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CEILING TILES WITH REINFORCING MEMBER

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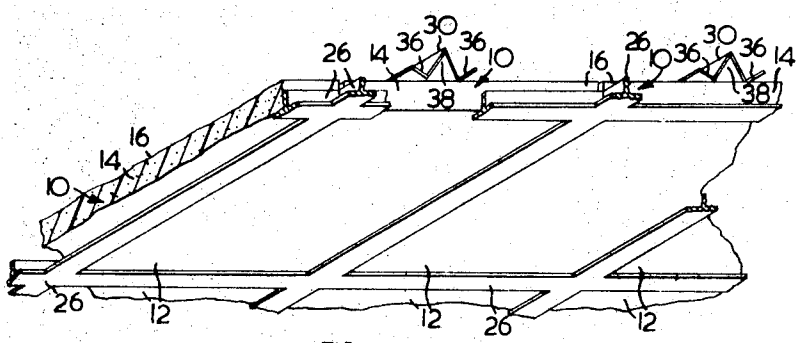


FIG. 1

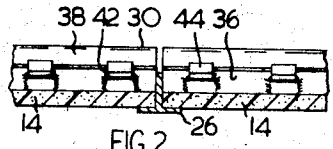


FIG. 2

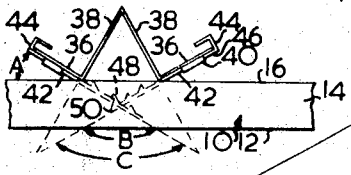


FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

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CEILING TILES WITH REINFORCING MEMBER

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ABSTRACT OF THE DISCLOSURE

An oversize ceiling tile made from board such as mineral board is provided with a reinforcing spine made of sheet metal or like material to prevent sag, the spine being adapted to be securely attached to the tile with penetrating fasteners on each side of the spine which criss-cross within the core of the tile.

The use of mineral board for ceiling tiles is well known, however, its usefulness has heretofore been limited to tile sizes up to two by four feet because of the board's tendency to sag, particularly with age, when used in larger sizes. Ceiling tiles of larger dimensions are, however, highly desirable.

Normally, large size tiles are mounted in suspended ceiling grids and the larger the tile, the less expensive the grid since fewer grid members are necessary. From an aesthetic point of view, it is also important to be able to use large tiles to prevent a "busy" looking effect, particularly in high ceilings.

Accordingly, this invention provides the means for economically utilizing large size ceiling tiles by providing a tile with an economical, light weight spine having a high degree of rigidity. The spine is secured to the tile by fasteners or clips which are retained and directed by fastener retaining means on the spine. The fasteners penetrate the back of the tile and engage the tile core to provide an effective grip without showing through the front face of the tile.

The spine will normally be formed from sheet metal. Galvanized iron of 25 mil thickness has been found to give adequate rigidity at low cost. The fasteners may be formed of similar material.

These and other advantages of the invention are set forth in the following specifications and claims considered in connection with the attached drawing to which they relate.

Referring to the drawing:

FIG. 1 is a fragmented perspective view of the tile of this invention as it is placed in a ceiling grid.

FIG. 2 is an elevation view of the tile and grid of FIG. 1.

FIG. 3 is a fragmented cross section of the tile of this invention.

FIG. 4 is a perspective view of the reinforcing member or spine which reinforces the tile.

FIG. 5 is a fragment of the reinforcing member or spine of FIG. 4.

FIGS. 6 and 7 are cross sections of other species of reinforcing members.

Referring to the drawing and particularly to FIGS. 1, 2 and 3, illustrating one mode of practising this invention, there is shown a square ceiling tile **10** comprising an outer face **12**, a core **14** and an inner face **16**. The tile may be substantially homogeneous or may be formed of two or more laminated layers. The board is supported about its periphery in suspended frame **26** (FIG. 1) (grid suspension means not shown). According to the preferred embodiment, a spine member **30** is provided having

a W-shaped cross section to provide a high degree of rigidity with light weight. The spine comprises a pair of outwardly extending longitudinal sides **36** and a longitudinal inverted V shaped center or bridge section **38**. The base of the W is in contact with the inner face **16**. The spine extends substantially between opposite sides of the periphery of the tile. Thus, the spine ends as well as the tiles are supported by frame **26** when the tile is in place in the grid. The sides **36** of the spine member are each provided with a series of spaced pairs of slots **32** (FIG. 5). Extending between the slots and partially defined by them are displaced longitudinal bands **40**. The fasteners **42** comprise a head **44**, which is provided on the upper end of shank section **46** (FIG. 3). The shank is provided adjacent its lower end with barbs **48** and point **50** on its lower end. When the spine is in place with its base against the back **16** of the tile, a fastener **42** is inserted through each pair of slots **32** between the side **36** and the displaced band **40** and is pressed through the inner facing **16** into the tile core **14**, the core being engaged by the barbs. It should be noted that the angle of the sides **36** and the length of the fasteners are selected to preclude penetration of the outer facing **12** of the tile by the fastener. The head **44** which comprises a bent portion extending normally from the shank engages the outermost edge of its related side **36** holding the spine securely in place against the inner face **16**. The fasteners are thus guided and held in position on the spine by the bands **40** and they are retained in the tile core by the barbs **48**. Because of the orientation of the sides **36**, the fasteners, which lie adjacent the sides, enter the tile at an acute angle A (FIG. 3). Since the two series of fastener retaining means **40** on the spine are out of register longitudinally, the fasteners which are inserted on both sides of the spine criss-cross within the core of the tile to hold the spine securely against removal from any angle.

In the preferred embodiment a rather shallow angle A (FIG. 3) of 30° between the sides **36** and the inner surface **16** is chosen to provide a fastener crossing angle B of 120° within the core. An acute angle C of 45° is chosen for the included angle of the center or bridge section **38**. This provides a bridge section midpoint which is spaced from the surface **16** by a distance which is sufficient to provide a high degree of rigidity, while at the same time providing a relatively small distance between the lines of contact of the spine with the tile. To obtain crisscrossing of the fasteners, it is necessary to keep the lines of contact relatively close so that long clips which might penetrate the outer surface are not necessary.

FIGS. 6 and 7 show other alternative embodiments of the spine cross section. The important properties common to the preferred embodiment as well as the other species are the angle and spacing of the outwardly extending sides to provide the proper angular relation of the clips with respect to each other and the core of the tile, as well as the degree of rigidity provided by the center section.

I claim:

1. A spine adapted for attachment to a structural tile having an inner face, a core, and an outer face, said spine being elongated and comprising a pair of spaced, narrow, longitudinal sides defined by outer and inner edges and forming, in cross section, in obtuse angle with respect to each other, and a longitudinal bridge section connecting said sides at said inner edge, at least a portion of said bridge section being spaced from the plane of said inner face, said spine having at least a line of contact at each said inner edge with said inner face, each of said sides being further provided on its surface adjacent to said inner face with fastener retaining means adapted to engage fastener means, each of said fastener means comprising a shank having a lip on one end adapted to engage said outer edge, a point on the other end and barbs adjacent

said pointed end, said shank comprising a flat elongated member adapted to be received in said fastener retaining means, said fastener means being retained thereby against its respective side to assume substantially the same angle with respect to said tile as its respective side, said fastener means being adapted for penetration of said inner face substantially adjacent said inner edge, and with said barbs being in retentive engagement with the material of said core, whereby said fastening means crisscross each other within said core to retain said spine securely to said tile.

2. A spine as in claim 1 wherein said sides and said bridge section of the spine form a W-shaped cross section.

3. A spine as in claim 1 wherein each of said fastener retaining means on said spine comprises a band connected at its ends to and having its center portion displaced from its associated side and being defined by a pair of vertically spaced parallel slots in said associated side, said fastener retaining means being adapted to receive said fastener means between said side and said displaced band portion.

4. A spine as in claim 3 wherein said fastener retaining means are provided in a substantially equally spaced series on each of said sides between said inner and said outer edges extending from one end of said spine to the other, the series on one of said sides being sufficiently out of register longitudinally from the series on the other of said sides to permit the fastener means retained thereby to crisscross within said core.

5. A reinforcing spine means adapted for attachment to a structural tile having an outer face, an inner face, a peripheral edge and a core, and adapted to be supported by said peripheral edge in a frame-like grid, said means comprising an elongated spine adapted to be mounted on said inner face and to extend across said tile with its opposite ends substantially adjacent said peripheral edge, said spine having a W-shaped cross section, the sides of said W being obtusely divergent, the base of said spine being in contact with said inner face, the sides each being provided with a series of fastener receiving means said series on one side being out of register with the series on the other side, said reinforcing means further comprising fastening means received in said fastener receiving means, and further adapted to extend beyond said base to penetrate said inner face and said core at substantially the same angle as its associated side, whereby said fastener means, when viewed in cross section, present a crisscross pattern in said core below said W cross section.

6. A structural tile comprising a sheet of tile material having an inner face, a core, an outer face, and a peripheral edge, said tile further comprising an elongated spine adjacent to said inner face and extending across said tile with its ends adjacent opposite points on said peripheral edge, said spine comprising a pair of spaced, narrow, longitudinal sides defined by outer and inner edges and forming, in cross section, an obtuse angle with respect to each other, and a longitudinal bridge section connecting

said sides at said inner edge, at least a portion of said bridge section being spaced from the plane of said inner face, said spine having at least a line of contact at each said inner edge with said inner face, each of said sides being further provided on its surface adjacent to said inner face with fastener retaining means adapted to engage fastener means, each of said fastener means comprising a shank having a lip on one end adapted to engage said outer edge, a point on the other end and barbs adjacent said pointed end, said shank comprising a flat elongated member adapted to be received in said fastener retaining means, said fastener means being retained thereby against its respective side to assume substantially the same angle with respect to said tile as its respective side, said fastener means penetrating said inner face substantially adjacent said inner edge, and with said barbs being in retentive engagement with the material of said core, whereby said fastening means crisscross each other within said core to retain said spine securely to said tile.

7. The structural tile of claim 1 wherein said sides and said bridge section of the spine form a W-shaped cross section, and wherein each of said fastener retaining means on said spine comprises a band connected at its ends to and having its center portion displaced from its associated side and being defined by a pair of vertically spaced parallel slots in said associated side, said fastener retaining means being adapted to receive said fastener means between said side and said displaced band portion.

8. The structural tile of claim 7 wherein said fastener retaining means are provided in a substantially equally spaced series on each of said sides between said inner and said outer edges extending from one end of said spine to the other, the series on one of said sides being sufficiently out of register longitudinally from the series on the other of said sides to permit the fastener means retained thereby to crisscross within said core.

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