SEISMIC CLIP FOR CEILING PANELS

Inventor: Gale E. Sauer, Sinclairville, NY (US)

Correspondence Address:
Armstrong World Industries, Inc.
2500 Columbia Avenue
P. O. Box 3001
Lancaster, PA 17604-3001 (US)

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ABSTRACT
Suspended ceiling systems having seismic clips for holding ceiling panel down so as to prevent the panel from becoming dislodged during a seismic event are provided. The seismic clip generally includes at least one wing ending in a bent foot. The wing is attached to a tab that has a catch projecting therefrom. The tab and catch act to fasten the seismic clip to a grid and the wing contacts the upper surface of a panel so as to inhibit upward movement of the panel. A safety clip is also provided that is attached to a ceiling panel and that engages a portion of the ceiling grid when the ceiling panel is dislodged and falls from its predetermined position within the ceiling system.
SEISMIC CLIP FOR CEILING PANELS

CROSS-REFERENCE TO RELATED APPLICATION

[0002] This application claims the benefit of U.S. Provisional Application Serial No. 60/368,487, filed Mar. 29, 2002, which is incorporated herein in its entirety by reference.

TECHNICAL FIELD

[0003] This invention relates generally to suspended ceiling systems and, more particularly, to devices for maintaining ceiling panels in place within a ceiling grid.

BACKGROUND

[0004] As the service sector of the economy grows, more and more workers find themselves in offices rather than manufacturing facilities. The need for flexible reconfigurable office space has resulted in open plan workspaces; large rooms with reduced ceiling height and, in many cases, modular office partitions that can be moved and reconfigured with relative ease. Modular ceiling panels or suspended ceilings allow lighting, paging, and other ceiling mounted systems to be reconfigured and provide accessibility to equipment within the plenum space between the suspended ceiling and the hard ceiling. The ceiling panels of suspended ceilings also can provide fire and visual barriers between the plenum and people below.

[0005] Such suspended ceilings typically consist of a plurality of individual ceiling panels supported by a suspended gridwork made up of a series of T-shaped cross supports. L-shaped wall moldings support the ceiling panels around the periphery of the room, with the cross supports extending across the room so as to form a series of square or rectangular openings each sized to receive and support a ceiling panel. In this regard, the dimensions (i.e., length and width) of the openings generally are slightly less than the dimensions (i.e., length and width) of the ceiling panels so that the peripheral edges of the panels rest on the cross supports.

[0006] Most ceiling panels are manufactured in standard square or rectangular sizes. Some ceiling panels further have simple square cut edges and are supported within a ceiling opening with their edges resting on the cross supports. More decorative ceiling panels are, in some cases, formed with reverse rabbeted edges sometimes referred to as “kerfed edges”. Such kerfed edges on ceiling panels generally have an inverted L-shaped cross section or slot that forms a flange or a lip configured to rest on the cross supports and/or wall moldings surrounding an opening. As a result, when a ceiling panel with kerfed edges is positioned within its grid opening, the face of the panel resides slightly below the plane of the support grid. This provides a clean decorative appearance while permitting the panels to be installed quickly and easily after the gridwork is hung.

[0007] During a seismic event of sufficient intensity, such as an earthquake, the ceiling panels can become dislodged and fall from the suspended ceiling system, generally causing damage to the panels and posing an injury hazard to the room occupants. Therefore, there is a need for a suspended ceiling system that provides mechanisms by which ceiling panels remain secured therein during a seismic event.

SUMMARY

[0008] Briefly described, the present invention comprises a suspended ceiling system wherein individual ceiling panels are maintained in position during a seismic or jarring event. The ceiling system includes a series of clips that cooperate with both a ceiling grid and one or more ceiling panels to maintain the panel(s) in position adjacent the grid, even when the suspended ceiling system is exposed to seismic and/or other jarring forces. Each clip generally includes at least one wing or side section having a tab projecting therefrom, with a catch attached to or projecting from the tab. The tab and the catch of each clip cooperate with a portion of the ceiling grid so that the clip can be fastened in place. When the clip is in a locking position installed on the ceiling, its wing contacts an adjacent ceiling panel and generally inhibits upward movement of the panel edge, thereby preventing the panel from becoming dislodged from the grid.

[0009] The clips further can comprise a metal band that is bent in the center to form a pair of side sections or wings that are generally curled near their ends. A portion of each wing is cut and bent inwardly to form a tab. A section of the tab of each wing is also die cut and bent to form a catch, with the catches of each wing generally being bent toward each other. In use, each clip will be fastened to the grid of the suspended ceiling system by sliding its tabs downwardly over a bulb or center section of a T-bar of the grid so as to allow the catches to clear the bottom of the bulb. The angled catches engage the bottom of the bulb so as to retard upward movement of the clip. Each wing of each clip extends downwardly from the center of the clip on one side of the T-bar and engages and bears against the top surface of a ceiling panel adjacent that side of the T-bar so as to resist any upward movement of the ceiling panel.

[0010] The present invention also encompasses a suspended ceiling system having one or more safety clips attached to individual ceiling panels, wherein the safety clip(s) prevent the individual ceiling panels from falling even after the panels become dislodged from the ceiling grid. Each safety clip generally includes a base with an arm extending upwardly at an angle therefrom and having a hook or catch at the free end. The safety clip is attached to the upper surface of a ceiling panel adjacent a T-bar of the ceiling grid when installed. The safety clip is oriented on the ceiling panel so that its arm extends upwardly and outwardly beyond the panel edge, such that when the panel is installed on the ceiling grid, the hook of the safety clip is aligned above the adjacent T-bar. The hook accordingly engages the T-bar when the edge of the panel to which it is attached drops a sufficient distance.

[0011] The invention is also directed to the method for assembling the ceiling system. The clips are inserted onto respective beams of the ceiling grid prior to installation of a respective panel into a grid opening. With the clip properly positioned, the respective panel is inserted at an angle through the respective grid opening, such that the respective panel engages and resiliently deforms a first respective clip. As insertion continues, the panel is rotated and is then moved in a direction which is essentially parallel to the plane of the ceiling grid, causing the respective panel to engage and resiliently deform a second respective clip. The respective panel is then aligned in proper position in the respective
grid opening such that the respective panel is properly seated in the respective grid opening. In this position, the respective clips exert a force on the respective panel to maintain the panel in the properly seated position.

[0012] These and other features, objects, and advantages of the present invention will become more apparent upon review of the detailed description set forth below when taken in conjunction with the accompanying drawings, which are briefly described as follows.

BRIEF DESCRIPTION OF DRAWINGS

[0013] FIG. 1 is a perspective view of a seismic clip that embodies principles of the present invention.

[0014] FIG. 2a is a side elevational view of the seismic clip of FIG. 1.

[0015] FIG. 2b is a side elevational view of the seismic clip as in FIG. 2a with exemplary dimensions provided for particular features of the seismic clip.

[0016] FIG. 3a is a front elevational view of the seismic clip of FIG. 1.

[0017] FIG. 3b is a front elevational view of the seismic clip as in FIG. 3a with exemplary dimensions provided for particular features thereof.

[0018] FIG. 4a is a top plan view of the seismic clip of FIG. 1.

[0019] FIG. 4b is a top plan view of the seismic clip as in FIG. 4a with exemplary dimensions provided for particular features thereof.

[0020] FIG. 5a is a front elevational view the highlighted section of FIG. 3. FIG. 5b is a front elevational view as in FIG. 5a with exemplary dimensions provided for particular features thereof.

[0021] FIG. 6a is a perspective view of a suspended ceiling system embodying principles of the present invention.

[0022] FIG. 6b is a side elevational view of a section of the suspended ceiling system of FIG. 6a.

[0023] FIG. 6c is a side elevational view of an edge of a ceiling panel with an A profile.

[0024] FIG. 6d is a side elevational view of an edge of a ceiling panel with a B profile.

[0025] FIG. 6e is a side elevational view of an edge of a ceiling panel with a C and/or D profile.

[0026] FIG. 7a is a perspective view of another embodiment of a suspended ceiling system embodying principles of the present invention.

[0027] FIG. 7b is a side elevational view of a section of the suspended ceiling system of FIG. 7a.

[0028] FIG. 8a is a perspective view of yet another embodiment of a suspended ceiling system embodying principles of the present invention.

[0029] FIG. 8b is a side elevational view of a section of the suspended ceiling system of FIG. 8a.

[0030] FIG. 9 is a front elevational view of a section of a suspended ceiling system of the present invention with a seismic clip cooperating with ceiling panels and a T-bar of the grid of the system.

[0031] FIG. 10a is a side elevational view of a safety clip that embodies principles of the present invention.

[0032] FIG. 10b is a side elevational view of the safety clip of FIG. 10a with exemplary dimensions provided for particular features thereof.

[0033] FIG. 11a is a top plan view of the safety clip of FIG. 10a.

[0034] FIG. 11b is a top plan view of the safety clip as shown in FIG. 11a with exemplary dimensions provided for particular features thereof.

[0035] FIG. 12a is a front elevational view of the safety clip of FIG. 10a.

[0036] FIG. 12b is a front elevational view of the safety clip as shown in FIG. 12a with exemplary dimensions provided for particular features thereof.

[0037] FIG. 13 is a front elevational view of a section of a suspended ceiling system of the present invention with a seismic clip cooperating with a T-bar of the grid of the system prior to the installation of the ceiling panel.

[0038] FIGS. 14a through 14d are schematic horizontal sectional views, with the panel first and second edges A and B in profile, showing the progressive steps of installing the panel in the ceiling system of the present invention.

DETAILED DESCRIPTION

[0039] Referring now in more detail to the drawings, in which like numerals refer to like parts throughout the several views, FIGS. 1-9 illustrate seismic clips for use with ceiling panels and suspended ceiling systems that embody principles of the present invention. FIGS. 6a, 7a, 8a and 9 illustrate the clip of this invention as it appears when installed in various suspended ceiling systems.

[0040] FIGS. 1 through 5 illustrate one embodiment of a seismic clip 10 of the present invention. In this embodiment, each seismic clip 10 is formed from a metal band 16, such as by die-cutting, stamping or other metal formation processes. However, the present invention also encompasses seismic clips that are formed from more than one piece of material. The material from which the clip is formed may be, for example, galvanized steel, although various other metals, alloys and synthetic materials that are suitable for use in suspended ceiling systems and that meet the necessary building code requirements also may be used. As shown in FIGS. 2a and 3a, each clip 10 generally has a two wings 22a and 22b that are joined at the midpoint of the band 16 by a joint 18, and generally are aligned at an approximately 90° angle at joint 18. This point of attachment of the wings or joint 18 of the seismic clip of the present invention alternatively may be formed a continuous curvature or arc without delineated joint.

[0041] Each wing 22a and 22b generally includes a shoulder portion 24a and 24b, respectively, there along which the lower portions of wings 22a and 22b extend inwardly and downwardly toward an arcuate end or curved foot 26a and 26b, respectively. The curved feet 26a and 26b generally
curve outwardly and away from each other, although inward curvature is also contemplated by the invention. The wings 22a and 22b typically have sufficient resiliency so as to enable the wings to bend or flex outwardly, and will apply a biasing force downwardly and inwardly in response to an upward force moving there against.

[0042] Tabs 28a and 28b further are formed from or attached to an inner portion of each wing 22a and 22b. Each tab 28a and 28b is generally rectangularly shaped with each of the tabs 28a and 28b remaining attached to the wings 22a and 22b, respectively, along a point of attachment 30a and 30b, respectively. The points of attachment 30a and 30b of each tab 28a and 28b, respectively, and the wings are disposed between the joint 18 and the shoulders 24a or 24b of the wings to which the tabs are attached. Each tab is bent inwardly from the wing to which it is attached toward the opposite wing. As shown in FIG. 5b, the angle at which each tab is bent with respect to its wing typically is approximately 45%, with the tabs 28a and 28b further generally extending in substantially parallel alignment.

[0043] A section of each tab 28a and 28b generally is also formed and bent to form a catch 32a and 32b, respectively. Each catch 32a and 32b includes a prong 34a and 34b, formed or attached along inner portions of the tabs 28a and 28b. As shown in FIGS. 2 and 4, the prongs 34a and 34b are generally rectangularly shaped and are attached to the tabs at lower or second ends thereof. The prongs 34a and 34b each are bent at their points of attachment inwardly from the tabs 28a and 28b, so that they extend inwardly and upwardly at an angle relative to the tabs 28a and 28b. The catches 32a and 32b also include tongues 36a and 36b, respectively, which are bent outwardly from the tabs. Tongue 36a cooperates with prong 34a, as does tongue 36b with prong 34b, to form a lower receiving surface that may accept the bulb of a T-bar, as explained below.

[0044] FIGS. 2b, 3b, 4b and 5b provide dimensions for one example of the embodiment of the seismic clip 10 for purposes of illustration. As an example, the seismic clip may be approximately 1 to 3 inches wide from the edge of one foot to another. The clip may be approximately 1 to 2 inches high, from the joint to the bottom surface of the feet. It may also be understood that the present invention further encompasses seismic clips with dimensions that vary from those provided, since the dimensions of the seismic clip used with a particular suspended ceiling system will vary depending upon the dimensions and compositions of the other ceiling system components. Further, while the seismic clip 10 is shown herein as having two wings, the present invention also encompasses a clip have only one of each of the wings, feet, tabs, prongs, catches and shoulders.

[0045] FIGS. 6a, 7a and 8a illustrate various embodiments of the suspended ceiling systems of the present invention. In each embodiment, one or more seismic clips cooperate with both the system grid and the system ceiling panels to maintain those panels in place during a seismic event.

[0046] FIG. 6a shows a suspended ceiling system 100 formed of a ceiling grid 60 supporting panels 50 and 51 and clips 10 and 75 or 76. Clips 10 can be seismic clips as shown in greater detail in FIGS. 1-5b. Clips 75 and 76 are vector border clips that are used to help secure ceiling panels in position adjacent a wall. The grid 60 generally includes T-bars 40 and stabilizer bars 47. As shown in FIG. 6b, the grid 60 rests upon a molding flange 70, which is attached to a wall of the room in which the suspended ceiling system 100 is disposed. The seismic clips 10 of the present invention are placed along the grid 60 so that they engage ceiling panels 50. Depending upon the size of the grid 60 and the panels 50 more than one or more seismic clips 10 may be positioned to cooperate with a particular edge of a panel.

[0047] FIGS. 6c, 6d and 6e illustrate the different edge profiles of ceiling panels that may be used within the suspended ceiling system of the present invention. The A and B profiles are generally referred to within the drawings as the kerfled edges. In general, on a given ceiling panel, an edge having an A profile will be opposed by an edge having a B profile and the other two edges will have C/D profiles. The A and B profiles are generally configured so that the flange of a T-bar may be inserted into a slot in the profile, whereas profiles C and D are generally configured for a flange to be positioned above the lip of the profile when the ceiling panel is disposed within the grid.

[0048] FIGS. 7a and 7b illustrate another suspended ceiling system 200 of the present invention. Again, seismic clips 10 are shown attached to T-bars and cooperating with the kerfed edges of ceiling panels 50 so as to hold the panels in place during a seismic event. This suspended ceiling system 200 includes spring border clips 77 that act to help secure the outer boundary panels 51 of the system. A molding flange 70, as shown in FIG. 7b, supports the outer boundary panels 51 of this system 200.

[0049] FIGS. 8a and 8b show yet another embodiment of the suspended ceiling system of the present invention. This system 300 includes a grid 360 supporting panels 50 and 51, and an assortment of clips 10, 80 and 81. In this embodiment, the seismic clips 10 engage and hold the kerfed edges of the panels 50 in place, while woodworks vector clips 80 are attached to the outer boundary panels 51 and rest on molding flange 70.

[0050] FIG. 9 illustrates how some of the components of a suspended ceiling system of the present invention cooperate to maintain ceiling panels in place adjacent the system grid. The system grid includes T-bar 40, which is joined in a network to other T-bars within the suspended ceiling system. T-bar 40 includes center bar 41 that has a bulb 42 attached at the top end and a flange 44 attached at the bottom end. Side B of panel 52 and side A of panel 50 are both joined to flange 44. Panels 50 and 52 are suspended within the ceiling system in part by these connections with T-bar 40, with a seismic clip 10 mounted over T-bar 40. When installed, the seismic clip 10 is urged down over a T-bar 40. During this process, the lower surfaces of catches 32a and 32b slide over the bulb 42 of the T-bar and bias tabs 28a and 28b outward. Once the prongs 34a and 34b clear the lower edges of bulb 42, tabs 28a and 28b bias the catches 32a and 32b with prongs 34a and 34b inwardly so as to capture the bulb of the T-bar between the prongs 34a and 34b so that they cannot move upward past the bulb 42 without being moved outwardly away from the T-bar 40 so as to clear the bottom of bulb 42.

[0051] The seismic clip 10 of the present invention generally is sized so that, as the prongs 34a and 34b clear the bottom of bulb 42, the feet 26a and 26b come into biased,
engaging contact with the top surfaces of panels 52 and 50, respectively. The seismic clip 10 further may be sized or designed such that a predetermined amount of pressure is applied by the feet 26a and 26b against the panels 52 and 50, respectively, when the seismic clip 10 is fastened to a T-bar 40. Each panel within the suspended ceiling system also may have one or more seismic clips aligned along a side thereof so that one or more sides of the ceiling panel, as appropriate, can be held down by multiple seismic clips.

[0052] When the suspended ceiling system is arranged, upward force on the panels 50 and 52 is resisted by seismic clip 10, although the resistance can be overcome with a reasonable level of manual force if necessary. However, the seismic clip 10 does not inhibit lateral movement of the ceiling panels 50 and 52, which may be necessary to install and remove the panels. Each wing 22a and 22b will tend to bend upward and/or outward when upward force is applied to the bottom of feet 26a and 26b and will correspondingly tend to resist such upward force with a biased downward and/or inward counter force. As a result, if the suspended ceiling system is subjected to a seismic event, such as an earthquake, any tendency of the panels 50 and 52 to move upward during the event will be resisted by seismic clip 10. Without the ability to move upward, the ceiling panels cannot become dislodged from the ceiling system. Consequently, the panels are not subject to damage from becoming dislodged and do not pose safety hazards as falling objects. Furthermore, the seismic clips 10 may serve to help dampen the effects of vibration on the ceiling panels and also allow installation and removal of the ceiling panels even while the seismic clip is installed.

[0053] FIGS. 8a and 10a-12b illustrate an embodiment of the safety clip 81 of the present invention. In this embodiment, each safety clip 81 is formed from a metal band 89, such as by die-cutting, stamping or other metal forming processes. However, the present invention also encompasses safety clips that are formed from more than one piece of material. The material from which the safety clip is formed may be, for example, galvanized steel, although various other metals, alloys and synthetic materials that are suitable for use in suspended ceiling systems and that meet the necessary building code requirements also may be used. The safety clip 81 includes a base 82 having an arm 83 that extends upwardly away from the base at an angle and ends in a hook 84. As shown, the hook 84 includes a bight portion 85 attached to arm 83, and a leg 86 extending downwardly from the bight portion 85, although it is contemplated that the hook may include simply a substantially continuously curved or arcuate section. The leg 86 further generally is angled away from arm 83. The base 82 includes an aperture 88 through which a screw or other fastener may be inserted so as to fasten the safety clip 81 to a ceiling panel.

[0054] FIGS. 10b, 11b and 12b provide dimensions for one example of the embodiment of the safety clip 81 for purposes of illustration. As an example, the safety clip may be approximately 3 to 4 inches long from the end of the leg to the end of the base. The safety clip may be approximately 2 to 3 inches high, from the base to the bight portion. The arm may be angled away from the base at an angle of between about 90 degrees to about 120 degrees. The leg 86 may be angled away from the bight portion at an angle of between about 90 degrees to about 110 degrees. It will also be understood that the present invention further encompasses safety clips with dimensions that vary from those provided, since the dimensions of the safety clip used with a particular suspended ceiling system will vary depending upon the dimensions and compositions of the other ceiling system components.

[0055] FIG. 8a shows the safety clip 81 arranged within suspended ceiling system 300. The safety clips 81 are fastened to the upper surfaces of ceiling panels 50 and 51 by fasteners 91. The safety clips 81 are aligned adjacent the edges of the ceiling panels 50 and 51 so that their arms 82 extend upwardly and away from the panels and toward the T-bars 40 and/or adhering flanges 70. Hooks 84 are, in turn, generally aligned above the T-bars and/or adhering flanges 70, although they need not be directly aligned above the T-bars and/or adhering flanges. As shown in FIG. 8a, the safety clips 81 typically do not engage the T-bars or adhering flanges when the ceiling panels 50 and 51 are in their normal installed positions within the suspended ceiling system 300. Further during installation of the panels, the arms of the safety clips 81 may be bent or flexed away from the T-bars as they are moved up and past the adjacent T-bars and/or adhering flanges.

[0056] In the event that a ceiling panel becomes dislodged and falls from its predetermined position within the suspended ceiling system, whether by a seismic event, a force being applied to the panels by an individual or some other jarring occurrence or event, the hook of the safety clip engages the T-bar or adhering flange, thereby preventing the ceiling panel from falling more than a limited distance and being completely dislodged from the ceiling grid. The safety clip also may be used in conjunction with the seismic clip, as shown in FIG. 8a, or separately from it. The safety clip further may be used with large heavy panels, such as those made of wood, or other types panels that may be awkward to handle.

[0057] Referring to FIGS. 13, 14A, 14B, 14C, and 14D, the method of installing the seismic clips 10 and panels 50, 52 in the grid openings of the ceiling grid will be described. For ease of explanation and understanding, the installation of panel 50 will be used, however the same method applies to the other panels 52.

[0058] Referring to FIG. 13, the seismic clip is installed on the beams or T-bar 40 prior to insertion or installation of panels 50, 52. As previously described, once the prongs 34a and 34b of the seismic clip clear the lower edges of bulb 42, tabs 28a and 28b bias the catches 32a and 32b with prongs 34a and 34b inwardly so as to capture the bulb of the T-bar between the prongs 34a and 34b so that they cannot move upward past the bulb 42 without being moved outwardly away from the T-bar so as to clear the bottom of bulb 42. In this position, curved feet 26a and 26b are spaced from the flange of the T-bar 40 in both the horizontal and vertical direction. The spacing X between the flange and each respective foot is less than the thickness of the panels as measured between the upper surface of the panel and the top wall of the kerf.

[0059] With the clip 10 properly positioned on the T-bar 40, the panel 50 is brought into position toward the ceiling in an inclined position, as shown in FIG. 14A, with edge A uppermost. Each panel has a kerf 133 provided at an edge A at a lower level in the panel than kerf 135 in edge B. Both kerfs extend in horizontal planes. As this occurs, a portion of
the panel proximate edge A engages wing 22b causing the wing 22b to be resiliently displaced in the direction of arrow K. The configuration of curved foot 26a acts as a lead in surface to facilitate the insertion or installation of the panel 50. The configuration of the foot prevents the free edge thereof from distorting or digging into the panel during installation of the panels. Other configurations of feet 26a and 26b can be used without departing from the scope of the invention.

[0060] As seen in FIG. 14B, the installation of the panel 50 continues as the kerf 133 in edge A engages with the grid flange side 128 to form a hinge to pivot the panel 50 to a generally horizontal position in the ceiling system, against the grid 60, wherein lower lip 141 on edge B abuts flange side 129. As this point, the kerf 135 in edge B will align with the adjacent flange side 129. As this occurs, a portion of the panel proximate edge B engages wing 22a causing the wing 22a to be resiliently displaced in the direction of arrow L. The configuration of curved foot 26b acts as a lead in surface to facilitate the insertion or installation of the panel 50. As previously described for curved foot 26a, the configuration of the foot prevents the free edge thereof from distorting or digging into the panel during installation of the panels.

[0061] Referring to FIG. 14C, the entire panel is then shifted, or translated, toward the right toward edge B to seat the kerf 135 in edge B on its adjacent flange side 129 on the grid 60. This movement occurs in a direction which is essentially parallel to the plane of the ceiling grid. As this shift occurs, the kerf 133 in edge A slides away from and out of its adjacent flange, permitting edge A to drop until it reaches the tread 139 of registration step 136, as seen in FIG. 14D. The panel 50 now lies in the horizontal plane of the ceiling, since the level of the tread 139 of the registration step 136 in edge A is the same as that of the upper side 30 of kerf in edge B, as seen in FIG. 14D. The configuration of the feet also facilitates the sliding movement of the panel. As previously described, the free edge of each foot does not dig into the panel, and therefore does not retard the sliding movement of the panel.

[0062] The panel 50 can be slightly shifted back to the left against the vertical riser 134 of registration step 136, in what in effect is a feedback effect. This enables the installer to readily and virtually automatically minutely position the panel horizontally with a minimum of visual judgment, using simply a technique of feel.

[0063] In the position shown in FIG. 14D, the wings 22a and 22b are maintained in a slightly stressed position, such that a downward force, as represented by arrows M, is applied to the panels. Consequently, the use of the seismic clip maintains the panels in the position shown in FIG. 14D. In this position the cooperation of the flange side 129 and the registration step 136 of tread 139 prevent the lateral movement of the panel.

[0064] For removal, the steps necessary to install the panel 50 are reversed. In order to begin the removal process, an upward force is applied to the panel 50. The upward force must be sufficient to overcome the resistance of the seismic clip 10. With the resistance of the seismic clip overcome, the seismic clip 10 does not inhibit lateral movement of the ceiling panels 50 and 52, which may be necessary to install and remove the panels. Each wing 22a and 22b will tend to bend upward and/or outward when upward force is applied to the bottoms of feet 26a and 26b by the panels. However in a seismic event, in which a manual force is not applied to the bottom of the panel, the seismic clip will apply a sufficient force to the panel to resist such seismic force with a biased downward and/or inward counter force. As a result, if the suspended ceiling system is subjected to a seismic event, such as an earthquake, any tendency of the panels 50 and 52 to move upward during the event will be resisted by seismic clip 10. Without the ability to move upwardly, the ceiling panels cannot become dislodged from the ceiling system. Consequently, the panels are not subject to damage from becoming dislodged and do not pose safety hazards as falling objects. Furthermore, the seismic clips 10 may serve to help dampen the effects of vibration on the ceiling panels and also allow installation and removal of the ceiling panels even while the seismic clip is installed.

[0065] While particular embodiments of the present invention that have been discussed and disclosed herein represent the best mode known of carrying out the invention, other embodiments will suggest themselves to persons skilled in the art in view of this disclosure. Therefore, it will be understood that variations, additions, deletions, and modifications to the illustrated embodiments not specifically discussed herein may be affected without departing from the spirit and scope of the invention as set forth in the claims and that the scope of the invention should be limited only by the claims.

What is claimed is:

1. A method of assembling a group of component, the group having a ceiling grid of intersecting beams forming grid openings, clips which cooperate with the grid, and panels each of which is adapted to fit into, and extend horizontally within a respective grid opening, the method comprising the steps of:

- inserting respective clips onto respective beams of the grid prior to installation of a respective panel into a grid opening;
- installing the respective panel at an angle through the respective grid opening, such that the respective panel engages and resiliently deforms a first respective clip;
- moving the respective panel in a direction which is essentially parallel to the plane of the ceiling grid, causing the respective panel to engage and resiliently deform a second respective clip;
- aligning the respective panel in proper position in the respective grid opening such that the respective panel is properly seated in the respective grid opening, whereby the respective clips exert a force on the respective panel to maintain the panel in the properly seated positions.

2. The method as recited in claim 1 wherein the clips have curved feet which cooperate with upper surfaces of the panels when the panels are installed and seated in the grid openings.

3. The method as recited in claim 2 wherein the curved feet are configured to act as lead in surfaces to properly guide the panels during the installation of the panels into the grid openings.

4. The method as recited in claim 3 wherein the beams have upper sections and flanges which extend from lower sections thereof.
5. The method as recited in claim 4 wherein prongs of the clips extend beyond the upper sections of the beams when the clips are inserted onto the beams, tabs, attached to the prongs are biased inward so as to capture the upper sections to maintain the clips in position on the beams.

6. The method as recited in claim 5 wherein the curved feet are spaced from the flanges a distance which is less than the thickness of the panels, such that as the panels are fully installed, the clips exert a force on the panels to maintain the panels in a properly seated position.

7. The method as recited in claim 1 wherein the panels have kerfs provided at opposed edges thereof, the kerfs cooperate with flanges of the beams as the panels are installed and properly positioned on the beams.

8. The method as recited in claim 7 wherein respective kerfs have treads and vertical risers provided proximate to each other, such that when the panels are properly seated in the grid openings, the clip exerts sufficient force on the panel to maintain the flanges in engagement with the treads while preventing the flanges from moving beyond the vertical risers.

9. The method as recited in claim 1 wherein an upward force is applied to a bottom surface of the respective panel in order to remove the respective panel from the respective grid opening, the upward force being sufficient to allow the spring forces of the respective clips to be overcome such that the respective panel may be slide and angled relative to the grid.

10. A suspended ceiling system comprising:

a ceiling grid having grid openings, the ceiling grid having flanges which extend proximate the grid openings;

panels positioned in the grid openings, the panels have kerfs extending from edges thereof, the kerfs cooperate with the flanges of the ceiling grid to support the panels in the grid openings, the kerfs being dimensioned to allow the panel to move both vertically and horizontally with respect to the plane of the ceiling grid as the panels are installed or removed from the grid openings;

clips received on and maintained in position on the ceiling grid, portions of the clips cooperate with the panels to apply a force to the panels to maintain the panels in a properly seated position in the grid opening, the clip has arcuate ends which engage the panels, whereby when an appropriate force is applied to the panels, the arcuate ends for the clips will cooperate with panels to prevent damage of the panels as the clips are resiliently deformed to allow the panels to be removed from the grid openings.

11. The system as recited in claim 10 wherein the arcuate ends of the clips cooperate with upper surfaces of the panels when the panels are installed and seated in the grid openings.

12. The system as recited in claim 11 wherein the arcuate ends configured to act as lead in surfaces to properly guide the panels during the installation of the panels into the grid openings.

13. The system as recited in claim 12 wherein the ceiling grid has beams having upper sections and lower sections, the flanges extend from the lower sections.

14. The system as recited in claim 13 wherein prongs of the clips extend beyond the upper sections of the beams when the clips are inserted onto the beams, tabs, which extend from the prongs, are biased inward so as to capture the upper sections to maintain the clips in position on the beams.

15. The system as recited in claim 14 wherein the clips are in an unstressed position, the arcuate ends are spaced from the flanges a distance which is less than the thickness of the panels, such that as the panels are fully installed, the clips exert a force on the panels to maintain the panels in a properly seated position.

16. The system as recited in claim 15 wherein the panels have kerfs provided at opposed edges thereof, the kerfs cooperate with flanges of the beams as the panels are installed and properly positioned on the beams.

17. The system as recited in claim 16 wherein respective kerfs have treads and vertical risers provided proximate to each other, such that when the panels are properly seated in the grid openings, the clip exerts sufficient force on the panel to maintain the flanges in engagement with the treads while preventing the flanges from moving beyond the vertical risers.

18. A clip for use to maintain ceiling panels in position relative to ceiling grids during a seismic occurrence, the clip comprising:

at least one wing member with an arcuate free end, the at least one wing member having sufficient resiliency so as to enable the at least one wing to bend outwardly and exert a biasing force downwardly and inwardly in response to an upward force applied thereto;

tab attached to the at least one wing member, the tab has a prong extending therefrom, the prong tab extends inwardly and upwardly at an angle relative to the tab, the prong being dimensioned to cooperate with the ceiling grid to maintain the clip in position relative to the ceiling grid.

19. The clip as recited in claim 18 wherein two wing members are provided, the arcuate ends extending outwardly and away from each other.

20. The clip as recited in claim 19 wherein tongues extend from and are bent outwardly from the tabs, the tongues and tabs cooperate to form a lower receiving surface which may accept ceiling grid.

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