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- (21) Application No. 52648/76 (22) Filed 16 Dec. 1976 (19)
 (31) Convention Application No. 7 606 521 (32) Filed 8 March 1976 in
 (33) France (FR)
 (44) Complete Specification published 2 April 1980
 (51) INT. CL.³ F16S 1/02
 (52) Index at acceptance
 F2M 222 251 274 278 C2
 EIW JCW



(54) JOINING OF PANELS OF BOX SHAPE

(71) I, JEAN CHEREAU, a French citizen, of Le Val Saint Père, 50300 Avranches, France, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention concerns a way of joining prefabricated panels intended especially for refrigerated vehicles and for the construction of buildings.

A system is known for joining a plurality of double-walled prefabricated panels or elements in box form filled with an appropriate material, these elements having strips with cooperating surfaces which can be applied one against the other. The surfaces of the said strips form between them a tubular space which, after the joining of two or more panels, is filled with a suitable material. Thus it is possible to produce box panels of glass-fibre-reinforced polyester, the cooperating strips of which are moulded in one single piece with the remainder of the box, the interiors of these panels and the tubular space between two boxes being filled with a polyurethane foam cast *in situ*. Before the introduction of the polyurethane foam into the tubular space separating two boxes, several extensible key pieces are disposed inside this tubular space and bear upon an angle of each strip in order to apply these two strips against one another, these key pieces being made for example of polyester.

With the assemblies thus obtained, one observes more or less pronounced defects of planeness along the joints of the panels. Moreover the installation of the key pieces between two panels before the injection of the polyurethane foam renders the assembling of panels relatively lengthy and irksome, while it is necessary to destroy a panel in order to separate it from the adjacent panels.

The invention has the purpose of remedying these drawbacks by providing a manner of joining prefabricated panels which pre-

sents no defect in planeness, even after a long period of use.

An assembly according to the present invention comprises at least two prefabricated panels placed in flank-to-flank alignment, each panel being of box form with filling material in the box, each flank of each box including a male strip and a female strip which fit together with a female strip and made strip respectively of the adjacent panel, the fitting together being by relative movement parallel to the planes of the main faces of the panels, and the four strips of two adjacent panels defining a tubular space between the opposed flanks of those panels, which space is filled with a material which resists separation of the panels.

In a preferred embodiment, each male strip projects from the respective flank, and has in cross section the shape of a base limb connected to the box, a terminal fin substantially parallel to the base limb, and a transverse limb interconnecting the base limb and the terminal fin and at right angles to them, and each female strip defines a groove along the length of the respective flank, adapted to receive a terminal fin.

In order to assemble two panels thus having complementary shaped strips on their mutually facing flanks, it is sufficient to fit the male strip of each panel into the female strip of the other panel. Thus the two panels are perfectly aligned and then the filling material, e.g. polyurethane foam, can be cast *in situ* between the two panels.

Further particular features and advantages of the present invention will appear in the course of the description which will follow. One embodiment of the invention is shown in the accompanying drawings, given by way of non-limitative example. In these drawings: —

Figure 1 is a section through two panels, before being assembled; and

Figure 2 is a section, corresponding to Figure 1, showing the assembly obtained after junction of the two panels shown in Figure 1.

Referring to Figure 1, one sees two prefabricated panels 1, 2, constituting standardised modular elements which can be utilised especially for the construction of isothermal and refrigerated containers, and also in various other constructions.

Each panel 1, 2 comprises a box 3 which is a parallelepiped of substantially rectangular section, filled with an appropriate material 4. The box 3 is for example moulded in glass-fibre-reinforced polyester, while the material 4 is rigid polyurethane foam cast *in situ*.

In accordance with the invention, each flank 5, 6 of each box 3 includes a male strip 7 and a female strip 10, which are respectively adapted to fit together with the corresponding female strip 10 and male strip 7 of the adjacent box. The male strip 7 is arranged laterally on the flank 5, as a prolongation of one main face of the box 3. Each strip 7 is constituted by a relatively thick base limb 7a which prolongs the corresponding face of the box 3, a transverse limb 7b, and a terminal fin 7c practically perpendicular to the transverse limb 7b and of thickness less than that of the base 7a.

The female strip 10 is constituted by an offset portion in the flank wall of the panel which defines a longitudinal groove 8 formed over the whole length of the flank 5 or 6, like the strips 7, on the other side of the central longitudinal plane P in relation to the male strip 7 of the same flank 5 or 6. As may be seen clearly from Figure 1, the strips 7 and 10 are reversed in relation to the central plane P on two opposite flanks 5 and 6 of one and the same panel 1 or 2. The depth of each groove 8 is practically equal to the width of a terminal fin 7c of a male strip 7.

In order to join two prefabricated panels 1 and 2, it suffices to place them in line with one another, then to bring them together in such a manner as to fit the terminal fins 7c of the male strips 7 into the corresponding grooves 8 positioned opposite to the said male strips 7. The junction of the two panels 1 and 2 represented in Figure 2 forms between them a tubular space of approximately rectangular section, which is then filled with polyurethane foam 9 by injection or pouring. After expansion and polymerisation this material imparts a high-strength connection, both mechanical and chemical, to the joints thus produced between the panels 1 and 2. This filling is carried out in a manner known *per se*.

The strips 7 and 10 are advantageously obtained by folding, or moulding, drawing or extrusion of the material constituting the box 3, that is to say glass-fibre-reinforced polyester in the example as described.

The operation of joining of the two panels 1 and 2 which has just been described is repeated with the strips 7 and 10 of the opposite flanks of the panels 1 and 2, in order to join these latter with other panels (not shown). It will be seen that the joining thus obtained with the panels according to the invention presents practically no defect in planeness in use, in contrast with the known embodiment. Moreover the arrangement of the male strips 7 and of the corresponding grooves 8 ensures a more convenient and better alignment than that obtained with the known panels, while furthermore two panels according to the invention can be separated from one another easily, without the necessity of one of them being destroyed. The invention permits elimination of the retaining key pieces which were disposed in the tubular space between two panels according to the earlier known embodiment, and this reduces the time necessary for the assembly of the panels according to the invention.

The invention is applicable to numerous technical fields, such as the construction of isothermal and refrigerated containers or cold chambers in road or rail vehicles, also in structures or buildings, the rigid polyurethane foam of the embodiment described above being replaced in this latter case, for example by liquid concrete.

WHAT I CLAIM IS: —

1. An assembly comprising at least two prefabricated panels placed in flank-to-flank alignment, each panel being of box form with filling material in the box, each flank of each box including a male strip and a female strip which fit together with a female strip and male strip respectively of the adjacent panel, the fitting together being by relative movement parallel to the planes of the main faces of the panels, and the four strips of two adjacent panels defining a tubular space between the opposed flanks of those panels, which space is filled with a material which resists separation of the panels.

2. An assembly according to claim 1, in which each male strip projects from the respective flank, and has in cross section the shape of a base limb connected to the box, a terminal fin substantially parallel to the base limb, and a transverse limb interconnecting the base limb and the terminal fin and at right angles to them, and each female strip defines a groove along the length of the respective flank, adapted to receive a terminal fin.

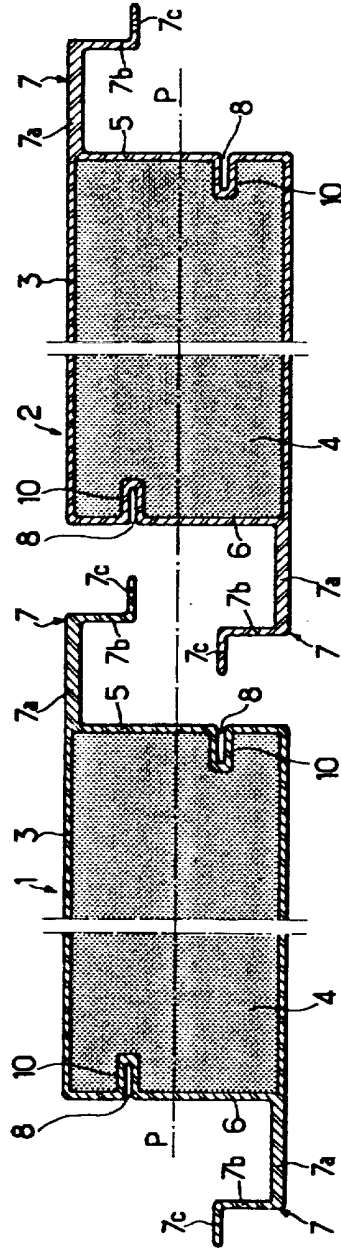
3. An assembly according to claim 1 or claim 2, in which each box is made of glass-fibre-reinforced polyester, and rigid polyure-

thane foam fills each box and the tubular space between each two boxes.

4. An assembly according to claim 1, substantially as described with reference to
- 5 Figure 2 of the accompanying drawings.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1980.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.

FIG.1**FIG.2**