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Yamamoto et al.

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[54] **SHIFTABLE PILLAR WHEEL SUPPORTING DEVICE**

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[52] **U.S. Cl.**.....**52/646,** 52/63, 52/2 EE, 104/246, 105/141, 135/4 R, 295/1

[51] **Int. Cl.**.....**E04b 1/36,** E04b 1/347, E04h 12/18

[58] **Field of Search**.....104/246; 105/141, 105/151; 52/63, 222, 647; 135/3 R, 4 R

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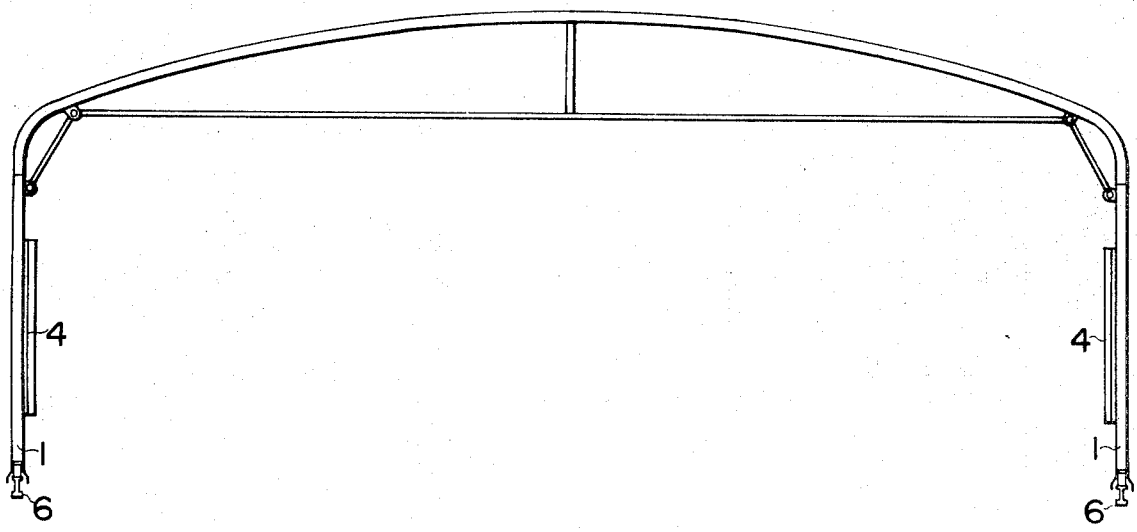
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[57] **ABSTRACT**

This invention relates to a pillar moving and supporting wheel mechanism provided in a pillar device for shelters wherein the friction with the upper flange of a rail is reduced to make the movement of the pillar smooth and light and to control the lateral sway and upward action of the pillar.

8 Claims, 4 Drawing Figures



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2 Sheets-Sheet 1

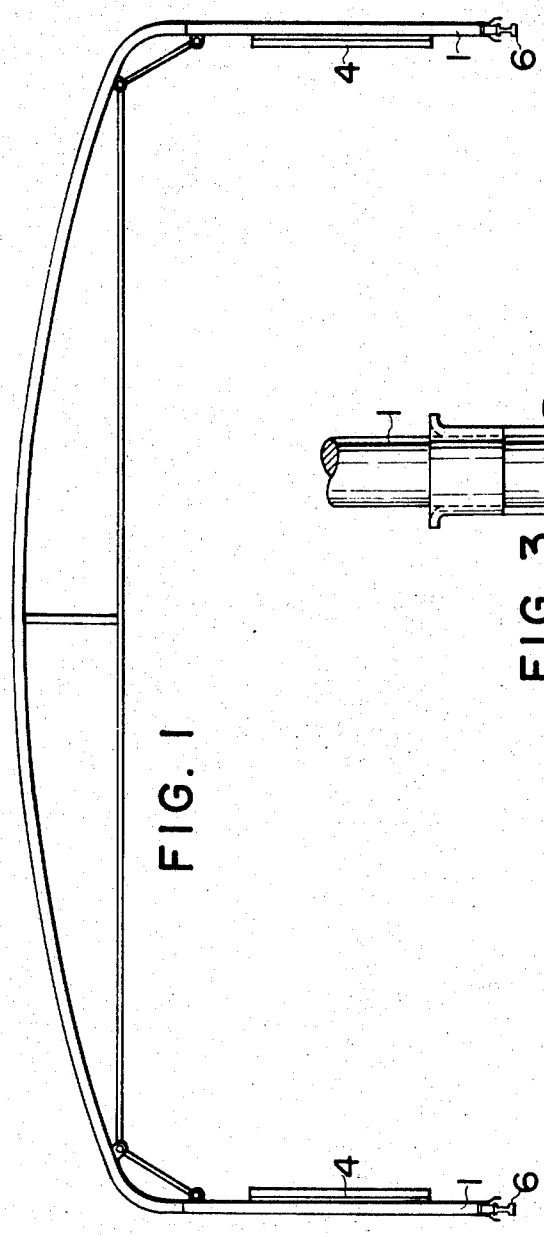


FIG. 1

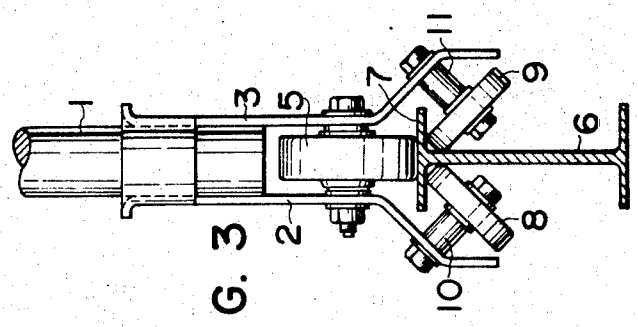
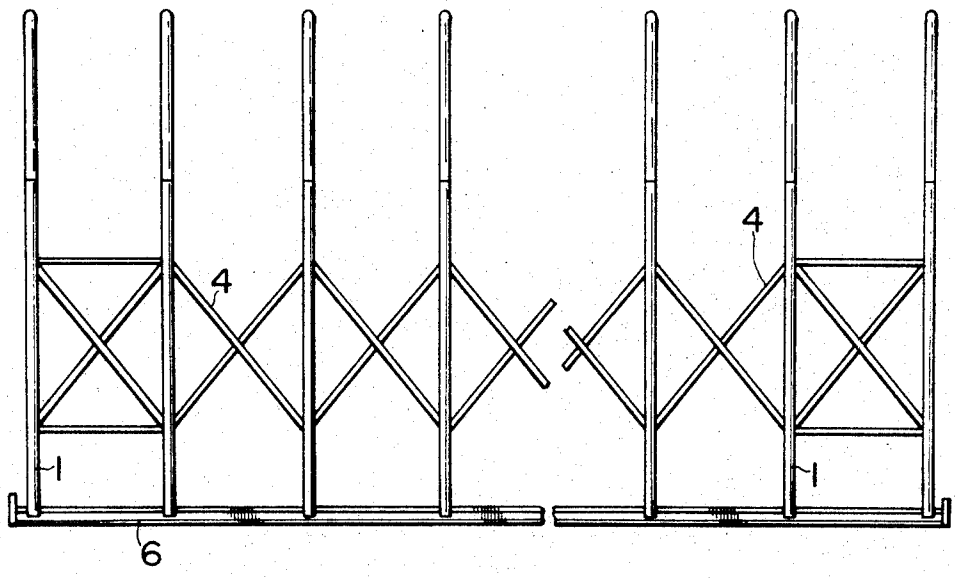


FIG. 3

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FIG. 2



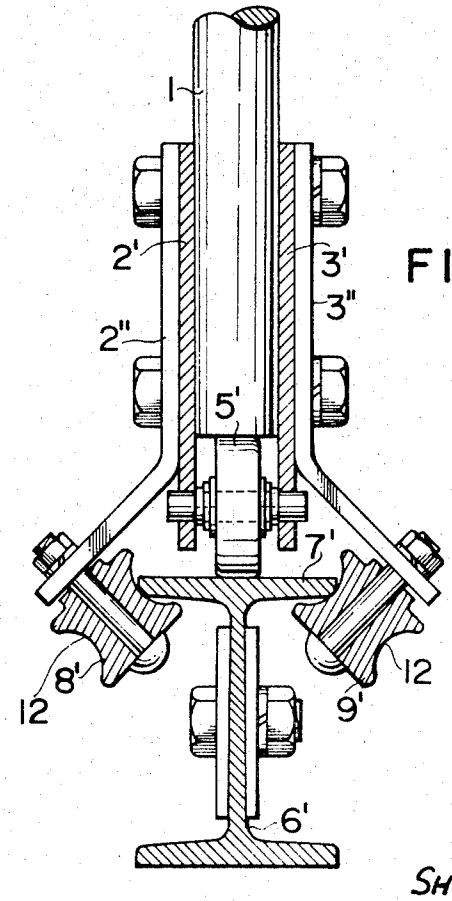


FIG. 4

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SHIFTABLE PILLAR WHEEL SUPPORTING DEVICE

This invention relates to pillar devices to be used in shelters generally called collapsible structures and more particularly to a pillar moving mechanism for making the length in the direction of the ridge of the roof of each of many pillar frames mounted and set on a pair of right and left rail-shaped foundations free to extend and contract.

In the conventional technique, such pillar moving mechanism has great defects that it can not move smoothly and catches on the rail.

An object of the present invention is provide a pillar moving mechanism which can move the pillar smoothly and lightly by eliminating such defects.

In the drawing:

FIG. 1 is an elevation of a collapsible structure;

FIG. 2 is a magnified lower side view of the structure shown in FIG. 1;

FIG. 3 is a magnified view of a pillar moving mechanism according to the present invention;

FIG. 4 is a view showing another embodiment of the mechanism according to the present invention.

As understood from FIGS. 1 and 2, the collapsible structure is formed of many pillars 1 and a roof part made, for example, of a cloth and fitted on them and is further fitted with freely extending and contracting accordion-type X-shaped supporters 4 for supporting respective pillars with each other when the shelter is assembled. The pillar moving mechanism of the present invention is connected with the pillar 1 through brackets removably fitted to the base of the pillar 1 by such combining means as bolts and nuts.

The details of a pillar moving mechanism according to the present invention is shown in FIG. 3.

Right and left brackets 2 and 3 in a pair bearing a roller 5 are made straight in the upper parts, are extended symmetrically outward and downward in the lower parts, are further suspended perpendicularly and are fixed to the base of the pillar 1 with bolts and nuts or the like. Guide rollers 8 and 9 are symmetrically set through respective short shafts 10 and 11 inside the symmetrically outward and downward extended parts and a rail 6 is held and controlled directly in the T-shaped part of the upper flange 7 with a pair of the guide rollers 8 and 9 and the above mentioned roller 5.

FIG. 4 shows a pillar moving mechanism according to another embodiment of the present invention and the same parts therein are represented by the same corresponding dashed numerals.

In this embodiment, right and left brackets 2' and 3' in a pair bearing a roller 5' are made straight, other symmetrically outward and downward extended brackets 2'' and 3'' are placed respectively outside said brackets 2' and 3' and all the brackets are fixed to the base of a pillar 1' with bolts and nuts or the like.

Other parts are substantially the same as in the formation of the above mentioned first embodiment except that, in the second embodiment, a concave 12 is made in the middle of the outer periphery of each of the guide rollers 8' and 9' and is pressed to engage with each end of the upper flange 7' of a rail 6'.

When the pillar moving mechanism is formed as mentioned above, the bending angle of the above mentioned bracket bent in the lower part most desirably

minimizes the friction of the above mentioned guide roller or its concave with the upper flange of the rail so that the movement of the pillar may be smooth and light and the lateral sway and upward action of the pillar may be directly controlled. Therefore, the present invention has an advantage that the engaging area of the guide roller with the flange of the rail is reduced so that the roller may not catch on the rail by a lateral sway or the like, the rail may be held and the movement of the pillar may be made smoother and lighter.

What is claimed is:

1. In a collapsible building structure having a plurality of vertical pillars

a. a pair of spaced parallel rails, each rail comprising a generally vertical section and a flange on the top edge of and perpendicular to said vertical section, said flange extending horizontally beyond the opposite sides of said vertical section forming opposed right angles between the bottom surfaces of said flange and the opposite surfaces of said vertical section, and

b. means movably supporting each of said pillars on one of said rails comprising a centrally located main roller mounted for rotation about a horizontal axis, the periphery thereof contacting the top surface of said flange and a pair of opposed guide rollers adjacent opposite sides of the vertical section of said rail and below said flange, each of said guide rollers having axially spaced sharp cylindrical edges at opposite sides thereof, being mounted for rotation about an axis at an acute angle with respect to the adjacent surfaces of both said vertical section and said flange, and being located such that said sharp cylindrical edges engage said adjacent surfaces of said vertical section and flange respectively, the cylindrical surface of each of said rollers between said sharp edges being spaced from the juncture of said vertical section and flange,

c. whereby the area of contact between each guide roller and said rail is minimized and said pillars are movably secured to said rails and may be moved along said rails more easily.

2. A collapsible building structure as defined in claim 1 wherein said support means further comprises

a. a pair of spaced brackets between which is mounted said main roller,

b. the lower part of said brackets below said main roller extending symmetrically outwardly, and

c. said guide rollers being mounted on said lower part of said brackets.

3. In a collapsible building structure having a plurality of vertical pillars

a. a pair of spaced parallel rails, each rail comprising a flange in a generally horizontal plane and having a flat top surface and opposite longitudinal edges which are free and unsupported, and

b. means movably supporting each of said pillars on one of said rails comprising a centrally located main roller mounted for rotation about a horizontal axis, the periphery thereof contacting the top surface of said flange and a pair of opposed guide rollers adjacent said opposite edges respectively of said flange, each of said guide rollers having a concave peripheral surface and being mounted for

rotation about an axis at an acute angle with respect to the plane of said flange such that said guide roller extends beneath the respective edge of said flange and its concave peripheral surface engages the respective edge of said flange,

c. whereby the area of contact between each guide roller and said rail is minimized and said pillars are movably secured to said rails and may be moved along said rails more easily.

4. A collapsible building structure as defined in claim 3 wherein said support means further comprises

a. a pair of spaced brackets between which is mounted said main roller,

b. the lower part of said brackets below said main roller extending symmetrically outwardly, and

c. said guide rollers being mounted on said lower part of said brackets.

5. A collapsible building pillar support device for mounting on a rail having a generally vertical section and a flange on the top edge of and perpendicular to said vertical section, said flange extending horizontally beyond the opposite sides of said vertical section forming opposed right angles between the bottom surface of said flange and the opposite surfaces of said vertical section, said pillar support device comprising a centrally located main roller mounted for rotation about a horizontal axis, the periphery thereof being adapted to contact the top surface of said flange and a pair of opposed guide rollers for positioning adjacent opposite sides of the vertical section of said rail and below said flange, each of said guide rollers having axially spaced sharp cylindrical edges at opposite sides thereof, being mounted for rotation about an axis at an acute angle with respect to the axis of said main roller, and being positioned such that said sharp cylindrical edges will engage said adjacent surfaces of said vertical section and flange respectively of said rail with the cylindrical surface of each of said rollers between such sharp edges spaced from the juncture of said vertical section and flange of said rail, whereby the area of contact between each guide roller and the rail is minimized and said pillars are movably secured to said rail and may be moved along said rail more easily.

6. A collapsible building pillar support device as defined in claim 5 further comprising a pair of spaced brackets between which is mounted said main roller, the lower part of said brackets below said main roller extending symmetrically outwardly, and said guide rollers being mounted on said lower part of said brackets.

7. A collapsible building pillar support device for mounting on a rail having a flange in a generally horizontal plane and having a flat top surface and opposite longitudinal edges which are free and unsupported, said support device comprising a centrally located main roller mounted for rotation about a horizontal axis, the periphery thereof being adapted to contact the top surface of said flange and a pair of opposed guide rollers arranged to be positioned adjacent said opposite edges respectively of said flange, each of said guide rollers having a concave peripheral surface and being mounted for rotation about an axis at an acute angle with respect to the axis of said main roller such that said guide roller will extend beneath the respective edge of said flange and its concave peripheral surface will engage the respective edge of said flange, whereby the area of contact between the guide roller and said rail is minimized and said pillars are movably secured to said rails and may be moved along said rails more easily.

8. A collapsible building pillar support device as defined in claim 7 further comprising a pair of spaced brackets between which is mounted said main roller, the lower part of said brackets below said main roller extending symmetrically outwardly, and said guide rollers being mounted on said lower part of said brackets.

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