(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 093 006**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **83302328.6**

(22) Date of filing: **25.04.83**

(51) Int. Cl.³: **E 04 F 10/08**
E 06 B 9/28

(30) Priority: **26.04.82 GB 8212009**
20.05.82 GB 8214756
25.06.82 GB 8218488

(43) Date of publication of application:
02.11.83 Bulletin 83/44

(84) Designated Contracting States:
AT BE CH DE FR IT LI LU NL SE

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(54) **Improvements in louvred structures and in mullions and the like members for supporting louvres.**

(57) A continuously louvred ventilator is extended around an inclined corner of a building structure across faces of the structure which may be inclined at different angles to the vertical. The louvres (10) are mounted on angularly adjustable mounting brackets (62) in turn mounted on angularly adjustable U-shaped pieces (66) slidable lengthwise in longitudinal slots 25 in mullions (61). These inbuilt adjustments allow the louvres to be set up *in situ* so as to present unbroken lines of louvres intersecting at the corner.

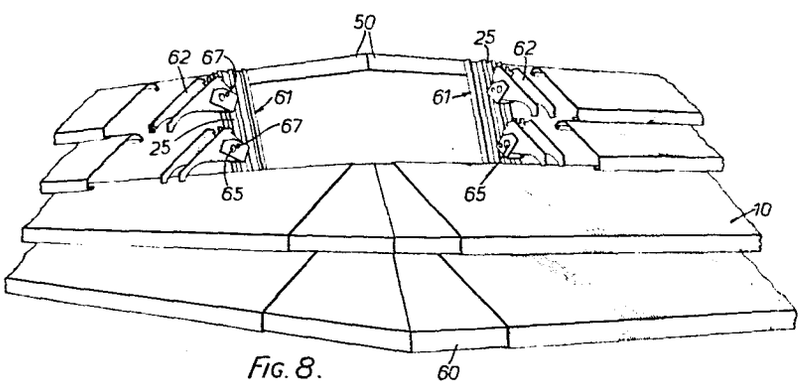

Fig. 8.

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"IMPROVEMENTS IN LOUVRED STRUCTURES AND IN MULLIONS AND THE LIKE MEMBERS FOR SUPPORTING LOUVRES"

The present invention relates to louvred structures and in mullions and the like members for supporting louvres.

It is known to provide a louvred ventilator in which a bank of louvres is mounted to the front of a frame and any intermediate frame members or mullions so as to conceal the frame work and present, instead, unbroken lines of louvres when the ventilator is viewed in frontal aspect. The louvres generally run horizontally but they may run vertically or even at some intermediate angle. These so called "continuous louvres" may be used for ventilation purposes and/or for concealing a building frontage or for concealing a superstructure mounted on the top of a building.

In many instances a bank of horizontally arranged continuous louvres are extended across a vertical face of a building structure to a vertical edge of the structure where the building structure face intersects a further vertical face of the building structure, the further vertical face of the building structure also carrying a bank of horizontal continuous louvres extending to the same vertical edge and joining with the continuous louvres of the first said bank so as to give the appearance of

unbroken, horizontal lines of louvres extending round the vertical edge.

The present invention deals with the problem of providing a continuous louvre with an inclined or curved edge which may extend in a vertical or an inclined plane. Thus, for example, a continuous louvre may be required to fill an opening in a vertical wall of a building structure, the opening being of non-rectangular or diamond shape.

Hitherto, in order to deal with this problem, louvres have been extended beyond vertically disposed side frame members or mullions to fill the opening. This may involve the provision of two or more rectangular frames to support the end portions of continuous louvres overhanging side frame members, to prevent vibration of the overhanging end portions of the louvres with consequent noise production and to give sufficient strength and support to the louvre overhanging portions.

If a non-rectangular opening has straight sides, then a purpose-built frame for the continuous louvre bank may be especially constructed. This requires careful "tailoring" to space and angle the louvre fixing brackets precisely to match the shape of the opening however, and this is a serious impediment to the cheap and easy manufacture off the site and

really requires site-construction.

Such a measure might be resorted to if it was required to maintain the maximum ventilation opening through a continuously louvred ventilator in as far as the provision of a series of rectangular frames can block-off quite a large proportion of the ventilation opening of the ventilator.

The present invention also addresses the problem of providing continuous louvres which are at least in part inclined to the vertical. Thus, by way of further example, a building frontage may have an inclined portion required to be clad with a bank of continuous louvres running horizontally or at an angle to the horizontal and such a bank of louvres may be required to extend to or around an inclined or curved edge of the inclined building face onto a vertical building face or even a further inclined building face which intersects the first said face at said edge, the further inclined face being inclined at the same or a different angle to the first said face. In these circumstances the louvres themselves are often required to be mounted on the or each inclined face in the same profile orientation as is adopted on adjacent vertical faces, e.g. with the main louvre surfaces inclined at 45° to the vertical, regardless of the angle of inclination of the building face.

In order to overcome the aforementioned problems, and to enable continuous louvres to be constructed in situ, the present invention broadly provides a mullion for continuous louvres having a plurality of louvre fixing brackets for supporting a bank of louvres in front of the mullion so as substantially to obscure the mullion when the louvres are viewed in frontal aspect, the fixing brackets being adjustable lengthwise with respect to the mullion and angularly to tilt the brackets with respect to the lengthwise extent of the mullion.

The present invention further provides a continuous louvre including adjoining banks of continuous louvres of identical cross-sectional size and shape intersecting at a corner, at least one of said louvre banks to one side of said corner including one or more mullions in accordance with the present invention as hereinbefore defined, said mullion or mullions being inclined to the vertical, said louvre brackets being so spaced apart and orientated with respect to said mullion or mullions as to support said one louvre bank to said one side of said corner with its louvres extending the louvres of the other louvre bank to the other side of said corner in unbroken lines.

The present invention still further provides a continuous louvre filling an aperture in a building

structure having at least one upwardly extending non-vertical edge, the ventilator including a mullion in accordance with the present invention as hereinbefore defined, disposed parallel to and/or adjacent each upwardly inclined non-vertical edge of the aperture.

When constructing continuous louvres in situ, the present invention still further provides a method of constructing a continuous louvre including adjoining banks of continuous louvres of identical cross-sectional size and shape intersecting at a non-vertical corner, comprising fixing one bank of louvres in position with its louvres extending to said corner, and then fixing a mullion in accordance with the present invention in position to support the ends of the louvres of the other bank of louvres adjacent said corner, spacing apart said mullion brackets, one for each louvre, along the mullion and tilting the louvre brackets with respect to the mullion so as to align each louvre of said other bank of louvres with a louvre of said one bank of louvres with its profile orientation in matching relation thereto whereby the louvres of said other bank of louvres extend the louvres of said one bank of louvres in unbroken lines, and then clamping the louvre brackets to the mullion.

The present invention still further provides a method of constructing a continuous louvre in an aperture in a building structure having at least one upwardly inclined or curved edge comprising fixing the louvres in the plane of the aperture, intermediate their length, with the louvres extending to said edge of the aperture, fixing a mullion in accordance with the present invention adjacent said inclined or curved edge of the aperture, spacing apart said mullion brackets, one for each louvre, along the mullion and tilting the louvre brackets with respect to the mullion so as to be in a position and orientation to support the louvres adjacent said inclined or curved edge of the aperture and then clamping the louvre brackets to the mullion.

Specific embodiments of the present invention in all of its various aspects as hereinbefore defined will now be described by way of example, and not by way of limitation, with reference to the accompanying drawings in which like reference numerals are used throughout to indicate corresponding parts. In the accompanying drawings:

FIG. 1 shows a prior art continuous-louvred louvre ventilator in frontal aspect and filling an opening in a vertical wall of a building, the opening having one opposite pair of horizontal sides and a

further opposite pair of sides inclined at an acute angle to the horizontal, in this case, in opposite directions;

FIG. 2 is a cross-section and shows the construction of the vertical frame members or mullions in the ventilator of Fig. 1;

FIG. 3 is a view corresponding to Fig. 1 showing a continuously louvred louvre ventilator according to the present invention;

FIG. 4 is a side view to a larger size of side frame member or mullion provided in accordance with the present invention in the ventilator shown in Fig. 3;

FIG. 5 is an end view from the top end in Fig. 4;

FIG. 6 is a perspective view of a further ventilator according to the present invention with certain of the louvres broken away to show two of the mullions according to the present invention employed in the construction of the ventilator;

FIG. 7 is an end view of one of these mullions prior to angular adjustment of parts thereof;

FIG. 8 is a perspective view of a still further ventilator according to the present invention with certain of the louvres broken away to show two of the mullions according to the present invention

employed in the construction of the ventilator;

FIG. 9 is a front elevation of the ventilator shown in Fig. 8;

FIG. 10 is a side view to a larger size of a side frame member or mullion provided in accordance with the present invention and employed in the ventilator shown in Figs. 8 and 9; and

FIG. 11 is a view from the top end in Fig. 10.

With reference to the accompanying drawings, Figs. 1 and 2 show a prior art ventilator having a bank of horizontally extending louvres 10 supported on fixing brackets 11 (see Fig. 2) on vertically extending frame members or mullions 12 interconnected by horizontal frame members 13. The opening filled by the ventilator is generally indicated at 15.

Fig. 2 shows two lengthwise portions 10' of a continuous louvre 10 abutting end to end centrally between a pair of fixing brackets 11, 11 on the mullion. This arrangement is used for the central mullion 12 in Fig. 3 in which like reference numerals indicate parts corresponding with parts already described.

The construction of the side frame members or mullions 20 in Fig. 3 is shown in detail in Figs. 4 and 5. Pairs of louvre fixing brackets 21 are formed in one piece as U-shaped yokes 22. These are slidable lengthwise of the mullion 20 along a longitudinal

slot 25 in the mullion. The mullion is made up of a channel-form piece 26 to which is rivetted two further pieces 27 and 27' of the same cross-section and one of which, 27', is reversed end-to-end in the assembly when forming the mullion. The pieces 27, 27' have flange portions 28 rivetted as at 29 to the channel web 30 upstanding wall portions 31 extending at right angles to the channel web 30, and flange portions 32 extending towards one another, parallel to the channel web 30, the flange portions 32 having inturned, longitudinal, confronting, free-edge portions 32' bounding the slot 25. The pieces 26, 27, 27', 32 form a box-section having side flanges as at 28 which are used to rivet the mullion to the horizontal frame members 13.

Each yoke 22 has an externally screw threaded member in the form of a pivot bolt 40 entered through a hole in the yoke and which is received in an internally screw threaded clamping member in the form of an internally screw threaded boss 41 fixed on a U-shaped clamping piece 42 the free end edges of the limbs of which engage the inside surfaces of the flange portions 32 and the cross-piece of which bridges across the inturned edges of the flange portions 32'. By tightening the bolt 40 the fixing brackets 21 presented by the two limbs of the yoke

may be fixed at any desired longitudinal position along the slot 25 and at any desired angle with respect to the longitudinal dimension of the mullion. In the present case the fixing brackets are orientated to bring the brackets into a vertical position.

In the present embodiment the slot 25 is open at both ends and this allows the yokes 22 already carrying pivot bolts and clamping pieces to be assembled on the mullion from one end. The slot 25 may be open at one end only or it may be replaced by a line of shorter slots and each pivot bolt 40 may be entered through an individual slot or each slot may receive a plurality of the sets of yokes 22, bolts 40 and clamping pieces 41, 42 with the bolts entered through the slot.

The fixing brackets 11 correspond in size and profile with the fixing brackets 21. The louvres 10, as is known per se, are shaped to snap-fit on the fixing brackets, the louvre profile in size and cross-section corresponding to that of the fixing brackets as shown in the upper end in Fig. 4. The mullions 20 may be produced in a long length and then cut to a desired length and fitted with the required number of fixing brackets 21. The fixing brackets may thereafter be positioned and angled on site precisely to suit the inclinations of the sides of the opening 15.

The yokes 22 may be replaced by L-shaped pieces each presenting only one fixing bracket 21 if desired.

If mullions 20 are used to form a framework for a continuously louvred louvre ventilator to fill an arch shaped opening for example, then the louvres 10 would overhang the mullions 20 at their sides adjacent the curvi-form edge of the opening, the mullions 20 being disposed chordwise in the opening. Thus, mullions in accordance with the present invention may be used to construct continuously louvred louvre ventilators to a wide variety of outline shapes including diamond shapes which may be rectangular.

A mullion 20 may also be used to support the ends of a bank of continuous louvres at one end of the bank of louvres adjacent an inclined edge of a vertical face of a building structure where the face intersects an inclined face of the building structure and the continuous louvres are required to extend round that edge. Thus, a mullion in accordance with the present invention is not necessarily used to construct a ventilator in an opening.

The ventilator shown in Fig. 6 comprises a plurality of mullions 39 having pairs of louvre fixing brackets 21 formed in one piece as U-shaped

yokes 22 mounted by rivets 38 (see Fig. 7) on L-shaped pieces 37 slidable lengthwise of the mullions along a longitudinal slot 25' in the side of each mullion. Each mullion is made up of two pieces 45 and 46 rivetted together as at 47, the pieces 45, 46 together defining a box section 48 with a compound side flange 49 at the opposite side of the mullion from the slot 25'. The side flanges 49 are used to rivet the mullions to horizontally extending frame members such as 50. Each L-shaped piece 37 has a pivot bolt 40, as before, entered through a hole in the L-shaped piece and which is received in an internally screw threaded boss 41 fixed on a U-shaped clamping piece 42 again as before. By tightening the bolt 40 the fixing brackets 21 presented by the two limbs of the yoke 22 may be fixed at any desired longitudinal position along the mullion and at any desired angle with respect to the longitudinal dimension of the mullion, in the present case, so as to orientate the fixing brackets to accommodate the slope of the mullion.

The mullions 39 may be produced in a long length and then cut to a desired length and fitted with the required number of fixing brackets 21. The fixing brackets may thereafter be positioned and angled on site precisely to suit the inclinations

of the mullions after assembling the mullions to the frame members 50. The fixing brackets may finally be fixed by rivetting their L-shaped pieces 37 to the pieces 45 of the box-sections.

The yokes 22 and the L-shaped pieces 37 may be replaced by plane pieces each presenting only one fixing bracket 21 if desired.

Mullions 39 as described may be used to construct continuously louvred louvre ventilators in a plane which inclines to the vertical up to more than 40°. The limit of the angle is determined by the size and vertical spacing of the louvres 10 assuming that the louvre brackets themselves are to be orientated to position the yoke webs 36 vertically since the greater the angle of inclination of the mullions, the closer the leading edge of each louvre approaches the upper surface of the louvre next below it.

Fig. 6 shows a continuously louvred louvre ventilator extending round a corner formed at the intersection of two planes inclined at different angles of 50° and 60° to the horizontal respectively. The louvres 10 are interconnected at the corner by corner pieces 60 in a manner known per se.

If the corner is formed at the intersection of an inclined plane and a vertical plane, the mullion extending adjacent the corner in the vertical plane

is constructed like the mullion 20 described with reference to Fig. 4, the mullion 20 extending parallel to the line of intersection.

The ventilator illustrated in Figs. 8 and 9 comprises a plurality of mullions generally indicated at 61 having pairs of louvre fixing brackets 62 formed in one piece as U-shaped yokes 63 (see Fig. 11) mounted for pivoting about a pivot axis 64 on rivets 65 to a U-shaped piece 66 slidable lengthwise of the mullions along a longitudinal slot 25 in the front face of the mullion. Each mullion is made up of three pieces 26, 27, and 27' as shown in Fig. 4. The mullions are rivetted to horizontal frame members 50. Each U-shaped piece 66 has a pivot bolt 40 received in an internally screw threaded boss 41 fixed on a U-shaped clamping piece 42 all as described with reference to Fig. 4. By tightening the bolt 40 the U-shaped piece 66 may be fixed at any desired position along the mullion 61 and at any desired angle with respect to the longitudinal dimension of the mullion about a pivot axis coinciding with the longitudinal axis 67 of the bolt 40, the axis 67 extending at right angles to the axis 64. Correspondingly, the fixing brackets 62 presented by the two limbs of the yoke 63 may be adjusted at any desired angle with respect to the longitudinal dimension of the mullion 61 by pivoting

about the axis 64 and then fixed in position by rivetting the yoke 63 to the U-shaped piece 66 at a position as at 67 (see Figs. 8 and 9) offset from the axis 64.

The mullions 61 may be produced in a long length and then cut to a desired length and fitted with the required number of fixing brackets 62 and their associated pieces as described. The fixing brackets may thereafter be positioned and angled on site precisely to suit the inclinations of the mullions 61 after assembling the mullions 61 to the frame members 50 and then fixed in position as described above.

In the last connection, the inclinations of the mullions 61 may be chosen as required. Thus, in the present case, as more clearly evident from an inspection of Fig. 9, the mullions 61 are disposed parallel to the line of intersection of the two planes of the ventilator at the corner of the ventilator shown in Fig. 8. These planes may be inclined to the vertical up to more than 40°, the limit of the angle being determined by the size and vertical spacing of the louvres 10, the louvres being positioned horizontally.

It will be appreciated that the two intersecting planes of the ventilator being described may be

inclined at different angles to the vertical. It will also be appreciated that the mullions 61 need not necessarily extend parallel to the corner line of the intersection of the planes since the louvre brackets 62 may still be adjusted to position the yoke webs 63' in vertical planes to accommodate the mounting of the louvres 10 horizontally.

The mullions 61 as described may be used as side frame members to construct a frame for a continuously louvred louvre ventilator to fill a non-rectangular opening in an inclined wall of a building structure.

Mullions or side frame members 61 as described are primarily intended for the construction of continuously louvred louvre ventilators in inclined planes and at locations requiring a double inclination of a mullion or side frame member, the mullion or side frame member sloping from top to bottom or end to end as viewed both in front and side elevation.

Ventilators as described herein may alternatively be used for concealing parts of a building frontage or a superstructure mounted on top of a building. To this extent the mullions 20, 39 or 61 may simply be fixed to the building frontage or superstructure and need not necessarily comprise

part of a frame-work as such defining a ventilation opening.

The louvre mounting brackets 62 may be orientated to mount continuous louvres 10 running at any desired angle to the horizontal. The brackets 62 may be orientated to mount louvres 10 sloping rearwardly from their top to their bottom longitudinal edge. An arrangement of continuous louvres sloping in this fashion may be illustrated by inverting Fig. 8 or Fig. 9 so that the planes of the ventilator slope inwardly from top to bottom. Such an arrangement is particularly well suited to masking building superstructure from view from street level. Yokes 63 present pairs of louvre mounting brackets 62 to enable lengths of louvre to be abutted end to end between the brackets. This is not essential and in an alternative construction the U-shaped pieces 66 could be replaced by L-shaped pieces having the bolt 40 passing through one limb and a rivet 65 rivetting a single plate-form louvre mounting bracket 62 to its other limb.

CLAIMS:

1. A mullion (20 or 39 or 61) for continuous louvres having a plurality of louvre fixing brackets (21 or 62) for supporting a bank of louvres (10) in front of the mullion so as substantially to obscure the mullion when the louvres are viewed in frontal aspect characterised in that the fixing brackets (21 or 62) are adjustable lengthwise with respect to the mullion (20 or 39 or 61) and angularly to tilt the brackets with respect to the lengthwise extent of the mullion.

2. A mullion as claimed in claim 1 in which the louvre fixing brackets (21) are angularly adjustable with respect to the mullion (20 or 39) each about a single pivot axis.

3. A mullion as claimed in claim 1 in which the louvre fixing brackets (62) are angularly adjustable with respect to the mullion (61), each about two pivot axes (64, 67) at right angles to one another and each extending transversely with respect to the lengthwise extent of the mullion.

4. A mullion as claimed in claim 3 in which each louvre fixing bracket is pivoted to a mounting piece (66) about one (64) of said two pivot axes, the mounting piece being adjustable lengthwise with respect to the mullion and angularly about the other

(67) of said two pivot axes.

5. A mullion as claimed in any preceding claim in which each louvre fixing bracket is angularly adjustable about the longitudinal axis of an externally screw threaded member (40) threadedly engaged in an internally screw threaded clamping member (41, 42), the pivot member (40) passing through a slot (25) running lengthwise of the mullion to be received in the clamping member (41, 42) and being adjustable along the length of the slot prior to tightening of the clamping member (41, 42) by rotation of the pivot member (40).

6. A mullion as claimed in claim 5 in which a single slot is provided and the slot is open ended at at least one end and runs the full length or substantially the full length of the mullion.

7. A mullion as claimed in claim 5 or 6 in which the mullion is of box section, the slot or slots are formed between opposed, inturned side flange portions (32') bounding the lengthwise extent of the slot or slots and the clamping members (41, 42) are U-shaped and bridge said side flange portions (32').

8. A continuous louvre including adjoining banks of continuous louvres (10) of identical cross-sectional size and shape intersecting at a

corner, at least one of said louvre banks to one side of said corner including one or more mullions (20 or 39 or 61) as claimed in any preceding claim, said mullion or mullions being inclined to the vertical, said louvre brackes (21, 62) being so spaced apart and orientated with respect to said mullion or mullions as to support said one louvre bank to said one side of said corner with its louvres extending the louvres of the other louvre bank to the other side of said corner in unbroken lines.

9. A continuous louvre as claimed in claim 8 in which said mullion or mullions lie parallel to said corner.

10. A continuous louvre as claimed in claims 8 or 9 in which said louvre banks are each inclined to the vertical at a different angle and each includes one or more mullions (39 or 61) as claimed in any preceding claim 1 to 7.

11. A continuous louvre filling an aperture (15) in a building structure having at least one upwardly extending non-vertical edge, the ventilator including a mullion as claimed in any preceding claim 1 to 7, disposed parallel to and/or adjacent each upwardly inclined non-vertical edge of the aperture.

12. A method of constructing a continuous

louvre including adjoining banks of continuous louvres (10) of identical cross-sectional size and shape intersecting at a non-vertical corner, comprising fixing one bank of louvres in position with its louvres extending to said corner, and then fixing a mullion (20 or 39 or 61) as claimed in any one of claims 1 to 7 in position to support the ends of the louvres of the other bank of louvres adjacent said corner, spacing apart said mullion brackets (21 or 62), one for each louvre, along the mullion and tilting the louvre brackets with respect to the mullion so as to align each louvre of said other bank of louvres with a louvre of said one bank of louvres with its profile orientation in matching relation thereby whereby the louvres of said other bank of louvres extend the louvres of said one bank of louvres in unbroken lines, and then clamping the louvre brackets to the mullion.

13. A method as claimed in claim 12 further including rivetting the mullion brackets to the mullion.

14. A method of constructing a continuous louvre in an aperture (15) in a building structure having at least one upwardly inclined or curved edge comprising fixing the louvres (10) in the plane of the aperture, intermediate their length, with the

louvres extending to said edge of the aperture, fixing a mullion (20) as claimed in any one of claims 1 to 7 adjacent said inclined or curved edge of the aperture, spacing apart said mullion brackets (21), one for each louvre, along the mullion and tilting the louvre brackets with respect to the mullion so as to be in a position and orientation to support the louvres (10) adjacent said inclined or curved edge of the aperture and then clamping the louvre brackets to the mullion.

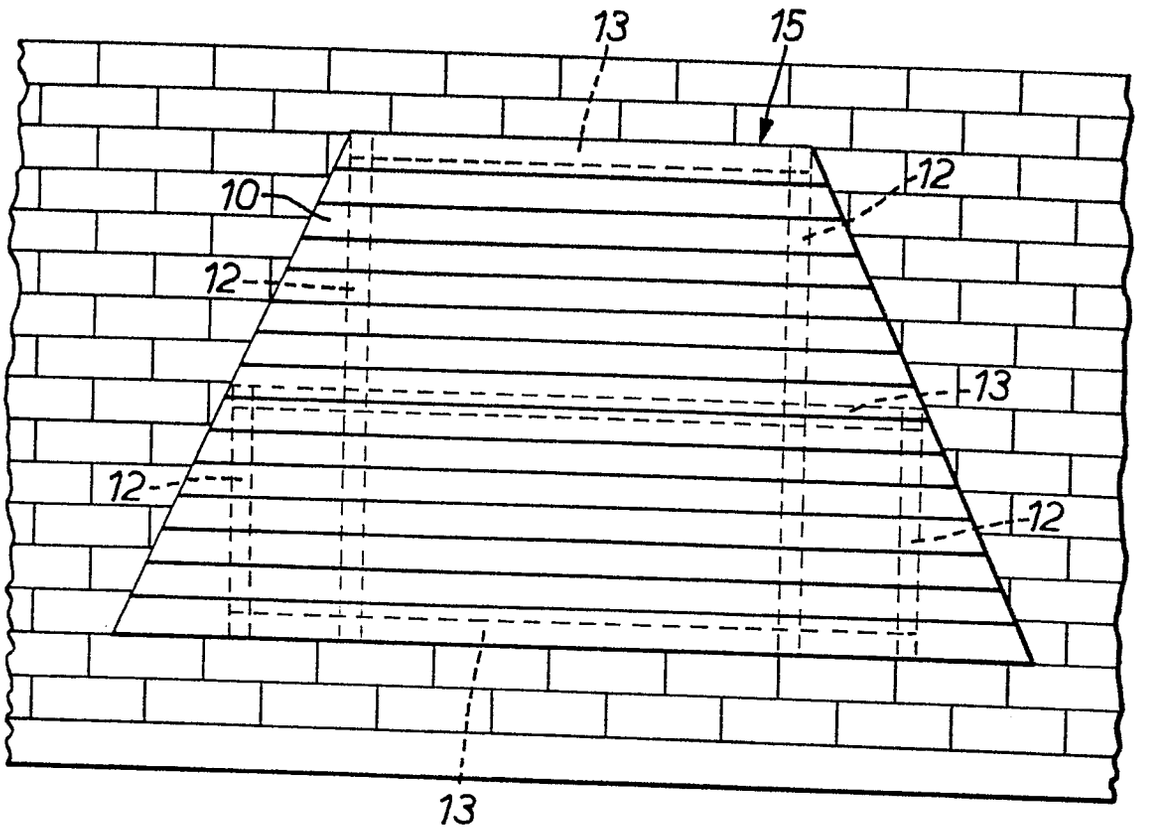

FIG. 1.
(PRIOR ART)

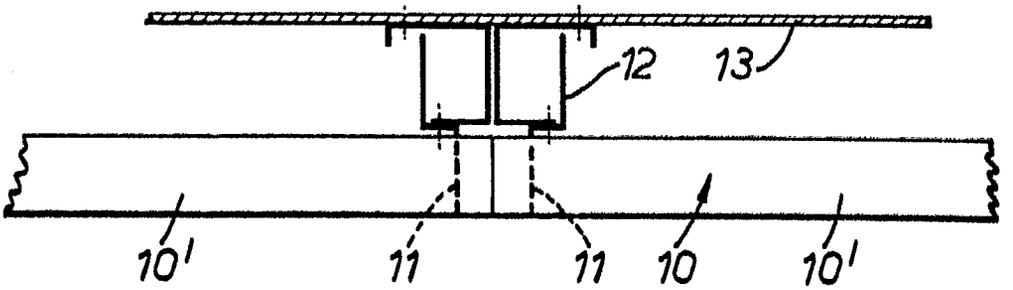

FIG. 2.
(PRIOR ART)

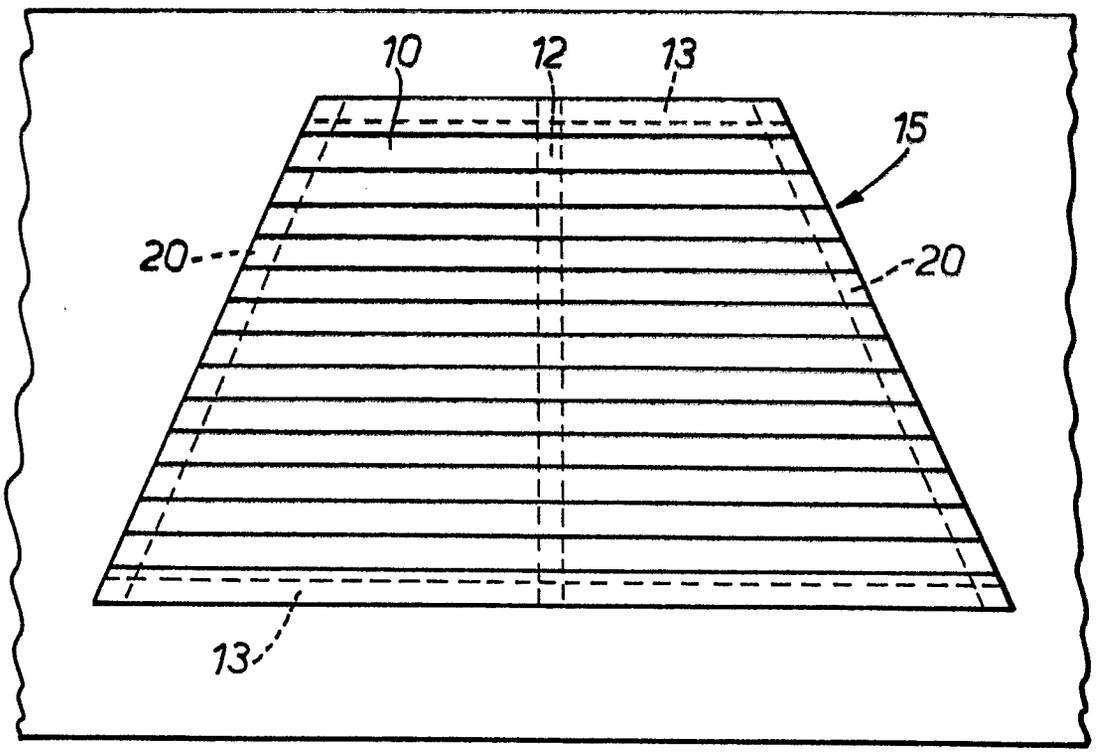

FIG. 3.

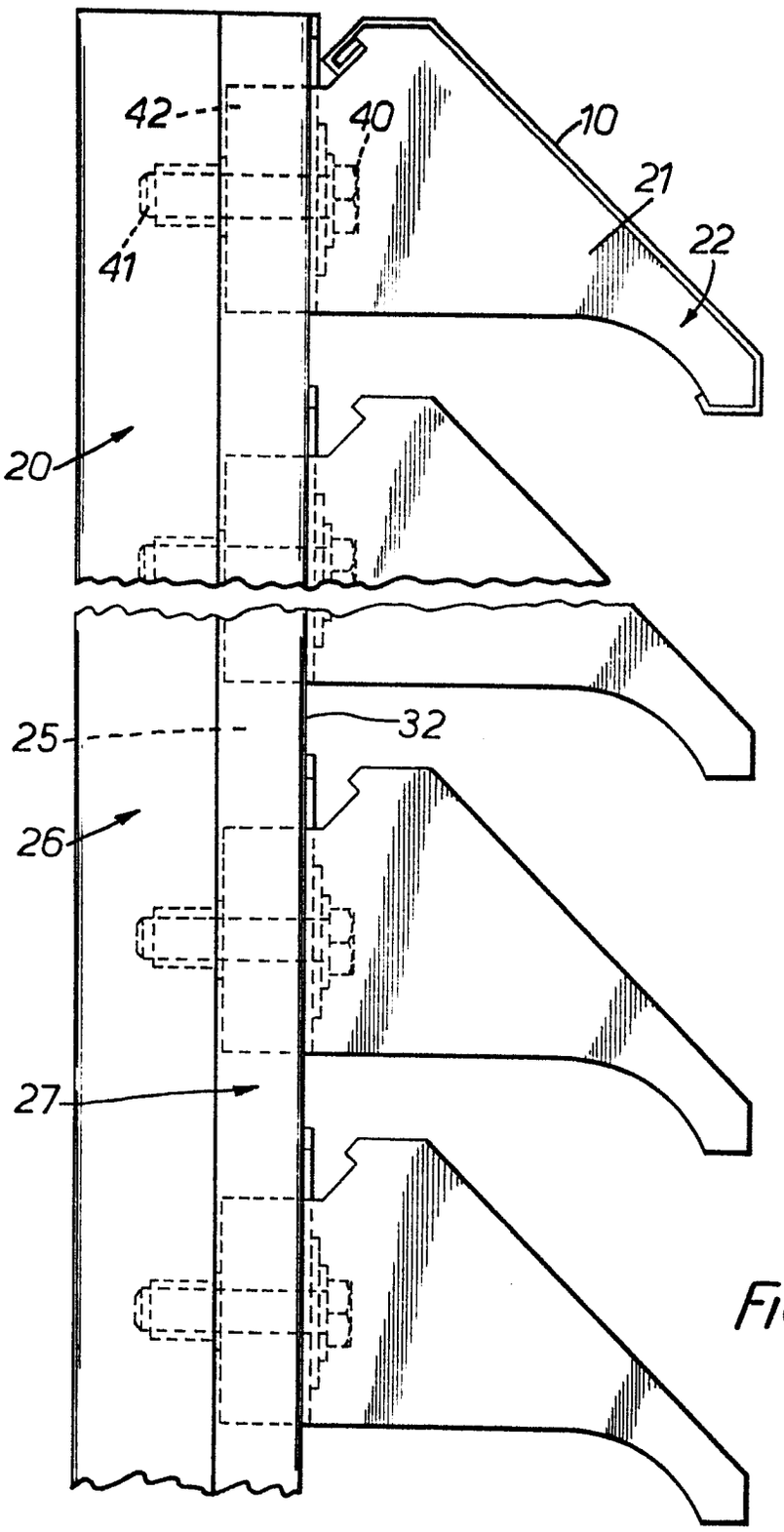

FIG. 4.

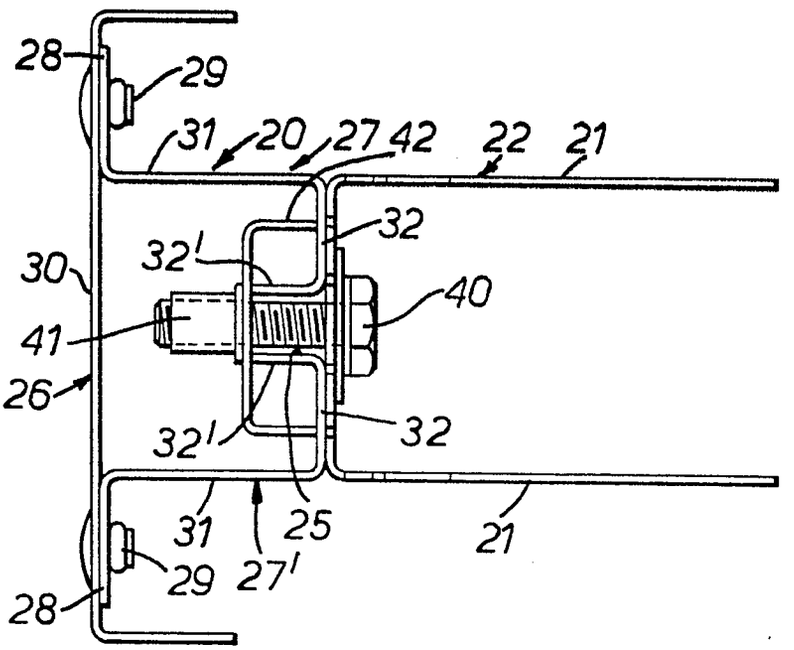

FIG. 5.

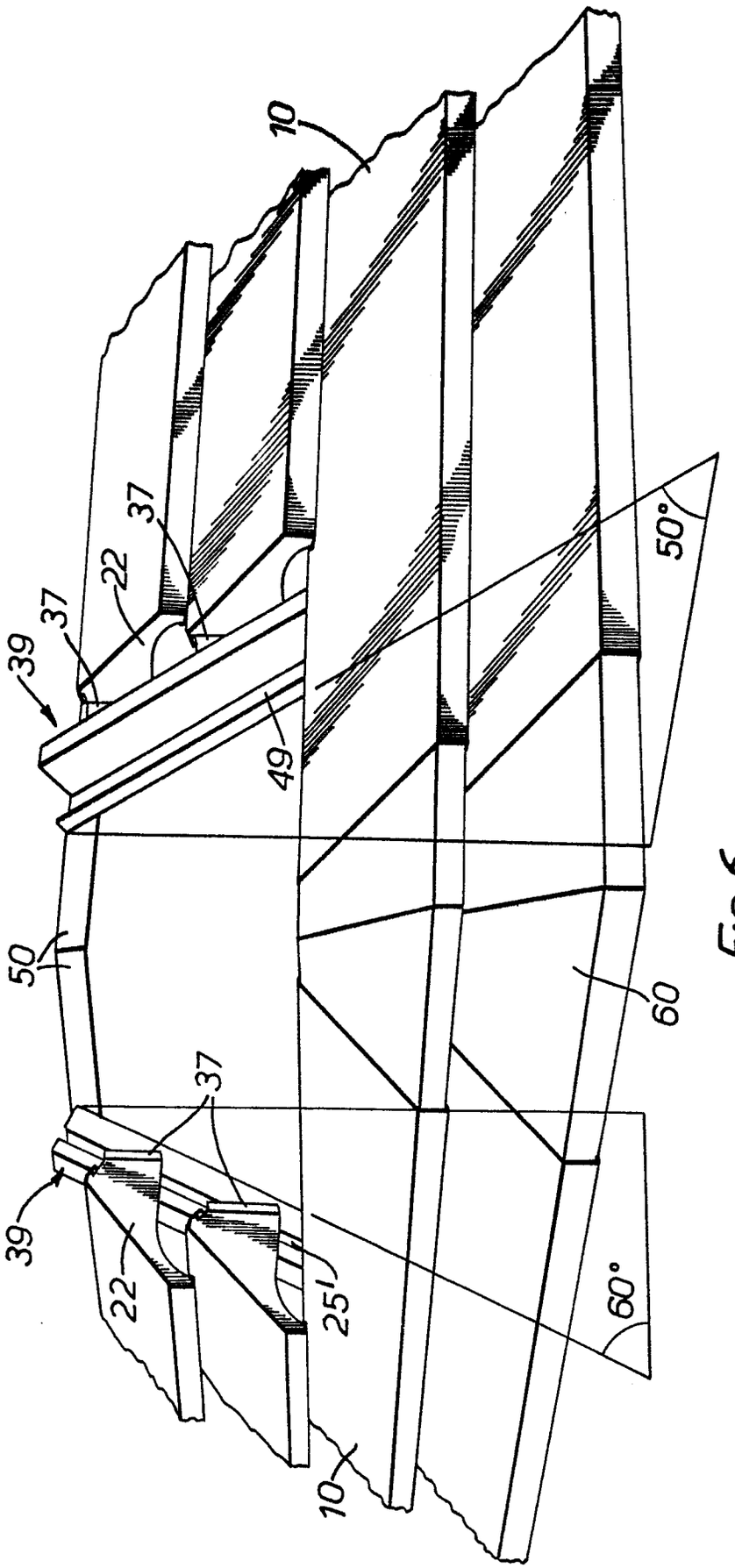

FIG.6.

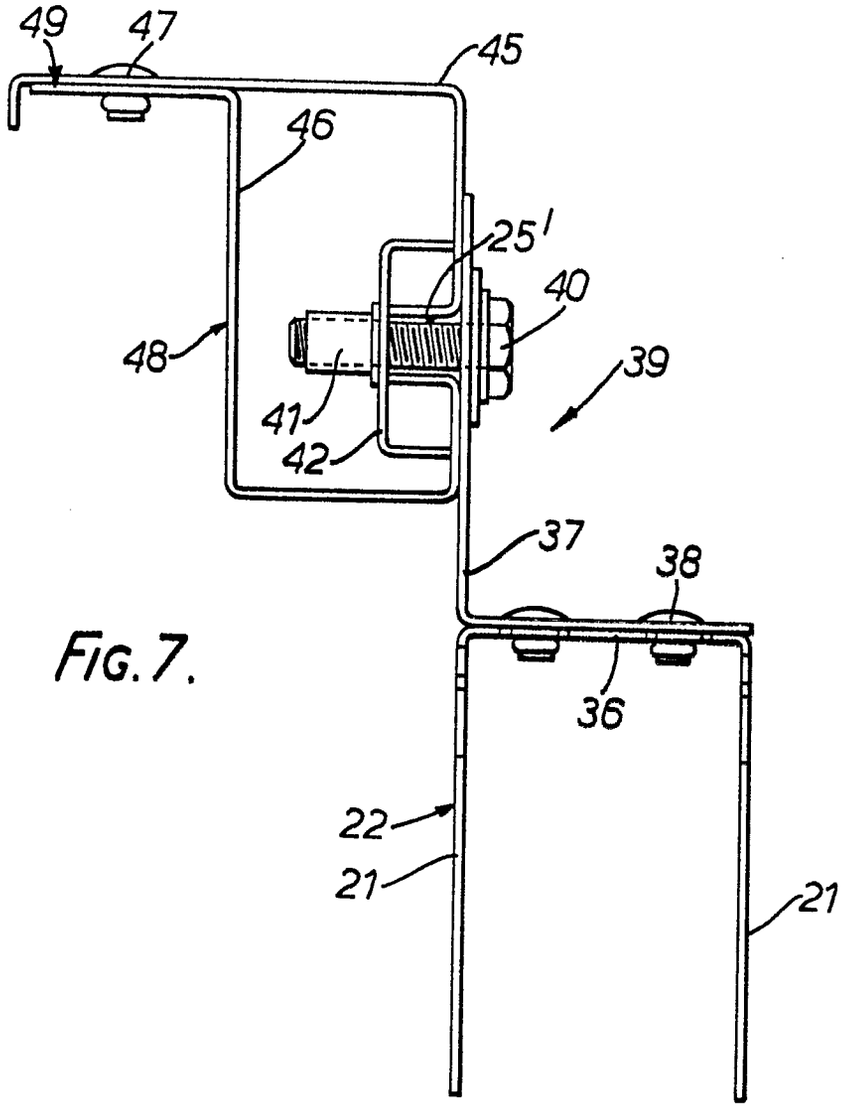
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FIG. 7.

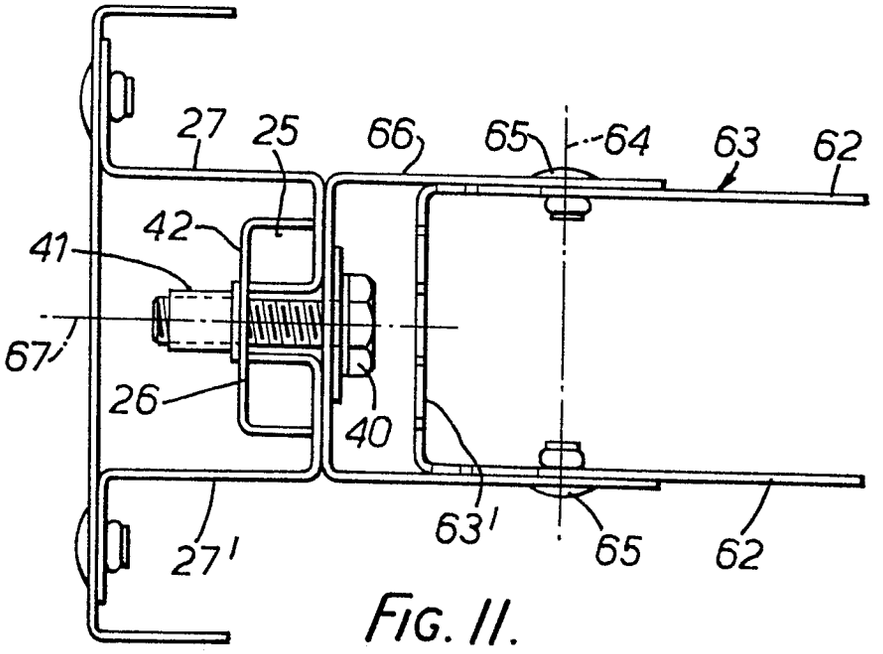
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FIG. 11.

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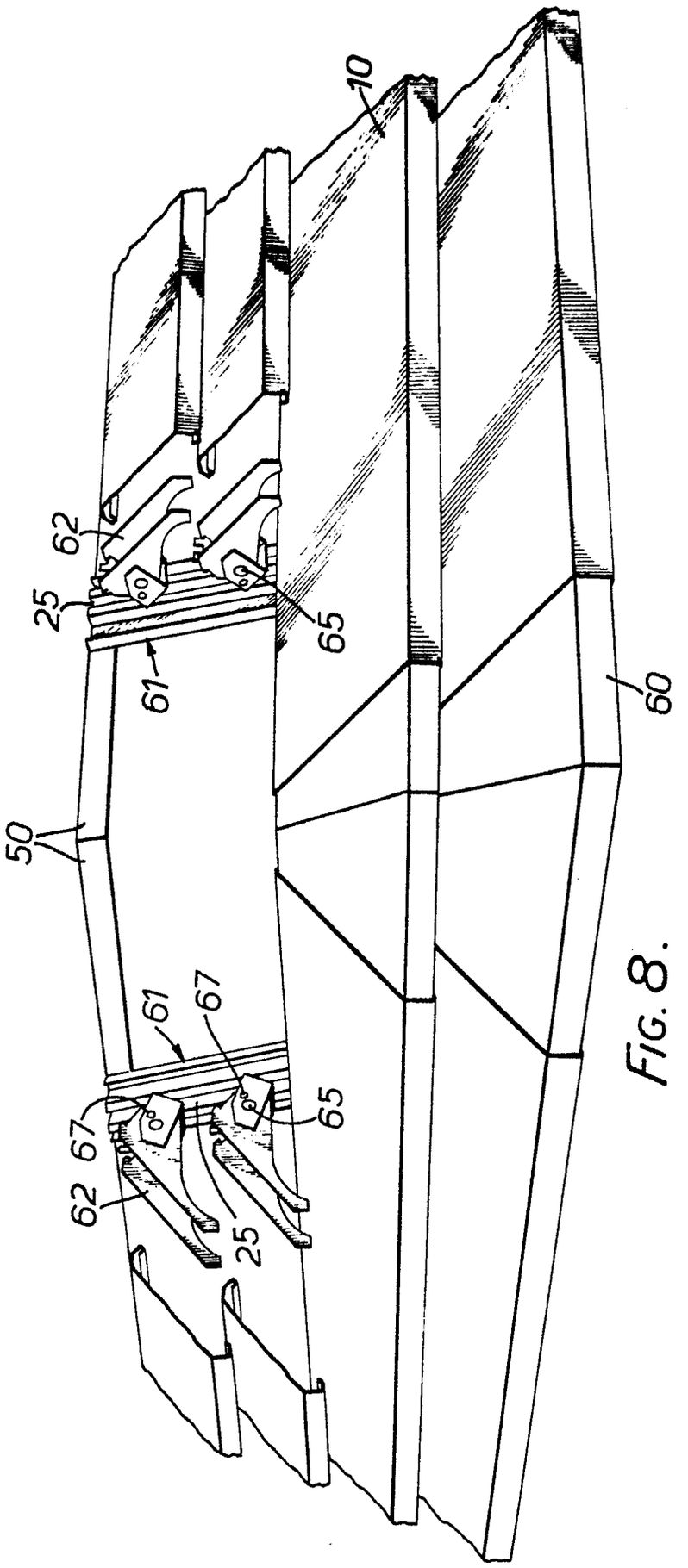

FIG. 8.

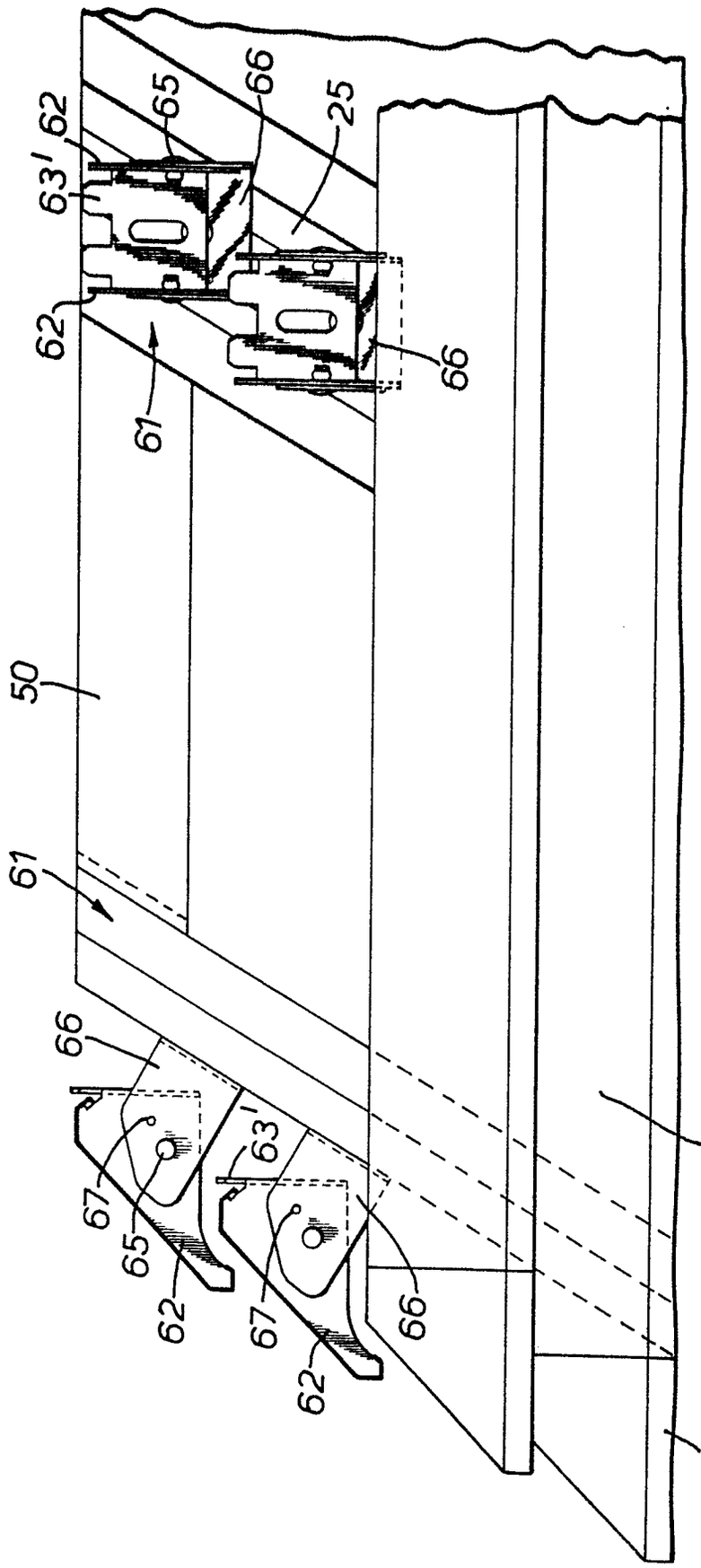

FIG. 9.

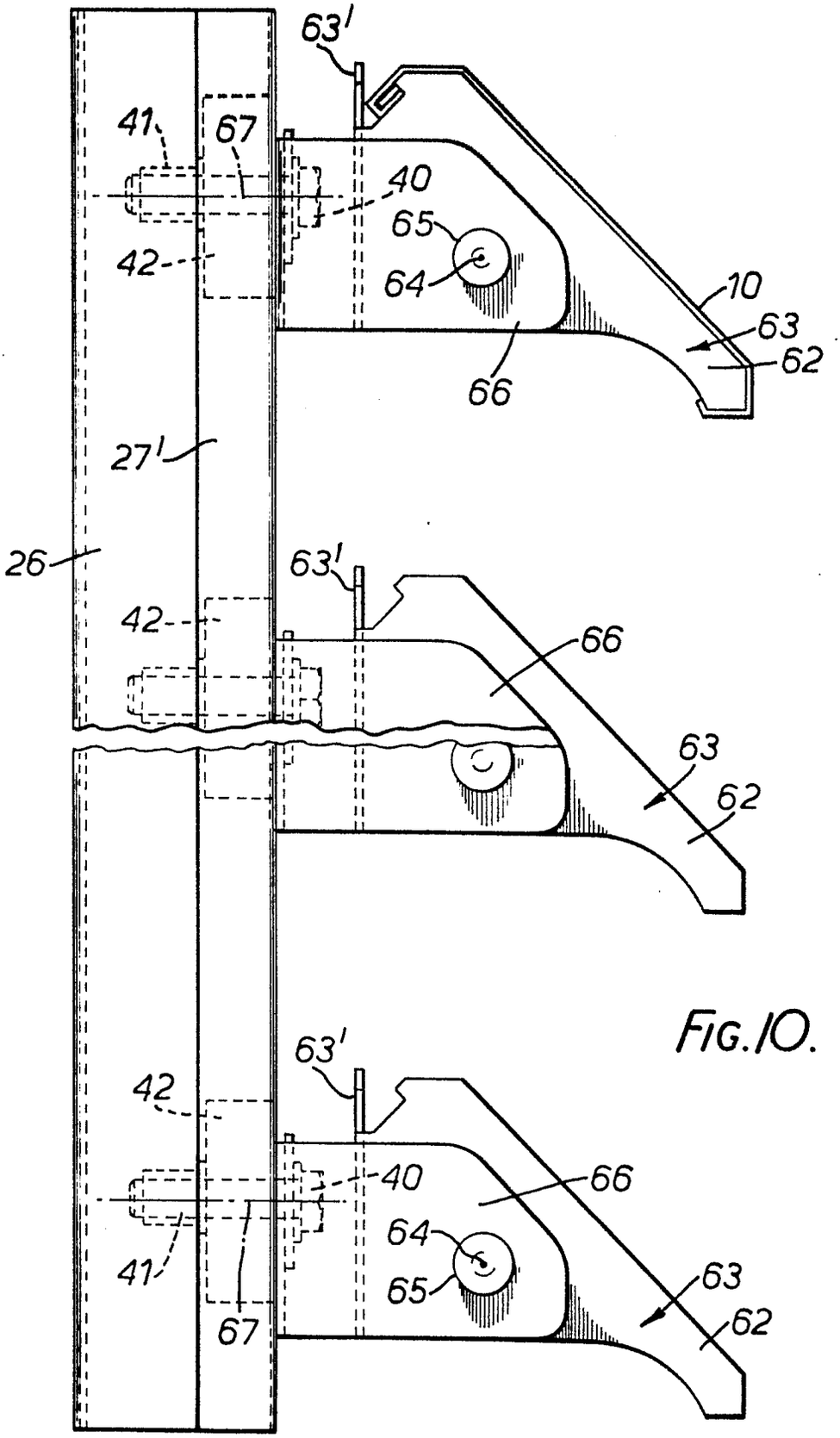
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FIG. 10.