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H. G. BLUM

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PANEL ASSEMBLY

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FIG. 1

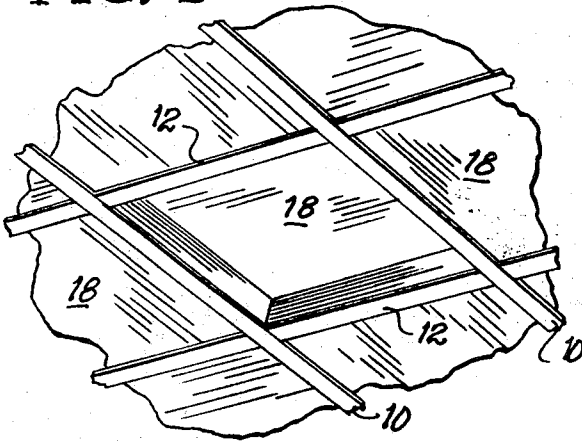


FIG. 2

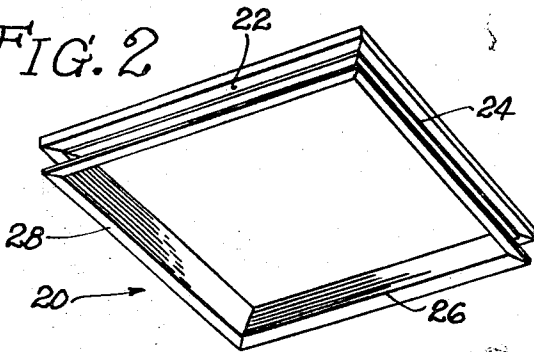


FIG. 3

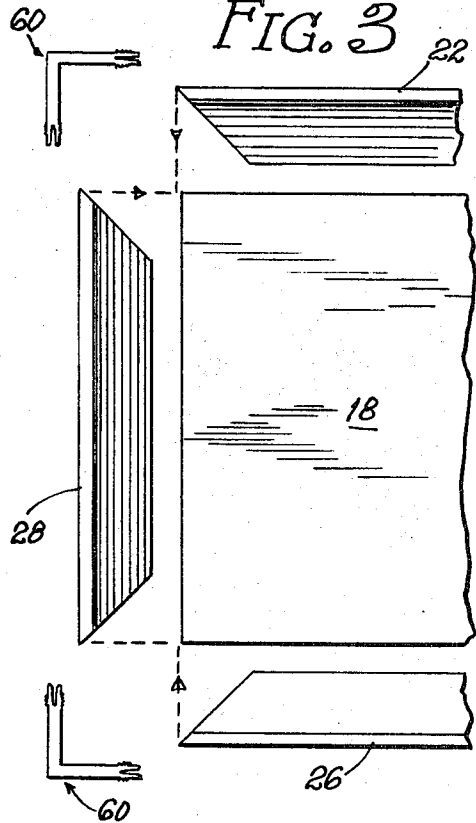


FIG. 4

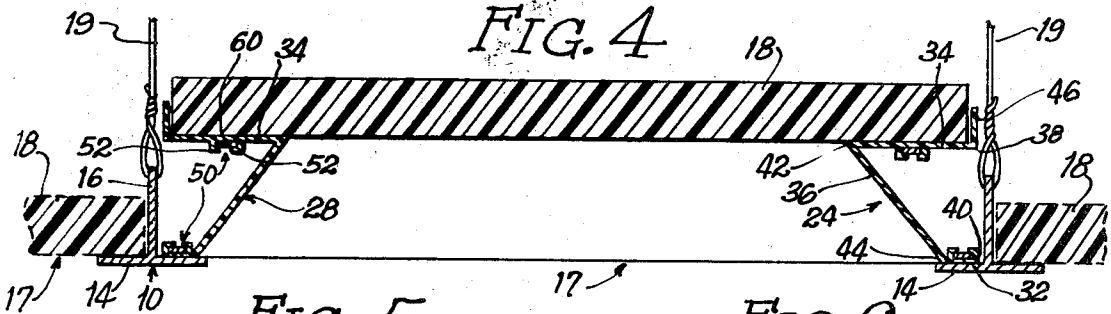


FIG. 5

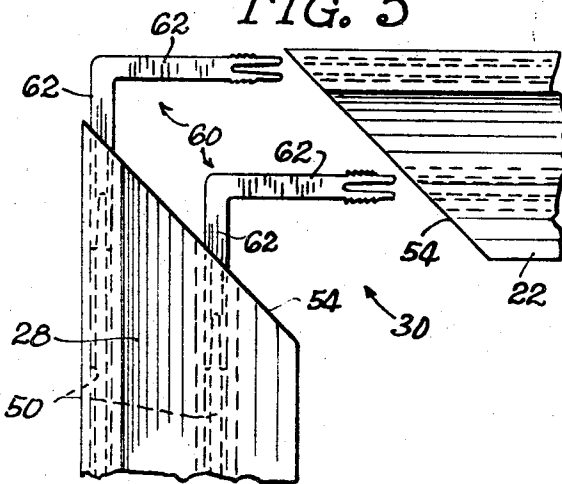


FIG. 6

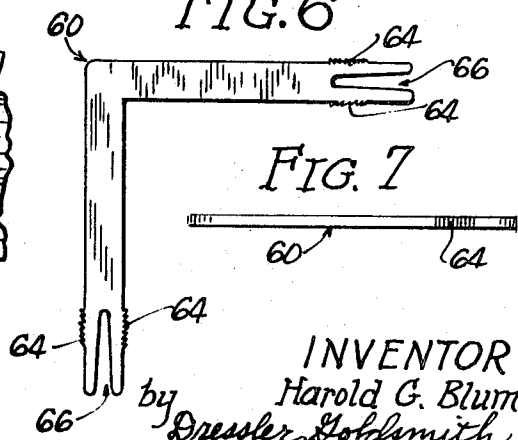
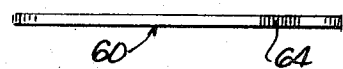


FIG. 7



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PANEL ASSEMBLY

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6 Claims

ABSTRACT OF THE DISCLOSURE

A decorative frame for supporting selected acoustical panels above the main support structure of a suspended ceiling. The decorative frame includes a plurality of side frame members each having upper and lower flanges which have outer edges in vertical alignment with each other and which are interconnected by an integral upwardly and inwardly inclined web. The frame elements are interconnected to define a rectangular frame by a mitered joint defined between the adjacent ends and an elongated slot on the adjacent surface of each of the flanges which slots terminate at the joint. An L-shaped connector has two legs respectively received in the slots of the adjacent members and the free ends of the legs have serrations defined on opposed surfaces with a recess extending inwardly from the free end of each leg and between the two surfaces to allow flexing of the surfaces during insertion of the legs into the slots.

BACKGROUND OF THE INVENTION

The present invention relates generally to suspension of acoustical insulation panels and suspending means for such panels and more particularly to improved mechanism for locating certain panels at varying heights with respect to other panels.

Recently, the interiors of many residential, office and commercial buildings have been greatly improved in appearance and provided with more effective lighting and sound control through the addition of supplemental ceilings. In many buildings of this type, particularly the older buildings, the height of the ceiling above the floors locates the lighting, normally attached to the ceiling, at a considerable distance above the desired level. Furthermore, in many buildings of this type, particularly the office and commercial structure, it has become common practice to utilize a portion of the upper area of the room to provide ducting for heating and/or cooling, as well as other ancillary equipment, such as piping and electrical wiring.

In suspended ceilings of this type, the supporting structure for the panels commonly includes a plurality of parallel, transversely spaced main runners of inverted T-bars or beams which are hung by wires, or other devices from suitable joists with cross-T-bars or beams extending between adjacent pairs of main runners at longitudinally disposed points to define openings. The ceiling panels close the openings and are usually composed of a fibrous glass stock which has superior noise reduction capacity, high thermal insulating characteristics and is generally fire-proof in construction. These panels are supported on the horizontal flanges defined by the cross member of the T-bar.

While such a suspended ceiling has found considerable commercial success, one of the objections of this type of arrangement is that the entire ceiling provides a substantially uninterrupted surface which is many times not desirable, particularly in rooms of substantial size.

SUMMARY OF THE INVENTION

The present invention contemplates a separate frame which is capable of being incorporated into a present

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day commercial suspended ceiling and which allows any number of panels to be disposed at a level different than the main level of the ceiling so as to break up the continuous, uninterrupted surface which consequently greatly enhances the appearance of the ceiling. The frame of the present invention is constructed in a manner so that the various frame side members or elements may be shipped in the unassembled condition and the elements can readily be assembled into a unitary frame structure without the aid of any type of tools.

Accordingly, the frame of the present invention includes a plurality of frame side elements each of which includes a lower and upper flange which, in the assembled condition, have outer edges in substantial vertical alignment with each other and in which the upper flange is of greater width or transverse dimension than the lower flange and the two flanges are interconnected by an integral web extending between and integral with the inner edges of the respective flanges. The side frame elements or members are interconnected to define the rectangular frame by a mitered joint and an interlock mechanism which substantially seals the joint. The interlock mechanism includes L-shaped members which cooperate to define a slot. The respective slots communicate at one end with the mitered joint and receive an L-shaped connecting member having perpendicularly disposed legs. The free ends of the legs have serrations or teeth defined on opposed surfaces and a recess extending from the free ends and between the respective surfaces to allow flexing of the surfaces during insertion of the members into the slots.

As shown on the drawings:

FIG. 1 is a perspective view, from below, of a ceiling suspension system incorporating the present invention;

FIG. 2 is a perspective view, similar to FIG. 1, showing the frame of the present invention in its assembled condition;

FIG. 3 is a fragmentary plan view of the frame with the elements shown in a condition ready for assembly;

FIG. 4 is a vertical sectional view of the frame shown in its assembled condition in the suspended ceiling;

FIG. 5 is an enlarged fragmentary plan view of the interlock mechanism of the present invention;

FIG. 6 is an enlarged plan view of one of the interlocking elements; and

FIG. 7 is a side elevation view of the interlock element shown in FIG. 6.

FIG. 1 of the drawings illustrates a fragmentary perspective view of a suspended ceiling including a ceiling support structure comprising a plurality of longitudinally extending beams such as inverted T-bars 10 and transversely extending T-bars or cross pieces 12 which cooperate to define a plurality of openings.

As more clearly shown in FIG. 4, each of the ceiling support beams includes a horizontally extending flange or support leg 14 and a vertically or upwardly extending leg 16 that is disposed intermediate the side edges of the horizontal leg 14. The portions of each of the horizontal legs or flanges 14 which extend to one side of the vertical legs or flanges 16 cooperate to define an opening 17 each of which is adapted to receive an acoustical ceiling panel 18 which is supported on the horizontal legs of the main runners 10 and cross pieces 12. The upper ends of the vertical legs 16 of the support structure are normally suspended from suitable joists or beams forming part of the building structure by wires 19 with the cross pieces 12 normally interlocked by suitable interlocking mechanism on the ends of the cross pieces 12 and on the main runners 10. Since the support structure per se is well known and does not form any part of the present invention, no further detailed description thereof is necessary.

According to the primary aspect of the present invention, means are provided for supporting selected ones of the panels 18 in a position spaced above the horizontal legs 14 a distance greater than the heights or vertical dimensions of the vertical legs 16 of the ceiling support structure.

The means of the present invention comprises a frame 20 including frame elements 22, 24, 26 and 28. The respective side frame elements 22, 24, 26 and 28 are arranged and cooperate to define a substantially rectangular frame and, for this purpose, adjacent ends of the respective side frame elements are interconnected by interconnecting means 30 which will be described in more detail hereinafter. Since each of the side frame elements is identical in cross-sectional configuration and construction, with the exception of the length of the elements, the side frame elements will be described in connection with elements 24 and 28.

Each of the side frame elements includes a lower horizontal flange 32 and an upper horizontal flange 34 which are interconnected by a web 36. The horizontal dimension of the upper flange 34 is substantially greater than the horizontal or transverse dimension of the flange 32 and the outer edges 38 and 40 of the respective flanges are in a vertically aligned position when the frame elements are interconnected in the manner shown in FIG. 4 while the inner edges 42 and 44 are integral with side edges of the web 36. Thus, it will be seen that the greater dimension of the upper flange 34 and the integral connection between the inner edges 42 and 44 will locate the web 36 in such a position so as to extend upwardly and inwardly of the edge of the lower flange, for a purpose which will be described hereinafter. The outer edges 38 of the respective upper flanges 34 have upwardly extending vertical elements or flanges 46 which cooperate to define a recess that is substantially the side of the panel 18 so that the panel will be in substantially fixed position with respect to the frame 20 when the two members are in the assembled condition shown in FIG. 4.

According to one aspect of the present invention, the interconnecting means between the adjacent ends of the respective frame elements is designed so that a substantial seal is provided between the adjacent ends thereby eliminating any transmission of light through the joints or corners. For this purpose, the interconnecting means 30 includes slots 50 defined on the adjacent surfaces of the respective upper and lower flanges 32 and 34 with the slots being disposed between the side edges 38 and 42 and 40 and 44 of the respective flanges. The means for defining the slots includes a pair of L-shaped legs or members 52 with the first legs of the L-shaped members being integral with and extending from the adjacent surfaces of each of the flanges 32 and 34. The second legs of the L-shaped members extend towards each other and are spaced below the flange surfaces to thereby define the slot 50 between the horizontally extending legs and the surface of the flange.

The interconnecting means 30 further includes means for defining a mitered joint between the adjacent ends of the flanges and which is defined by angularly formed end surfaces 54 which intersect the longitudinal axis of the respective elements at 45° so that the surfaces cooperate to substantially seal the entire corner area in the assembled condition shown in FIG. 2.

The interconnecting means 30 for the side frame elements further includes interlock means for interconnecting the frame elements to define a substantially unitary frame 20. The interlocking means cooperate with the slots 50 defined on the respective flanges 32 and 34 and include L-shaped members 60 each having legs 62 that terminate in free ends. The free ends of the respective legs or parts 62 have serrations or teeth 64 defined on opposed surfaces thereof and have a recess 66 extending from the free end and disposed between the teeth 64 of the respective surfaces of the legs.

In assembling the frame 20 of the present invention, the various side frame elements and the interlocking means are arranged in substantially the position shown in FIG. 3. Subsequently, one of the legs 62 of each of the interconnecting members 60 is forced into a slot defined on the respective flanges 32 and 34, of for example, frame element 28, to a position substantially as shown in FIG. 5. Thereafter, the second legs 62 of the interconnecting members 60 are forced into the slots 50 defined on the end of the second adjacent frame element, as for example frame element 22. During such insertion of the legs, the recess 66 allows the opposed surfaces of the legs 62 to move towards each other thereby facilitating insertion of the serrated edges or teeth 64 into the slots 50.

In the completely assembled condition of the elements 22 and 28, the adjacent surfaces 54 defining the free ends of each of the respective elements 22 and 28 are in contacting engagement with each other and the respective legs 62 are completely received in the slots 50 to securely interlock the two side frame elements. Also, it will be seen, from an inspection of FIG. 4, that the slots 50 defined on the upper flange 34 are laterally offset from the slots 50 defined on the lower flange 32. This further insures that the completely assembled frame 20 shown in the condition in FIG. 2 will define a substantially unitary frame having sealed corners which prevent the transmission of light therethrough.

In its completely assembled condition and with the acoustical ceiling panel 18 supported on the upper surface of the upper flanges 34 and in the recess defined by the vertical legs 46, it will be seen that the entire panel 18 is located a substantial distance above the adjacent panels 18 supported directly on the flanges 14 of the ceiling support structure. Furthermore, the length of the web 36 insures that the panel 18 is disposed above the upper end of the vertical leg 16 of the ceiling support structure and the integral nature of the web with the flanges 32 and 34 completely seals the area between the upper edge of the vertical legs 16 and the flange 34. Also, the fact that the upper flange has a greater transverse dimension than the lower flange and the web is integral with the inner edges of the respective flanges, will have the lower end of the outer surface defined by the web 36 extend at an acute angle with respect to the horizontal flange 14 and merges with the lower surface of the panel 18 at an obtuse angle thereby greatly enhancing the appearance of the entire assembly.

The frame assembly of the present invention allows the installer to select a pattern and locate any member of panels 18 at a height other than the height defined by the horizontally extending flanges 14. If desired, various frames having webs 36 of varying dimensions could be utilized in a single suspended ceiling thereby allowing panels to be disposed at selected tiers or various other desirable arrangements.

The particular frame of the present invention also has the advantage of being able to be shipped in its unassembled condition to considerably reduce the size of the shipping package. Once the frame elements are at the final destination, the entire frame can be simply and effectively assembled without the necessity of any tools. This allows for greater flexibility of the use of the particular frame since many home owners desiring to use such a device would not have the necessary specially adapted equipment which is many times necessary for assembling devices of this type.

A further advantage of the frame of the present invention is that the frame can be utilized in suspended ceilings which are already installed thereby allowing present owners of suspended ceilings to vary the ceiling heights of the individual panels by merely removing the panels desired to be rearranged, locating the panels in the recess defined on the frame of the present invention, and thereafter installing the frame and panel in the position shown in FIG. 4. In the assembled condition, the entire frame of the present invention is disposed entirely above the

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lower horizontal flanges of the T-bars so that the aesthetic appearance of that structure is visible in the final ceiling assembly.

What is claimed is:

1. In combination with a ceiling support structure including longitudinal and transverse T-bars defining at least one opening with said T-bars each having a horizontal leg and an upwardly extending vertical leg disposed intermediate side edges of said horizontal leg, a panel, and means supporting said panel on said horizontal legs in a position spaced from and above said horizontal legs, the improvement of said means comprising a plurality of elongated frame elements cooperating to define a rectangular frame, said elements each including upper and lower horizontal flanges with said upper flange having a transverse dimension greater than said lower flange and each of said flanges having inner and outer edges, each of said frame elements further including an inclined web integral with and extending between said flanges, and interconnecting means between adjacent ends of said elements comprising means defining a miter joint between said adjacent ends of said elements, means defining elongated slots on said elements and terminating at said joint, said slots being disposed between said flanges and inwardly of said inner and outer edges, and interlock means for each of said joints and having portions received in said slots whereby to connect said elements and form a unitary frame for said panel with said panel supported on said upper flange and spaced from said horizontal leg of said support structure.

2. The combination as defined in claim 1, including the further improvement of said interlock means comprising a member having perpendicularly disposed parts terminating in free ends, means defining serrated surfaces adjacent each of said ends, and means defining a recess extending from said ends and between said surfaces whereby to allow flexing of said surfaces during insertion of said legs into said slots.

3. The combination as defined in claim 1, including the further improvement of said means defining said elongated slots comprises a pair of L-shaped members for each of said elements and each having a first leg integral with one of said flanges and extending towards the other of said flanges, said members having second legs extending from the opposite ends of said first legs and directed towards each other whereby said slots are defined between said one of said flanges and said second legs.

4. The combination as defined in claim 1, including the further improvement of said inclined web being integral with the inner edges of said upper and lower flanges and having a width to locate said upper flange above the free end of said vertical leg, said outer edges of said flanges being in vertical alignment whereby said web of each element extends upwardly and inwardly of said inner edge of said lower flange, said upper flanges each having a vertical element integral with said outer edge, said vertical elements cooperating to define a recess substantially the size of the panel.

5. The combination as defined in claim 1, including the

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further improvement of said means defining slots including first and second means defining first and second slots extending from each end of each of said flanges with the slots on said upper flanges being laterally offset from the slots of said lower flanges, and said interlock means comprising a pair of L-shaped members each having a pair of remote ends, said remote ends being received in respective ones of said slots whereby to securely interconnect said elements.

6. In combination with a ceiling support structure including longitudinal and transverse inverted T-bars defining a plurality of openings between adjacent edges of horizontal legs of the inverted T-bars with a plurality of panels being supported on upper surfaces of said horizontal flanges, the improvement of means for supporting selected ones of said panels above said horizontal surfaces of said legs and comprising a frame having a plurality of frame elements interconnected to define a substantially rectangular opening, each said frame element comprising a web extending upwardly and inwardly of said horizontal leg and having a width substantially greater than the height of the vertical legs of said T-bars, integral upper and lower flanges extending from one side of said web and having free edges substantially in vertical alignment with each other with said lower flange supported on said horizontal leg and said upper flange spaced above the upper edge of said vertical leg, and means for connecting adjacent ends of said elements and comprising first means defining elongated slots on the adjacent surfaces of each of said horizontal flanges, said slots being laterally offset from each other and aligned with corresponding slots on the other of said elements, and interlocking means received in said cooperating aligned slots and each comprising an L-shaped member having free ends respectively received into respective ones of said slots, said free ends each having first means defining a recess extending from said ends and between opposed surfaces, and second means defining teeth on said opposed surfaces adapted to maintain said members in said slots whereby to securely interlock adjacent frame elements and provide a substantially unitary frame, said selected ones of said panels being supported on said upper surface of said upper flanges whereby to locate said selected ones of said panels substantially above the upper surface of said horizontal legs.

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PRICE C. FAW, JR., Primary Examiner

U.S. Cl. X.R.

40—155; 52—484, 656; 287—189.36