May 30, 1967 B. O. PURDY 3,321,879

CEILING SUPPORT STRUCTURE WITH COLLAPSIBLE JOINT CLIP

Filed Aug. 5, 1964 2 Sheets-Sheet 1

Fig. 1.

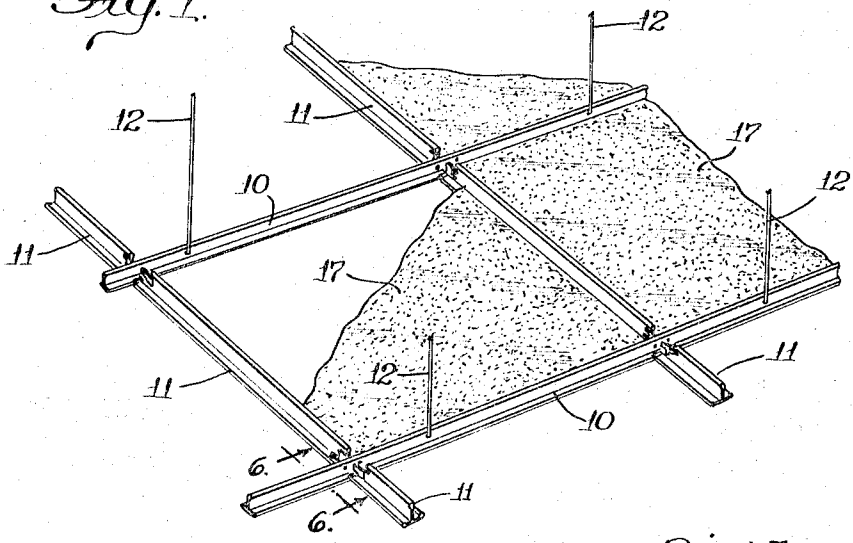
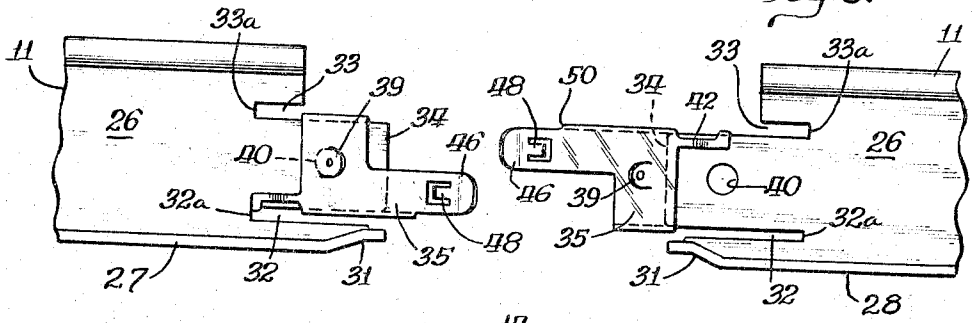


Fig. 5.



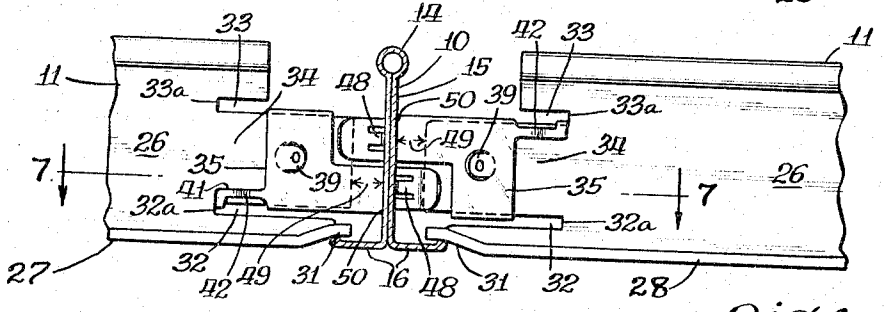
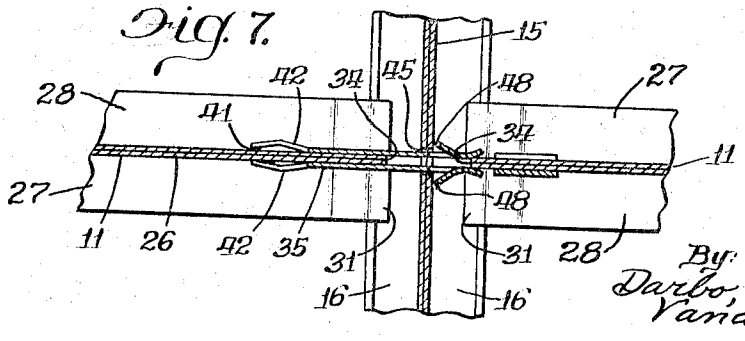


Fig. 6.

Fig. 7.



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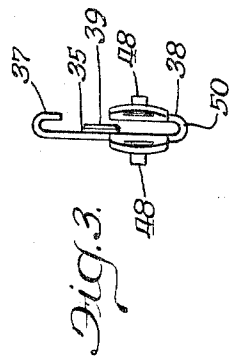


Fig. 3.

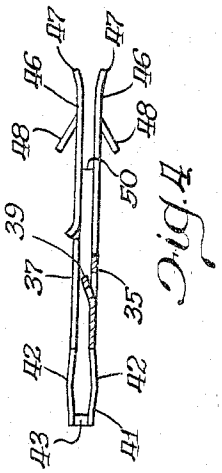


Fig. 4

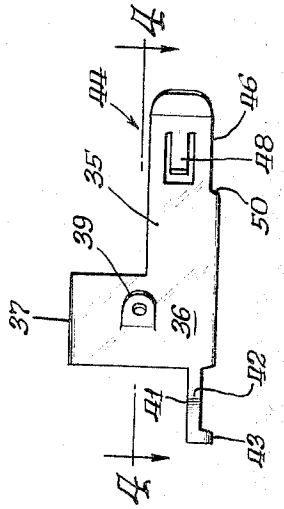


Fig. 2.

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CEILING SUPPORT STRUCTURE WITH COLLAPSIBLE JOINT CLIP

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5 Claims. (Cl. 52—232)

This invention relates to a suspended ceiling structure, and the following disclosure thereof is offered for public dissemination upon the grant of a patent therefor.

In general the present invention provides a suspended ceiling structure that is easy to install yet provides unusual rigidity. Embodiments of the invention provide a ceiling structure capable of holding the ceiling in place despite the existence of high temperature conditions. In many installations it is necessary that the ceiling structure ba capable of maintaining the ceiling intact during the course of a fire. This is being demanded as a precaution towards the containing of a fire that may originate in a location having a suspended ceiling. In general it is demanded that the ceiling remain intact for a period of about two hours when subjected to a temperature of about 2000° F.

Under such conditions the metallic framing members of a suspended ceiling will expand to a substantial extent. If the members fit together snugly with no provision for permitting such expansion, they will bend and warp to the end that the squares of ceiling material, or tiles, fall away from the supporting members. When this happens the fire can spread through the space above the ceiling, gaining entry through the openings that result. Embodiments of the present invention permit the expansion of the supporting members to the end that they do not twist or bend and thus serve to retain the ceiling tiles. Despite this fact the members are securely locked together so that they will not come apart as a result of bumps or jars, such as may occur when ceiling tiles are put into place in the supporting members or removed therefrom.

Further objects and advantages will become apparent from the following description taken in conjunction with the drawings, in which:

FIGURE 1 is a perspective view of a ceiling structure embodying the present invention;

FIGURE 2 is a side elevation of an improved spacing and expansion locking clip of this invention for connecting the cross T's to the main runner;

FIGURE 3 is an end elevation of the clip shown in FIGURE 2;

FIGURE 4 is a sectional view taken on the line 4—4 of FIGURE 2;

FIGURE 5 is an enlarged view of adjacent ends of cross T's with the left T having the novel locking clip in complete engagement thereon and the right T having the novel locking clip in partial engagement therewith;

FIGURE 6 is an enlarged view of the main longitudinal runner in vertical section as viewed at line 6—6 of FIGURE 1, both novel locking clips mounted on the ends of cross T's and the noses thereof inserted through adjacent openings in the main runner web from opposite directions in complete locking engagement therewith to permit expansion of the cross T's relative to the main runner when subject to heat; and

FIGURE 7 is a fragmentary sectional view taken on the line 7—7 of FIGURE 6 showing the two locking clips engaging the main runner with outwardly bent spacing portions to insure a flexing of the ends of the cross T's relative to the main runner when they are heated.

Although the following disclosure offered for public dissemination is detailed to ensure adequacy and aid understanding, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how others may later disguise it by variations in form or additions or further improvements. The claims at the end hereof are intended as the chief aid toward this purpose; as it is these that meet the requirement of pointing out the parts, improvements, or combinations in which the inventive concepts are found.

The embodiment of FIGURES 1–7 comprises a plurality of longitudinal main runner T's 10 positioned at spaced intervals having cross T's 11 connected thereto and forming a grid. This grid of beams is suspended from above, as for example, by means of wires 12 connected in holes 13 in the main T's 10. The longitudinal T's 10 are supplied in a range of standard lengths, but in many installations must be longer than any within that range.

Each longitudinal T 10 has a top loop 14, vertical webs 15 and two opposite horizontal flanges 16 upon which edges of ceiling panels 17 are adapted to rest. The under sides of the flanges form a decorative trim for the panels and the false ceiling thus formed.

Referring to FIGURES 1 and 5, the cross T's 11 each have a doubled web 26 and two flanges 27 and 28 corresponding in height and in width to the corresponding portions of the main T 10. The cross T's 11 are secured at the ends to the main longitudinal T 10. The ceiling panels 17 are supported by the flanges of both T's 10 and 11. The cross T's 11 are mounted for a sliding or expanding movement relative to the main T's 10 due to the action of heat.

Each cross T 11 is formed at its engaging ends with its bottom flange extending and having an offset 31 bent at the end thereof. Offset 31 engages and rests upon the upper side of one flange 16 of the main T 10 while maintaining the main portions of the flanges in a common plane. The web 26 of cross T 11 has two slots 32 and 33 extending inwardly and forming between them a parallel sided tongue 34, the outer end of which extends about the same distance at the end as the bottom flange offset 31. Upon this tongue is seated a spacing and locking clip 35 of FIGURES 4, 5 and 6. Slots 32 and 33 define abutments 32*a* and 33*a* at the closed end of the slots.

The novel spring locking clip 35 has a body portion 36 with oppositely turned hooks 37 and 38 at top and bottom on the same side and spaced from each other to adapt the clip for sliding application to the tongue 34. The clip has an inwardly biased spring tongue 39 between the hooks 37 and 38 to cooperate with an opening 40 in the tongue 34 on which the clip is slidable. This biased locking tongue 39 and the mating opening 40 permit the cross T 11 to be applied toward the main T 10 to engage the clip 35 with the tongue 39 and prevent it from moving away from the cross T 10. An extension spacer 41 at this end of the clip 35 has opposite band sides 42 reduced in width and bowed outwardly to bend easily in that direction when crushed or deflected by pressure. Sides 42 are united in a closed end or link 43.

End 43 is inserted in one of the tongue slots 32 or 33 into contact with abutment 32*a* or 33*a* at the inner end thereof. When the clip is in this position, the locking tongue 39 engages its opening 40 or tongue 34 limiting outward movement of the clip 35 thereon. However, T 11 can move outwardly toward the T 10 under heat expansion by further pressing the bowed sides 42 of the spacer outwardly and collapsing them in the directions in which they are bowed.

At the end of the clip 35 opposite this spacer 41 is a reduced nose 44 at one side of the center of the clip adapted to be inserted through one of two vertical slots 45 in a main T 10 for the attachment of one or the other of the opposite cross T's 11. Extending from beyond shoulder 50 this nose has free sides 46 for slight flexing

with outwardly turned extremities 47 and outwardly turned engaging flaps 48. To install the nose extremities 47 are pinched slightly together and are inserted through one of the slots 45 until the flaps 48 are through the openings. Upon release the flaps 48 will spring outwardly and prevent the withdrawal of the nose 44. Shoulder 50 abuts the opposite side of web 15 and prevents movement of the nose of the clip any farther through opening 45 under normal conditions.

When the cross T's 11 are mounted in place on the main T's, the flange offsets 31 rest on the flange 16 of the main T's 10. A space 49 is provided for longitudinal expansion of the cross T's between the end of the tongue 34 and web 15 of the main T's. This space is about equal to the length of the spacer 41.

As only one of the two vertical slots 45 is used for attaching each cross T 11 to a main T 10, the other slot 45 for each pair may be used for another cross T 11 connected oppositely at the same place. In this latter case, the locking clips 35 are placed oppositely and inverted because of the nose being at one side of the center of the clip.

With this construction the cross T 11 supports are also provided with separate and individual means for a sliding movement due to expansion caused by heat. Both of the grid T's 10 and 11 may be provided with additional slots 45 for the connection of additional cross pieces to accommodate different ceiling panels.

Cross T's are assembled by first slipping clips 35 on noses 34. The noses 44 of the spacer and locking clips 35 are inserted through the slots 45 in longitudinal T 10. The clips 35 may be upright or inverted, but provide double engagement at the two ends. The engagement flaps 48 snap into place when clips 35 are inserted through slots 45 in main T's 10 and are held open by the nose 34 of the opposite cross T 11. The cross T's 11 thus are held against separation. After the grid of T's are assembled, the panels 17 are fitted into place to rest upon the flanges of the T's.

I claim:

1. In a ceiling support structure comprising a plurality of longitudinal T's with a plurality of cross T's extending between the longitudinal T's with clips engaging the end of each cross T and connecting it to the adjacent longitudinal T, and wherein said T's have vertical webs and horizontal flanges, the improvement comprising: said end of the cross T having a nose formed as an extension of the web, said nose having an end spaced from the web of the longitudinal T and a terminus at which the nose joins the web, said cross T defining an abutment at said terminus; said clip being received on said nose and having means engaging the nose to prevent withdrawal of the clip from the nose while permitting the clip to move

in the opposite direction on the nose, said clip having means extending beyond said end and engaging the web of the longitudinal T, and deformable means extending in the opposite direction into contact with said abutment to normally prevent movement of the clip in said opposite direction on said nose.

2. A structure as set forth in claim 1, wherein the ends of the flanges of the cross T extend upwardly above the flanges of the longitudinal T and terminate a spaced distance from the sides of the web of the longitudinal T.

3. A clip for use on a nose of a cross T of a ceiling support structure including longitudinal T's, said clip including: a body portion adapted to mount on said nose; means extending in one direction from said body portion to engage said longitudinal T; a pair of bands extending in the opposite direction from said body portion and terminating at extending ends, said bands, between said body and ends, being bowed outwardly away from each other; and a connecting link between said bands at the extending ends of the bands.

4. In a ceiling suspension structure comprising a rectangular grid composed of longitudinal and cross connected T's, with the T's having vertical webs and horizontal flanges, the longitudinal T's having openings through the webs thereof at intervals and the cross T's having attachable end clips engageable in said openings, the improvement comprising: said cross T having an end tongue formed by parallel slots, said tongue having a distal end spaced from the web of the longitudinal T, said clip being slideable on said tongue, the clip having a bendable spacer extension fitting first into one of said slots and abutting the end thereof and collapsible to limit the expansion of the cross T to the approximate length of said spacer extension.

5. The structure as set forth in claim 4, wherein the sides of thes pacer are bowed outwardly but the ends are united so that under compression due to heat the sides will bend more outwardly and may fold together from said ends if sufficiently crushed.

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