

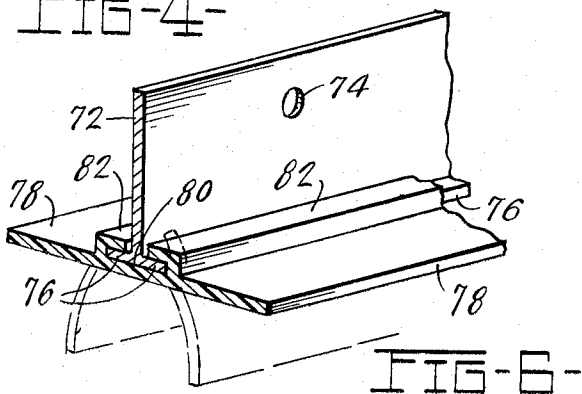
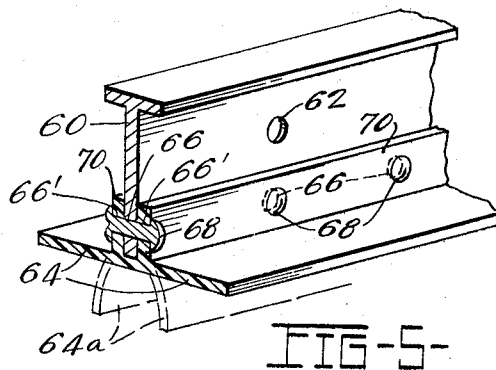
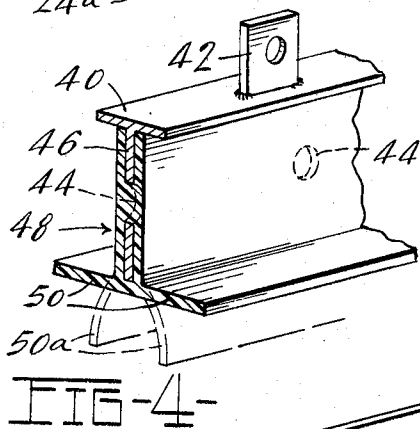
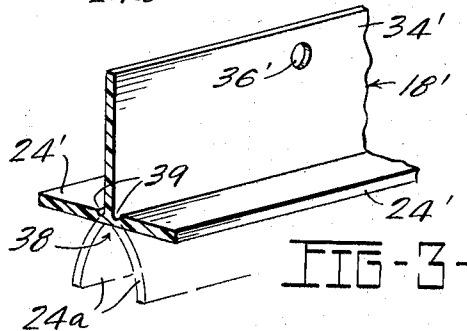
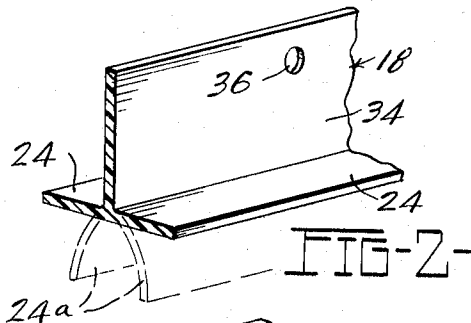
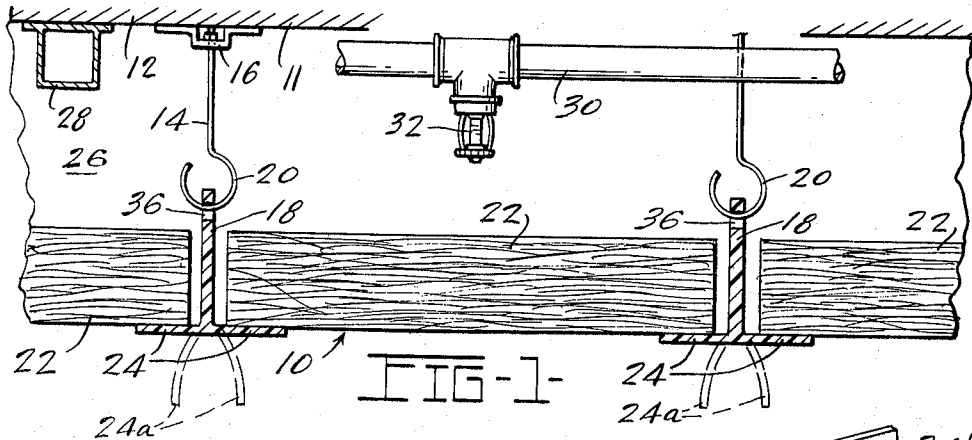
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3,246,432

HEAT SENSITIVE SUSPENDED CEILING STRUCTURE

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3,246,432

HEAT SENSITIVE SUSPENDED CEILING
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2 Claims. (Cl. 52—98)

This invention relates to improvements in construction of virtual or false ceilings and the like, and is particularly directed to heat softenable support elements for use in such construction.

False ceilings generally comprise a plurality of grid bar units adapted to be hung in areas beneath an upper floor or overlying roof in a room or building area and which are adapted to receive rectangular panels of prefabricated materials such as fibrous glass tiles, gypsum board, plywood or metal pans or the like. These ceilings usually are suspended by use of wires, hanger rods or other means, affixed to the underside of the roof or floor thereabove in a manner to present a neat, level and decorative appearance in the room therebelow.

Usually such ceilings, aside from being solely decorative, are utilized to provide means of concealment of auxiliary building equipment such as power lines, air ducts, service piping, etc., as well as to conceal rough or unfinished parts of walls or ceilings of a building. Furthermore, heat sensitive sprinklers or other fire protective devices may be included with such equipment and likewise may be concealed substantially if not completely by such ceilings; however the sprinkler heads or nozzles associated with such devices ordinarily are required to be exposed to view below such a ceiling in order to be of desired effect during a fire.

One of the objects of the present invention is to provide a simple, effective, economic, heat sensitive and decorative ceiling structure having the utilitarian quality of permitting concealment of fire nozzles and other fire protective devices associated therewith behind such a decorative ceiling while also preserving the efficacy of the fire protective devices.

Another object is to provide a heat softenable support means for a ceiling panel element comprised in this invention.

Another object is to provide a heat sensitive ceiling construction which will give way or collapse, or drop out at least in part when an abnormal or otherwise undesirable increase in temperature occurs adjacent the ceiling structure, thereby exposing the previously concealed protective devices and expediting their intended use.

The invention as herein described comprises a suspended ceiling structure having vertical rods or wires affixed to the underside of an upper floor or roof adapted to suspend the ceiling at a predetermined elevation therebelow. Suitable horizontally disposed grid bars are arranged to form a cellular skeleton framework for the structure and are adapted to support a plurality of rectangular ceiling panels arranged in predetermined patterns, the grid bars being formed or otherwise provided with narrow ledges or flange elements extending horizontally from the body or web of each of the bars in a manner to offer support for the edges of the panels placed thereon. The ledges or flange elements are formed of a heat softenable material such as for example a synthetic thermoplastic resin which will deform characteristically when subjected to relatively high ambient temperatures to permit collapse of the supporting flanges and subsequent fall out or drop out of the panels comprising the ceiling structure, the previously concealed protective devices being exposed thereby to the high ambient temperature to permit procedural functioning thereof.

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The above mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 illustrates in cross section a conventional manner in which a ceiling panel may be suspended below an upper floor by use of grid bars and wire hangers together with certain heat softenable support elements comprising this invention;

FIGURE 2 illustrates one type of grid bar comprising a heat softenable material and adapted ordinarily to support ceiling tiles or panels in a conventional manner;

FIGURE 3 illustrates another type of grid bar similar to that of FIGURE 2, but with certain modified structural characteristics adapted to induce faster collapse of the ceiling;

FIGURES 4 and 5 illustrate how a combination of metal and heat softenable resin may be joined together to form a unitary ceiling panel support bar; and

FIGURE 6 illustrates a modified type of construction comprising a heat softenable ceiling panel support element adapted for attachment to a conventional metal grid bar.

With reference now to FIGURE 1, a false ceiling 10 may be suspended from the underside 11 of a floor or roof member 12 in a conventional manner by means of hanger rods or wires 14, cleats 16, and a plurality of grid bars 18 having substantially permanent support therefrom such as for example, hook and eye connection 20 with the rods 14. The ceiling structure 10 comprises rectangular panel elements or tiles 22 adapted to rest on thermosensitive flanges 24 extending horizontally from and along the grid bars 18, and forms an enclosed space 26 with the roof member 12 thereabove. The ducts 28 adapted to convey air, water, wiring, power lines, etc., may be completely concealed in the space 26 above the ceiling. Fire protective devices such as for example, a sprinkler supply pipe 30 having thermosensitive sprinkler heads 32 associated therewith also may be concealed in the space 26 in order to more effectively preserve the decorative quality of the ceiling 10.

The effectiveness of the sprinklers when so concealed is maintained by means described herein as follows: the grid bars 18 and thermosensitive flanges 24 associated therewith may be formed of a material such as a thermoplastic resin having the characteristics and properties of deforming sufficiently when heated to a predetermined temperature to permit drop out of the ceiling panels 22 and also to permit subsequent exposure of the thermosensitive sprinkler heads 32 to the newly elevated temperature thus enabling the protective devices 30, 32 to function in their respective manner.

As may be seen in FIGURE 2, one form of grid bar 18 may comprise a vertical web member 34 having spaced apart eyelets or openings 36 adapted to receive the hanger wires 14 for support thereof. The flanges or ledges 24 extend sidewardly from the web 34 in a normally rigid form to support the ceiling panels 22 thereon. The ledges 24 may be of predetermined thickness and sufficiently heat sensitive as to become limp when subjected to increased ambient temperatures, and collapse or sag or otherwise deform to a position 24a, thus enabling the tile or panel member 22 to drop out or fall away from its normal position in the ceiling and expose the protective devices thereabove to the increased ambient temperature.

Another form of grid bar 18' may be seen in FIGURE 3 to comprise a web member 34' having eyelet openings 36' and flange members 24' adapted to deform under the influence of a change in temperature to a position 24'a. This form comprises in addition, a central linear core or zone 38 of reduced thickness along the juncture

of the flanges 24' and web 34'. This zone of reduced thickness may comprise longitudinal grooves 39 extending along the zone 38 in order to provide a greater degree of heat sensitivity at a predetermined and restricted portion of the grid bar and thus permit a more rapid collapse of the ceiling structure.

In FIGURES 4, 5, and 6 there is disclosed a type of grid bar construction wherein the provision of a main supporting bar or web element of metal supplies a greater degree of rigidity and firmness to a ceiling support structure than when construction is restricted solely to the use of thermoplastic materials per se.

With particular reference to FIGURE 4, there is indicated a main reinforcing bar 40 of metal or other heat resistant material and having eyelets 42 welded or otherwise affixed to the bar 40 for use in hanging or suspending the ceiling in a conventional manner. Lateral openings 44 may be provided in the ordinarily vertically disposed web portion 46 of the bar for the purpose of anchoring a thermosensitive element 48 thereto. The thermosensitive element 48 may be molded or extruded or otherwise attached or bonded to the bar and may be provided with horizontally disposed flange portions 50 extending longitudinally along the lower edge of the web to provide support means for a ceiling tile which may be installed thereon. The thermosensitive material may substantially surround the web portion 46 of the bar as it envelops the opposite faces thereof, the material preferably also passing laterally through the openings 44 to assist in permanently affixing the thermosensitive material to the bar. The flanges 50 while extending normally outwardly horizontally from the web portion 46 will be caused to droop or sag under the influence of a rise in ambient temperature and will assume a substantially downwardly disposed position 50a thereby.

Another type of construction as disclosed in FIGURE 5 may comprise a metal bar 60 having eyelet openings 62 therein to provide fastening means for a plurality of conventional hanger rods or wires or the like, and heat sensitive flange members 64 adapted to support ceiling panels or tiles which may be installed thereon and to be normally supported thereby. This particular construction comprises spaced openings 66 in the web 60, adapted to receive a plurality of rivets or pins 68 extending therethrough. Lips 70 projecting upwardly from the juncture of the flanges 64 and extending longitudinally therewith may be provided with correspondingly spaced openings 66' also adapted to receive the pins 68 and thereby secure the flanges 64 to the bar 60. As the flanges 64 become heated under the influence of an increased ambient temperature they will sag or collapse to a depending position 64a and thus permit drop out of the ceiling tile normally supported thereby.

In FIGURE 6 there is disclosed a type of grid bar 72 having eyelet openings 74 adapted to receive conventional hanger rods or wires (not shown) and having formed at the bottom edge thereof laterally disposed flange portions 76 adapted to receive and support thereon a pair of thermosensitive transverse ledge or flange members or elements 78 running longitudinally and contiguously along the flange portions 76 on the bar 72 to provide thermosensitive support means for ceiling tiles or panels which may be installed thereon. The ledge members 78 may be formed as a unitary structure having a common central juncture or zone 80.

Projecting upwardly and inwardly from the thermosensitive ledge members 78, and immediately adjacent the flange members 76 on the bar 72 there may be provided a pair of mating and opposed hook shaped ribs 82 adapted to reach upwardly and inwardly over the flange members

76 to provide a firm support for the ledge members 78, and the ceiling tiles which may be installed thereon.

When the heat sensitive ledge members 78 are subjected to an increased ambient temperature such as in case of fire, the ledge members characteristically will become limp and will sag to a generally downwardly extending position 78a and permit collapse or drop out of the ceiling panels mounted thereon.

In systems where lighting panels are supported by the grid or where novel decorative variations in the supporting structure are desired, the grid bars or the supporting ledge portions of such bars can be of transparent or translucent material as desired. Such light transmitting materials incorporated in the grid bars, besides providing a wider range of decorative effects, can be utilized to minimize the visibility of the supporting elements by making them relatively transparent, or can be utilized to permit additional transmission of light therethrough when incorporated in a lighting system.

While there is described above the principles of this invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of this invention.

I claim:

1. A grid bar for a suspended ceiling construction in which removable panels are supported by a plurality of said bars, said grid bar comprising a generally rigid thermally resistant upstanding web portion adapted for suspension from an overlying support structure and being aligned in a ceiling position, and a thermally responsive longitudinal flange portion continuously connected to said web portion and extending laterally therefrom along its length, said thermally responsive flange being adapted to support an edge of a ceiling panel under conditions of a predetermined thermal range and to deform and release the support of said panel edge under conditions of temperature above said thermal range, said thermally responsive flange having a linear zone of reduced thickness extending along its length at which the deformation of said flange occurs to release a supported panel edge at temperatures above said thermal range.

2. A grid bar for a suspended ceiling construction in which removable panels are supported by a plurality of said bars, said grid bar comprising a generally rigid thermally resistant upstanding web portion adapted for suspension from an overlying support structure and being aligned in a ceiling position, and a thermally responsive longitudinal flange portion continuously connected to said web portion and extending laterally therefrom along its length, said thermally responsive flange being adapted to support an edge of a ceiling panel under conditions of a predetermined thermal range and to deform and release the support of said panel edge under conditions of temperature above said thermal range, said thermally responsive flange being of different material from that of the upstanding web portion.

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