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(54) **Titre : Structure of articulated frames that are deployable on rails.**

(57) **Abrégé :**

The invention relates to a-structure (1) formed of several frames (10), where each frame, (10) is formed by a plurality of stiles and rails (20) including one upper stile (21) and one lower stile (22), and where the frames (10) are hinged to each other pairwise by the upper stiles (21) thereof or the lower stiles (22) thereof in order to form a deployable and foldable accordion structure. Each pair of hinged lower stiles (22) is provided with at least one displacement mechanism (50) which comprises a translation device (51) and a guiding device (52), where the translation device (51) can translate the lower stiles (22) on a track (60) during movement between the deployed position and the folded position of the structure (1), and where the guiding device (52) can guide the lower stiles (22) along the track (60) during passage of the structure (1) between the deployed position and the folded position.

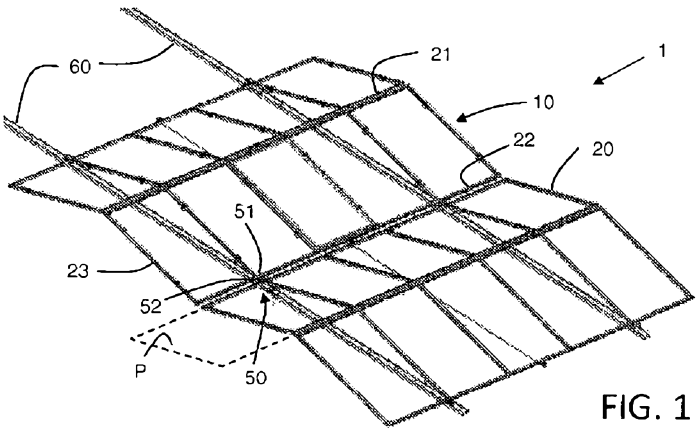

FIG. 1

Fig. 1

STRUCTURE OF ARTICULATED FRAMES THAT ARE DEPLOYABLE ON RAILS

The present invention relates to a structure formed of several frames, where each frame is formed by a plurality of stiles and rails including one upper stile and one lower stile, and where the frames are hinged to each other pairwise by the upper stiles thereof or the lower stiles thereof in order to form a deployable and foldable accordion structure.

In various industrial applications, such structures are used which are foldable during transport thereof in order to take up a minimum of space (the frames are then folded against each other), and then unfoldable after arriving on-site. For example, this is the case in the field of renewable energies, where solar panels are fixed onto the frames. All the panels can be exposed to the sun on-site, in order to optimize electricity production, by deployment of the structure.

The deployment of the structure can be done by using tracks, which constitute a support allowing a deployment on any kind of terrain. In that way, the lower edges of the frames are the ones which move on the tracks.

An example of such a structure is given by the document EP 2,378,565, where the lower edges of the frames have projections that slide in tracks that can be dismantled.

An improvement to the mechanisms for deployment of structures relative to the tracks is sought.

The invention aims to propose a structure allowing an easier deployment on tracks.

This goal is achieved by means of the fact that each pair of hinged lower stiles is provided with at least one displacement mechanism which comprises a translation device and a guiding device, where the translation device can translate the lower stiles on a track during movement between the deployed position and the folded position of the structure, and where the guiding device can guide the lower stiles along the track during passage of the structure between the deployed position and the folded position.

Because of these dispositions, the structure is more easily displaceable on a track with a large variety of geometries, because the track does not need to have a guiding device. Effectively, the guiding devices are carried by the frames. Additionally, the displacement device moves on the track, meaning rests on the upper part of the track. The positioning and engagement of the structure with the tracks are therefore quick and easy.

Advantageously the translation device comprises a wheel rollable on the upper surface of the track.

In this way, the deployment and folding of the structure is improved.

Advantageously the translation device comprises a slider slidable on the upper surface of the track.

Advantageously, the guiding device comprises at least one guide displaceable along and facing a lateral edge of the track.

Advantageously, each pair of hinged lower stiles is provided with at least two displacement mechanisms.

Thus, when two parallel tracks are present, the structure is displaceable on both tracks and is therefore more stable in displacement thereof.

Advantageously, the lower stile of each of the end frames of the structure is provided with at least one displacement mechanism.

In that way, the end frames can contribute to guiding the structure and displacement thereof.

The invention also relates to an assembly formed of a structure according to the invention and to at least one solar panel carried by one of the frames.

The invention will be better understood and the advantages thereof will appear more clearly on reading the following detailed description of an embodiment shown as a nonlimiting example. The description refers to the attached drawings on which:

- Figure 1 is a perspective view of the structure with a translation element according to a first embodiment of the invention, resting on tracks;
- Figure 2 is an enlarged perspective view of the translation element from Figure 1;
- Figure 3 is a side view of the translation element from Figure 2.

Figure 1 shows the structure 1 formed of several frames 10. Each frame 10 extends in a main plane P, and is formed from an assembly of stiles and rails 20. The plane P is thus the plane in which the stiles and rails 20 extend. This assembly comprises an upper stile 21, a lower stile 22 and at least two rails 23 which each connect the upper stile 21 and the lower stile 22. The structure 1 comprises one or more central frames 10, and two end frames. Each central frame 10 is hinged by the upper stile 21 thereof to the upper stile of a first adjacent frame, and by the lower stile 22 thereof to the lower stile of a second adjacent frame. Each end frame 10 is hinged to a

single central frame 10, either by the upper stile 21 thereof or by the lower stile 22 thereof.

Thus, the structure 1 is an accordion structure deployable (into deployed position) and foldable (into folded position) by pivoting of the frames 10 around hinges between the upper stiles 21 and hinges between the lower stiles 22.

In the folded position, the main planes P of the frames 10 are all parallel, for example vertical.

In the deployed position, shown in Figure 1, the frames 10 are all located substantially in a single plane, for example a horizontal plane, meaning that two adjacent frames 10 make an angle close to 180° between them.

In this way, the deployment and folding of the structure 1 is more stable.

Advantageously, the structure 1 comprises an even number of central frames 10, and each end frame 10 is hinged to the upper stile 21 of the central frame 10 which is adjacent to it by the upper stiles 21 thereof, such that the lower stile 22 of the end frame 10 is intended to rest on the tracks.

That configuration applies to the following description.

The frame 10 can have any desired shape. For example, the frame 10 is rectangular, the stiles and rails 20 of the frame 10 form one or more adjacent rectangles within this frame 10.

For example, as shown in Figure 1, each frame 10 of the structure 1 is formed of an upper stile 21, a lower stile 22 and six parallel rails 23. These stiles and rails 20 define five identical rectangles, where each of these rectangles is delimited by an upper stile 21, a lower stile 22 and two rails 23.

Each of these rectangles can receive one panel, for example a solar panel (not shown).

Two adjacent upper stiles 21 are hinged by a pivot connection.

Two adjacent lower stiles 22 are also hinged by a pivot connection.

These pivot connections are for example formed by a plurality of projections carried in part by one of the stiles (21, 22) and in part by the adjacent stile (21, 22), where these projections are connected by a rod or an assembly of rods aligned along the pivoting axis of the pivot connections.

Each pair of lower stiles 22 hinged to each other is provided with at least one displacement mechanism 50 which comprises a translation device 51 and a guiding device 52.

The translation device 51 can translate these lower stiles 22 on a track 60 between the deployed position and the folded position of the structure 1.

This translation on the track 60 is done on the upper surface 61 of the track 60.

The translation device 51 is mounted on one or the other of the adjacent lower stiles 22.

For example, the translation device 51 comprises a wheel 511 rollable on the upper surface 61 of the track 60. This embodiment is shown in Figures 1, 2 and 3. The wheel 511 is mounted free in rotation on one or more projections 512 carried by one of the lower stiles 22.

Alternatively, the translation device 51 comprises a slider slidable on the upper surface 61 of the track 60.

The guiding device 52 can guide the lower stiles 22 along the track 60 during deployment or folding of the structure 1, meaning for any position of the frames 10 relative to the track 60 when the lower stiles 22 translate on the track 60.

The guiding device 52 is mounted on one or the other of the adjacent lower stiles 22.

For example, the guiding device 52 comprises at least one guide 521 displaceable along and facing a lateral edge 62 of the track 60.

Generally, it is intended that structure 1 move on several tracks 60, for example on two tracks 60, each pair of hinged lower stiles 22 is provided with one displacement mechanism 50 for each rail 60.

Thus, the guiding device 52 comprises at least one guide 521 per rail 60. Advantageously, the guiding device 52 comprises at least two guides 521 per track 60, where the track 60 is located between these two guides 521. In that way, the guiding of the structure 1 on the tracks 60 is more effective.

For example, as can be seen in Figure 3, the guiding device 52 comprises two plates 521 mounted on the one of the lower stiles 21 not carrying the translation device 51. These plates 521 are each located facing one of the lateral edges 62. These plates 521 are mounted such that one part of the track 60 is always sandwiched between a

portion of the two plates 521 for any position of the structure 1 between the folded position thereof and the unfolded position thereof. Thus, the guiding is always effective.

Advantageously, each displacement mechanism 50 forms one of the pivot connections (or the pivot connection if there is only one of them) between two adjacent lower stiles 22.

In this way, the assembly of the structure 1 is improved.

For example, the translation device 51 is carried by the first of the lower stiles 22, the guiding device 52 is carried by the other lower stile 22 hinged to the first of the lower stiles 22, and one rod passes through the holes of the translation device 51 and the guiding device 52, where this rod forms the pivoting axle for the connection pivot between these two adjacent frames 10.

For example, as shown in Figure 2, the holes are located in the plates 521 and in the projections 512, and the rod (not shown) passes through these holes and through the center of the wheel 511 such that the pivoting axis of the hinge is coincident with the rotation axle of the wheel 511.

Advantageously, the lower stile 21 of each of the end frames 10 of the structure 1 is provided with at least one displacement mechanism 50. These displacement mechanisms 50 are positioned on the one or more tracks 60 when the structure 1 passes between the folded position thereof and the deployed position thereof.

Thus, the end frames 10 contribute to guiding the structure 1 on the one or more tracks 60.

The fact that the displacement mechanism 50 is located entirely on the structure 1, and not on the tracks 60, allows the structure 1 to easily adapt to a variety of tracks 60.

Further, the fact that the translation of the lower stiles 22 along the tracks 60 is done on the tracks 60, therefore on the upper surface 61 of each track 60, allows an easier and quicker deployment and folding of the structure 1. In fact, once the tracks 60 are in place, it is sufficient to position the structure 61 such that the displacement mechanism 50 is located on the rails 60 in order for the structure 1 to be unfolded. The translation of the lower stiles 22 is done whatever the geometry of the track 60 and the upper surface 61 thereof.

The invention is not limited to the embodiment/s illustrated in the drawings. Accordingly it should be understood that where features mentioned in the appended claims are

followed by reference signs, such signs are included solely for the purpose of enhancing the intelligibility of the claims and are in no way limiting on the scope of the claims.

CLAIMS

1. A structure (1) formed of several frames (10), where each frame (10) is formed by a plurality of stiles and rails (20) including one upper stile (21) and one lower stile (22), and where said frames (10) are hinged to each other pairwise by the upper stiles (21) thereof or the lower stiles (22) thereof in order to form a deployable and foldable accordion structure, said structure (1) being characterized in that each pair of hinged lower stiles (22) is provided with at least one displacement mechanism (50) which comprises a translation device (51) and a guiding device (52), where said translation device (51) can translate said lower stiles (22) on a track (60) during movement between the deployed position and the folded position of said structure (1), and where the guiding device (52) can guide said lower stiles (22) along said track (60) during passage of said structure (1) between the deployed position and the folded position.

2. The structure (1) according to claim 1 characterized in that said translation device (51) comprises a wheel (511) rollable on an upper surface (61) of the track (60).

3. The structure (1) according to claim 1 characterized in that said translation device (51) comprises a slider slidable on an upper surface (61) of said track (60).

4. The structure (1) according to any one of claims 1 to 3 characterized in that said guiding device (52) comprises at least one guide (521) displaceable along and facing a lateral edge (62) of the track (60).

5. The structure (1) according to any one of claims 1 to 4 characterized in that each pair of hinged lower stiles (22) is provided with at least two displacement mechanisms (50).

6. The structure (1) according to any one of claims 1 to 5 characterized in that the lower stile of each of the end frames (10) of the structure (1) is provided with at least one displacement mechanism (50).

7. An assembly formed of a structure (1) according to any one of the preceding claims and at least on solar panel carried by one of said frames (10).

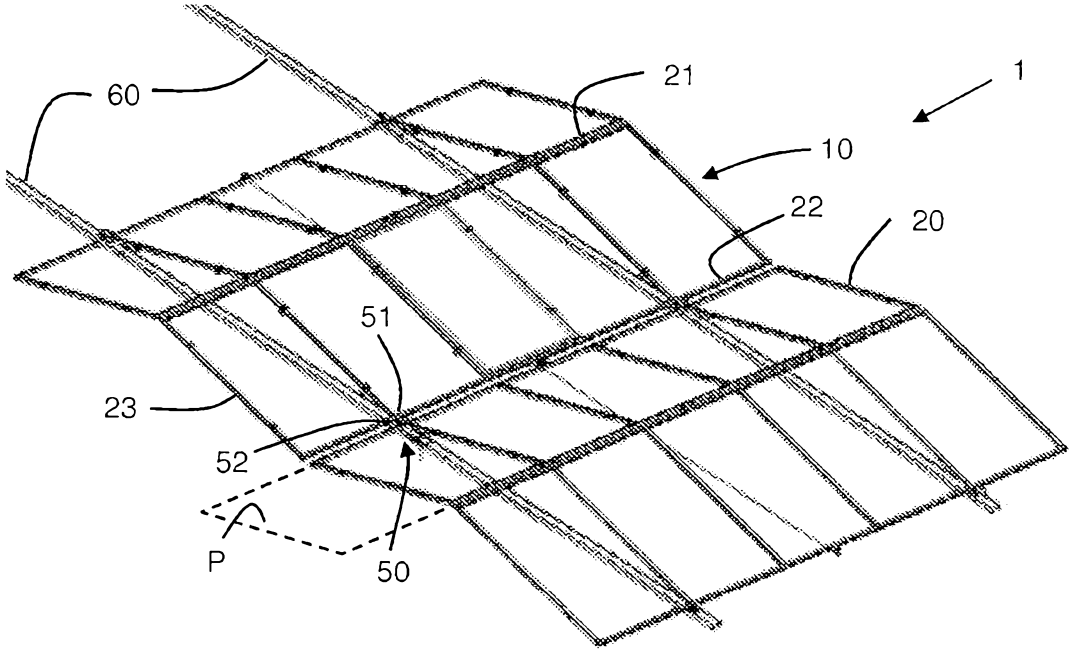
60
21
1
10
22
20
51
23
52
P
50

FIG. 1

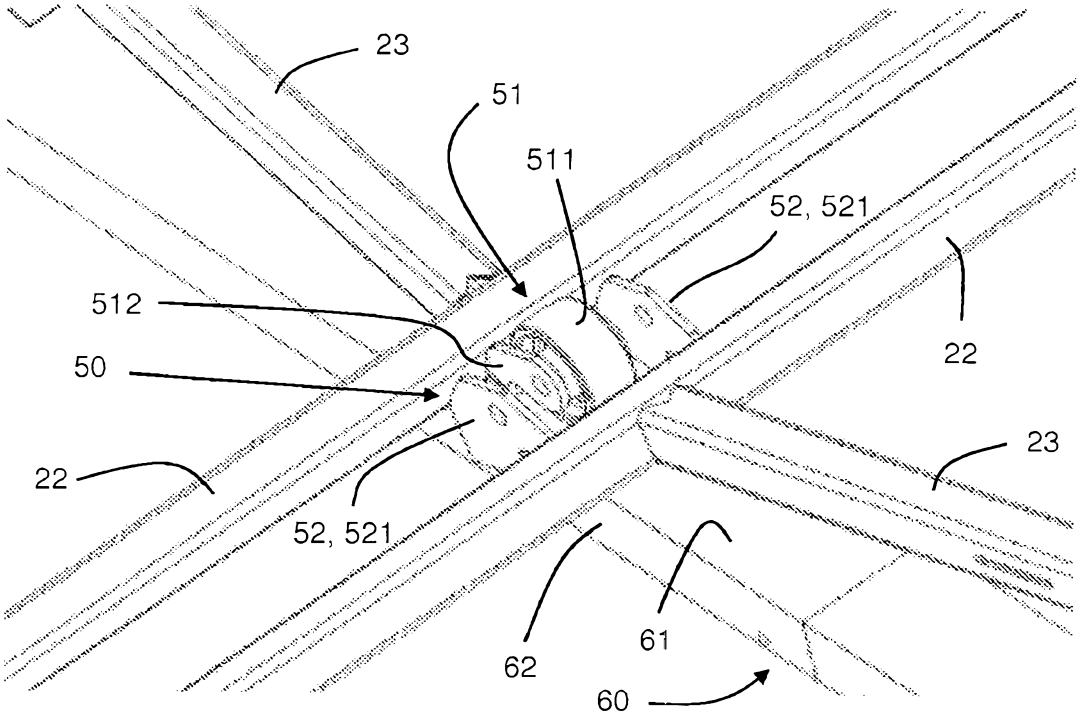
23
51
511
52, 521
512
50
22
22
23
52, 521
62
61
60

FIG. 2

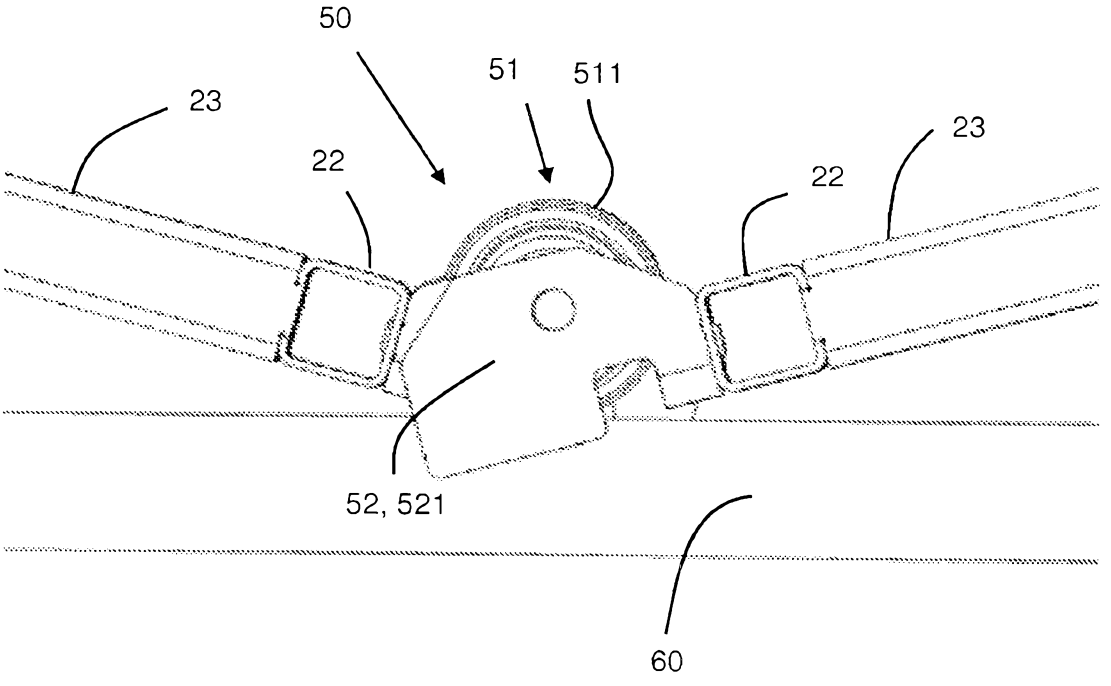

FIG. 3

ABSTRACT

The invention relates to a structure (1) formed of several frames (10), where each frame (10) is formed by a plurality of stiles and rails (20) including one upper stile (21) and one lower stile (22), and where the frames (10) are hinged to each other pairwise by the upper stiles (21) thereof or the lower stiles (22) thereof in order to form a deployable and foldable accordion structure. Each pair of hinged lower stiles (22) is provided with at least one displacement mechanism (50) which comprises a translation device (51) and a guiding device (52), where the translation device (51) can translate the lower stiles (22) on a track (60) during movement between the deployed position and the folded position of the structure (1), and where the guiding device (52) can guide the lower stiles (22) along the track (60) during passage of the structure (1) between the deployed position and the folded position.

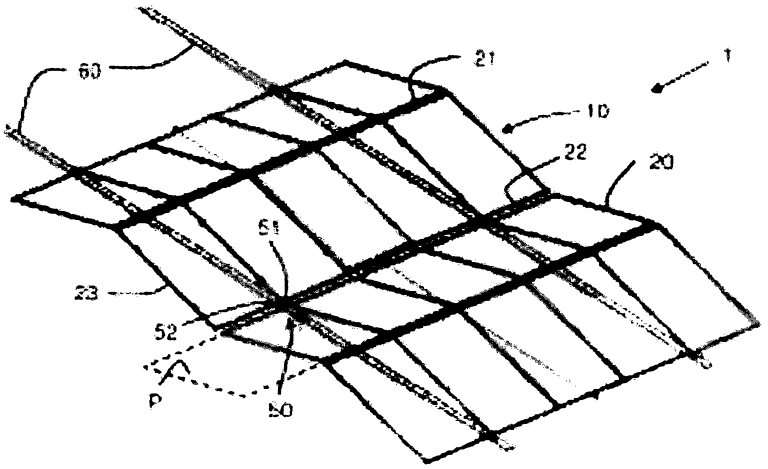

FIG. 1