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 [73] Assignee **Stepan Chemical Company**

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[54] **ROOFING TILE**
6 Claims, 10 Drawing Figs.

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52/543, 52/553

[51] Int. Cl. E04d 1/20,

E04d 3/32

[50] Field of Search..... 52/533,

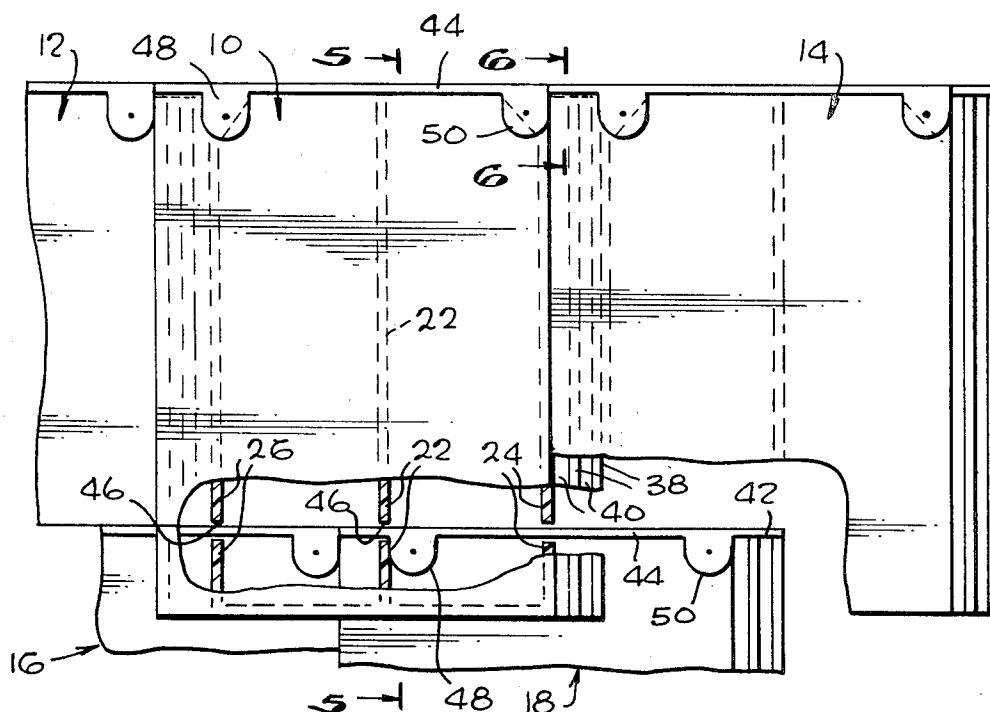
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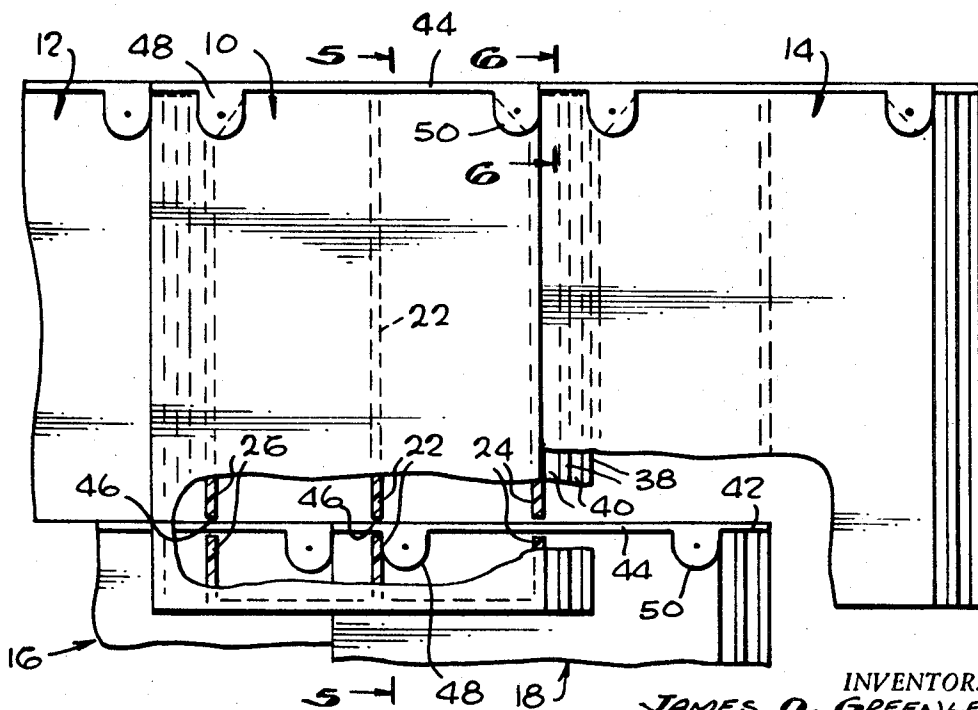
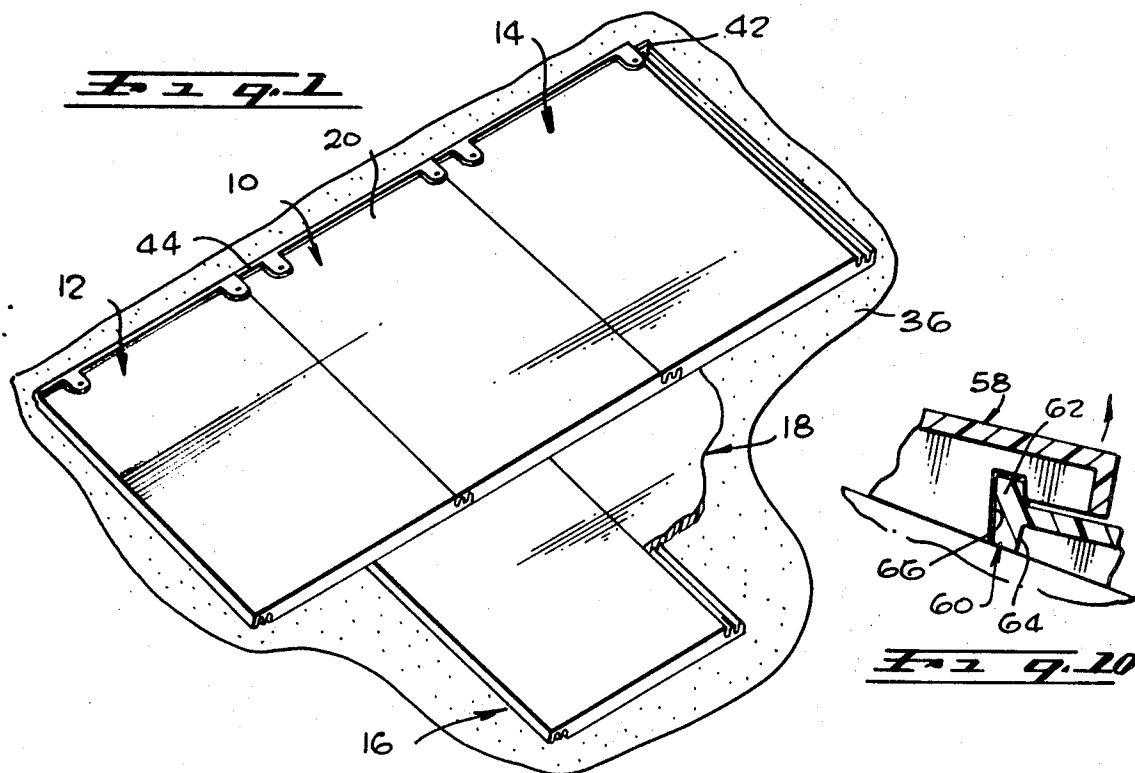
ABSTRACT: Plastic molded roofing tile arranged so that laterally positioned tiles overlap in a ridge and channel arrangement. An upstanding flange at the top end of this overlap dams water flow against movement in that direction. Longitudinally related tiles are also overlapped with an upstanding flange at the upper end of the lower tile engaging in a transverse groove through reinforcing ribs in the bottom of the upper tile. Upstanding nailing bosses in the lower tile engage between the flanges to provide a locator stop to locate and rigidize the interrelationship. In one embodiment, the upstanding flange lockingly engages the downwardly directed ribs to prevent direct upward lifting of the upper tile.



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SHEET 1 OF 2



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3,579,940

SHEET 2 OF 2

Fig. 3

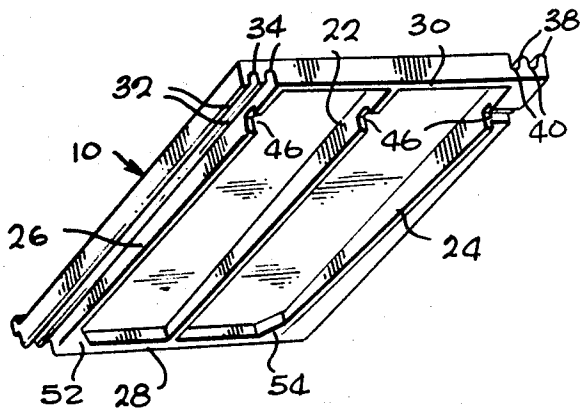


Fig. 4

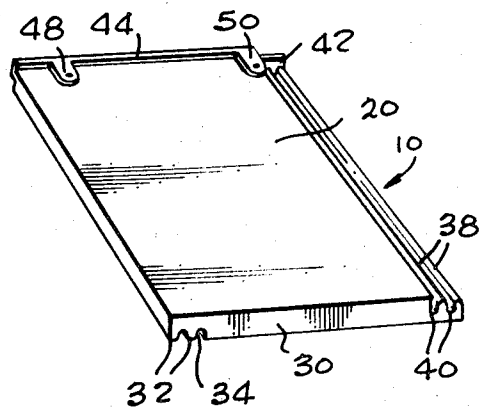


Fig. 5

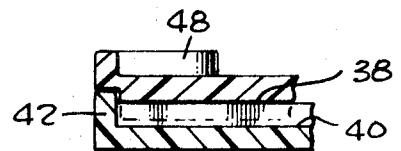
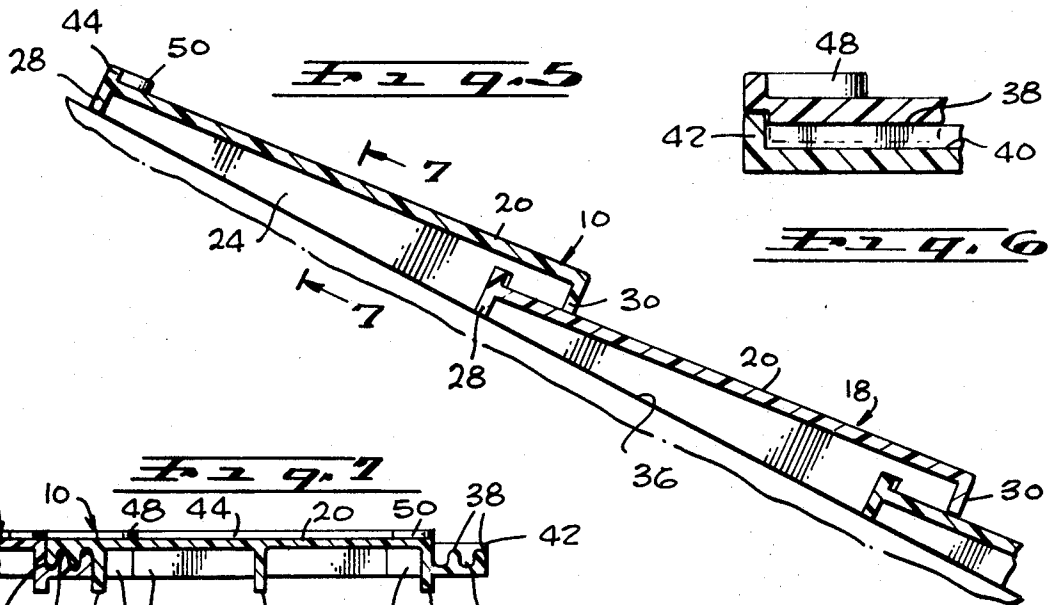


Fig. 6

Fig. 7

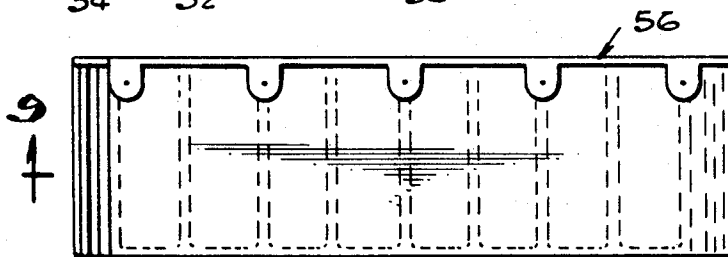
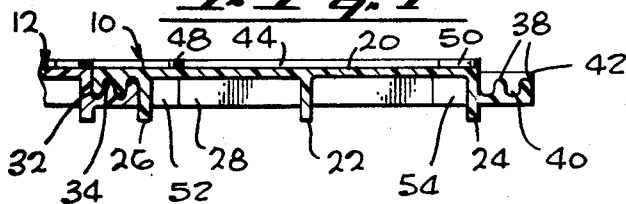


Fig. 8

Fig. 9



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1

ROOFING TILE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is directed to roofing tile, and particularly roofing tile made of moldable material. The molded tiles interlock laterally and longitudinally and are provided with integrally formed alignment stops.

2. Description of the Prior Art

The prior art abounds with roofing tile made of formable materials. Perhaps the oldest roofing tile of this type is the style presently called Spanish tile. These interlocking, half-cylindrical tubes, employed for roofing purposes, go back into antiquity. In comparatively modern times, much design effort has gone into the definition of a moldable roofing tile structure which is advantageous for one reason or another as compared to this Spanish tile. However, most of the design effort has gone into the consideration of molding from tile clay or Portland cement mixtures. Tile clay is conveniently extruded, and extrusion is more economical than individual molding. Therefore, considerable design effort has gone into roofing tile having uniform cross section.

Additionally, considerable design effort has also been devoted to the molding of individual tiles. In such a case, a uniform cross section need not be adhered to but, instead, interlocking features together with stops and dams are achievable. The tiles of the prior art include lateral overlap between adjacent tiles, including tongue and groove type of overlap. Furthermore, the prior art includes longitudinal overlap with upstanding ribs engaged in recesses.

One of the problems shared by all of the prior art is that the prior art interlocking roofing tile designs were created with the necessity of keeping their intended materials in mind. The intended materials ranged from tile clay to reinforced Portland cement. In the case of tile clay and ordinary cement, the material is quite brittle and must be formed in fairly heavy sections to produce the requisite strength. In the case of reinforced cement, the cost of reinforcement was such that only the thinnest sections were economically feasible. Asbestos reinforced cement is an example of such material. Thus, the reinforced cements were designed with minimum thickness, for economy, consistent with an adequate breaking strength. The final design strength of such roofing tile was usually comparable to the tile clay type of roofing tiles. Accordingly, the prior structures were not of optimum design character, when considering today's modern materials and the moldability criteria of various synthetic polymer compositions.

SUMMARY OF THE INVENTION

In order to aid in the understanding of this invention, it can be stated in essentially summary form that it is directed to a roofing tile. The roofing tile comprises a substantially planar main panel. The panel has upwardly facing engagement means along one lateral edge, and corresponding downwardly facing engagement means along the other lateral edge. These are arranged for lateral interengagement between adjacent tiles. An upwardly directed flange extends all the way along the top edge of the panel. The lower side of the panel has downwardly directed reinforcing ribs, and these ribs each have a notch therein for acceptance of the upper flange on the top of the adjacent tile. This provides interlock between adjacent rows of tiles. Bosses are positioned adjacent the flange and act as a locator stop to interengage with the reinforcing ribs in order to provide lateral positioning reference between adjacent rows of roofing tile.

Accordingly, it is an object of this invention to provide a roofing tile which comprises a tile panel having appropriate ridges, flanges and ribs for full interlocking with adjacent tiles. It is still another object to provide roofing tiles which have overlap between lateral tiles comprising longitudinal ridges and grooves, with the longitudinal ridges and grooves being provided with a dam at the top end thereof to prevent upward

2

water flow. It is a further object to provide adjacent roofing tile with interlocking means between adjacent rows of roofing tile, including a flange on the upper face of the lower tile interengaging with stops on the lower side of the upper tile. It is still another object to provide reinforcing ribs on the bottom of a tile molded from synthetic polymer composition material, with appropriate mixture of suitable compounds, wherein an economical and moldable tile of synthetic polymer composition material is attained. It is a further object to provide ribs for reinforcing a molded tile, so that a maximum strength is obtained with minimum material. It is a further object to provide notches in the reinforcing ribs in a tile, which notches engage with a flange on the adjacent row of tiles to provide row-to-row interlocking. It is yet another object to provide upward extending bosses on the lower tile, which bosses engage with flanges on an upper tile to provide a locator stop and lateral positioning between tiles in adjacent rows.

Still other objects, features and attendant advantages of the present invention, together with various modifications, will become apparent to those skilled in the art from a reading of the following detailed description of the preferred embodiment constructed in accordance therewith, taken in conjunction with the accompanying drawings wherein like numerals designate like parts in the several FIGS.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a plurality of roofing tiles in accordance with this invention, showing the manner in which they are interlocked when laid on a roof.

FIG. 2 is an enlarged top plan view, with parts broken away, showing the interrelationship between adjacent tiles.

FIG. 3 is a bottom perspective view of a tile in accordance with this invention.

FIG. 4 is a top perspective view of such tile.

FIG. 5 is a longitudinal section taken generally along the line 5-5 of FIG. 2.

FIG. 6 is an enlarged detail section taken generally along the line 6-6 of FIG. 2.

FIG. 7 is a transverse section taken generally along the line 7-7 of FIG. 5.

FIG. 8 is a top plan view of a similar but longer tile in accordance with this invention.

FIG. 9 is a transverse section taken generally along the line 9-9 of FIG. 8.

FIG. 10 is a fragmentary enlarged longitudinal section, with parts broken away, showing a detail of a further embodiment of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, it will be recognized that the roofing tile of this invention have identical features; thus, the description of a single roofing tile 10 serves as a description of the roofing tiles 12, 14, 16 and 18 therearound, as seen in FIG. 1.

Roofing tile 10 has a top panel 20 which is substantially all exposed to the weather. Accordingly, top panel 20 is that which is seen on the roof, and is appropriately colored and/or patterned. Top panel 20 may be formed with ridges and grooves to resemble wood shake, or it may be configured in any desired surface character. Preferably, it is substantially smooth and planar to resist the accumulation of dirt. The preferred material of roofing tile 10 is synthetic polymer composition material, with appropriate compounds mixed therein. Preferably, it is a thermoplastic compound with appropriate fillers to give proper color, strength, appearance, weather resistance, impact resistance and economy. In view of these considerations, it can be seen that the roofing tile can be marbled in appearance, or can be of one color.

In view of the moldability and strength of the molding compound for the roofing tile, top panel 20 can be formed to be fairly thin. However, in order to strengthen this panel, as well as provide the proper angular relationship of the tile with

respect to the roof deck, top panel 20 has downwardly extending reinforcing ribs 22, 24 and 26. These ribs are of such dimension as to extend downward to and contact roof deck 36. The top and bottom edges of top panel 20 are finished off with downwardly directed flanges 28 and 30. Flange 28 extends downward to contact the roof deck, and flange 30 is exposed to the weather and extends downward to contact the top panel of roofing tile 18, as shown in FIG. 5.

As is seen in FIGS. 3, 4 and 7, beneath the left side of top panel 20 are downwardly directed ridges 32 which define a pair of upwardly directed grooves 34. Adjacent and parallel to the inner groove 34, as is seen in FIG. 7, is downwardly directed rib 26. Rib 26 is preferably identical to the strengthening ribs 22 and 24, as shown. However, in a less preferred embodiment it does not extend downwardly all the way to the roof deck but instead terminates in a plane at the bottom edge of the flanges 28 and 30. In that less preferred embodiment it is thought that rib 26 need not extend down to the deck 36 because it is closely adjacent the rib 24 of the next, left tile 12, as is seen in FIG. 7. In that case, the left side of tile 10 derives its support from the direction of lateral overlap.

As is seen in the same FIGS., the right-hand side of tile 10 has an outwardly extending panel on which are positioned upwardly extending ridges 38 which define therebetween downwardly extending grooves 40. The entire panel extending to the right of rib 24 is terminated at its upward end by dam 42. As is seen in FIG. 6, dam 42 is complemented by an appropriate recess in the adjacent tile. The ridges and grooves, which are upwardly and downwardly facing on opposite edges of the tile, define longitudinal channels which are disposed on the lateral edges of the tile. Furthermore, they are dimensioned and shaped in such a manner that lateral overlap (see FIG. 7) places the ridges and grooves of the adjacent tile together. This interlocking inhibits and effectively prevents the flow of water between the tiles down to the roof deck. Furthermore, the dam 42 inhibits the flow of water upwardly along the lower grooves, to prevent wind from blowing the water out of the upper ends of the grooves onto the roof deck. Accordingly, a tight, lateral joint is achieved.

Longitudinal overlap, as well as proper angular relationship of the tile, and waterproofing of the joint between tile rows, is accomplished by resting flange 28 on the deck, and flange 30 on the top panel of the next lower tile 18, as is seen in FIG. 5. Flanges 22, 24 and 26 are reduced in depth at the outer ends so that they rest on the top of the top panel. Additionally, top panel 20 carries an upstanding transverse flange 44 at its upper edge. This flange 44 extends transversely from one side of the tile to the other, and is in line with dam 42. In a sense, dam 42 is a continuation of flange 44, but dam 42 is necessarily of lesser height, as is seen in FIGS. 4 and 7. In order to accommodate flange 44, notches 46 (best seen in FIGS. 3 and 5) are cut in all of flanges 22, 24 and 26. These notches receive the upstanding flange 44. Flange 44, together with end flange 28, form the top edge of the tile 10, and flanges 22, 24 and 26 are cut to stop at and engage upon flanges 28 and 44 of the next lowermost tile. By this means, proper support on the roof deck is accomplished, and flange 44 acts as a dam which prevents windblown water from blowing up over the top edge of the tile onto the deck.

An important feature of this invention is the presence of nailing bosses 48 and 50. As best seen in FIGS. 3-7, these bosses extend upward at the top edge of tile 10, to be even with the top edge of flange 44. They preferably have holes therethrough or knockouts therein of such size as to accept suitable nails for nailing the roofing tile down upon the roof deck. The upward extension of the bosses prevents windblown water from going down the nail holes, as well as providing strength. In addition to extending upwardly from top panel 20, the nailing bosses extend downwardly to the bottom edge of flange 28, so that the lower extension of the nailing bosses extend to the roof deck. The nailing bosses below the top panel are in the form of fillets 52 and 54, which lie against the flange 28 and respectively against ribs 26 and 24.

An important feature of the nailing bosses, in addition to providing the ability to solidly secure the roofing tile to the deck, is the fact that the upwardly extending portions of the nailing bosses 48 and 50 engage between the downwardly extending ribs below the top panels to provide lateral locator stops between adjacent longitudinal tile rows. As is seen in FIG. 2, the left-hand nailing boss 48 on tile 18 engages against rib 22 on tile 10, to provide a lateral stop. This relationship provides uniform installational character so that a workman need not exercise the same diligence or skill to achieve a properly oriented roofing tile installation.

The embodiment of the roofing tile 56, shown in FIGS. 8 and 9, is identical to the roofing tile 10, except for the fact that the roofing tile 56 is very much wider between lateral edges. It has proportionally more nailing bosses and reinforcing ribs, so that it corresponds in lateral length to a plurality of laterally disposed tiles 10. Thus, roofing tile 56 permits a more rapid application of tile without so many interconnecting joints, to provide a more secure roof at less installational cost. Roofing tile 56 is endowed with all of the features of roofing tile 10, including overlapping with lateral tiles by means of longitudinally disposed ribs and grooves, having a dam at the top end, longitudinal overlapping by means of lateral grooves and flanges, and lateral interlocking between longitudinal tiles by engagement of bosses with reinforcement ribs.

Roofing tiles 58 and 60, shown in FIG. 10, are a further embodiment. These tiles incorporate all of the features of tile 10 including lateral overlapping with longitudinal grooves, a dam at the top of the grooves, longitudinal overlapping of tiles in adjacent rows with interlocking between lateral grooves and flanges, together with interengagement of nailing bosses with reinforcing ribs to provide lateral stops between longitudinal rows. The additional feature of the embodiment of FIG. 10 is that the upwardly extending flange 62, corresponding to flange 44 and the downwardly extending flange 64, corresponding to flange 28, are angularly disposed and flange 62 enters an angularly disposed series of notches 66 in the reinforcing ribs. These flanges and notches are angularly related to the plane of the top surface, and are preferably angularly directed toward the top of the tile, to form an obtuse angle with respect to the top surface in the direction of the bottom edge of the tile. The joint is sufficiently tight that, when an attempt as by the force of wind is made to lift tile 58 in the direction of the arrow in FIG. 10, to rotate about the pivot point of the nailing bosses at the upper end of the tile 58, flange 62 jams in notches 66 to prevent such lifting. Accordingly, holddown of the bottom edge of the tile is accomplished. It is clear that the tiles 58 and 60 can be slid together during assembly but, after nailing down the top edges of the tiles at the nailing bosses, the bottom edges of the tiles can no longer be lifted. Accordingly, tile securement is accomplished.

This invention having been described in its preferred embodiment, it is clear that it is susceptible to numerous modifications and embodiments within the ability of those skilled in the art and without the exercise of the inventive faculty.

I claim:

1. A roofing tile adapted to be molded from a material including synthetic polymer composition material and comprising:
 - a planar top panel having a downturned flange at the bottom thereof, said planar top panel and said downturned flange being adapted to be substantially exposed to the weather;
 - an upturned flange at the top end of said top panel;
 - lateral edges on said top panel, said lateral edges being directed lengthwise of said roofing tile from one flanged end to the other flanged end, said lateral edges being adapted to laterally overlap and interlock with laterally adjacent identical tile;
 - at least one nailing boss on said roofing tile, said nailing boss being positioned adjacent said upturned flange, and extending upwardly from said top panel; and
 - at least one longitudinal rib formed beneath said top panel, a notch in said longitudinal rib adjacent said downturned

flange, said notch in said longitudinal rib being positioned to engage said upturned flange of a longitudinally overlapping identical tile, said nailing boss extending upward to engage beside the rib to provide a lateral stop between adjacent rows of assembled tiles whereby individual tiles of the next adjacent row are accurately positioned against previously assembled tiles of the subjacent row.

2. The roofing tile of claim 1 wherein said roofing tile has two nailing bosses adjacent said upturned flange, each of said nailing bosses extending upwardly from said top panel, at least as far as said upturned flange so that either one of said nailing bosses can act as a stop against the longitudinal rib beneath a longitudinally adjacent overlapping tile.
3. The roofing tile of claim 2 wherein there are two downwardly extending ribs beneath said top panel, said downwardly extending ribs being spaced from each other to strengthen said top panel, each of said ribs having a said notch therein, and each of said ribs being shaped along the edge away from said top panel in such a manner as to engage a roof deck on one side of said notch and the adjacent tile which it is overlapping on the other side of said notch, said notches in said ribs thus positionally defining adjacent overlapped roofing tile.
4. The roofing tile of claim 1 wherein said

upturned flange and said notch in said reinforcing rib are obtusely, angularly related with respect to said top surface of said roofing tile so that, when adjacent longitudinal tiles are overlapped and said flange is engaged in said notch, the upper tile is restrained from direct upward motion by interengagement with the adjacent tile.

5. The roofing tile of claim 4 wherein said roofing tile has two nailing bosses adjacent said upturned flange, each of said nailing bosses extending upwardly from said top panel, at least as far as said upturned flange so that either one of said nailing bosses can act as a stop against the longitudinal rib beneath a longitudinally adjacent overlapping tile.

6. The roofing tile of claim 5 wherein there are two downwardly extending ribs beneath said top panel, said downwardly extending ribs being spaced from each other to strengthen said top panel, each of said ribs having a said notch therein, and each of said ribs being shaped along the edge away from said top panel in such a manner as to engage a roof deck on one side of said notch and the adjacent tile which it is overlapping on the other side of said notch, said notches in said ribs thus positionally defining adjacent overlapped roofing tile.

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