July 4, 1961 W. V. WILDE 2,990,921

SUSPENDED CEILING GRID CONSTRUCTION

Filed June 18, 1957 2 Sheets-Sheet 1

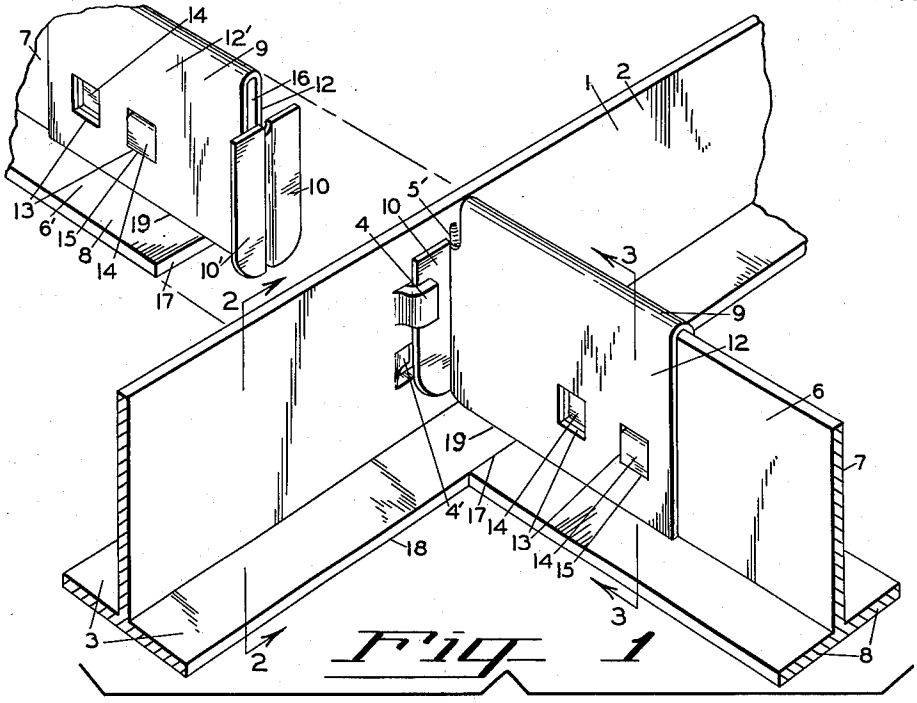


Fig 1

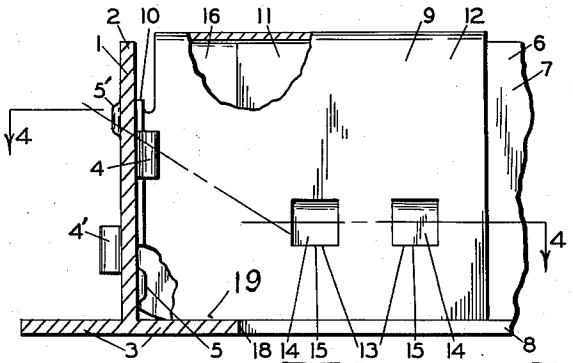


Fig 2

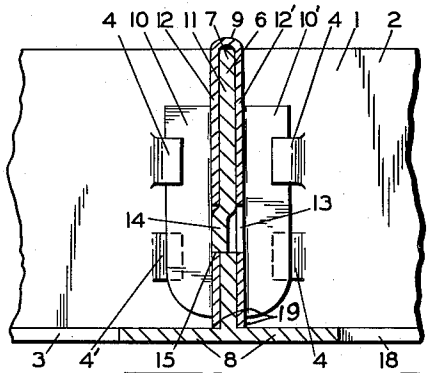


Fig 3

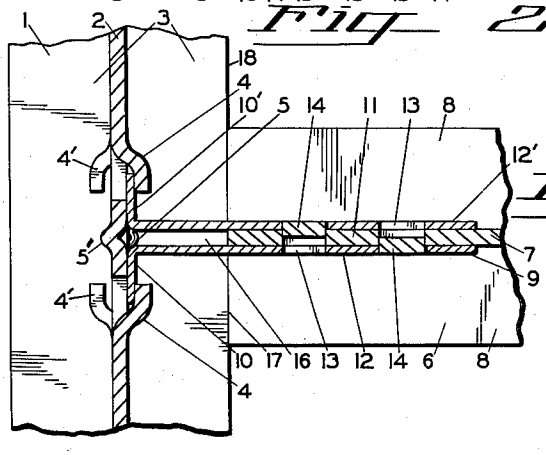


Fig 4

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SUSPENDED CEILING GRID CONSTRUCTION

Filed June 18, 1957 2 Sheets-Sheet 2

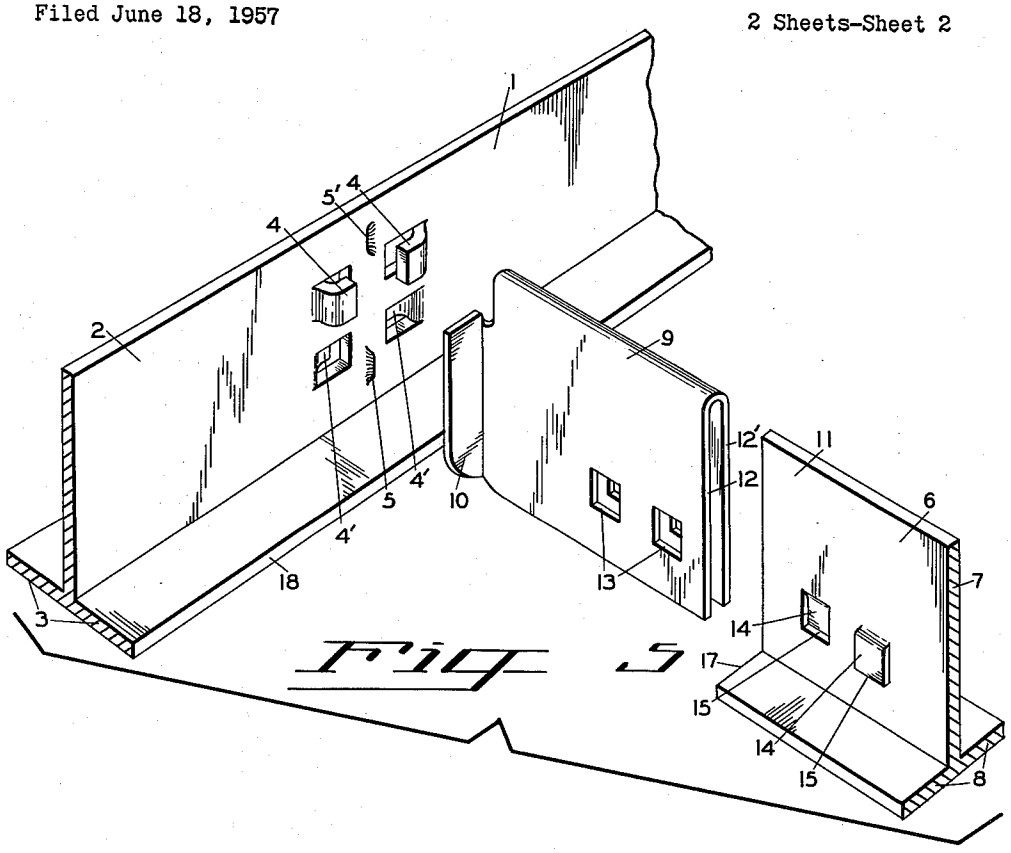


Fig 5

Fig 6

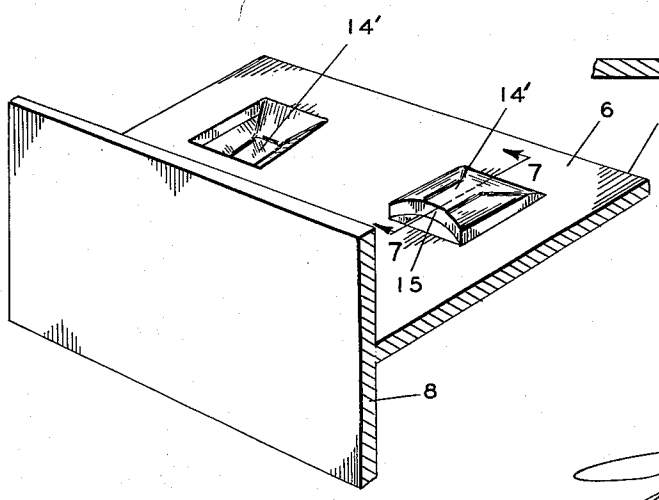
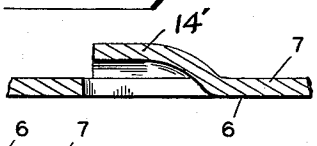


Fig 7



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SUSPENDED CEILING GRID CONSTRUCTION

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This invention relates to ceiling construction and more particularly to ceiling grids for supporting ceiling panels.

In the construction of suspended ceilings comprising a light guage metal framework which is hung by wires from the structural ceiling or roof joists, the suspended grid framework generally consists of preformed inverted T-section bars which are disposed at right angles and are secured together by means of clips or other fastenings. Usually, the bottom flanges of the T-sections are exposed, and serve to support various types of ceiling panels for decorative, acoustical or light reflecting purposes.

The primary object of the present invention is to provide means for interlocking the cross runners of the grid framework with the supporting main runners in a simplified manner that will reduce the time normally required for installation.

Another object of the invention is to provide means for connecting ceiling grid members, and having a positive locking connection between the grid members.

A further object of the invention is to provide means for connecting ceiling grid members with a positive locking connection but which is capable of being readily disengaged without deformation of either the grid members or the connector means to thereby facilitate rearrangement or complete disassembly of grid members, or provide large openings for access to the area above the suspended ceiling.

It is still another object of the invention to provide a ceiling grid construction having simplicity of design, economy of construction and efficiency in operation.

Briefly, the novel connection between grid members, according to the present invention, comprises a pair of spaced, opposed ears or fingers punched from each side of the web of the main runners for embracing right angle flanges on a clip removably mounted on the ends of the cross members of the grid, said pairs of ears being vertically spaced to permit alignment of the cross members on opposite sides of the main runners. The clip comprises a U-shaped member adapted to straddle the webs of the cross members and be releasably secured thereto by mating lugs and apertures. Spaced above and below the respective pairs of ears are protrusions or detents disposed on the main runner web centrally relative to the pair of ears on the same side of the web and adapted to be straddled by the ends of the walls or branches of the holding clip in order to prevent the clip and cross member from turning or twisting relative to the main runner, the ears and detent forming a three-point connection maintaining the cross members in a vertical position relative to the main runners.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings wherein like reference characters indicate like parts through the several figures and in which:

FIG. 1 is a view in perspective, partially exploded, of an intersection of a main runner and opposed cross members;

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1, parts of the clip being broken away for convenience of illustration;

FIG. 3 is a cross-sectional view taken on line 3—3 of FIG. 1;

FIG. 4 is a cross-sectional view taken on line 4—4 of FIG. 2;

FIG. 5 is an exploded view of a section of a main runner, a holding clip and the end portion of a cross runner;

FIG. 6 is an enlarged fragmentary view of a cross-member having a modified form of locking lug, and

FIG. 7 is a cross-sectional view taken on line 7—7 of FIG. 6.

Referring now to the drawings in detail, the usual ceiling grid construction comprises a plurality of suspended main runners 1 disposed in spaced, parallel, coplanar relation, and supporting and connected by a plurality of perpendicularly disposed, parallel cross-members 6. The runners and members usually are of substantially identical construction and comprise bars of inverted T-section with upstanding webs and horizontal cross-flanges, the latter forming frames for supporting ceiling panels either by resting thereon or by being clipped thereto. Consequently, in the drawings, the main runners are shown as comprising vertical webs 2 with horizontal cross flanges 3 while the cross-members 6 comprise vertical webs 7 with horizontal cross-flanges 8.

The present invention is directed to means for releasably connecting the cross-members 6 to the main runners 1 and for this purpose, the webs 2 of the main runners are provided with longitudinally spaced connecting means each of which includes two pairs of vertically spaced ears 4 and 4′ respectively associated with two vertically spaced protrusions or detents 5 and 5′. The pairs of ears 4 and 4′ and the detents 5 and 5′ conveniently are struck from opposite sides of the web 2 with the ears of each pair in opposed spaced relation and the protrusion or detent associated with each pair protruding from the same side of the web 2 and located generally opposite and between the ears of the other pair, as may be seen most clearly in FIG. 5. Referring specifically to FIG. 5, it will be seen that the ears 4 extend in opposed relation from one side of the web 2 and are spaced above the ears 4′ which extend in opposed relation from the other side of the web 2. A detent 5 is punched from the web 2 more or less between and centrally of the ears 4′ and protruding from the web on the same side as the ears 4 for association therewith in establishing a connection with a cross-member 6 on that side of the main runner. Similarly, the detent 5′ is located more or less between the ears 4 for association with the ears 4′. The detents do not have to be horizontally aligned with the respective ears but must be vertically spaced from their associated pairs of ears.

The ends 17 of the cross-flanges 8 of the cross-members 6 are cut off square at each end and, conveniently, the ends 11 of the webs 7 of the cross-members may also be squared off and coplanar with the ends 17 of the cross-flanges 8. In other words, the ends of the cross-members 6 may be squared off. Adjacent each end, the cross-members 6 are provided with a pair of lugs 14, 14 (FIGS. 1–5) or 14′, 14′ (FIGS. 6 and 7) which are spaced longitudinally and struck from opposite sides of the webs 7, said lugs 14 or 14′ being inclined outwardly from the webs 7 at their upper portions and having free bottom edges 15 which are spaced above the cross-flanges 8 and preferably are squarted off and parallel with said cross-flanges.

The ends of the cross-members 6 are secured to the main runners 1 by clips 9 which may be molded or formed from relatively thin sheet material. The clips 9 comprise a U-shaped body including branches 12, 12′ having at one end perpendicularly disposed flanges 10, 10′, respectively. The branches 12, 12′ are each pro-

vided with a pair of longitudinally spaced openings 13 which preferably are square, the openings 13 in the respective branches 12, 12' being aligned and the openings of each pair being spaced a distance corresponding to the spacing between the lugs 14 or 14' on the cross-member webs 7. The length of the branches 12, 12' from the bight therebetween to their opposite free edges 19 corresponds to the height of the web 7 of the cross-members 6.

In use and assembly, a clip 9 is mounted on each end of a cross-member 6, the clip body straddling the web 7 with the free edges 19 of the branches 12, 12' substantially in abutment with the upper surfaces of the cross-flanges 8 and with the openings 13 coincident with and nesting the lugs 14, 14' of the web 7 and the flanged end of the clip extending beyond the end of the web 7 to provide a space or channel 16, as best shown in FIGS. 1–4. When mounting the clip 9 over the web 7, the branches 12, 12' are cammed apart by and slide over the lugs 14, 14' until the respective openings 13 register with the lugs whereupon the branches 12, 12' retract and the lugs 14, 14' are seated in the respective openings 13, the bottom free edges 15 of the lugs overlying and engaging the bottom edges of the openings to retain the clip on the web 7.

When the clips 9 are mounted on the ends of a web 7, the cross-member 6 is ready for mounting on and connection with the main runners 1. To effect this assembly, a cross-member 6 is positioned with the flanges 10, 10' of an end clip 9 flush against the side of the web 2 of a main runner 1 with said flanges above and centrally disposed relative to the respective pair of ears 4 or 4', and then lowered to slide the clip down between the ears of the respective pair with the flanges between the web 2 and the respective ear of the particular pair. The clip is maintained in a vertical position as it is mounted on the main runner 1 so that the ends of the branches 12, 12' at the flanges straddle the detent 5 or 5' associated with the respective pair of ears. The clip 9 is lowered until the bottom edges 19 of its branches 12, 12' rest on the upper surfaces of the main runner cross-flanges 3.

With reference to FIG. 1, for example, the flanges 10, 10' of the clip 9 in the foreground, have been disposed against the near side of the web 2 of the main runner 1 above and centrally of the pair of ears 4, and then lowered to slide the clip down between the ears 4 with the flanges between the web and the respective ears. It will be noted that the lower outer corners of the flanges 10, 10' are rounded to facilitate sliding the flanges down between and behind the ears. As the clip was lowered, it was maintained in a vertical position until the flanged ends of the branches straddled the detent 5, as shown in FIGS. 2 and 4, which projects into the channel or space 16. The ears 4 and detent 5 cooperate in retaining the detent in a vertical position. The clip 9 in FIG. 1 is fully lowered so that its bottom edges 19 rest on the cross-flange 3 and thereby positions the cross-flanges 8 of the cross-member 6 coplanar with the cross-flange 3. The outer surfaces of the flanges 10, 10' are spaced from the end edges 17 of the cross-member cross-flanges 8 a distance equal to the width of the cross-flange 3 so that the end edge 17 will snugly fit against the longitudinal edge 18 of the cross-flange 3. The lower free corners of the branches 12, 12' are rounded, as best shown in FIGS. 1 and 2, so that any material or dirt in the angle between the web 2 and cross-flange 3 will not interfere with the proper positioning of the cross-member 6 relative to the main runner 1.

Referring again to FIG. 1, it will be seen that a cross-member 6 in the background is about to be connected to the far side of the main runner 1 opposite to and in alignment with the cross-member 6 in the foreground. In this case, however, the flanges 10, 10' of the clip 9 are placed against the web 2 above the ears 4' and astraddle the detent 5' which projects into the channel 16 between the clip branches 12, 12'. The clip is then lowered into position as previously described. It will be noted that the associated ears and detent 4 and 5 or 4' and 5' provide a three point connection with the clip and thereby prevents twisting of the clip and associated cross-member.

If it is ever necessary to remove any of the cross-members or disassemble the ceiling grid, it is merely necessary to raise the cross-member ends to slide the flanges 10, 10' up from the respective pair of ears. It is seldom necessary to remove the clips 9 from the cross-members 6 but in the event that it is necessary, the branches 12, 12' may be easily pried and sprung away from the web 7 by means of a screw driver or the like to enable raising the clip until the bottom edges of the openings 13 pass above the bottom edges of the lugs 14, 14' whereupon the clip may be readily slid from the web 7.

Although a certain specific embodiment of the invention has been shown and described, it is obvious that many modifications thereof are possible. The invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

What is claimed as new is:

1. A ceiling grid construction comprising a main runner and a cross-member connected perpendicularly thereto, said runner and cross-member being of inverted T-section and having a cross-flange with a centrally disposed upright web, said runner having a pair of opposed ears on one side of its web and detaining means protruding from said one web side and spaced generally vertically from said ears, said cross-member web including a portion extending beyond the end of the cross-flange and having a pair of oppositely disposed substantially coplanar flanges on the end thereof and perpendicular thereto for fitting between the web and ears and engaging the detaining means of said runner with the extending portion between the opposed edges of said ears and the detaining means preventing angular movement of each cross-member, the end of the cross-flange on said cross-member being spaced from the outer surfaces of the coplanar flanges a distance substantially equal to one half the width of the cross-flange on the runner, whereby the end of said member cross-flange abuts the longitudinal edge of the runner cross-flange, the bottom edge of said extending portion being disposed to rest on said runner cross-flange and support said cross-member cross-flange coplanar therewith.

2. A ceiling grid construction comprising a main runner and a cross-member connected perpendicularly thereto, said runner and cross-member being of inverted T-section and having a cross-flange with a centrally disposed upright web, said runner having a pair of opposed ears and a protruding detent on one side of its web with said detent centrally of but spaced vertically from said ears, said cross-member web including a portion extending beyond the end of the cross-flange and having a pair of oppositely disposed substantially coplanar flanges on the end thereof and perpendicular thereto and with a channel therebetween for fitting between the web and ears of said runner with the extending portion between the opposed edges of said ears and the detent nested in said channel, the end of the cross-flange on said cross-member being spaced from the outer surfaces of the coplanar flanges a distance substantially equal to one half the width of the cross-flange on the runner, whereby the end of said member cross-flange abuts the longitudinal edge of the runner cross-flange, the bottom edge of said extending portion being disposed to rest on said runner cross-flange and support said cross-member cross-flange coplanar therewith.

3. A ceiling grid construction comprising a main runner and oppositely disposed cross-members connected perpendicularly thereto, said runner and cross-members being of inverted T-section and having a cross-flange with

a centrally disposed upright web, said runner having a pair of opposed ears and a protruding detent struck from each side of its web, said pairs of ears being vertically spaced on said web and said detents being vertically spaced from and centrally disposed relative to the ears on the respective sides of said web, said cross-member webs each including a portion extending beyond the end of the cross-flange and having a pair of oppositely disposed substantially coplanar flanges on the end thereof and perpendicular thereto for fitting between the web and the respective ears of said runner with the respective extending portions between the opposed edges of said ears, said extending portions each also having a channel between the bases of said flanges for mating the respective detent, the end of the cross-flange on each cross-member being spaced from the outer surfaces of the respective coplanar flanges a distance substantially equal to one half the width of the cross-flanges on the runner, whereby the ends of said member cross-flanges abut the respective longitudinal edges of the runner cross-flange, the bottom edges of said extending portions being disposed to rest on said runner cross-flange and support said cross-flanges in coplanar assembly.

4. A ceiling grid construction comprising a main runner and a cross-member connected perpendicularly thereto, said runner and cross-member being of inverted T-section and having a cross-flange with a centrally disposed upright web, said runner having a pair of opposed ears and a protruding detent on one side of its web with said detent centrally of and spaced vertically from said ears, said cross-member web having a pair of longitudinally spaced lugs adjacent its end, a U-shaped clip having parallel branches with pairs of aligned openings therein, said clip straddling said cross-member web with said lugs nested in respective openings in said branches and removably locking said clip on said web, a portion of said clip extending beyond the end of said web and the branches having a pair of oppositely disposed substantially coplanar flanges on the end thereof and perpendicular thereto for fitting between the web and ears of said runner with the clip between the opposed edges of said ears and the detent nested between said branches, the end of the cross-flange on said cross-member being spaced from the outer surfaces of the coplanar flanges a distance substantially equal to one half the width of the cross-flange on the runner, whereby the end of said member cross-flange abuts the longitudinal edge of the runner cross-flange, the bottom edges of said clip branches resting on said cross-flanges and supporting said cross-member cross-flange coplanar with said runner cross-flange.

5. A grid construction according to claim 4 wherein said lugs are on opposite sides of said cross-member web.

6. A ceiling grid construction comprising a main runner and oppositely disposed cross-members connected perpendicularly thereto, said runner and cross-members being of inverted T-section and having a cross-flange with a centrally disposed upright web, said runner having a pair of opposed ears and a protruding detent struck from each side of its web, said pairs of ears being vertically spaced on said web and said detents being vertically spaced from and centrally disposed relative to the ears on the respective sides of said web, said cross-member webs each having a pair of longitudinally spaced lugs adjacent the end thereof, a clip for each cross-member web, said clips being U-shaped and having parallel branches equal in height to said webs and having pairs of aligned openings, said clips respectively straddling said webs with respective openings receiving said lugs and removably locking said clips in position, a portion of each clip extending beyond the end of the associated cross-flange and having a pair of oppositely disposed substantially coplanar flanges on the end thereof and perpendicular thereto for fitting between the web and the respective ears of said runner with the respective clip between the opposed edges of said ears and said clip branches straddling the respective detent, the end of the cross-flange on each cross-member being spaced from the outer surfaces of the respective coplanar flanges a distance substantially equal to one half the width of the cross-flanges on the runner, whereby the ends of said member cross-flanges abut the respective longitudinal edges of the runner cross-flange, the bottom edges of said clip branches being disposed to rest on said runner cross-flanges and support said cross-flanges in coplanar assembly.

7. A grid construction according to claim 6 wherein said lugs are on opposite sides of said cross-member web.

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