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LUMINOUS CEILING STRUCTURE AND CONNECTOR MEANS THEREFOR

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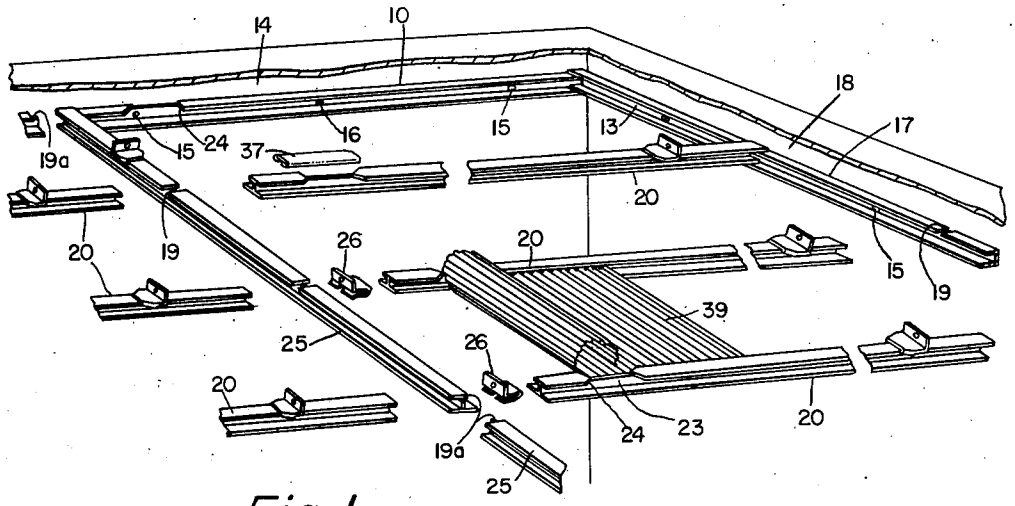


Fig. 1

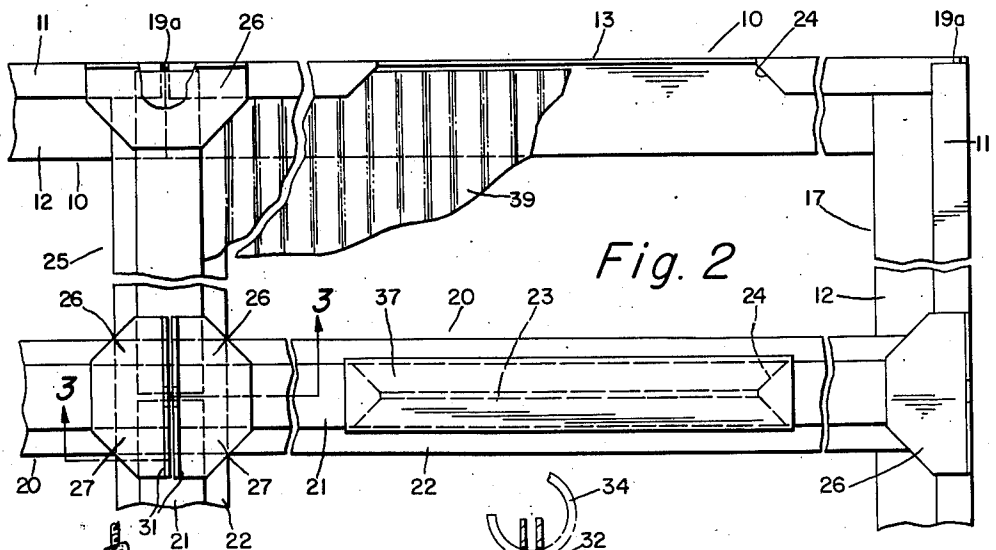


Fig. 2

Fig. 3

Fig. 4

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LUMINOUS CEILING STRUCTURE AND CONNECTOR MEANS THEREFOR

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The present invention relates in general to an overhead framework for supporting decorative or functional ceiling panels, and more particularly to an arrangement for a luminous ceiling structure.

It is the primary object of my invention to provide an arrangement of elements for an overhead framework of the character described which is easy to assemble and install.

Another object of my invention is to provide an improved connector element for assembling such a framework.

Still another object of my invention is to provide means for assembling such a framework with rigidity and uniformity of alignment and spacing.

Other objects and advantages of my invention will be apparent during the course of the following description.

FIG. 1 is an exploded fragmentary perspective view of an overhead framework which embodies the features of my invention.

FIG. 2 is a fragmentary top plan view of the elements of FIG. 1 in assembled relationship.

FIG. 3 is a cross-sectional view through one of the connected intersections of the framework, taken as indicated on line 3—3 of FIG. 2.

FIG. 4 is a detail perspective view of one of the connector clamps embodying features of my invention.

The framework consists of a plurality of channel elements arranged in a modular pattern of predetermined dimensions and interconnected with each other in substantially rigid relationship by means of slidable connectors which prevent displacement of the channel elements from their interconnected positions. The assembled framework is suspended from an overhead or ceiling area by means of suitable adjustable supports and desirably is additionally secured at its periphery to the walls or other vertical support surfaces adjacent the ceiling area.

As shown in the drawings, the various channel elements comprise a side wall channel **10** which is of J-shaped cross-section. The channel **10** has spaced parallel legs **11** and **12** interconnected by a web **13** at right angles thereto. In use, the web **13** lies against a vertical mounting surface such as a room wall **14** and the element **10** is disposed horizontally with the legs **11** and **12** projecting laterally into the room area. The leg **11** is shorter than the leg **12** and the channel is so disposed that the leg **11** is uppermost and the leg **12** projects beyond it to form a ledge. The web **13** is provided with a series of spaced mounting holes **15** which permit the channel **10** to be screwed or otherwise secured to the mounting surface **14** by suitable fasteners, as indicated at **16**.

An end wall channel **17** of like cross-section having legs **11** and **12** and a connecting web **13** with spaced apertures **15** is horizontally secured to the intersecting wall surface **18** which is normal to the surface **14**. The upper or short leg **11** of the channel **17** is provided at uniformly spaced points with a narrow transverse cut-out or slot **19** which is of a width slightly greater than the thickness of the web of the main or longitudinal support element which it is designed to accommodate, and which will now be described.

A main or longitudinal track or support element **20** extends parallel and level with the side wall channel **10**. The track **20** has an I-shaped cross-section defined by a horizontal upper flange **21**, a parallel lower flange **22**

which is symmetrically wider than the flange **21**, and a vertical median web **23** which extends between the flanges.

Near one end of the track **20**, at a uniform predetermined distance from that end, which can be approximately 2–4 inches, the upper flange **21** is cut-away or recessed to provide a longitudinally-extending entry notch **24** in the flange on each side of the median web **23**. The notch **24** is of sufficient length to permit ready insertion of the light-diffusing panels, this length being, for example, about six inches. The track **20** is so disposed that the notched end thereof is in horizontal transverse alignment with the notches **24** in like tracks **20** which are parallel and coextensive therewith, as well as with a like notch **24** which is provided in the upper leg **11** of the side wall channel **10**, which is also coextensive with the track **20**.

A cross-track or support element **25** of the same cross-sectional configuration as the track **20**, having upper and lower flanges **21** and **22** and a vertical web **23**, extends parallel to the end wall channel **17** and normal to the side wall channel **10** and the tracks **20** adjacent the ends thereof and in substantially the same horizontal plane. The upper flange **21** of the cross-track **25** is provided with narrow spaced slots **19** which are uniformly spaced from each other in longitudinal alignment with the slots **19** in the end wall channel **17**. The symmetrical halves of the tracks **20** and **25** which are disposed on opposite sides of the median web **23** define horizontally extending channels similar to the channels **10** and **17**.

As best seen in FIGS. 3 and 4, a connector element **26** serves to secure the framework elements **10**, **17**, **20** and **25** in assembled relationship at the intersections thereof. The connector **26** comprises a body portion **27**, two adjacent corners of which are rebent or folded into approximately parallel spaced relationship with the underside of the body **27** and form spaced symmetrical ears **28** adapted to straddle and underlie the flange **21** of the tracks **20** or **25**. The connector **26** is made of any suitable material, such as steel, which has some degree of resiliency and the gap **29** which is defined between the ear **28** and the body **27** has a width or vertical dimension which is slightly less than twice the thickness of the flange **21**, so that the connector slides easily onto and on the upper flange of track **20** or **25**, but will frictionally grip a double thickness of flange such as exists where the framework elements intersect and one of the flanges overlies another. To more readily guide the connector **26** into such frictional engagement, the forward edge of each ear **28** is preferably formed with a short down-turned lip **30**.

The connector **26** is provided at the forward edge of the body portion **27** with a vertically extending flange **31** having an opening **32** provided therein. The flange **31** serves both as a finger grip for grasping and moving the connector and as an upright ear to which one end of a suspension rod or hanger element **33** may be connected. The opposite ends of the suspension rod are provided with hooks **34**, one of which passes through the aperture in flange **31** and the other of which engages an eye bolt or other securing element which is affixed to an overhead surface in the ceiling area. A plurality of suspension rods **33** are utilized to support the framework and prevent any sag or unevenness therein. It is desirable that the rods **33** be adjustable in length, and to that end, I have shown a turnbuckle assembly **36** on the rod for accomplishing such adjustment when necessary.

In installing and assembling the framework, the wall channels **10** and **17** are first secured to the vertical support surfaces at the desired height to provide a rectangular periphery for the framework The ends of the channels **10** and **17** are disposed in overlapping relationship at the four corners of the framework where the channels meet, with the leg **11** of the side channel **10** underlying the leg **11**

of the end channel 17. These channels, as well as the tracks 20 and 25, are of such cross-section that they may be extruded elements of aluminum or the like, and it is further convenient and desirable that the thickness of the webs, legs and flanges be uniform in all the several framework members.

The side wall channels 10 are of a convenient predetermined uniform length which corresponds to the length of the panel to be retained therein. The end wall channels 17 are of a convenient predetermined uniform length which corresponds to a multiple of the width of the panel to be retained therein. For example, if the panel module is substantially eight feet long and three feet wide, the channel 10 will be provided in eight foot lengths and the channel 17 will be provided in nine foot lengths, with the slots 19 spaced three feet apart. Each end of the elements 10, 17 and 25 is formed with a cut-away portion 19*a* on the respective leg 11 or flange 21 which is equivalent to a half of the slot 19. Thus when two or more end channels 17 are mounted in linear abutment, the abutting ends will define a slot 19 formed by the two adjacent cut-away portions 19*a* in the leg 11. A similar result is achieved when the side channels 10 or the cross-tracks 25 are disposed in linear abutment.

Assuming, for the purposes of example, that the framework is intended to provide a decorative area 40 feet long by 27 feet wide, five of the channels 10 would be used on each of the side walls and three of the channels 17 would be used on each of the end walls, which, when the tracks are assembled thereto, will provide a total of forty-five 3 x 8 panel-receiving modules.

The next step in the assembly is to secure three main tracks 20 to the end wall channel 17. A connector element 26 is slipped onto the flange 21 of the track 20 and the web 23 is inserted into the slot 19 in the channel 17 with the flange 21 resting on the leg 11 and the flange 22 resting on the leg 12. The connector 26 is then moved toward the end wall and the flange 21 and leg 11 are frictionallly gripped and retained by the connector. The slot 19 positions the end of the track at the required modular spacing from the side wall channel 10, and the slot 19 further maintains the track 20 normal to the channel 17 and parallel to the channel 10.

After three or more of the tracks 20 have been so secured, the free ends of the tracks 20 are similarly connected to a cross track 25. A slidable cap or shield 37, the purpose of which will become apparent as the description proceeds, is slipped onto the flange 21 of the track and then a connector 26 is slid onto the track 20. The web 23 of each track 20 is engaged in a slot 19 on the cross-track 25 and the connector 26 is moved into position to grip the flanges 21 of the tracks 20 and 25. It is to be noted that the bend 38 of the ears 28 serves as an abutment to prevent the connector 26 from extending beyond the plane of the web 23 of the cross-track 25.

One end of the cross-track 25 engages the slot 19 formed by the abutting portions 19*a* of the side wall channel elements 10 and is there secured by a connector 26. Another group of three longitudinal tracks 20 is then secured to the opposite side of the cross-track 25, in alignment with the tracks 20 previously installed, by means of connectors 26 which are disposed with their upright flanges 31 in face-to-face relationship to the opposite connectors 26. The other end of this second group of tracks 20 is then secured to a second cross-track 25 in the manner above-described, which cross-track, in turn, is secured to the side wall channels 10. The process is continued until the opposite end wall channel 17 is reached and the final group of three tracks 20 is secured thereto.

Another group of three tracks 20 is then secured to an end wall channel 17, coextensive with and in the same manner as the group first assembled. A second cross-track 25 is secured to the other ends of this group of tracks 20, and the cross-track is connected in alignment with the first-installed cross-track 25 by means of the pair of opposed connectors 26 which already are secured to the free end of the first cross-track. The previous steps are then continued and repeated until the entire framework is assembled by means of the slots 19 and the slide connectors 26.

The flexible light diffusing panels 39 or other decorative panels may then be inserted in the modular framework by feeding them through the entry notches 24 so as to be retained between the surfaces of the flanges 21 and 22 or the legs 11 and 12, as the case may be. Preferably the panels are inserted as partial sections of the framework are assembled, rather than after the complete framework is completed.

The cap or shield 37 is a flanged piece which is of sufficient length to cover the notch 24. It is slidable on the flange 21 of the track 20 to overlie the notch 24 after the panel 39 has been inserted and thus restrain any tendency of the panel to gap or bulge upwardly adjacent to the notches 24.

As previously indicated, the framework is further supported by means of adjustable suspension rods 33 having a hooked end 34 which traverses the opposed flanges 31 of each pair of connectors 26 and thus serves to tie the connectors together and prevent inadvertent displacement of the paired connectors 26.

Thus, by using the slots 19 to locate the tracks 20 in a uniform predetermined pattern and to position them at right angles to the cross elements, a uniform and accurately aligned parallelogram framework is readily assembled. The connectors or frictional clamp 26 serves to retain the structural elements in abutment and prevent any displacement of the elements at their intersections. Yet, when desired, the framework or any part thereof may be readily disassembled by slidably disengaging the connectors 26.

By factory pre-cutting and slotting of the framework elements accuracy is assured and economies are effected in installation time and cost without the necessity of utilizing special tools or skills. The use of the slidable connectors 26 eliminates any need for screwing, bending, riveting or other tedious or time-consuming metal-securing operations at the installation site or dependence upon the skill and judgment of the installer in locating and aligning the structural elements.

Although I have used a 3 x 8 module in describing the framework, it will be understood that other preselected modular dimensions may be utilized. Furthermore, it will be apparent that if the area to be covered is not an exact multiple of the modular elements in either length or width or both, a set of cross-members 17 and 25 or longitudinal members 10 and 20 may be easily cut to shorter length at the installation site to cover the area completely and properly. The framework will then comprise a dominant central group of the pre-selected modular panels and one or more peripheral groups of panels having a different modular dimension, as required.

It is to be understood that the forms of my invention, herewith shown and described, are to be taken as preferred examples of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. An overhead modular framework for supporting decorative panels, comprising a plurality of structural channel elements disposed in an intersecting parallelogram arrangement having portions of said elements in overlapping relationship, the mouths of parallel adjacent channels being disposed in horizontally-opposed relationship to define panel-retaining tracks, and resilient connector elements slidably carried by one group of parallel structural elements and slidably movable into clamping engagement with an intersecting group of structural ele-

ments at the intersections thereof to secure said groups of structural elements to each other, said connector elements having spaced opposed gripping surfaces engaging the overlapping portions of said structural elements, the space between said surfaces being normally less than the thickness of said overlapped portions.

2. An overhead modular framework as defined in claim 1, wherein said connector element comprises a body having portions thereof rebent into underlying relationship thereto to form spaced clamping ears, and an upright flange having an aperture therein for connection to an overhead support.

3. An overhead modular framework as defined in claim 2, wherein the forward edges of said ears are provided with a downwardly extending guide lip.

4. An overhead modular framework as defined in claim 2, wherein the pair of connector elements engaging opposite sides of an intersection are disposed in opposed relationship whereby the upright flanges thereof are proximate each other, and an overhead support member having a portion thereof traversing said pair of flanges and securing said pair of connectors against displacement relatively to each other.

5. An overhead modular framework for supporting a plurality of decorative panels, comprising a plurality of structural channel elements disposed in an intersecting parallelogram arrangement, the mouths of parallel adjacent channels being disposed in horizontally-opposed relationship to define panel-retaining tracks, one group of parallel structural elements being provided with a plu-

rality of uniformly spaced recesses extending transversely thereof, a transverse group of parallel structural elements slidably engaging said recesses in intersecting overlapping engagement with said one group of structural elements, and movable connector means for frictionally securing said groups of elements to each other in said overlapping relationship, said connector means having a rebent flange defining spaced gripping surfaces, the space between said surfaces being normally less than the thickness of the overlapped portions of said intersecting structural elements.

6. An overhead modular framework as defined in claim 5, wherein each of the elements of said groups of structural elements consists of a pair of channels having a common vertical web portion and oppositely directed coplanar leg portions extending transversely to said web portion, said recesses are provided in the upper leg portion of each element of said one group of structural elements and said recesses are of a width adapted to slidably accommodate the web portions of the elements of said transverse group of structural elements and retain said latter elements against angular displacement relatively to said recessed elements.

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