

PATENT SPECIFICATION

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(54) SCREEN CEILING

(71) We, HUNTER DOUGLAS INDUSTRIES B.V. (formerly HUNLAS B.V.), a Dutch Body Corporate, of Piekstraat 2, Rotterdam, Holland, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

10 The present invention relates to a screen ceiling.

According to a first aspect of the present invention there is provided a screen grid ceiling comprising a set of striplike panels, each panel having connecting means located adjacent respective edges thereof for connection to gusset jointing members, said gusset jointing members each having a central member which has a projecting support for each panel to be connected, each support being provided with at least one projection, said panel connecting means comprising at least one slot or hole, which can be engaged by a support projection, and joining pieces being provided which in co-operation with each support projection, lock the panel rigidly to the gusset jointing member. Such a ceiling may be composed of members which can be manufactured in a simple way and can be combined to form the screen ceiling with a minimum of tools. The decorative screen ceiling enables the composition of various aesthetically justified ceiling configurations starting from the same constructional idea and members.

In a preferred embodiment of the screen ceiling according to the invention the central member extends transversely to the longitudinal direction of the panels and each projecting support consists of a bearing plate which extends over the length of the central member and projects outwardly therefrom. Each bearing plate has at least one projection which consists of a L-

shaped member extending in the longitudinal direction of the central member. The L-shaped member may comprise a first portion which is wider than the thickness of the panel and is angularly positioned on the bearing plate, preferably perpendicularly, and a second portion being directed outwards parallel to the bearing plate and which is almost as wide as a corresponding hole or slot in the panel through which the L-shaped member extends when the panel is mounted on the central member. The joining piece is dimensioned and shaped to be enclosed in the space between the L-shaped member and the panel abutting the bearing plate.

The embodiment provides easy installation and fixing of the panels.

In this ceiling construction, panels cut at desired length can be used, e.g. of aluminium, either straight, curved, or profiled in another way, provided that they are provided with at least one slot or hole adjacent their longitudinal extreme ends, which slots or holes can be formed by a simple punching operation. The central member, the projecting supports and projections can be manufactured as a unit, e.g. of aluminium or synthetic material, for instance, by applying an extrusion process. Since a reduced number of joining pieces is necessary for connecting the panels to the central member, the total number of members of the ceiling is minimal.

Instead of the L-shaped members other configurations are possible, for instance, conical portions can be provided which project from at least one face of the bearing plate and in co-operation with cup or cap-shaped joining pieces enclose the panels.

In a practical embodiment the central member has a sleeve profile having a polygonal cross section and having at least at one longitudinal wall, which has an out-

wardly extending bearing plate, said plate having an L-shaped member.

The screen ceiling provides an equal and restful image pattern when bearing plates at opposite longitudinal walls of the central members are positioned in parallel planes, which are laterally and mutually staggered with respect to the centre of the central member, over such a distance that panels which are supported by said bearing plates, are positioned in one plane. The L-shaped members are preferably positioned, seen from the centre of the central members, at corresponding side faces of the bearing plates.

In order to hide the gusset joint at least partially from view, the joining piece can be provided with a cover projecting to one side. Alternatively, the surface of the bearing plate which faces away from the L-shaped member may be provided with a projecting cover. Either of these guard walls may be concave or convex or have any other suitable shape. The gusset joint is optimally hidden from view, when the end of the guard wall remote from the bearing plate is provided with an inwardly directed end wall.

The screen ceiling according to the present invention is mounted by means of a suspension device for the ceiling which engages the central member. The central member may be hollow, in which case the suspension device is provided with a resilient clamping construction positioned within the central member and engages a supporting bar which is inserted into the sleeve profile and projects from the upper end of said sleeve profile and is secured to any supporting construction above the ceiling. In this case the resilient clamping construction preferably consists of two spring plates, the ends of which engage opposite free end edges of the central member, and the spring plates are provided with resilient tongues, which within the central member, co-operate with the supporting bar. This form of clamping construction is almost completely hidden within the central member.

In order that the invention is more clearly understood, the following description is given, merely by way of example, reference being made to the accompanying drawings in which:—

Figure 1 shows a portion of one embodiment of screen ceiling according to the invention, in perspective, having two panels.

Figure 2 is a cross section along the line II-II of the central member of the gusset joint, having a suspension device mounted therein.

Figure 3 shows an embodiment of the resilient clamping construction, in per-

spective.

Figures 4 and 5 show upper views of cross sections of two further embodiments of gusset joint according to the invention;

Figure 6 shows a further form of fixing piece in perspective, together with a part of a panel and a part of a gusset jointing member;

Figure 7 and 8 shows a part of two other embodiments of a gusset jointing member;

Figures 9 and 10 show two different mounting patterns of the screen ceiling.

Referring to Figures 1, 9 and 10, the screen ceiling comprises a set of panels which at their longitudinally outer ends are rigidly connected to gusset jointing members, which are generally indicated by reference numeral 2.

In a preferred embodiment the gusset jointing members consists of a central member 3 having a hollow centre and a quadrangular cross section. Alternatively, the member 3 may have a polygonal cross section. At each longitudinal wall the central member has an outwardly projecting bearing plate 4, which extends perpendicularly to the longitudinal wall and extends over the length of the central member. The bearing plate 4 can also be angularly positioned other than in an angle of 90° with the longitudinal wall. It is not necessary that a bearing plate 4 extends from each longitudinal wall. The central member extends transversely to the longitudinal direction of the panels, which each engage a bearing plate 4 adjacent a longitudinally outer end of the panel.

On one face, each bearing plate has a projecting L-shaped member, generally designated 5. By means of this member 5 each panel is suspended from the central member 3, the L-shaped member engaging the panel through a hole provided in the panel end. The hole is in the form of a transverse slot 6, and a joining piece 7 co-operates with the transverse slot and the L-shaped member 5 to lock the panel.

The L-shaped member which extends in the longitudinal direction of the central member 3, comprises a first portion which is wider than the thickness of panel 1 and is perpendicularly positioned on the bearing plate 4. A second portion 9 of member 5 is directed outwardly parallel to the bearing plate 4 and is almost as wide as the corresponding transverse slot 6 in the panel through which the member 5 extends. Over the length of the L-shaped member 5 the joining piece 7 lies enclosed in a space between portions 8 and 9 and the bearing plate 4. In Figure 1 an arrow indicates the way in which the joining piece is inserted into said space. In mounted condition the joining piece is

locked behind the inner longitudinal edge of the transverse slot 6, since a locking cam 10, which projects from the inner surface of the joining piece, is snap-locked into the transverse slot 6.

The width of the panel portion which is positioned between the transverse slot 6 and the adjacent end edge of a panel 1, is almost equal to the distance between the portion 8 and the adjacent longitudinal wall of the central member 3.

Preferably the bearing plates 4 which are provided at opposite longitudinal walls of the central member, are positioned in parallel planes, which are laterally and mutually staggered with respect to the centre of the member, over such a distance that the panels 1, which are supported by said bearing plates, are positioned in one plane.

As seen from the centre of the central member 3, the members 5 are positioned at corresponding side faces of the bearing plates 4.

As shown in Figure 6 the upper end of the transverse slot 6 has a more narrow cut-out 11 which engages around the upper end of the portion 8 of the member 5 and locks the panel against falling out if the joining piece is removed. This may occur e.g. in case of fire, when the joining pieces 7 which in practice are manufactured from a synthetic resin, burn away first.

In mounted condition the transverse end portions 12 of the joining piece engage around the ends of the member 5. Thus, the joining piece is locked against lateral displacement, the end portions 12 also serving to improve the appearance of the gusset joint assembly. A rounded portion 12' adjacent each end portion 12 facilitates the insertion of the joining piece.

In the embodiment according to Figure 4 and 5 provisions are made which hide the gusset joint from view. In Figure 4 the surface of the bearing plate 4, which faces away from the L-shaped member 5, is provided with a projecting cover 13. In the embodiment according to Figure 5 the cover 13 forms a unit with the joining piece 7. The cover 13 may have any shape which is required for the effect aimed at, e.g. convex shaped (Figures 4 and 5) or concave shaped (dotted line in Figure 5) or another shape.

In order to give the joining piece an optimally enclosing shape, said piece may be provided with inwardly directed end walls 14 at the location of the outer end of the cover 13, as shown in Figure 6.

The panels 1 may be straight, bent, curved, bellied, perforated or shaped in another way. They may have varied proportions, such as e.g. various heights and/or thicknesses. In the represented em-

bodiments the panels are straight, having oppositely directed V-shaped strips at the longitudinal edges. Preferably, the panels consist of aluminium, as does the central member 3 and both may be formed by extrusion and sawn at the required length. The present invention is not limited to this embodiment.

A suspension device for the ceiling engages the central member 3. In the represented embodiments the suspension device is provided with a resilient clamping construction positioned within the central member 3, which consists of two spring plates 15, provided with resilient tongues 16 which, within the central member 3, co-operate with the screw thread of a supporting bar 17, which projects from above into the central member 3.

The ends of the spring plates 15 engage the end edges (Figure 2) of the sleeve profile of central member 3 by means of a bent end lip 18 which is positioned to be adjacent the opposite face of the bearing plate to that on which the panel is supported. A screw threaded sleeve may be screwed onto the screw threaded bar 17 above the resilient tongues 16, as shown in Figure 2, to guide the screw threaded bar and has an edge flange 20 which is positioned outside the central member and is supported onto projecting end portions 21 of the spring plates 15. Thus, by rotating the bar 17 relative to the tongues 16, the height of the central member 3 may be adjusted.

The supporting bar 17 may be secured above the ceiling to any supporting construction.

In the embodiments shown in Figure 7 and 8 the projection of the central member 3 is e.g. an upstanding portion 22 which engages the hole 23 of panel 1. For securing said panel more than portion 22 e.g. two portions the one above the other, can be used for each panel head end.

According to Figure 7 the portion or portions 22 project from one surface of the bearing plate 4, whereas according to Figure 8 portions 22 extend from both sides. In the latter case said portions are positioned in alignment. The embodiment according to Figure 8 provides a selection possibility with regard to the face to which the panel will be secured. Each portion 22 co-operates with a joining piece in the shape of a semi convex cap 24 whose edge is in contact with said panel. The cap consists of a somewhat resilient material, e.g. a synthetic resin and has a radially directed central pin 25 having a thickened head 26 provided at the concave side of the cap.

In mounted position of the panel 1 said head 26 is snapped into a first recess 27 in

said portion 22. In case a panel is absent (upper portion of Figure 8) the head 26 is pressed further inwardly and snapped into a second recess 28, and then the edge of the cap 24 is positioned against the bearing plate 4.

Figures 9 and 10 show as an example two mounting patterns of the ceiling according to the present invention, having straight panels as well as curved panels.

The gusset joints herein described may also be used for connecting strip material rather than ceiling panels, the strip material being provided with suitable end slots or holes.

WHAT WE CLAIM IS:—

1. A screen grid ceiling comprising a set of strip like panels, each panel having connecting means located adjacent respective edges thereof for connection to a gusset jointing member, said gusset jointing members each having a central member which has a projecting support for each panel to be connected, each support being provided with at least one projection, said panel connecting means comprising at least one slot or hole, which can be engaged by a support projection, and joining pieces being provided which in co-operation with each support projection, lock the panel rigidly to the gusset jointing members.

2. A screen ceiling according to claim 1, wherein the central member extends transversely to the longitudinal direction of the panels, each projecting support consists of a projecting bearing plate which extends over the length of the central member and carries the support projection which consists of an L-shaped member extending in the longitudinal direction of the central member and having a first portion angularly mounted on the bearing plate, the first portion being wider than the thickness of the panel and a second portion being directed away from the central member substantially parallel to the bearing plate, the second portion being almost as wide as the hole or slot through which the L-shaped member extends, and wherein a joining piece is provided which is engaged between the L-shaped member and the panel abutting the bearing plate.

3. A screen ceiling according to claim 2 wherein the first portion of each L-shaped member is mounted perpendicularly to its bearing plate.

4. A screen ceiling according to claim 2 or 3 wherein bearing plates are positioned at opposite longitudinal walls of the central member in parallel planes, which are laterally and mutually staggered with respect to the centre of the central member, over such a distance that panels which are supported by said bearing plates are

positioned in one plane.

5. A screen ceiling according to claim 4, wherein, seen from the centre of the central member, the L-shaped members are positioned on corresponding side faces of the bearing plates.

6. A screen ceiling according to any one of claims 2 to 5, wherein the upper end of the or each hole or slot in the panel has a narrower cut out portion which engages around one end of the first portion of an L-shaped member, said cut-out locking the panel against falling out after removal of the joining piece.

7. A screen ceiling according to any one of claims 2 to 6, wherein the or each joining piece has transverse end portions which engage around the ends of an L-shaped member.

8. A screen ceiling according to any one of claims 2 to 7, wherein the rear surface of the or each bearing plate which faces away from its L-shaped member is provided with an outwardly projecting guard wall for the adjacent gusset joint.

9. A screen ceiling according to claim 8, wherein each end of each guard wall is provided with an inwardly directed end wall at each end.

10. A screen ceiling according to any preceding claim wherein the central member has a hollow polygonal section.

11. A screen ceiling according to any preceding claim wherein a suspension device engages the central member.

12. A screen ceiling according to claims 10 and 11 wherein the suspension device is provided with a resilient clamping construction positioned within the hollow central member and engaging a supporting bar which is inserted into the hollow central member and projects from the upper end thereof and is securable to any supporting construction above the ceiling.

13. A screen ceiling according to claim 12, wherein the resilient clamping construction consists of two spring plates, the ends of which engage opposite free end edges of the hollow central member, said spring plates being provided with resilient tongues which within the hollow central member co-operate with the supporting bar.

14. A screen ceiling according to claim 12 or 13 wherein the supporting bar is a screw threaded bar, the screw thread of which co-operates with the resilient tongue.

15. A screen ceiling according to any one of claims 2 to 9 and claims 13 or 14 wherein the spring plates engage the free end edges of the sleeve profile by means of a bent end lip which is positioned at the opposite side of the bearing plate to that on which the panel is supported by said bearing plate.

said portion 22. In case a panel is absent (upper portion of Figure 8) the head 26 is pressed further inwardly and snapped into a second recess 28, and then the edge of the cap 24 is positioned against the bearing plate 4.

Figures 9 and 10 show as an example two mounting patterns of the ceiling according to the present invention, having straight panels as well as curved panels.

The gusset joints herein described may also be used for connecting strip material rather than ceiling panels, the strip material being provided with suitable end slots or holes.

WHAT WE CLAIM IS:—

1. A screen grid ceiling comprising a set of strip like panels, each panel having connecting means located adjacent respective edges thereof for connection to a gusset jointing member, said gusset jointing members each having a central member which has a projecting support for each panel to be connected, each support being provided with at least one projection, said panel connecting means comprising at least one slot or hole, which can be engaged by a support projection, and joining pieces being provided which in co-operation with each support projection, lock the panel rigidly to the gusset jointing members.

2. A screen ceiling according to claim 1, wherein the central member extends transversely to the longitudinal direction of the panels, each projecting support consists of a projecting bearing plate which extends over the length of the central member and carries the support projection which consists of an L-shaped member extending in the longitudinal direction of the central member and having a first portion angularly mounted on the bearing plate, the first portion being wider than the thickness of the panel and a second portion being directed away from the central member substantially parallel to the bearing plate, the second portion being almost as wide as the hole or slot through which the L-shaped member extends, and wherein a joining piece is provided which is engaged between the L-shaped member and the panel abutting the bearing plate.

3. A screen ceiling according to claim 2 wherein the first portion of each L-shaped member is mounted perpendicularly to its bearing plate.

4. A screen ceiling according to claim 2 or 3 wherein bearing plates are positioned at opposite longitudinal walls of the central member in parallel planes, which are laterally and mutually staggered with respect to the centre of the central member, over such a distance that panels which are supported by said bearing plates are

positioned in one plane.

5. A screen ceiling according to claim 4, wherein, seen from the centre of the central member, the L-shaped members are positioned on corresponding side faces of the bearing plates.

6. A screen ceiling according to any one of claims 2 to 5, wherein the upper end of the or each hole or slot in the panel end has a narrower cut out portion which engages around one end of the first portion of an L-shaped member, said cut-out locking the panel against falling out after removal of the joining piece.

7. A screen ceiling according to any one of claims 2 to 6, wherein the or each joining piece has transverse end portions which engage around the ends of an L-shaped member.

8. A screen ceiling according to any one of claims 2 to 7, wherein the rear surface of the or each bearing plate which faces away from its L-shaped member is provided with an outwardly projecting guard wall for the adjacent gusset joint.

9. A screen ceiling according to claim 8, wherein each end of each guard wall is provided with an inwardly directed end wall at each end.

10. A screen ceiling according to any preceding claim wherein the central member has a hollow polygonal section.

11. A screen ceiling according to any preceding claim wherein a suspension device engages the central member.

12. A screen ceiling according to claims 10 and 11 wherein the suspension device is provided with a resilient clamping construction positioned within the hollow central member and engaging a supporting bar which is inserted into the hollow central member and projects from the upper end thereof and is securable to any supporting construction above the ceiling.

13. A screen ceiling according to claim 12, wherein the resilient clamping construction consists of two spring plates, the ends of which engage opposite free end edges of the hollow central member, said spring plates being provided with resilient tongues which within the hollow central member co-operate with the supporting bar.

14. A screen ceiling according to claim 12 or 13 wherein the supporting bar is a screw threaded bar, the screw thread of which co-operates with the resilient tongue.

15. A screen ceiling according to any one of claims 2 to 9 and claims 13 or 14 wherein the spring plates engage the free end edges of the sleeve profile by means of a bent end lip which is positioned at the opposite side of the bearing plate to that on which the panel is supported by said bearing plate.



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16. A screen ceiling according to claim 15, wherein above the resilient tongues a screw threaded sleeve is screwed onto the screw threaded bar, which screw threaded sleeve bears onto end portions of the spring plates by means of an edge flange positioned outside the central member.
17. A screen ceiling according to any preceding claim, wherein a locking cam portion projecting from the inner surface of each joining piece is provided to be snap-locked behind the edge of the associated slot which is remote from the central member.
18. A screen ceiling according to any preceding claim, wherein the width of the panel portion between the or each hole or slot and the adjacent head edge of the panel, is almost equal to the distance between the central member and the projection.
19. A screen ceiling according to any preceding claim, wherein the joining piece is provided with a cover for the gusset joint.
20. A screen ceiling according to claim 19, wherein each end of each cover is provided with an inwardly directed end wall.
21. A screen ceiling according to claim 1 wherein the or each projecting support consists of a bearing plate having on either or both faces thereof one or more upstanding portions dimensioned to project through the holes or slots in a panel to be supported, the or each upstanding portion having one or more recesses therein facing away from the bearing plate, and wherein one or more part-spherical caps are provided, each cap being of a resilient material and having a radially inwardly projecting pin with a thickened end portion, the cap and pin being dimensioned so that the pin may engage in a said recess to clamp the said panel to the bearing plate.
22. A screen ceiling according to claim 21 wherein, the or each recess is associated with a further recess which projects further into the upstanding portion so that in the absence of a panel, a thickened end portion of a pin may engage in the or each further recess so that the rim of the associated cap contacts the bearing plate.
23. A screen ceiling substantially as hereinbefore described with reference to and as illustrated in Figure 1, 2, 3, 9 and 10 of the accompanying drawings.
24. A screen ceiling substantially as hereinbefore described with reference to and as illustrated in Figures 2, 3, 4, 9 and 10 of the accompanying drawings.
25. A screen ceiling substantially as hereinbefore described with reference to and as illustrated in Figures 2, 3, 5, 9 and 10 of the accompanying drawings.
26. A screen ceiling substantially as hereinbefore described with reference to and as illustrated in Figures 2, 3, 6, 9 and 10 of the accompanying drawings.
27. A screen ceiling substantially as hereinbefore described with reference to and as illustrated in Figures 2, 3, 7, 8, 9, and 10 of the accompanying drawings.

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