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(54) A PANEL CONSTRUCTION

(71) We, HUNTER DOUGLAS INDUSTRIES B.V., a Dutch Body Corporate of Piekstraat 2, Rotterdam, Netherlands do hereby declare the invention for which we
5 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 panel construction suitable for forming or cladding a wall or ceiling.

15 One type of such panel construction includes elongate panels and one or more groups of mutually parallel supports, which each have, on their sides facing the panel surfaces,
20 two parallel free longitudinal edges spaced from one another. The panels are in most cases fixed to the elongated supports and extend at a certain angle thereto, so that they cross the supports.

25 There are also constructions having several groups of mutually parallel supports, the groups of supports extending in directions different from one another and forming between them surface zones into which facings,
30 for example in the form of coffers, are inserted.

35 It is the object of the present invention to provide a wall or ceiling design which can be mounted in a simple manner on parallel supports and the manufacture of which is cheap. At the same time, the design is also intended to be suitable for mounting a new facing with the lowest possible production
40 expense, using supports which are already present, for example within the scope of renovation work, and using elongated panels or the like, even if there are groups of supports extending in different directions.

45 According to the invention there is provided a panel construction comprising a plurality of mutually parallel elongate support members, each having two parallel free longitudinal edges spaced apart from one another, elongate support elements carried by and parallel to said support members, clamping means engaged around the longitudinal edges of the support members and pressing said support elements against said support mem-

bers, panel holding means on said support elements and a plurality of panels held by said panel holding means. 50

Such a panel construction requires only low production costs and is also easy and simple to mount. In particular, it is also suitable for use with groups of mutually parallel support members which are already present. Should these groups of support members extend in different directions, the support member of one of these groups can be selected
55 for fixing the support elements and the panels. 60

In the following text, several advantageous embodiments of the invention are described, one of which can consist in the clamps being integral parts of the particular support elements. As a result of their shaping, the latter can thus be used, utilizing their inherent resilience, in the manner of a clamp for fixing to the supports, parallel to the longitudinal axis. 70

In another advantageous embodiment of the invention, the clamping means are in the form of separate clamps, each comprising a central part engaging the support element, a side arm on each side of the central part and locking against the longitudinal edges of the support member and a compensating part on each side of the central part which extends away from the support element and joins the adjacent side arm. In this embodiment, the compensating parts which are lifted off from the support element, are capable of being elastically deformed to an adequate extent when they are mounted on the support members. 75 80 85

A further proposal according to the invention is that the side arms include inwardly bent locking parts which converge towards one another in a direction away from those ends of the arms which are remote from the central part. Whilst the diverging ends of the arms make it possible simply to slide them onto or over the longitudinal edges of the supports, the firm seating on the supports is effected by the inwardly bent locking parts. According to the invention this results in an advantageous design of the 90 95

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clamps, if the latter approximately have a W-shape, so that the outer legs can form the side arms, whilst the inner legs form the central part in their common transition region and otherwise form the compensating part which permits adequate deformation.

5 The support elements can be formed by flat strips which permit an adaptation to round or angular cross-sections of the support. For
10 ceiling installations constructed in the customary manner, these support elements have, however, the disadvantage of a low inherent stiffness. By contrast, in a more advantageous embodiment, the support elements are of
15 channel section configuration, comprising a central flat strip and two lateral strips inclined thereto, the width of the central strip being greater than that of the lateral strips, and wherein said holding means comprise lips bent out of said central strip at a preset
20 spacing.

In an advantageous manner this results in a particularly flat shape of the support elements, provided the width of the central strip is thus at least twice that corresponding
25 to the height of the bent lateral strips.

If desired, a plurality of support elements are carried by a support member and a bracket including a longitudinal portion is positioned within said channel cross-section strip and two arms engaged in an aperture formed in the central strip portion of two adjacent support elements to space the holding lips thereon at a preset spacing.

30 The use of a bracket of this type, with the fixing points on the support elements being arranged correspondingly, has the result that the fixing points and apertures can already be provided during the manufacture of the support elements and are always available
40 even if the support elements are later cut to certain lengths. It is thus possible that two adjacent support elements can accurately be fixed in each case at such a longitudinal distance from one another that the screen spacing, which has been preset for the panels or their fixing means, can also be accurately maintained between the adjacent support elements.

45 It is thus no longer necessary to provide the recesses for the arms of the brackets only at the time of assembly.

50 If the support elements comprise a flat strip and the holding means comprise lips bent out of said flat strip, the clamping means may comprise side arms with inwardly directed locking parts on their free ends, said locking parts engaging around the longitudinal edges of the support member.

60 Advantageously, the clamps comprise a generally U-shaped resilient material element having, at the free end of the arms of the U, an outwardly directed arm having free ends, and an inwardly directed locking part on the free end of the arm, effective to clamp

around the support element strip and the longitudinal edges of the support member. Preferably, the clamp is formed of resilient flat strip material, so that the outwardly projecting arms and the inwardly directed locking parts form a channel shape on each arm, the open channel sides facing one another, the longitudinal axes of the channels being inclined in opposite senses with respect to the plane of the flat support element when the clamp is in a relaxed state prior to being put in place.

In the following text, two particularly preferred embodiments of the invention are described in detail, merely by way of example, reference being made to the accompanying drawings.

Figure 1 is a perspective view of one embodiment of panel construction according to the invention;

Figure 2 is a partial end view of the construction of Figure 1;

Figure 3 is a perspective view of a part of a support member with mounted support elements;

Figure 4 is a perspective view of a connector element of the construction of Figure 1;

Figure 5 is a perspective view of a clamp; Figure 6 is a schematic view showing the movement and deformation of such a clamp, when a support element is fixed to a support member;

Figure 7 is a view similar to Figure 6, showing the clamp in position on a support element;

Figure 8 is a perspective view of a portion of an alternative form of support element of a construction according to the invention;

Figure 9 is a perspective view of the element of Figure 8 in position on a support member;

Figure 10 is a perspective view of a clamp illustrated in Figure 9;

Figure 11 is a view illustrating the clamp of Figure 10 being put in place;

Figure 12 is a similar view to Figure 11 with the clamp in place; and

Figure 13 illustrates two different thicknesses and two different widths of the lower part of the support member of Figure 9 and how this is accommodated by different degrees of twist of the clamp of Figure 10.

The construction shown in Figures 1 to 7 has several mutually parallel support members 10, of which only one is shown here and which are suspended, for example, on suspension elements 11. The support members 10 each have an inverted T-shaped cross-section and forms two parallel free longitudinal edges 12.

Parallel to the longitudinal axis of the support member 10, support elements 14 are fixed to its underside facing the panels 13

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the support element being of channel shaped cross-section having a central strip 15 and two bent-up lateral strips 16. The width of the central strip 15 is more than twice the width of a lateral strip 16. Lips 17 are punched out and bent out of the central strip 15 of the support elements 14. As can be seen in Figure 2, these lips hold the panels 13. In order to give the latter a uniform distance from one another, the distance between the lips 17 is selected at an appropriate grid spacing.

The central strips 15 of the support elements 14 are provided with apertures 18, one arm 19 of each bracket 20 being able to engage in one of the apertures.

The pairs of lips 17, used for fixing a panel 13, have a preset grid spacing so that the resulting distance between two adjacent panels 13 is always equal. The distance of the apertures 18 and the arms 19 of the brackets from one another ensures this grid spacing. With the aid of the bracket 20, two adjacent support element 14 can thus be fixed relative to one another in the longitudinal direction on the support 10 in such a way that the pairs of lips 17 of adjacent support elements 14 have the preset grid spacing, even if they are not in direct contact with one another.

Whilst the bracket 20 serves to fix the position of adjacent support elements 14 on a support member 10 in the axial direction, the actual fixing of the support elements 14 to the support member 10 is effected with the aid of clamps 21. The latter have a cross-section which is similar to a W-shape. Two divergent outer arms 22 are bent inwards at their ends and form locking parts 23, whilst a central part of the clamp 21 is formed by a bridge 25, which is adjoined on either side by divergent inner arms 24, corresponding to the W-shape.

In detail, the fixing of a support element 14 is thus effected as follows:

The particular support element 14 is placed against the underside of the support member 10 parallel to the latter. As can be seen in particular from Figure 6, the clamp 21 is first slid, with the locking part 23 of one arm 22, over one longitudinal edge 12 of the support 10. Subsequently, the clamp 21 is pulled over in the direction of the opposite longitudinal edge 12. The inner arms 24, the bent transition region to the arms 22 and the arms 22 themselves represent a compensating part which makes it possible to deform the clamp 21 to such an extent that the latter can also be slid, by the second locking part 23, over the longitudinal edge 12 on the opposite side.

The final mounted position of the clamp 21 is shown in Figure 7. The central part formed by the bridge 25 lies against the underside of the central strip 15 of the support element 14 and thus presses the sup-

port element 14 against the underside of the support member 10. The region of the clamp 21, adjacent to either side of the bridge 25, is lifted off a little from the underside of the support element 14 and is given a distance from the latter, which approximately has the same magnitude as the height of the support element 14.

The height of the bracket 20 is such that the latter can be accommodated in the internal space of the support element 14.

Figures 8 and 9 illustrate a further form of support member and element in which like parts have been indicated by like reference numerals with the suffix A. Support element 14A is a flat strip with lugs 17A punched therefrom. The element 14A is held against the lower surface of the support member 10A, having spaced apart longitudinal edges 12A, by means of a clamp 30 illustrated in more detail in Figure 10. This comprises a generally U-shaped portion 31, at the outer edges of the arms of which divergent arms 32 are provided. These divergent arms 32 are provided at their free ends with an intumed locking part 33. The ends of the arms 32 and the intumed locking part form, in effect, a channel section to accommodate the edges of the strip 14A and the edges 12A of the support 10A as indicated in Figure 12.

In a preferred construction, as illustrated in Figure 13, the clamp 30 which is formed of a strip material which is resilient, is twisted in such a way that the channels formed by the ends of the arms 32 and the locking parts 33 have longitudinal axes which are angled in opposite senses to the plane of the support element strip 14A. This enables the same clamp to be used on support element strips of different thickness and/or support members of which the lower flange is of a different thickness.

Equally this form of strip can cope with a support element strip and/or a lower flange which is of a different width as indicated at the top of the drawing in Figure 13.

Numerous modifications of the examples which have been described here are conceivable, without departing from the scope of the invention.

WHAT WE CLAIM IS:—

1. A panel construction comprising a plurality of mutually parallel elongate support members, each having two parallel free longitudinal edges spaced apart from one another, elongate support elements carried by and parallel to said support members, clamping means engaged around the longitudinal edges of the support members and pressing said support elements against said support members, panel holding means on said support elements and a plurality of panels held by said panel-holding means.



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the support element being of channel shaped cross-section having a central strip 15 and two bent-up lateral strips 16. The width of the central strip 15 is more than twice the width of a lateral strip 16. Lips 17 are punched out and bent out of the central strip 15 of the support elements 14. As can be seen in Figure 2, these lips hold the panels 13. In order to give the latter a uniform distance from one another, the distance between the lips 17 is selected at an appropriate grid spacing.

The central strips 15 of the support elements 14 are provided with apertures 18, one arm 19 of each bracket 20 being able to engage in one of the apertures.

The pairs of lips 17, used for fixing a panel 13, have a preset grid spacing so that the resulting distance between two adjacent panels 13 is always equal. The distance of the apertures 18 and the arms 19 of the brackets from one another ensures this grid spacing. With the aid of the bracket 20, two adjacent support element 14 can thus be fixed relative to one another in the longitudinal direction on the support 10 in such a way that the pairs of lips 17 of adjacent support elements 14 have the preset grid spacing, even if they are not in direct contact with one another.

Whilst the bracket 20 serves to fix the position of adjacent support elements 14 on a support member 10 in the axial direction, the actual fixing of the support elements 14 to the support member 10 is effected with the aid of clamps 21. The latter have a cross-section which is similar to a W-shape. Two divergent outer arms 22 are bent inwards at their ends and form locking parts 23, whilst a central part of the clamp 21 is formed by a bridge 25, which is adjoined on either side by divergent inner arms 24, corresponding to the W-shape.

In detail, the fixing of a support element 14 is thus effected as follows:

The particular support element 14 is placed against the underside of the support member 10 parallel to the latter. As can be seen in particular from Figure 6, the clamp 21 is first slid, with the locking part 23 of one arm 22, over one longitudinal edge 12 of the support 10. Subsequently, the clamp 21 is pulled over in the direction of the opposite longitudinal edge 12. The inner arms 24, the bent transition region to the arms 22 and the arms 22 themselves represent a compensating part which makes it possible to deform the clamp 21 to such an extent that the latter can also be slid, by the second locking part 23, over the longitudinal edge 12 on the opposite side.

The final mounted position of the clamp 21 is shown in Figure 7. The central part formed by the bridge 25 lies against the underside of the central strip 15 of the support element 14 and thus presses the sup-

port element 14 against the underside of the support member 10. The region of the clamp 21, adjacent to either side of the bridge 25, is lifted off a little from the underside of the support element 14 and is given a distance from the latter, which approximately has the same magnitude as the height of the support element 14.

The height of the bracket 20 is such that the latter can be accommodated in the internal space of the support element 14.

Figures 8 and 9 illustrate a further form of support member and element in which like parts have been indicated by like reference numerals with the suffix A. Support element 14A is a flat strip with lugs 17A punched therefrom. The element 14A is held against the lower surface of the support member 10A, having spaced apart longitudinal edges 12A, by means of a clamp 30 illustrated in more detail in Figure 10. This comprises a generally U-shaped portion 31, at the outer edges of the arms of which divergent arms 32 are provided. These divergent arms 32 are provided at their free ends with an intumed locking part 33. The ends of the arms 32 and the intumed locking part form, in effect, a channel section to accommodate the edges of the strip 14A and the edges 12A of the support 10A as indicated in Figure 12.

In a preferred construction, as illustrated in Figure 13, the clamp 30 which is formed of a strip material which is resilient, is twisted in such a way that the channels formed by the ends of the arms 32 and the locking parts 33 have longitudinal axes which are angled in opposite senses to the plane of the support element strip 14A. This enables the same clamp to be used on support element strips of different thickness and/or support members of which the lower flange is of a different thickness.

Equally this form of strip can cope with a support element strip and/or a lower flange which is of a different width as indicated at the top of the drawing in Figure 13.

Numerous modifications of the examples which have been described here are conceivable, without departing from the scope of the invention.

WHAT WE CLAIM IS:—

1. A panel construction comprising a plurality of mutually parallel elongate support members, each having two parallel free longitudinal edges spaced apart from one another, elongate support elements carried by and parallel to said support members, clamping means engaged around the longitudinal edges of the support members and pressing said support elements against said support members, panel holding means on said support elements and a plurality of panels held by said panel-holding means.

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2. A panel construction as claimed in claim 1, wherein said clamping means are integral parts of said support elements.
- 5 3. A panel construction as claimed in claim 1, wherein said clamping means are formed as separate clamps, each comprising a central part engaging the support element, a side arm on each side of the central part and locking against the longitudinal edges of the support member and a compensating part on each side of the central part which extends away from the support element and joins the adjacent side arm.
- 10 4. A panel construction as claimed in claim 3, wherein the clamping means have an approximately W-shaped cross-section.
- 15 5. A panel construction as claimed in claim 3, wherein said side arms further comprise inwardly bent locking parts which converge towards one another in a direction away from those ends of the arms which are remote from the central part.
- 20 6. A panel construction according to any preceding claim, wherein said clamping means are resilient.
- 25 7. A panel construction according to any preceding claim, wherein said support elements are of channel section configuration, comprising a central flat strip and two lateral strips inclined thereto, the width of the central strip being greater than that of the lateral strips, and wherein said holding means comprise lips bent out of said central strip at a preset spacing.
- 30 8. A panel construction according to claim 7, wherein a plurality of support elements are carried by a support member and a bracket including a longitudinal portion and two arms is positioned within said channel cross-section strip the two arms being engaged in an aperture formed in the central strip portion of two adjacent support elements to space the holding lips thereon at a preset spacing.
- 40 9. A panel construction according to any one of claims 1 to 6, wherein said support elements comprise a flat strip mounted on the support member, wherein the holding means comprise lips bent out of said flat strip and wherein said clamping means comprise resilient strips each comprising side arms with inwardly directed locking parts on their free ends, said locking parts engaging around the longitudinal edges of the support member.
- 45 10. A panel construction according to claim 9, wherein the clamps comprise a generally U-shaped resilient material element having, at the free end of the arms of the U, an outwardly directed arm having free ends, and an inwardly directed locking part on the free end of the arm, effective to clamp around the support element strip and the longitudinal edges of the support member.
- 50 11. A panel construction according to claim 10, wherein said clamp is formed of resilient flat strip material, so that the outwardly projecting arms and the inwardly directed locking parts form a channel shape on each arm, the open channel sides facing one another, the longitudinal axes of the channels being inclined in opposite senses with respect to the plane of the flat support element when the clamp is in a relaxed state prior to being put in place.
- 55 12. A panel construction substantially as hereinbefore described, with reference to and as illustrated in Figures 1 to 7 of the accompanying drawings.
- 60 13. A panel construction substantially as hereinbefore described with reference to and as illustrated in Figures 9 to 13 of the accompanying drawings.
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