

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Jointing Arrangements for the Components of a Suspended Ceiling

We THE HONG KONG CHIAP HUA MFY. Co. (1947) LTD., a body corporate organised and existing under the laws of Hong Kong, of 902 Fung House, Hong Kong, do hereby
5 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 invention relates to components of suspended ceiling systems and in particular to means whereby the components can be secured together.

Suspended ceiling systems have been proposed formed as a grid network of components formed by extrusion (for example, from aluminium) the areas, for example
15 squares or rectangles defined by the components being filled with acoustic material, lighting panels, decorative panels or lamps.

According to the invention there is provided a jointing arrangement for the components of a suspended ceiling, in which
20 a web of a first member is formed with the slot, through which slot a tongue, forming part of a web of a further member is adapted to be inserted when the members are mutually at right angles, in which the tongue of the further member is formed
25 with a portion thereof offset with respect to the remainder of the tongue by providing a hole in the tongue and an angled slot in communication with the hole, the angled slot extending longitudinally of the member from the hole, and then laterally of the member to the edge of the tongue, and in which the tongue is flexible and elastic so that it can be inserted in the slot by
30 bending said portion into alignment with the remainder of the tongue, but said portion is adapted to return to the offset position after passing through the slot, so that a part of the offset portion bears against

the web of the first member to prevent undesirable retraction of the tongue from 45 the slot.

The offset portion is thus bonded by a portion of the hole, the two portions of the angled slot and one edge of the tongue, and is coupled to the remainder of the 50 tongue at one side, at which side it is bent by a swan neck bend out of the plans of the tongue.

Advantageously in one method of assembling the components of the invention, to 55 join a first member to a further member, the end of the tongue on the further member is pressed into the slot in the first member. The offset portion bends into the plane of the tongue and when it has 60 passed through the slot springs back to the offset position so that the edge of the offset portion defined by the second leg of the angled slot, will abut the web of the first member adjacent the slot therein to secure 65 the first member and the further member together. To separate the members a tool such as a screw driver is inserted in the hole and the offset portion levered into alignment with the plane of the tongue for 70 withdrawal through the slot in the first member.

The further members may each be formed with a tongue at each end, the tongue at one end being formed in an upper position, and the tongue at the other end in 75 a lower position, the tongues being of a height less than one half of the height of the web of the further member. Two slots one above the other may be provided in 80 the first member, whereby two further members may be coupled to a first member to form a cross, with the further members longitudinally aligned with one another and coupled to the first member from opposite 85 sides thereof and with the lower

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edges of the two further members lying in the same plane.

Advantageously both the first and the further members are formed to a T-section and are adapted to be assembled with the T-section inverted, to form a grid having its major faces horizontal. The bars of the T-sections thus form in the position of use, shelves surrounding each aperture in the grid bounded by the members, on which shelves panels and the like may be supported at their edges.

Advantageously there is provided a connection member for coupling the first member or further member to a wall member in the form of a right angle bracket and adapted to be secured to and extend along a wall with one flange of the wall bracket lying against the wall and the other flange projecting horizontally from the lower edge thereof, the connection member comprising an upright web, having first and second tongues, but out of the plane of the web about vertical axes, at one end, the first to engage beneath a turned over edge of said one flange of the wall bracket and the second to engage the upper surface of said other flange, and with a third tongue, bent out of the plane of the web about a horizontal axis, to engage a horizontal slot in the first or further member and a fourth tongue, bent out of the plane of the web about a vertical axis, to engage a vertical slot in the first or further member.

Thus to couple a grid member formed by a first or further member to a wall member, the grid member is cut off to a length such that it abuts the edge of said other flange of the wall member which is remote from the wall. Two saw cuts are then made in the web of the grid member, one vertical and one horizontal. The first tongue of the connection member is then placed so that an upwardly projecting portion thereof engages beneath the turned over edge of the said one flange, the fourth tongue is inserted into the vertical slot until the third tongue is engaged in the horizontal slot and the projecting portion of the fourth tongue is then bent over to lie against the web of the grid member.

Advantageously the first member is formed as a beam and is provided at modular lengths, with a series of apertures therethrough, whereby the beam when cut-off at a mid position of the series can be coupled at the end so cut-off, to a similarly cut-off end of a further beam member.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:—

Fig. 1 is an elevation of a main tee;

Fig. 2a is an elevation of a secondary cross tee;

Fig. 2b is a plan view of one end of

the secondary cross tee shown in Fig. 2a;

Fig. 3 is an elevation of a cross tee;

Fig. 4 is a cross sectional view of a wall bracket;

Fig. 5a is an elevation of a connection bracket;

Fig. 5b is a plan view corresponding to Fig. 5a;

Fig. 6 is a detail of a tee, cut ready for connection to a wall bracket;

Fig. 7 is a detail showing the coupling of a tee to a wall bracket by means of a connection member;

Fig. 8a is an elevation of a splicer;

Fig. 8b is a plan view corresponding to Fig. 8a;

Fig. 8c is an end view corresponding to Fig. 8a;

Fig. 9 is a detail showing end to end coupling of two main tees by a splicer;

Fig. 10a is a part sectional elevation showing the coupling of two cross tees to a main tee;

Fig. 10b is a plan view corresponding to Fig. 10a;

Fig. 11a-g show some of the grid patterns which can be formed by the components of the invention.

The components to form a grid ceiling comprise only six parts, a main tee 1 (Fig. 1), a secondary cross tee 3 (Fig. 2a) a cross tee 5 (Fig. 3), a wall bracket 7 (Fig. 4), a connection bracket 9 (Figs. 5a and 5b) and a splicer 11 (Figs. 8a, 8b and 8c). Advantageously the members 1, 3, 5 and 7 are formed as aluminium or other extrusions and the members 9 and 11 as pressings.

The main tee 1 is formed to an inverted T-section with a web 13 and a cross flange 15, a strengthening rail 17 being provided at the upper end. Advantageously the main tee is provided in twelve foot lengths to a modular length of one foot, that is to say the web 13 is provided with slots 19 and 21 at 12" spacings and with slots 23 and 25 and holes 26 at positions midway between adjacent sets of slots 19 and 21.

The secondary cross tee 3 shown in Fig. 2a is also of inverted T-section having a web 27 and a cross piece 29. The cross tees 5, Fig. 3, are also of inverted T-section having a web 31 and a cross piece 33.

At one of their ends, both the secondary cross tees 3 and the cross tees 5 have the web cut-away to form a projecting portion 35 and are further cut away to form a tongue 37. Each tongue 37 is provided with a hole 39 therein and with an angled slot, comprising a slot 41 extending generally longitudinally of the tee and a slot 43 extending vertically. A portion 47 defined by the hole 39 and the slots 41 and 43 can be bent out of the plane of the tongue 37 by a swan neck bend 45 as best shown

in Fig. 2b.

At the other end of each of the secondary cross tee 3 or the cross tee 5, a projecting portion 49 and a tongue 51 are formed in like manner to the projecting portion 35 and the tongue 37 except that whereas the projecting portion 35 and tongue 37 are provided adjacent the upper edge of the web 27 or web 31 the projecting portion 49 and tongue 51 are provided adjacent the lower edge of the web.

The tongues 37 and 51 are provided so that, with the cross piece 29 or 33 of the secondary cross tee 3 or cross tee 5 respectively, in the same plane as the cross-piece 15 of the main tee 1, the tongue 37 is on the same level as the slot 23 and the tongue 51 is on the same level as the slot 25 in the web 13 of the main tee 1. The tongue 37 of a cross tee 5 can thus be inserted through the slot 23 in a main tee 1 and the tongue 51 on a further cross tee 5 can be inserted in the slot 25 of the main tee 1 as shown in Figs. 10a and 10b.

As the tongue 37 is pressed through the slot 23 the portion 47 will be bent into alignment with the remainder of the tongue 37 but when the portion 47 has passed through the slot 23 it will spring back to its offset position so that an edge 53 of the portion 47, defined by the slot 43, will bear against the face of the web 13 of the main tee 1.

The cross pieces 33 of the cross tees 5 are aligned with the cross-piece 15 of the main tee 1 to give a flush surface as can be seen in Fig. 10a.

The secondary cross tees 3 are advantageously formed to a length of four feet with a set of slots 55 and 57 and holes 59 of the same kind as the slots 23 and 25 and holes 26 provided in the main tee 1, provided at a mid position. The cross tees 5 are advantageously formed to a length of two feet.

To couple one of the tees 1, 3 or 5, as shown in Fig. 7 a secondary cross tee 3, to the wall bracket 7, the secondary cross tee 3 is cut vertically at a position defined by the outer edge of a horizontal flange 61 of the wall bracket 7. As shown in Fig. 6 a vertical slot 63 and a horizontal slot 65 are then cut into the web 27 of the secondary cross tee 3, advantageously using a jig. An upwardly projecting portion 67 of a first tongue 69 of the connection member 9 (Figs. 5a and 5b), is then inserted beneath a turned-over upper edge portion 71 of a vertical flange 73 of the wall bracket 7. A second tongue 75 of the connecting member 9 bears upon the upper surface of the horizontal flange 61 of the wall bracket 7. A fourth tongue 77, at the other end of the connecting

member 9 to the first tongue 69, is then inserted laterally into the slot 63 cut in the web 27 of the secondary cross tee 3, and the connecting member 9 and the web 27 are moved into abutment so that a third tongue 79 on the connecting member 9 is inserted into the slot 65 in the web 27. The part of the fourth tongue 77 projecting through the slot 63 is then turned over to lie against the web 27 to retain the secondary cross tee 3 the wall bracket 7 and the connecting member 9 in position relatively one to another.

The splicer 11 shown in Figs. 8a, 8b and 8c is used for coupling sections of the main tee 1 in end to end abutment as shown in Fig. 9. The splicer 11 is formed as a pressing from a planar piece of material and comprises a strut 81 having tabs 83 pressed out at each end and a centre-bowed portion 85. As shown in Fig. 9, adjacent main tees 1 are joined in end to end abutment by engaging the centre-bowed portion 85 of the splicer in the slots 21 of the main tees 1 and engaging the tabs 83 of the splicer 11 in the slots 19 of the main tee 1. The lower edge of the strut 81 bears against the cross-pieces 15 of the main tees 1. After insertion of the tabs 83 through the slots 19, the tabs are bent over to lie against the web 13 of the main tee 1.

The main tees 1 are each provided at intervals of one foot along its twelve foot length with a pair of connected slots 21 and with slots 19 whereby waste can be reduced. Thus a main tee which has been cut off for joining to a wall bracket can be cut off again intermediate the pair of connected slots 21 and can be coupled to a further length of main tee by means of one of the splicers 11.

The apertures 26 in the main tee 1 and the apertures 59 in the secondary cross tee 3 are used for the connection to the grid of vertical or angled wires, whereby the ceiling can be supported from a roof above the ceiling.

As shown in Figs. 11a to 11g various patterns of grid ceiling having rectangular or square apertures therein can be formed by using the main tee 1 in combination with secondary cross tees 3 or cross tees 5, or both cross tees 3 and cross tees 5. Since the modular length of the main tee is one foot, the length of the cross tees 5 is two feet and the length of the secondary cross tees 3 is four feet with a centre coupling position, the grid apertures can be two feet square or two feet by four feet and can be either in aligned or in staggered form one with another.

WHAT WE CLAIM IS:—

1. A jointing arrangement for the components of a suspended ceiling, in which

in Fig. 2b.

At the other end of each of the secondary cross tee 3 or the cross tee 5, a projecting portion 49 and a tongue 51 are formed in like manner to the projecting portion 35 and the tongue 37 except that whereas the projecting portion 35 and tongue 37 are provided adjacent the upper edge of the web 27 or web 31 the projecting portion 49 and tongue 51 are provided adjacent the lower edge of the web.

The tongues 37 and 51 are provided so that, with the cross piece 29 or 33 of the secondary cross tee 3 or cross tee 5 respectively, in the same plane as the cross-piece 15 of the main tee 1, the tongue 37 is on the same level as the slot 23 and the tongue 51 is on the same level as the slot 25 in the web 13 of the main tee 1. The tongue 37 of a cross tee 5 can thus be inserted through the slot 23 in a main tee 1 and the tongue 51 on a further cross tee 5 can be inserted in the slot 25 of the main tee 1 as shown in Figs. 10a and 10b.

As the tongue 37 is pressed through the slot 23 the portion 47 will be bent into alignment with the remainder of the tongue 37 but when the portion 47 has passed through the slot 23 it will spring back to its offset position so that an edge 53 of the portion 47, defined by the slot 43, will bear against the face of the web 13 of the main tee 1.

The cross pieces 33 of the cross tees 5 are aligned with the cross-piece 15 of the main tee 1 to give a flush surface as can be seen in Fig. 10a.

The secondary cross tees 3 are advantageously formed to a length of four feet with a set of slots 55 and 57 and holes 59 of the same kind as the slots 23 and 25 and holes 26 provided in the main tee 1, provided at a mid position. The cross tees 5 are advantageously formed to a length of two feet.

To couple one of the tees 1, 3 or 5, as shown in Fig. 7 a secondary cross tee 3, to the wall bracket 7, the secondary cross tee 3 is cut vertically at a position defined by the outer edge of a horizontal flange 61 of the wall bracket 7. As shown in Fig. 6 a vertical slot 63 and a horizontal slot 65 are then cut into the web 27 of the secondary cross tee 3, advantageously using a jig. An upwardly projecting portion 67 of a first tongue 69 of the connection member 9 (Figs. 5a and 5b), is then inserted beneath a turned-over upper edge portion 71 of a vertical flange 73 of the wall bracket 7. A second tongue 75 of the connecting member 9 bears upon the upper surface of the horizontal flange 61 of the wall bracket 7. A fourth tongue 65 77, at the other end of the connecting

member 9 to the first tongue 69, is then inserted laterally into the slot 63 cut in the web 27 of the secondary cross tee 3, and the connecting member 9 and the web 27 are moved into abutment so that a third tongue 79 on the connecting member 9 is inserted into the slot 65 in the web 27. The part of the fourth tongue 77 projecting through the slot 63 is then turned over to lie against the web 27 to retain the secondary cross tee 3 the wall bracket 7 and the connecting member 9 in position relatively one to another.

The splicer 11 shown in Figs. 8a, 8b and 8c is used for coupling sections of the main tee 1 in end to end abutment as shown in Fig. 9. The splicer 11 is formed as a pressing from a planar piece of material and comprises a strut 81 having tabs 83 pressed out at each end and a centre-bowed portion 85. As shown in Fig. 9, adjacent main tees 1 are joined in end to end abutment by engaging the centre-bowed portion 85 of the splicer in the slots 21 of the main tees 1 and engaging the tabs 83 of the splicer 11 in the slots 19 of the main tee 1. The lower edge of the strut 81 bears against the cross-pieces 15 of the main tees 1. After insertion of the tabs 83 through the slots 19, the tabs are bent over to lie against the web 13 of the main tee 1.

The main tees 1 are each provided at intervals of one foot along its twelve foot length with a pair of connected slots 21 and with slots 19 whereby waste can be reduced. Thus a main tee which has been cut off for joining to a wall bracket can be cut off again intermediate the pair of connected slots 21 and can be coupled to a further length of main tee by means of one of the splicers 11.

The apertures 26 in the main tee 1 and the apertures 59 in the secondary cross tee 3 are used for the connection to the grid of vertical or angled wires, whereby the ceiling can be supported from a roof above the ceiling.

As shown in Figs. 11a to 11g various patterns of grid ceiling having rectangular or square apertures therein can be formed by using the main tee 1 in combination with secondary cross tees 3 or cross tees 5, or both cross tees 3 and cross tees 5. Since the modular length of the main tee is one foot, the length of the cross tees 5 is two feet and the length of the secondary cross tees 3 is four feet with a centre coupling position, the grid apertures can be two feet square or two feet by four feet and can be either in aligned or in staggered form one with another.

WHAT WE CLAIM IS:—

1. A jointing arrangement for the components of a suspended ceiling, in which



- a web of a first member is formed with the slot, through which slot a tongue, forming part of a web of a further member, is adapted to be inserted when the members
- 5 are mutually at right angles, in which the tongue of the further member is formed with a portion thereof offset with respect to the remainder of the tongue by providing a hole in the tongue and an angled slot in
- 10 communication with the hole, the angled slot extending longitudinally of the member from the hole, and then laterally of the member to the edge of the tongue, and in which the tongue is flexible and elastic so
- 15 that it can be inserted in the slot by bending said portion into alignment with the remainder of the tongue, but said portion is adapted to return to the offset position after passing through the slot, so that a
- 20 part of the offset portion bears against the web of the first member to prevent undesirable retraction of the tongue from the slot.
2. A jointing arrangement according to
- 25 claim 1, in which the offset portion is bounded by a portion of the hole, the two portions of the angled slot and one edge of the tongue, and is coupled to the remainder of the tongue at one side, at which
- 30 side it is bent by a swan neck band out of the plane of the tongue.
3. A jointing arrangement according to claim 1 or claim 2, in which the further member is formed with a tongue at each
- 35 end, the tongue at one end being formed in an upper position, the tongue at the other end being formed in a lower position and the tongues being of a height less than one half of the height of the web of the further
- 40 member.
4. A jointing arrangement according to claim 3, in which two slots one above the other are provided in the first member whereby two further members may be coupled
- 45 to a first member to form a cross, with the further members longitudinally aligned with each other and coupled to the first member from opposite sides thereof and with the lower edges of
- 50 ~~longitudinally aligned with each other and coupled to the first member from opposite sides thereof and with the lower edges of the two further members~~ lying in the same plane.

5. A jointing arrangement according to 55 any one of the preceding claims, in which the first and further members are formed to a T-section and are adapted to be assembled with the T-sections inverted, to form a grid having its major faces hori- 60 zontal.

6. A jointing arrangement according to claim 5, in which the bars of the T-sections form shelves surrounding each aperture in the grid, on which shelves, panels and the 65 like can be supported at their edges.

7. A jointing arrangement according to any one of the preceding claims, in which includes a connection member for coupling the first member or further member to a 70 wall member in the form of a right angle bracket and adapted to be secured to and extend along a wall with one flange of the wall bracket lying against the wall and the other flange projecting horizontally from 75 the lower edge thereof, the said connection member comprising an upright web having first and second tongues bent out of the plane of the web about vertical axes, the first to engage beneath a turned over edge of 80 said one flange of the wall member and the second to engage the upper surface of said other flange of the wall member, a third tongue, bent out of the plane of the web about a horizontal axis, to engage a hori- 85 zontal slot in the first or further member and a fourth tongue, bent out of the plane of the web about a vertical axis, to engage a vertical slot in the first or further member. 90

8. A jointing arrangement according to any one of the preceding claims, in which the first member is formed as a beam and is provided at modular lengths with a series of apertures therethrough, whereby the beam 95 when cut off at a mid position of the series can be coupled, at the end so cut off, to a similarly cut off end of a further beam member.

9. A jointing arrangement for the com- 100 ponents of a suspended ceiling substantially as hereinbefore described with reference to any one of the accompanying drawings.

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