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BEAM TYPE CONSTRUCTION

Filed Dec. 30, 1960

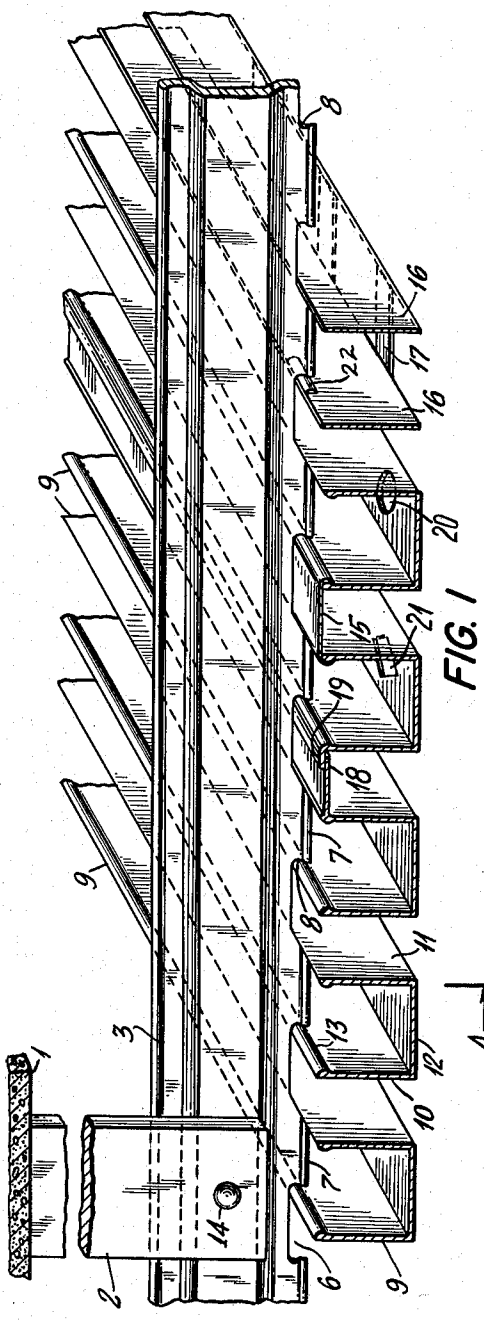

FIG. 1

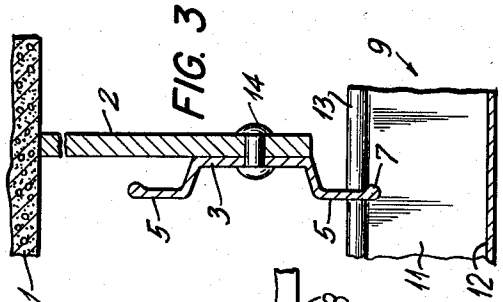

FIG. 3

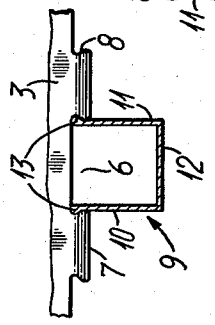

FIG. 4

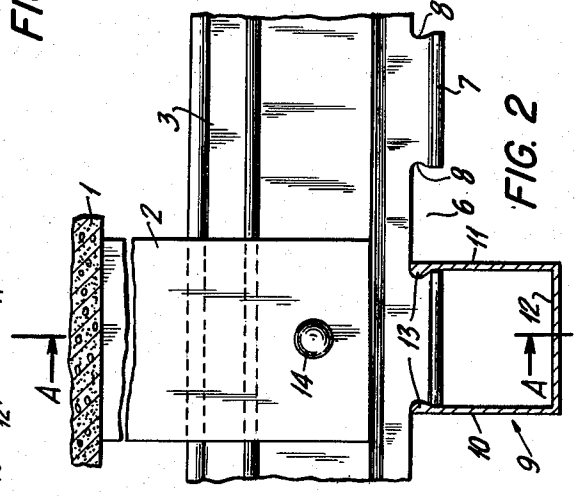

FIG. 2

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BEAM TYPE CONSTRUCTION

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4 Claims. (Cl. 189—82)

This invention relates to articles of construction and, more particularly, to a simplified form of beam construction suitable for the fabrication of exposed surfaces, for example, of the type found in industrial buildings, in which the surface may be fabricated by a single workman using virtually no tools or fastenings.

The invention finds particular application in the building industry in which it is desirable to find a simple and inexpensive yet extremely durable type of construction that is suitable, for example, for the fabrication of ceilings and walls. In the present invention, an exposed surface such as a ceiling, is constructed utilizing only the materials themselves that form the surface. No special tools are necessary. Furthermore, no fastenings are needed, such as screws and bolts, to complete the surface or to ensure that it is completely secure. Since no special tools, jigs, or fastenings are required, it may be seen that fabrication time is greatly reduced and labor expenses are, accordingly, greatly diminished.

In the present invention the beam members themselves, which may be of a general U-shape, are provided with small projections or tenons that run along the edges of the beams for their entire lengths. Thus, when the beam is viewed in cross section, two projections appear at the top of the U either on its inside or on its outside. Such a beam, for example, is placed across and attached to either a series of parallel stringers that form the timbers of a wall or to a series of parallel ceiling joists. In order to attach the beam to the stringers or to the joists, these latter members are notched with indentations similar in shape to the shape of the projections provided on the beams. However, the distance between adjacent indentations on a single stringer or joist is deliberately made not equal to the distance between the two projections on the unattached U-shaped beam, for example. Thus, in order to attach the beam to its supporting structure, the sides of the beam containing the projections must be stressed in order to fit the projections into the specially constructed indentations provided in the joists or stringers. Once the beam has been "snapped" into place, i.e., the projections have been fitted into their corresponding indentations, the beam is held in place by both the interlocking action of the projection and its associated indentation and the "spring" action of the sides of the beam forcing the projections into their associated indentations. As may be seen, if the projections are on the outside edges of the U-shaped beam, for example, the beam must be pressed inward, i.e., the U must be compressed, in order to fit the projections into their associated indentations. On the other hand, if the projections are on the inside of the U-shaped beam the U must be expanded in order to fit the projections into the indentations.

It may be appreciated that the type of construction just described results in many advantages other than that of easy fabrication. That is, since no fastenings such as bolts or screws are used, the beam-type surface may be dismantled easily simply by spreading apart, for example, the U-shaped beam and removing the projections from the indentations. All this may be done by one man, or at most two men, working together in a short period of time. Thus, the repairing of hidden electrical equipment, for example, concealed behind the beam surface is greatly facilitated. Further, the exposed beam surface may be

cut-out to provide various enclosures for lighting fixtures, for example, or for decorative material. Still further, because a rigid flexible material is all that is required, plastics as well as metals may be utilized in this type of construction.

Other advantages of the invention may be easily discerned, and the invention will be better understood by consulting the following detailed description when taken in conjunction with the drawings in which:

FIG. 1 depicts in perspective a ceiling constructed in accordance with the principles of the present invention;

FIG. 2 is an end view of one of the beams shown in FIG. 1 revealing some of the details of construction utilized in the present invention;

FIG. 3 is a section taken along the line A—A of FIG. 2; and

FIG. 4 is an end view of a beam constructed in accordance with the principles of this invention but differing slightly from the type of beam depicted in FIGURES 1 and 2.

Referring now to FIG. 1, a typical ceiling constructed in accordance with the principles of the invention is depicted. Attached to the top 1 of the room enclosure, for example, to a rafter, is a vertical suspension or support 2. Support 2 is attached to a joist 3 by means of a rivet 14, for example. A number of such supports 2 are utilized in order to suspend the horizontal joist 3; however, only one of the supporting members 2 is depicted. Further, although only one joist 3 is depicted in the figure, a series of such joists extend across the entire room from wall to wall and are arranged to form a series of parallel horizontal members spaced a given distance from each other.

As seen in the cross-sectional view of a typical joist 3 in FIG. 3, each joist has a flange 5. This flange extends along the entire length of the joist. Referring now to FIG. 2, it may be seen that the flange 5 is cut to produce a series of lips 7 with a cut-away portion 6 between adjacent lips. Each end of a lip 7 is further cut to provide an indentation 8 that has the same shape as one of the projections 13 that form portions of sides 10 and 11 of U-shaped beam 9. The projections 13 fit snugly into the indentations 8 at the end of the lips 7, and the beam 9 is accordingly attached to the joist 3. The projections 13 may extend continuously along the entire length of the beam, or they may be advantageously spaced along the beam, as projection 22 in FIG. 1.

In constructing the beam 9, the sides 10 and 11 should be preformed so as to be at an acute angle with base 12 of the beam rather than at the right angle as depicted in the figure. Thus, prior to assembly, beam 9 appears as having sides 10 and 11 that are pressed inward with respect to each other. Accordingly, when the beam is to be fitted onto the joist, the sides 10 and 11 must be pushed apart in order to fit the projections 13 into the indentations 8. In this fashion the beam has a propensity to "lock itself in" and the projections 13 are always pressed snugly into the indentations 8.

As may be noted, no special tools and, most importantly, no special fastenings such as bolts or screws are needed to fasten the beams to the ceiling joists. This is especially important in the construction of buildings in which, for example, decorative ceilings are to be provided at a minimal expense. By a simple prefabrication procedure of pre-constructing the ceiling joists and the beams with their respective indentations and projections, a covering ceiling may be applied easily by one or two workmen, at most, with a consequent reduction of expensive labor costs. The ease with which the ceiling may be constructed has its consequent advantages in the removal of the ceiling beams in the event that the space above the beams must be reached in order to repair elec-

trical wiring and the like that may be located therein. Furthermore, as depicted in FIG. 1, the beams are extremely useful in providing support for various equipment to be suspended therefrom. For example, lighting fixtures may be placed within circular cutout 20 that is easily produced in one of the beams 9. Similarly, square cutout 21 may house equipment with a corresponding base structure. Furthermore, the entire bottoms of the beams may be cut away to leave strips 17, for example, between sides 16 of the end beam of FIG. 1. As may be seen, any number of cut-outs and cut-out patterns may be utilized in the beam structure to provide any type of grid-work in the ceiling construction. Thus, the architect is provided with a myriad of construction possibilities and may easily adjust the acoustic characteristics of the ceiling to any type of room.

Turning now to FIG. 4, there is depicted an end view of the beam 9 in which the sides 10 and 11 of the beam are initially prestressed outward so as to form obtuse angles with the bottom portion 12 prior to attachment to the joist 3. Thus, in order to position the projections 13 in their corresponding indentations 8, the sides 10 and 11 must be pushed inward. Accordingly, due to the prestressing of the beam there is a constant outward force exerted by each of the sides 10 and 11 which positions the projections 13 snugly into the indentations 8 and ensures that a tight and permanent fit will be realized.

It may be necessary to provide a cover or the like between beams. Such a cover is depicted in FIG. 1 and is indicated by the numeral 15. The cover may be made to curl over the projections 13 that lie adjacent to each other and which form portions of adjacent beams. Alternatively, the covering structure between beams may take the form of the overlapping flanges 18 and 19 that are attached to the edges 11 and 10 of adjacent beams. As depicted in FIG. 1, the flanges 18 and 19 do not overlap each other at the mid-point between the beams. This is arbitrary, and the overlapping point may be made at any position desired.

It may be noted that the type of construction provided lends itself to various beam shapes within the general U-shaped family, i.e., H-shaped beams, V-shaped beams, and the like. All that is required, however, is that the beams be made of a material that is stiff enough to provide a spring-type action, thus to ensure constant and proper seating of the projections on the beams into their associated indentations. Further, the invention has been described in terms of a ceiling construction. However, it is not so limited, and may be applied usefully to form a wall structure or any type of structure that presents an exposed surface and which is to be constructed according to simple prefabrication methods. Thus, the invention should not be deemed limited to the particular beam shapes shown in the drawings, and the following claims, which define this invention, should be granted sufficient scope to embrace the numerous additions and substitutions that may be made by one practicing the invention.

What is claimed is:

1. A suspended beam ceiling comprising a plurality of substantially parallel U-shaped beams, each of the edges of the sides of said U-shaped beams containing a projection thereon, a plurality of ceiling joists, a plurality of support members for supporting the joists, each of the joists including a generally vertically disposed flange having spaced-apart cut-away portions formed along the lower edge thereof to provide a plurality of spaced-apart lips along said edge separated by the cut-away portions, opposite ends of each lip being formed with indentations adapted to receive the projections to form a ceiling of parallel disposed beams supported by the ceiling joists with each beam being supported by engagement of the projections on the sides thereof in the indentations of said joist flanges, and each of the sides of said U-shaped beams exerting an elastic force tending to retain the projection thereon into the corresponding indentation in the lip on the flange of the ceiling joist.

2. A suspended beam ceiling as recited in claim 1, wherein said projections are attached to the inside portions of said sides of said U-shaped beams, said elastic forces tend to force said sides toward each other, and each of said beams is supported by a single lip so as to cover the lip.

3. A suspended beam ceiling as recited in claim 1, wherein said projections are attached to the outside portions of said sides of said U-shaped beams, said elastic forces tend to force said sides away from each other, and each of said beams is supported by adjacent lips so as to cover the cut-away portion of the flange between the adjacent lips.

4. In combination with a suspended beam ceiling as recited in claim 1, a first plate attached to one of the sides of one of said beams and extending the length thereof, said first plate extending substantially perpendicularly outward from said one side toward the adjacent side of the adjacent one of said beams, a second plate attached to said adjacent side of said adjacent beam and extending the length thereof, said second plate extending substantially perpendicularly outward from said adjacent side toward said one side, said first and said second plates meeting between said one and said adjacent beams in overlapping fashion thereby to form a covering surface between said one and said adjacent beams.

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