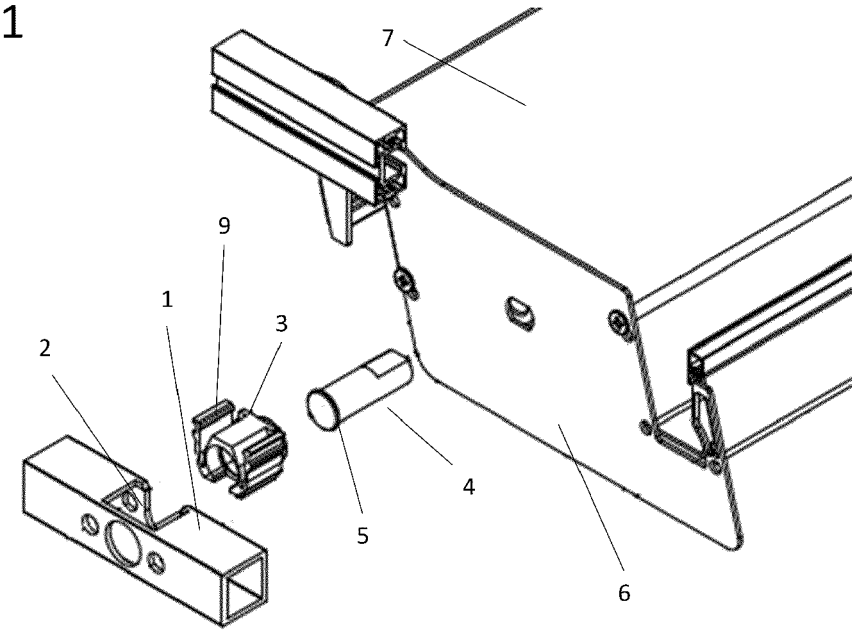
(54) STRUCTURAL SAFETY DEVICE FOR HORIZONTAL MOVABLE LOUVRED HORIZONTAL ENCLOSURES

(57) The invention relates to a device that provides structural robustness to a horizontal enclosure such as a pergola of movable slats, wherein said device comprises beams that support the slats where for each slat there is a bearing housed in a bushing where the bearing houses a shaft that has a stop at one of its ends and, where the shaft is joined to the slat by means of a header that closes laterally said slat.

FIG.1



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Description

[0001] The invention relates to a device that provides robustness to the structure of a top enclosure, preferably for pergolas with movable slats, which prevents the relative separation of the beams due to the bending of the slats when they are subjected to either lateral or vertical loads, wind, snow etc.

[0002] The device substantially improves the behaviour of the structure since it uses the slat itself as a traction and compression connection element for which purpose the shafts of each of the slats are anchored to the side beams by means of supports, where the shafts have flanges at one of their ends that allows it to stay coupled to the supports and, therefore, to stay attached to the side beams distributing the different loads that may affect it over the entire structure.

[0003] The field of action of this invention is that of horizontal enclosures.

BACKGROUND

[0004] Currently, to resolve the structural problems present in top enclosures of large dimensions associated to loads that may be generated on their surface, such as strong winds, snow, among others, a central crossbar is normally implemented, such as a flexible cable, which fastens the side beams, avoiding their separation.

[0005] Patent EP3303725 shows us a proof of this, since this invention consists of a slat roof comprising beams and a plurality of strips or slats arranged in parallel with one another where they have slat shafts whereby the slats are fixed to the respective beam.

[0006] Patent EP2431547 comprises a plurality of oscillating sheet on a frame that supports them, which includes at least two side beams that support side gutters wherein the oscillating sheets are hooked by means of hook pins that allow them to rotate. Each oscillating sheet has an arcuate section.

[0007] This type of embodiment is normally used in outdoor enclosures which can be affected by climatic events where the assembly is required to have additional properties that maintain the different elements tightly joined together to support said loads. In this case, as it has slats fixed to the side beams, it is feasible that the different loads that may affect it are centred at a point or some points of the structure and is not distributed uniformly over the entire surface of the structure which can generate the weakening thereof.

[0008] In addition, one of the drawbacks of this type of arrangement is that when load is applied to the slats, the side support beams usually curve generating a weakening process of the structure since the cables that pass through the slats or oscillating blades are usually made of a flexible material.

DESCRIPTION OF THE INVENTION

[0009] The invention relates to a device that improves the behaviour of the structure of horizontal enclosures, preferably of pergolas with movable slats, seeking to avoid the separation between the slats and the side beams that would lead to the detachment of the slats.

[0010] In this type of arrangement it is common to find structures composed of beams, the slats being supported on said beams, where normally the beams support the bushings that house the shaft of the slats. To avoid the structural weakening of the beams and the consequent detachment of the slats, it is advisable that the bushings are in an additional support that in this case can be a segmented profile for each slat or a single profile added to the beam or forming part of the beam itself that runs through it on its inner part, which we will call an auxiliary profile.

[0011] For each of the slats this machined auxiliary profile comprises a bushing where a bearing suitable for accommodating the shaft of said slat is seated. This shaft has at one of its ends a widening or any other geometry that protrudes from the section of the shaft that we will call stop.

[0012] In a preferred embodiment, the stop has a larger diameter than the rest of the shaft and than the bearing housing which prevents said shaft from exiting the bearing by horizontal displacement.

[0013] Preferably, each shaft is joined with its corresponding slat by means of a header that closes the slat laterally.

[0014] The distance between the header and the shaft stop is greater than the bearing depth, therefore once the shaft is housed in the bearing, a certain longitudinal clearance is generated that allows the assembly to assume possible expansions or contractions of the shaft or movements of the structure whereon it rests, maintaining the position and functionality of the slats.

[0015] Because the shaft cannot exit the bearing due to the action of the stop, in the event that, among other reasons, due to inclement weather, wind, expansions or blows, the support beams of the structure tend to separate relatively from the slats, the slats themselves perform a tensioning effect, preventing the beams from separating and the slats from falling with the consequent material risk and risk for physical well-being.

[0016] Likewise, even if the slats may warp because of the weight of the snow, wind, water or any other reason, the stop prevents the shafts from exiting the bearings, thus preventing the slats from falling.

[0017] On the other hand, in the event that there is expansion of the structure that laterally contains the slats due to the effect of the heat increasing their size, the longitudinal clearance of the shaft inside the bearing of each slat allows said expansion to be assumed.

[0018] The bearing preferably has a U-shape that allows the access and housing of the shaft therein and has extensions that have the ability to deform, preferably be-

ing of flexible material.

[0019] The U-shape of the bearing grips the shaft and prevents it from exiting it.

[0020] Once the shaft is housed in the inner cavity of the bearing, the extensions may be deformed to anchor the bearing by geometry and pressure in the bushing.

[0021] Once the bearing is anchored in the bushing, preferably with its part open downwards, the shaft cannot exit through the top or bottom part due to the action of the U-shaped body of the bearing fitted in the bushing nor slide horizontally beyond what is allowed by the clearance due to the effect of the shaft stop.

[0022] The headers located at each end of the slat are solidly joined to the shaft and therethrough, so that it allows a certain movement, to the bearing, thus allowing the rotation of the slat.

[0023] In a preferred embodiment, the auxiliary profile is joined to the beam by its inner side through anchoring means, although in another possible option, the beam and the auxiliary profile form a single piece.

[0024] In a preferred embodiment, the beam has spaces designed to accommodate the ends of the anchoring means to avoid the beam from being drilled with the consequent weakening thereof.

[0025] In a solution like the one shown, the assembly and dismantling of the slats is quick and simple, minimising installation times.

[0026] On the other hand, since it is not necessary to use tensioning means such as beams or tie rods, among others, the roof of the pergola can be completely occupied by movable slats with the advantages that this entails.

[0027] The arrangement of the device, "slat, shaft, beam" and these elements interconnected allow the rotation of the shaft of the movable slats within the bearing in the auxiliary profile and secure the assembly thanks to the stop comprised at the end of the shaft of the slats giving robustness to the structure against the different types of loads or expansions of the structural material that may occur.

[0028] In a possible embodiment, the bushing is in the beam and not in the auxiliary profile, however this embodiment could structurally weaken the beam.

DESCRIPTION OF THE FIGURES

[0029]

Fig. 1 An exploded view of the device in a possible embodiment is shown wherein the arrangement of the auxiliary profile (1) that communicates the slat (7) by means of the header (6) with the beam (not shown) is observed where the bearing (3) is arranged in the bushing (2) of the auxiliary profile (1) and is housed and fastened thereto by means of the extensions (9) and, where said bearing in turn houses the shaft (4) that has the stop (5) which prevents said shaft (4) from moving horizontally outside the bearing (3).

Fig. 2 A view is shown where the header (6) is observed communicated with the slat (7) and the bearing (3) (without the auxiliary profile) housing the shaft (4).

Fig. 3 A top perspective view is shown where the bearing (3) is observed, without the auxiliary profile, communicating the beam with the slat (7) through said bearing and the header (6).

Fig. 4 A side view is shown where the beam (8) is observed communicated with the slat (7) through the auxiliary profile (1) where the arrangement of the bearing (3) housed in the profile bushings can be seen.

DESCRIPTION OF AN EMBODIMENT

[0030] An embodiment of the invention is described here that is not limiting but merely explanatory.

[0031] The invention relates to a device that improves the behaviour of the structure of pergolas with movable slats that prevents the separation of the side beams.

[0032] In this structure, the beams (8) support the bushings (2) that house the shaft (4) of the slats where the bushings are located in the auxiliary profile (1) added to the beam running along its inner part in a segmented manner, i.e. one auxiliary profile for each slat.

[0033] A bearing (3) is placed on the bushings (2) suitable for accommodating the shaft (4) of the slats (7), said shaft having a stop (5) at one of its ends, which protrudes from the bearing on the side closest to the beam (8). This stop (5) has, at least at one point, a geometry that exceeds the perimeter of the circular section of the shaft. In the embodiment detailed here, the stop has a circular shape with a diameter greater than the diameter of the shaft itself which prevents the shaft from exiting the bearing due to horizontal displacement.

[0034] The end opposite the stop (5) of the shaft (4) is joined to the slat (7) by means of a header (6) that closes the slat laterally.

[0035] The distance between the stop (5) of the shaft (4) and the header (6) is greater than the bearing (3) depth, therefore once the shaft (4) is housed in the bearing (3) a certain longitudinal clearance is generated that allows the device to assume possible expansions, contractions or movements of the structure whereon the shaft of the slats rests maintaining an adequate position and promoting a lasting functionality of the slats.

[0036] In the event that the beams (8) tend to separate, either due to the inclement weather that can act on the structure or due to blows or expansions thereto, the slats themselves will behave as tensioners since the shaft is housed in the bearing, with the clearance discussed above, without being able to exit it and simultaneously communicated with the slats by means of the header,

this prevents the slats from separating from the beams.

[0037] The bearing (3) has a U-shape arranged in the auxiliary profile (1) and has flexible extensions (9) with the ability to deform without any breaks in its structure.

[0038] When the shaft (4) is housed in the internal cavity of the bearing (3), the extensions (9) of said bearing deform in such a way that the bearing (3) is anchored to the inside of the bushing (2).

[0039] As the bearing (3) is anchored to the bushing (2), the shaft (4) cannot exit either through the top part or through the bottom part thanks to the action of the U-shape of the bearing (3) arranged in the bushing and nor can it slide horizontally, beyond the established longitudinal clearance, out of the bearing due to the action of the shaft stop (5).

[0040] The header (6) closes the slat (7) laterally and is solidly joined to the shaft (4) at the end opposite the stop (5) and this, in turn, is housed in the bearing (3) that is accommodated within the auxiliary profile (1) where the joining of said elements allows the pivoting movement of the slat (7).

[0041] The bushings (2) are arranged in the auxiliary profile (1) and the latter is joined to the beam (8) on its inner side through anchoring means.

[0042] The beam (8) has spaces designed to house the ends of said anchoring means that avoid needing to drill the beam, thus avoiding its weakening.

Claims

1. STRUCTURAL SAFETY DEVICE FOR HORIZONTAL ENCLOSURES OF MOVABLE SLATS comprising beams (8) that support the slats (7) **characterised in that** the device comprises for each slat (7) a bearing (3) housed in a bushing (2) wherein the bearing houses a shaft (4) that has a stop (5) at one of its ends, wherein said shaft is joined to the slat (7) by means of a header (6) that closes the slat (7) laterally.

2. STRUCTURAL SAFETY DEVICE FOR HORIZONTAL ENCLOSURES OF MOVABLE SLATS according to claim 1, **characterised in that** the bushing (2) is arranged on an auxiliary profile (1) joined to the beam (8).

3. STRUCTURAL SAFETY DEVICE FOR HORIZONTAL ENCLOSURES OF MOVABLE SLATS according to claim 1, **characterised in that** the distance between the header (6) and the stop (5) of the shaft is greater than the depth of the bearing (3), generating longitudinal clearance.

4. STRUCTURAL SAFETY DEVICE FOR HORIZONTAL ENCLOSURES OF MOVABLE SLATS according to claim 1, **characterised in that** the bearing has a U-shape arranged in the auxiliary profile (1).

5. STRUCTURAL SAFETY DEVICE FOR HORIZONTAL ENCLOSURES OF MOVABLE SLATS according to claim 1, **characterised in that** the bearing comprises flexible extensions (9) at its ends.

6. STRUCTURAL SAFETY DEVICE FOR HORIZONTAL ENCLOSURES OF MOVABLE SLATS according to claims 1 and 5, **characterised in that** the extensions (9) deform to anchor the bearing (3) to the bushing (2).

7. A STRUCTURAL SAFETY DEVICE FOR HORIZONTAL ENCLOSURES OF MOVABLE SLATS according to claim 6, **characterised in that** the bearing (3) is made of a flexible material.

8. STRUCTURAL SAFETY DEVICE FOR HORIZONTAL ENCLOSURES OF MOVABLE SLATS according to claim 1, **characterised in that** the stop (5) comprises a geometry that, at least at one point, exceeds the perimeter of the shaft (4) section.

FIG.1

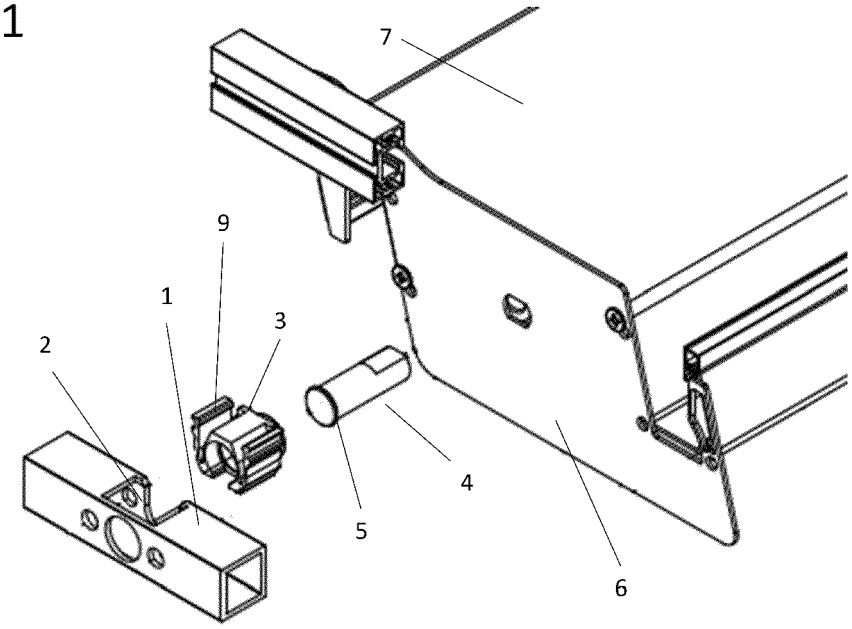


FIG.2

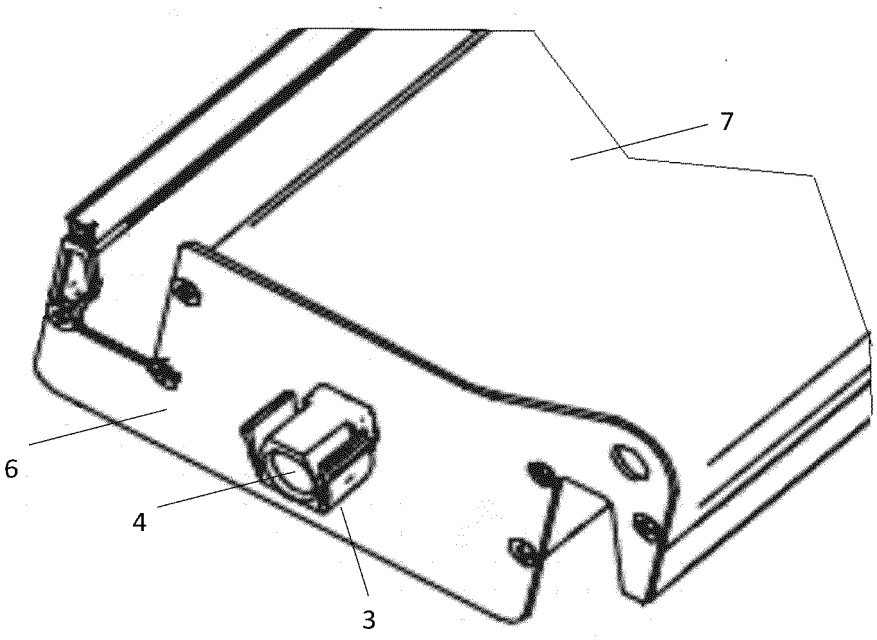


FIG.3

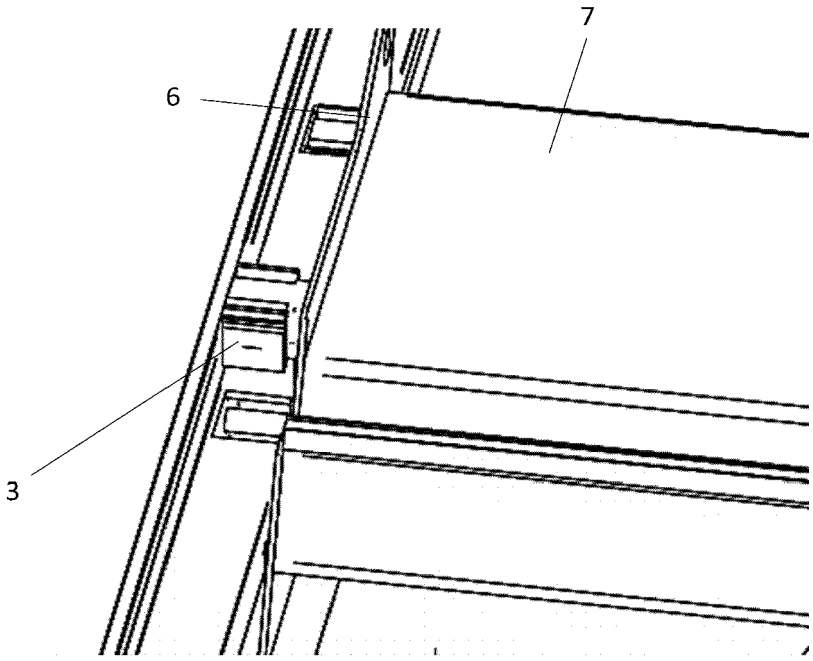
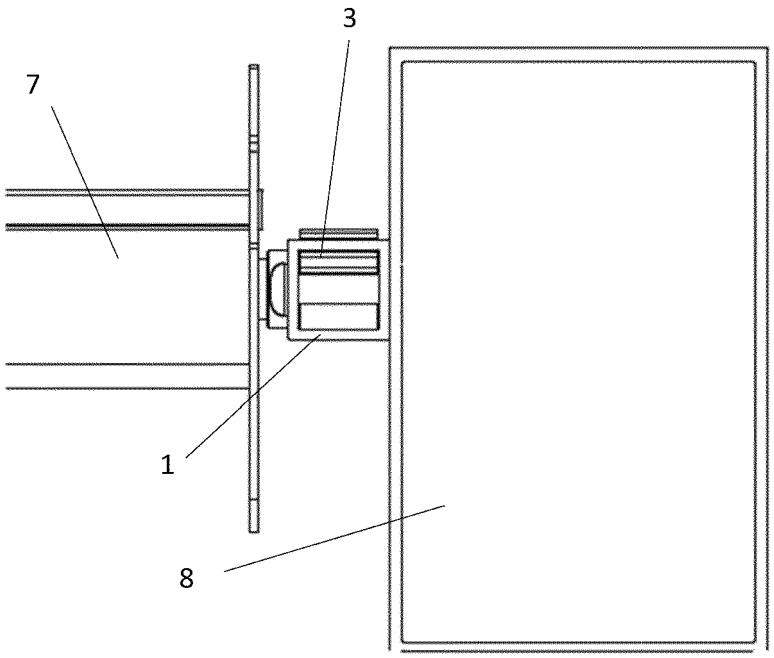


FIG.4



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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 3269

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	AU 33573 84 A (ROSSITER A L) 17 January 1985 (1985-01-17) * figures 3, 4 *	1-3,8	INV. E04B7/16 E04F10/10
X	US 2018/202155 A1 (ABEEL BART PIETER JULES [BE] ET AL) 19 July 2018 (2018-07-19) * figure 1 *	1-8	

TECHNICAL FIELDS SEARCHED (IPC)

E04B
E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 April 2023	Tran, Kim Lien

CATEGORY OF CITED DOCUMENTS

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03-04-2023

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- EP 2431547 A **[0006]**