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(54) Ventilation device with louvred slat walls.

(57) The invention relates to a box-like structure, for example a roof structure, having a number of vertical, substantially right-angled walls comprising a number of elongate louvred slats running parallel to one another, and a cover plate supported by these walls.

The invention has for its object to give a box-like structure, for example a roof structure, a form such that a great flexibility in dimensioning is achieved and that the box-like structure can be assembled simply on site with the use of a minimal quantity of very simple tools.

In this respect the invention generally proposes a box-like structure of the type described characterized in that each of both end zones of each louvred slat is fixed between two spacers, these spacers being arranged in two rows extending transversely of the longitudinal direction of the louvred slats and being pressed towards one another by pressure means.

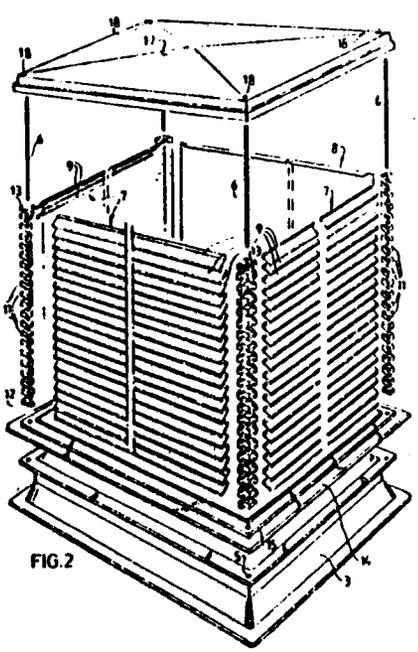

FIG.2

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TITLE MODIFIED
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Box-like structure with louvred slat walls

The invention relates to a box-like structure, for example a roof structure, having a number of vertical, substantially right-angled walls comprising a number of elongate louvred slats running parallel to one another, and a cover plate supported by these walls.

Such a box-like structure, particularly a roof structure, is known. A known box-like structure comprises a housing with walls consisting of metal plates which are provided with cuts, these cuts bounding wall parts that are pressed out of the plane of the wall. Such a construction has the drawback that it has no flexibility with respect to dimensioning.

The use is also known of a construction consisting of welded plates with louvred slats. This last form particularly has the drawback that the total of units to be transported is large and heavy whereby they are relatively difficult to transport and often have such dimensions that they cannot be carried through the doors already present in a building, so that recourse has to be made to cranes or the like, which has a high cost raising effect.

The invention has for its object to give a box-like structure, for example a roof structure, a form such that a great flexibility in dimensioning is achieved and that the box-like structure can be assembled simply on site with the use of a minimal quantity of very simple tools.

In this respect the invention generally proposes a box-like structure of the type described characterized in that each of both end zones of each louvred slat is fixed between two spacers, these spacers being arranged in two rows extending transversely of the longitudinal direction of the louvred slats and being pressed towards one another by pressure means.

In order to enable a very simple construction while ensuring as great a rigidity as possible with a minimum quantity of parts and material, especially in the case where the walls form an angle, for example an angle of 90°,

with one another, a variant is to be recommended which displays the feature that the spacers are arranged to grip the louvred slats from two adjoining walls.

The spacers can advantageously each take the form of a substantially block shaped member having at least one projection with two gripping surfaces positioned parallel to each other, at a preselected angle and at an interval from each other.

A very practical embodiment displays the special feature that the projection has the form of a block with a cross section in generally parallelogram form.

The form of the co-operating gripping surfaces is preferably complementary and adapted to the form of the louvred slats, being for example a profiled form.

In a particular embodiment the box-like structure according to the invention displays the feature that the spacers are provided with coaxial, continuous holes and that the pressure means comprise a member with tensile strength which can be placed through these holes, which member can be tensioned between the outermost end surfaces of the outer spacers of a row.

A very simple variant is one in which the member with tensile strength comprises a bolt or threaded rod having on one end a flange element and on the other a nut.

Each spacer is advantageously provided with a groove extending lengthwise of a row. Pairwise, these grooves can serve to accommodate for example a blind or perforated plate.

In an embodiment in which the grooves of a row are situated in one plane the blind plate can extend over a number of groove lengths, for example to form a blind wall.

In order to ensure a good contact between the spacers with clearance free clamping of the louvred slats, use is preferably made of an embodiment according to which the interval between co-operating gripping surfaces of adjoining spacers is selected with a view to the thickness of the louvred slats to be fixed.

In a practical embodiment the box-like structure according to the invention displays the characteristic that each spacer is provided with at least one hole extending lengthwise of the louvred slats for accommodating a plug, for example for attachment purposes.

The invention further relates to an end spacer consisting of a part of a spacer of the type already described which is divided into two in a plane lying perpendicular to the longitudinal direction of a row.

In this respect the invention also provides a method for manufacturing two end spacers, according to which method a spacer as claimed in any of the claims 1-10 is divided in two, for example by sawing, in a plane lying perpendicular to the longitudinal direction of the row.

The invention also relates to a louvred slat for use together with a box-like structure of the type described, which louvred slat is characterized by at least one portion protruding outside the spacers, this portion being bent over such that it lies in the plane of the rows of spacers of the associated wall. In a particular embodiment the protruding part can be perforated.

Generally known is a roof elevation having a flanged edge to support a box-like roof structure. In order to be able to place the roof structure according to the invention very simply or to remove it easily, for example for maintenance purposes or modification, the invention provides a roof elevation displaying the feature that the flanged edge extends outwards.

The invention will now be elucidated with reference to the drawing of several embodiments, to which the invention is not restricted. In the drawing:

fig. 1 shows a box-like roof structure in perspective view;

fig. 2 shows the roof structure as according to fig.1 in a view whereby the constituent parts are drawn at some distance from one another for the sake of clarity;

fig. 3 is a detail in which is shown the co-operation between spacers and louvred slats in a first embodiment;

fig. 4 is a view corresponding with fig. 3 of a variant;

fig. 5 shows the lower spacers of the column as in fig. 4, whereby the roof elevation with the base plate are also shown in partly broken away perspective view;

fig. 6 shows schematically a method for manufacturing end spacers; and

fig. 7 is a perspective view of a detail explaining the holes arranged in the projections.

Fig. 1 shows a box-like roof structure 1. The same roof structure is shown in fig. 2 in a view in which the various constituent parts are shown at some distance from one another.

A roof 2 supports a roof elevation 3 with a square peripheral form, the upper edge of which displays a flanged edge 4 protruding outwards. As fig. 2 shows this flanged edge 4 is furnished with attachment holes 5 for passage of threaded rods 6.

The roof structure has four vertical walls 7, 8, three of which, namely the walls indicated with 7, are provided in the manner shown in fig. 2 with louvred slats 9 and the fourth of which, indicated by the reference numeral 8, has a blind plate 10.

The louvred slats 9 and the plate 10 form the roof structure 1 together with columns of identical spacers 11 each column having a bottom spacer 12 and an upper spacer 13 as will later be described.

As fig. 2 clearly shows, the roof elevation 3 is first placed on the roof 2. On this elevation a base plate 14 is laid which is provided with holes 15, the position of which corresponds with the holes 5 in flanged edge 4 of roof elevation 3. A threaded rod 6 is placed through the holes 5, 15 and at the bottom a nut 16 is screwed onto threaded rod 6. A bottom spacer 12 is then first pushed over the four threaded rods 6, following which a bottom louvred slat 9 is placed on the associated spacers in a position to be

described later. A following set of four spacers 11 is then placed, after which one or more louvred slats are again placed, and so on, until finally upper spacers 13 are placed on the last louvred slats by sliding over the threaded rods 6.

In the embodiment of fig. 1 and 2 the blind plate 10 is also coupled to the spacers 11 in a manner to be described later.

Finally, on the assembly of spacers 11, 12, 13, consisting for example of reinforced plastic, and the stainless steel louvred slats 9 is arranged a top plate 17, for example of polyester, which is provided with holes 18 for passage of the threaded rods 6. The position of the holes is, as will be apparent, in register with the position obtained for threaded rods 6. Nuts 19 are arranged on the parts of the threaded rods 6 protruding above the fitted top plate 17, so that a tensile force results in the threaded rods 6 and thereby a pressure force is created between threaded rods 11, 12, 13, so that the louvred slats 9 are fixed rigidly.

As a result of the angles, in this case angles of 90°, between the various walls, a very rigid and strong construction is achieved because of this construction by tightening the nuts at the ends of threaded rods 6.

Figure 3 shows a part of a column of spacers 11, with an upper spacer 13 shown at a distance. Spacers 11 each take the form of a substantially block shaped element with two projections 19, 20 having a form identical to each other, which are formed on adjoining side faces of the spacer 11. Projections 19, 20 substantially take the form of a block having a cross section generally in the form of a parallelogram. With reference to fig. 3 the projection 19 is now to be described; projection 20 is, however, identical to it.

The upper face 21 and the lower face 22 of projection 19 serve as gripping faces for louvred slats 9 that are to be fixed. As will be apparent from fig. 3, the lower face 22 of an element in a higher position co-operates with the

upper face 21 of an element located beneath it to fix a louvred slat 9. The angle at which the faces 21 and 22, which in this example are parallel, are placed can be selected as desired in relation to the determined purpose of use. It is also noted in this respect that the angles at which projections 19 and 20 are placed can differ from each other.

In this embodiment the louvred slats 9 show on both sides a part projecting outside the spacers 11, 12, 13 which is positioned at an angle with the main surface of the louvred slat 9 such that it is situated in the plane of the associated wall.

Figure 3 further shows that the spacers 11, 12, 13 are provided with holes 24 going through them which are in register for passage of a threaded rod 6, in the way shown in fig. 2.

The distance between co-operating gripping surfaces 21, 22 of adjoining spacers 11, 12, 13 is selected with respect to the thickness of the plate material of which the louvred slats for fixing consist. Figure 3 shows that the block shaped main bodies of spacers 11, 12, 13 are pressed onto one another with the surfaces that are facing each other, while as a result of the aforementioned (small) interval between gripping surfaces 21, 22 an excellent clearance free fixing of the louvred slats 9 is furthermore ensured. Especially when use is made of plastics, whether reinforced or not, for manufacturing the spacers 11, 12, 13, as a result of the relatively easy elastic and, if required, plastic deformability, an excellent clearance free construction can be obtained by a correct dimensioning and by applying a correct tensile stress in the threaded rods 6.

Fig. 3 further shows that the projection 19, and therefore also the identical projection 20, takes a divided form, that is, it has in this case a vertically positioned groove 25 running through it. Hereby is achieved that vertical blind plates 26 can be fitted. In the absence of louvred slats 9 these blind plates 26 can have a greater

height than that corresponding with the height of one spacer 11. In fig. 2 is shown for example that the rear wall 8 is not provided with louvred slats, but only with a blind plate 10 which is held in place in the grooves 25 of the respective spacers 11, 12, 13, these grooves being in line with one another.

The projection 19 displays two holes 27, 28 extending lengthwise of the louvred slats 9 for accommodating a plug, for example for attachment purposes.

Figure 4 corresponds with fig. 3. This figure shows a variant indicated by 11′ of the spacer 11 as according to the previously discussed figure. In this embodiment the projections, indicated in this case by respectively 19′ and 20′, are provided with active end surfaces, a top face 21′ and a bottom face 22′ respectively, having a complementary form, the shape of which is adapted to the profiled form of the louvred slats 9′ shown in fig. 4. Such louvred slats 9′ have the advantage relative to the louvred slats 9 in accordance with the previously discussed figure that they are more rigid, which can be an advantage for longer louvred slats. Attention is drawn to the fact that the louvred slats 9′ are mirror symmetrical in form, which confers the advantage that the total profile width is comparatively large, which improves rigidity, while the louvred slats 9′ can moreover not be placed incorrectly.

Figure 3 showed the way in which the top spacer 13 is placed on a spacer 11. Figure 5 shows the way in which a bottom spacer, in this case designated by 12′, co-operates with a spacer 11′ placed above it in the embodiment as in fig. 4.

It will be apparent that the upper face of the top spacer 13 as in fig. 3 and the lower face of the bottom spacer 12′ as in fig. 5 is flat for co-operation with respectively the lower face of the top plate 17 and the upper face of the base plate 14.

Figure 6 shows schematically a method for manufacturing two end spacers 12', 13'. For this purpose a spacer 11' is divided into two, for example by sawing, or by cutting using a laser beam, in a plane lying perpendicular to the longitudinal direction of a row, and therefore the longitudinal direction of the hole 24.

Now also shown with reference to fig. 6 is the build up of the block shaped main body of the spacer 11'. This main body comprises four walls 30 standing at right angles to one another which in addition to being joined together with their vertical side edges are also joined together by a central transverse wall 31 which holds a hollow tube 32 passing through it, the interior of which forms the continuous hole 24.

As is apparent from fig. 6, the plane 29 lies through the middle of the central transverse wall 31. This ensures that the mechanical strength and rigidity of the obtained end spacers 12' and 13' is as great as possible.

It will now be apparent from fig. 6 that the holes 27, 28 are positioned such that the plane 29 does not run through these holes. This ensures that the end spacers 12' and 13' are also furnished with complete holes, 28 and 27 respectively, that is, holes unaffected by the dividing process.

The build up of the projections 19' and 20' is also apparent from fig. 6. They are hollow, analogous to the form described of the block shaped main body of spacer 11' and the holes 27, 28 intended for the accommodation of, for example, a plug take the form of cylindrical elements.

It will be generally apparent without explanation that the construction of the various spacers shown and described ensures sufficient mechanical strength with the use of a minimal amount of material.

It will be particularly apparent from fig. 2 that, when a roof structure 1 is transported, all the parts can be grouped compactly, whereby the transport volume is comparatively small and the risk of damage during transport minimal. The construction of roof structure 1 can be

carried out virtually without special devices. The roof elevation is placed, making use if desired of base plate 19, on the roof 2, threaded rods 6 are arranged, over which spacers 11, 12, 13 are placed, louvred slats 9 and if desired vertical plates, such as the plate 10, being positioned between them. Finally the top plate or covering plate 17 is placed, after which the roof structure is completed using the nuts 19.

Adaptations required can be carried out simply at a later stage by additional placing or removal of spacers and louvred slats and/or plates.

Figure 7 shows a detail of an embodiment in which use is made in the right-hand wall of louvred slats 33 with perforated, bent over parts 34 which have a length such that, in the configuration of fig. 7, they connect together

In the left-hand wall not all the gripping surfaces of the projections 19 are utilized, but use is made of a blind plate 35 which by means of a bracket 36 supports a plug 37 which can be inserted into hole 27.

Shown in fig. 7 also is a plug 38 which bears a threaded end 40 which can rotate as according to arrow 39. As is indicated with broken lines, the plug 38 is of the type which, by tightening of a nut 41 over a threaded rod 42, makes an internal plug 34 move in the direction of arrow 44, whereby the plug 38 that is manufactured of elastic material expands and becomes tightly fixed in a hole 27, 28. This construction is for example suitable for arranging pivoting louvred slats which can be opened and closed. These are not shown in fig. 7.

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CLAIMS

1. Box-like structure, for example a roof structure, having a number of vertical, substantially right-angled walls comprising a number of elongate louvred slats running parallel to one another, and a cover plate supported by these walls, characterized in that each of both end zones of each louvred slat is fixed between two spacers, said spacers being arranged in two rows extending transversely of the longitudinal direction of the louvred slats and being pressed towards one another by pressure means.

2. Box-like structure as claimed in claim 1, characterized in that the spacers are arranged to grip the louvred slats from two adjoining walls.

3. Box-like structure as claimed in claim 1 or 2, characterized in that the spacers each take the form of a substantially block shaped member having at least one projection with two gripping surfaces positioned parallel to each other, at a preselected angle and at an interval from each other.

4. Box-like structure as claimed in claim 3, characterized in that the projection has the form of a block with a cross section in generally parallelogram form.

5. Box-like structure as claimed in any of the foregoing claims, characterized in that the form of the co-operating gripping surfaces is complementary and adapted to the form of the louvred slats, being for example a profiled form.

6. Box-like structure as claimed in any of the foregoing claims, characterized in that the spacers are provided with coaxial, continuous holes and that the pressure means comprise a member with tensile strength which can be placed through said holes, which member can be tensioned between the outermost end surfaces of the outer spacers of a row.

7. Box-like structure as claimed in claim 6, characterized in that the member with tensile strength comprises a bolt or threaded rod having on one end a flange element and on the other a nut.

8. Box-like structure as claimed in any of the foregoing claims, characterized in that each spacer is provided with a groove extending lengthwise of a row.

9. Box-like structure as claimed in claim 8, characterized in that the grooves of a row are situated in one plane.

10. Box-like structure as claimed in claim 3, characterized in that the interval between co-operating gripping surfaces of adjoining spacers is selected with a view to the thickness of the louvred slats to be fixed.

11. Box-like structure as claimed in any of the foregoing claims, characterized by at least one hole extending lengthwise of the louvred slats for accommodating a plug, for example for attachment purposes.

12. End spacer consisting of a part of a spacer of the type as claimed in any of the foregoing claims which is divided into two in a plane lying perpendicular to the longitudinal direction of a row.

13. Method for manufacturing two end spacers as claimed in claim 12, characterized in that a spacer as claimed in any of the claims 1-10 is divided in two, for example by sawing, in a plane lying perpendicular to the longitudinal direction of the row.

14. Louvred slat for use with a box-like structure as claimed in any of the foregoing claims 1-11, characterized by at least one portion protruding outside the spacers, this portion being bent over such that it lies in the plane of the rows of spacers of the associated wall.

15. Louvred slat as claimed in claim 14, characterized in that the protruding portion is perforated.

16. Roof elevation with a flanged edge for supporting a roof structure as claimed in any of the claims 1-11, characterized in that said flanged edge extends outwards.

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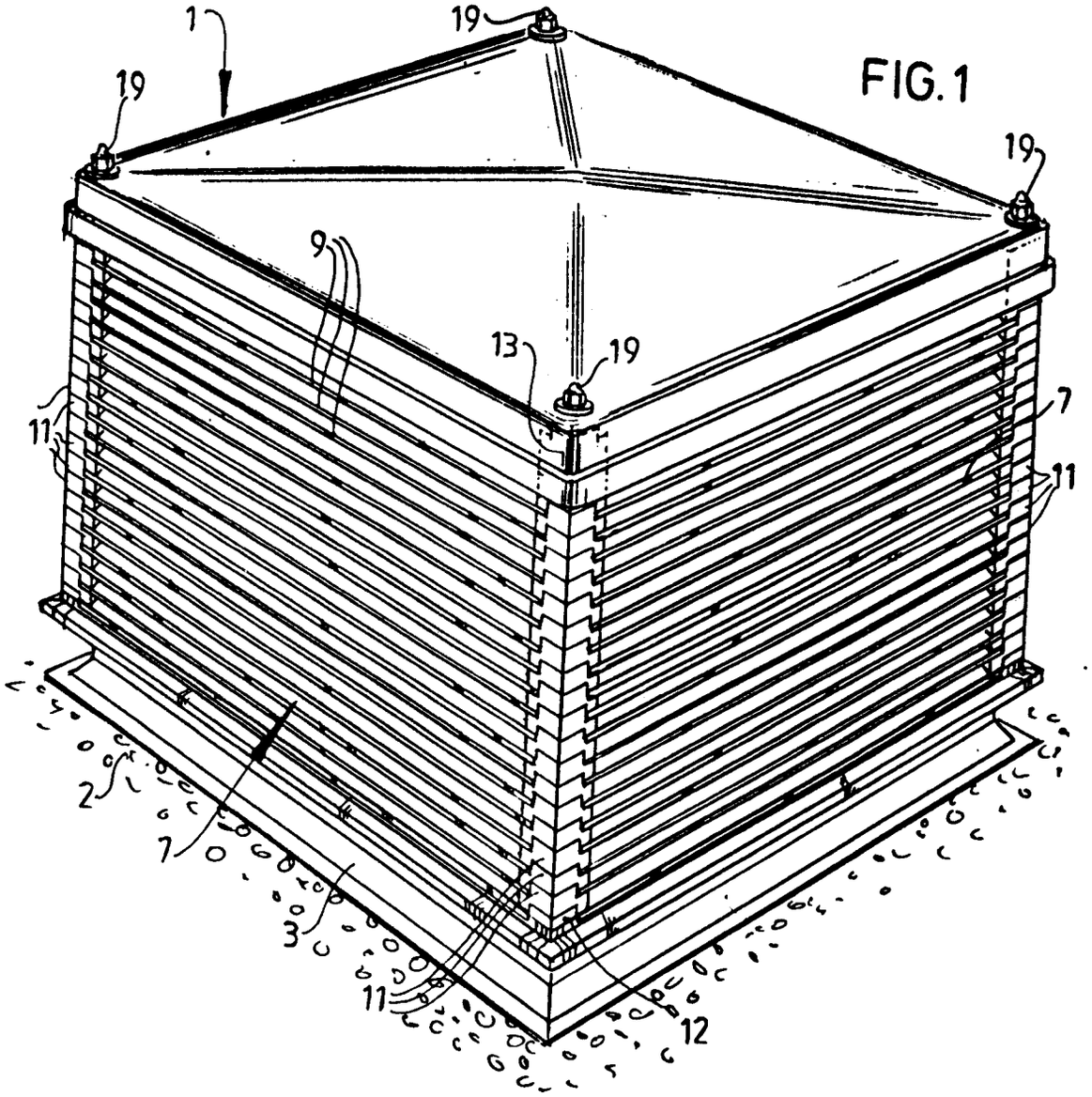
FIG. 1



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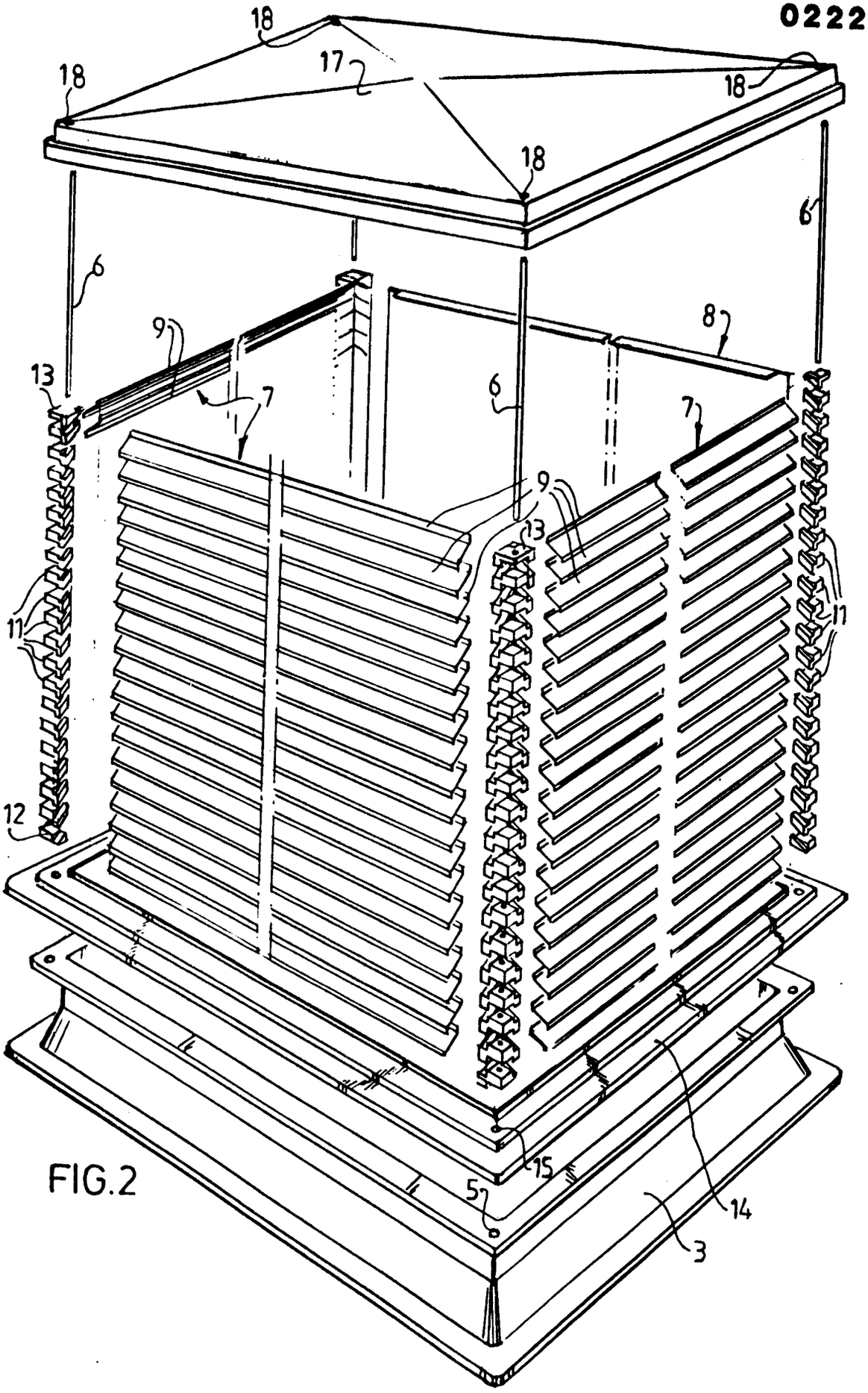

FIG.2

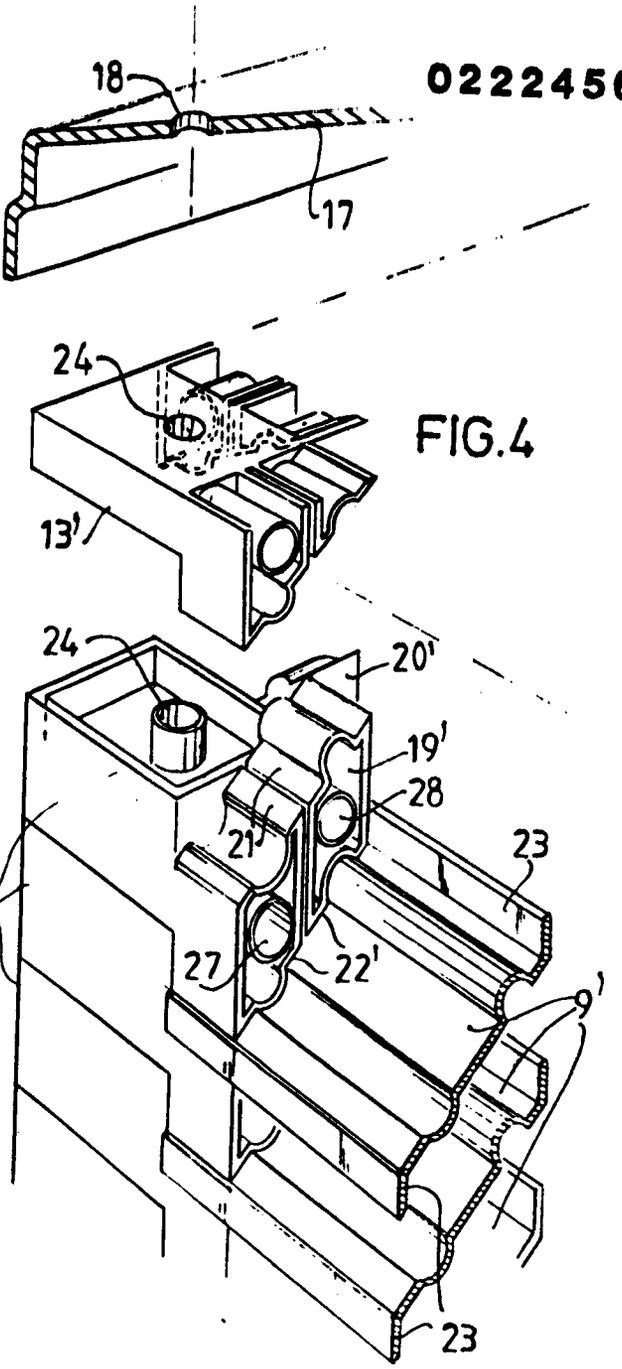
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FIG.4

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FIG.3

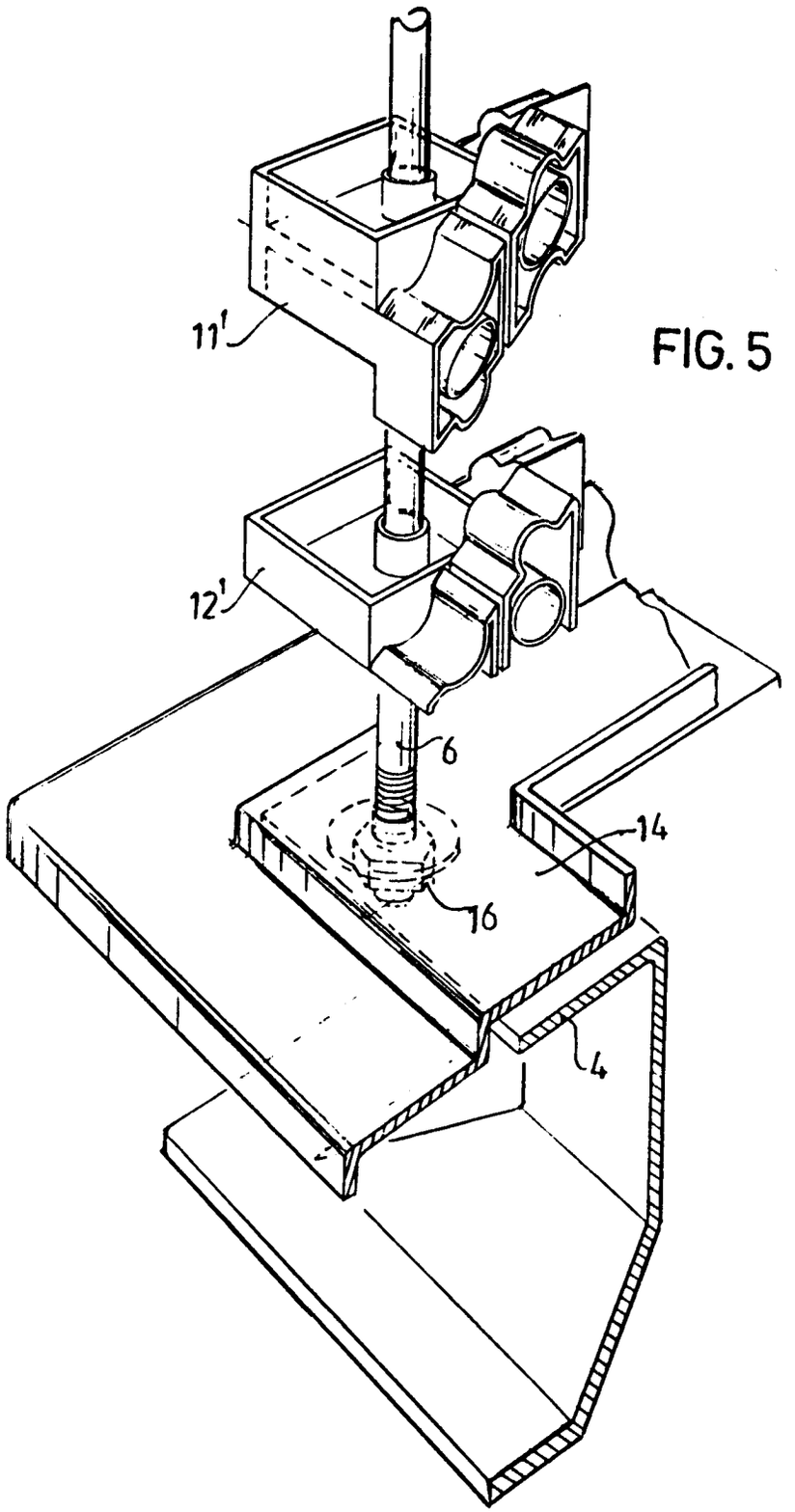

FIG. 5

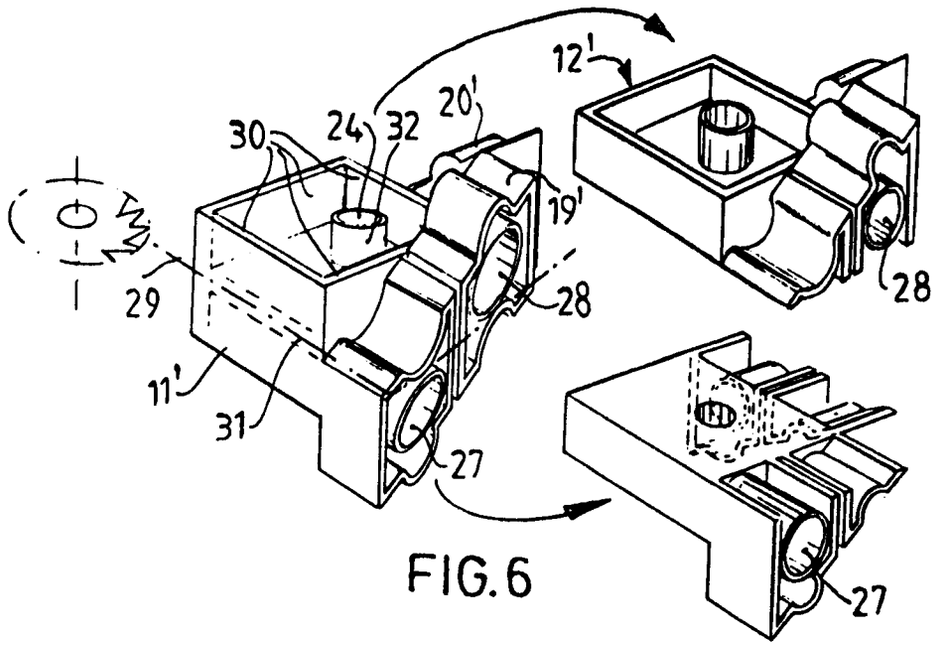
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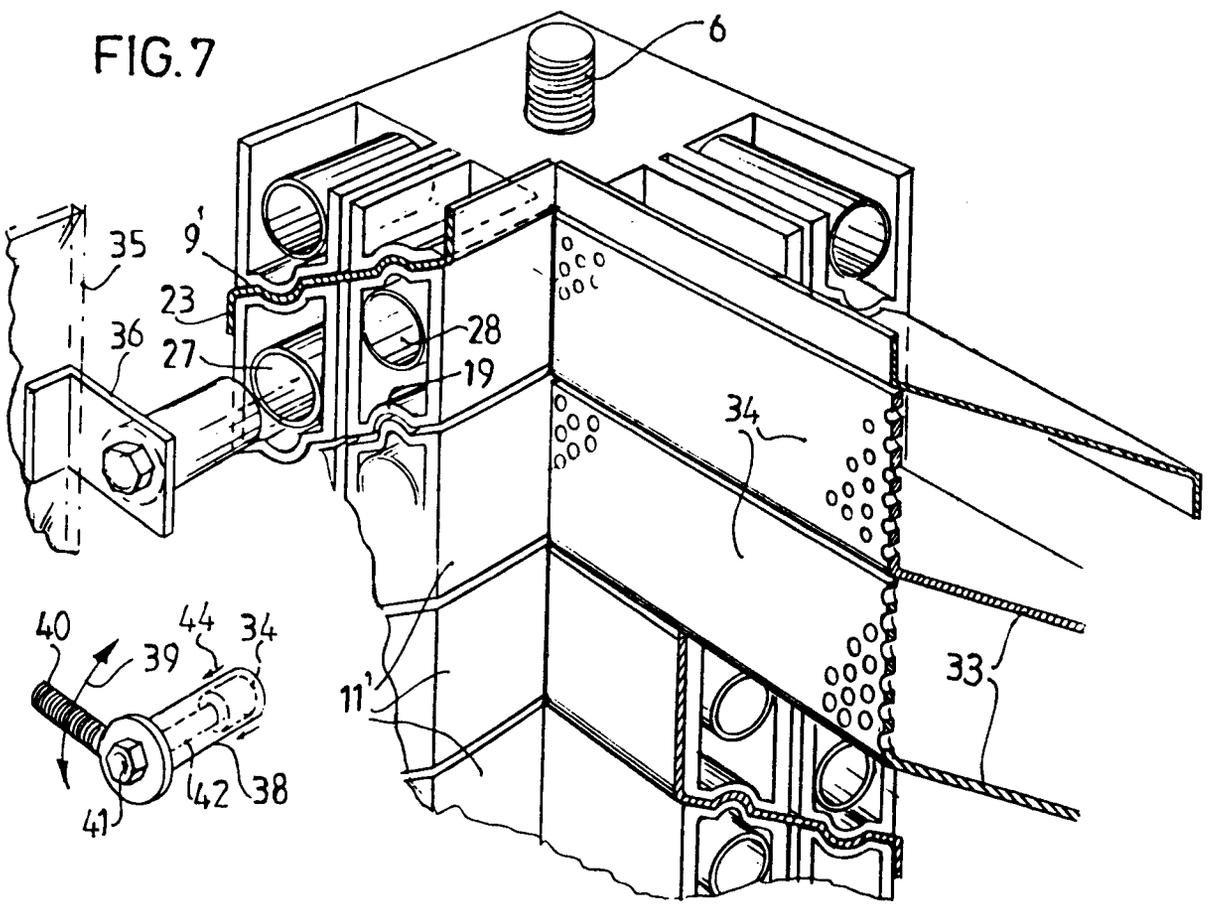
FIG.6

FIG.7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