March 5, 1935. S. W. CHAFFEE 1,993,086

ROOFING

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Fig. 1.

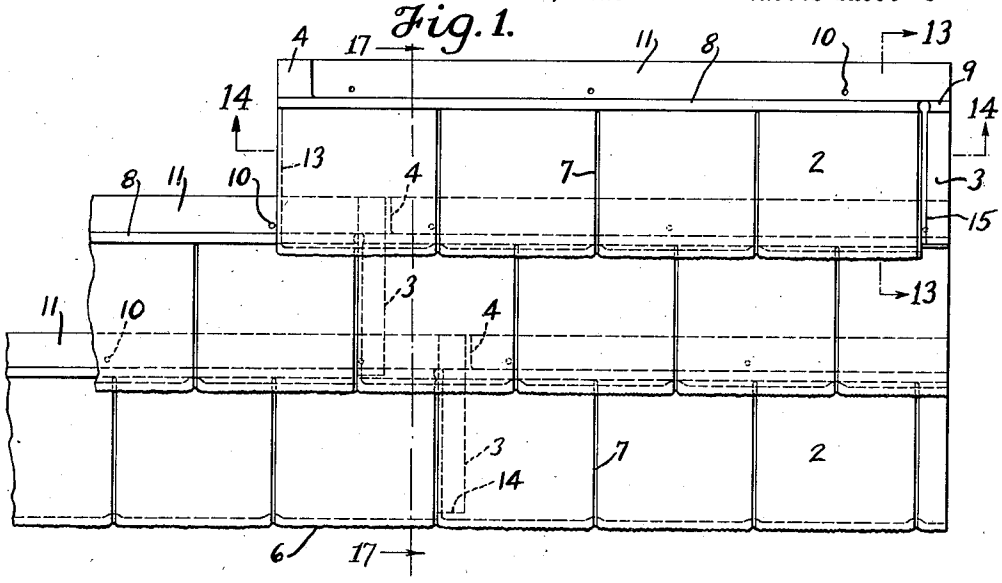



Fig. 2.

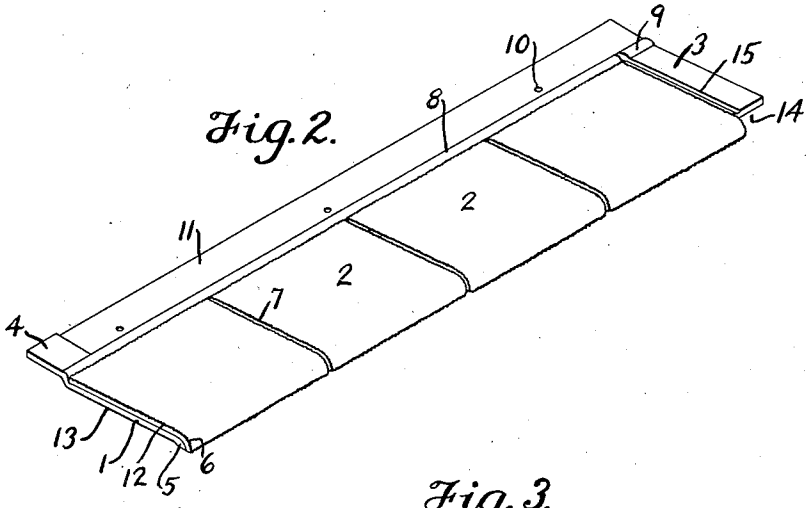
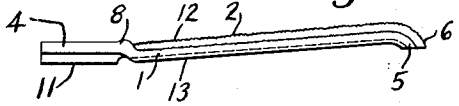



Fig. 3.



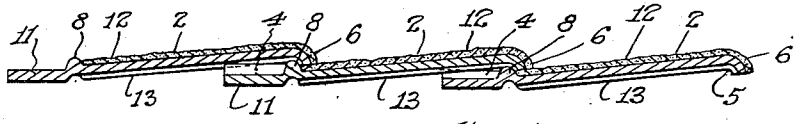




Fig. 17.

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BY Alden D. Redfield

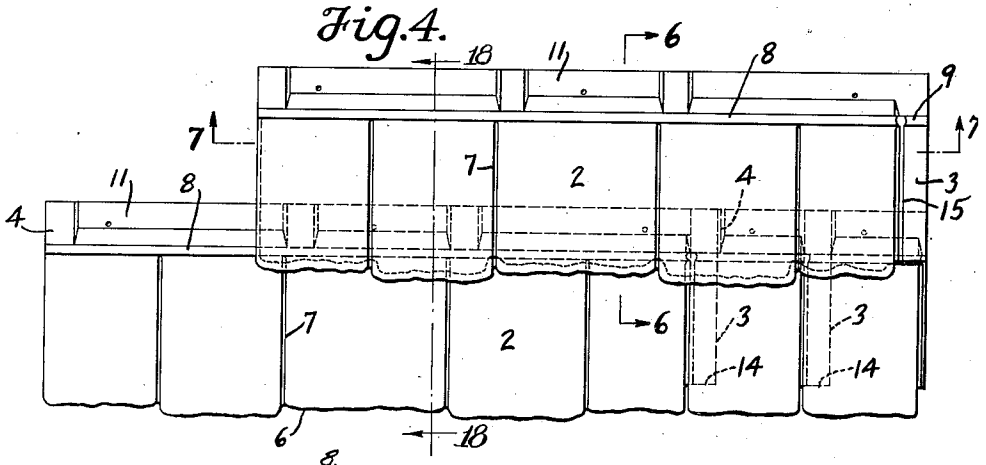
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ROOFING

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Fig. 4.



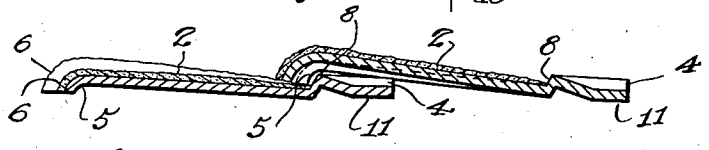




Fig. 18.

Fig. 5.

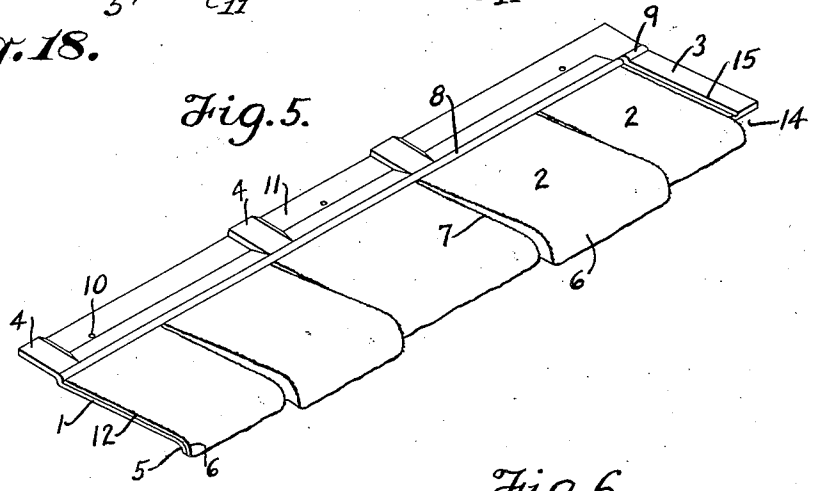



Fig. 6.

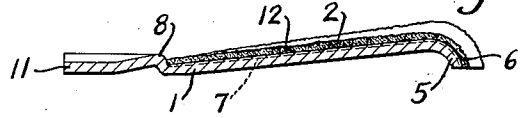
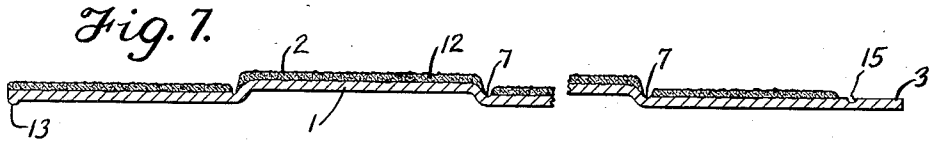



Fig. 7.




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Fig. 8.

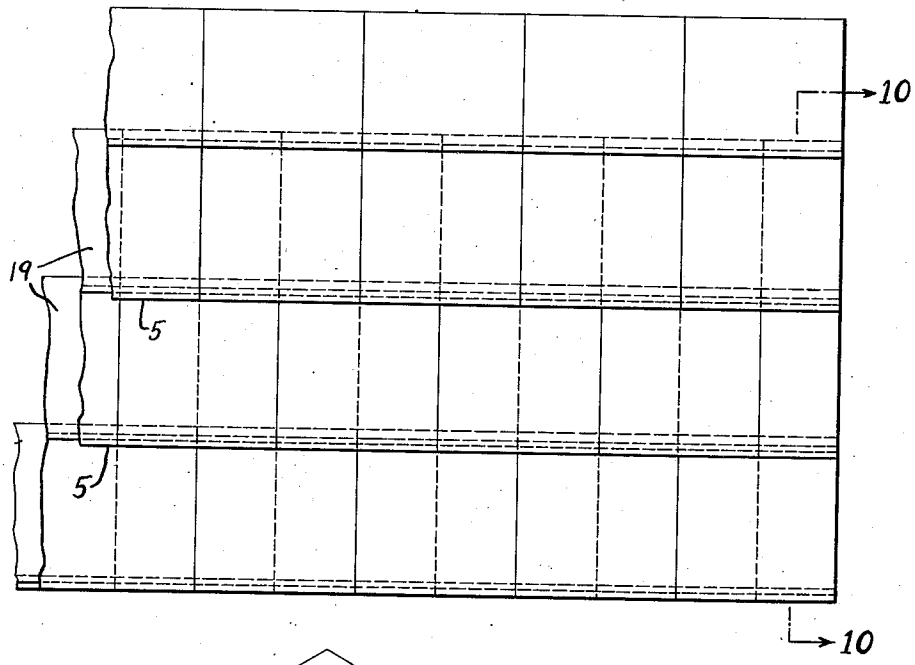



Fig. 9.

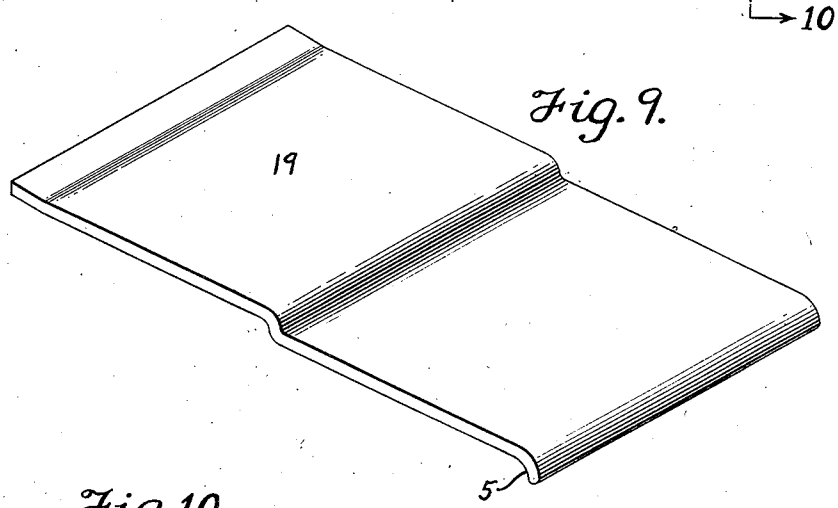
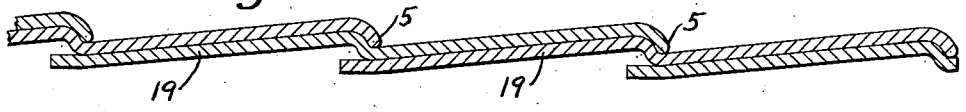



Fig. 10.




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Fig.11.

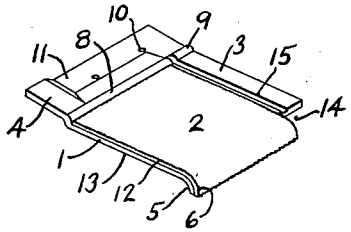



Fig.12.

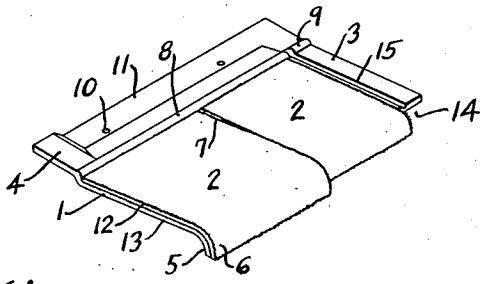



Fig.13.

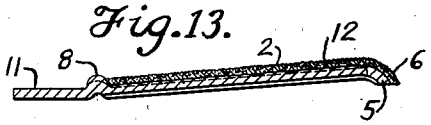



Fig.14.

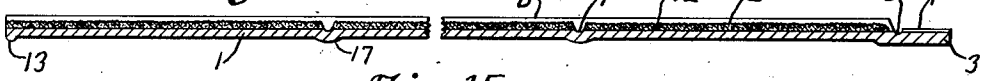



Fig.15.

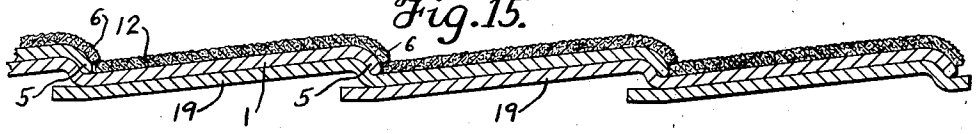
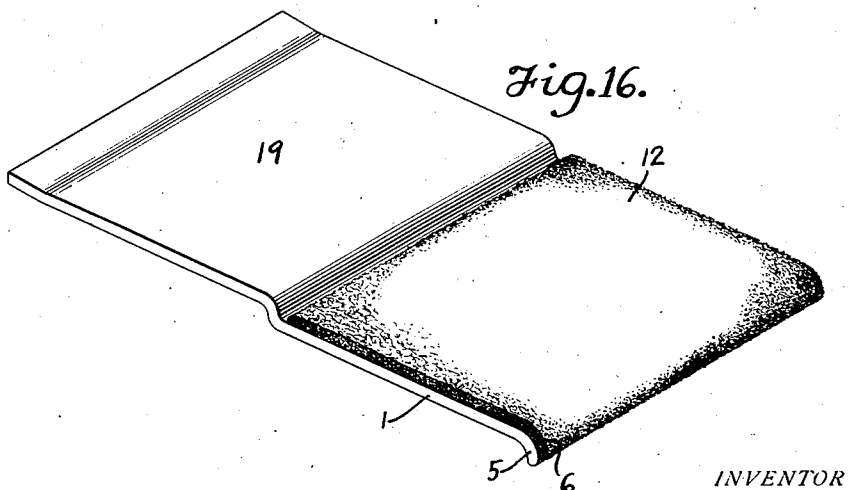



Fig.16.




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Patented Mar. 5, 1935 1,993,086

# UNITED STATES PATENT OFFICE

1,993,086

## ROOFING

Stewart W. Chaffee, New York, N. Y., assignor to Asphalt Process Corporation, New York, N. Y., a corporation of New Jersey

Application October 28, 1929, Serial No. 402,888

7 Claims. (Cl. 108—8)

This invention relates to composition shingles and shingle slabs and particularly to such shingles and slabs when constructed with any plastic material which becomes, relatively when set, stiff or rigid, such as cement-asbestos, reenforced saturated felt or any other plastic material, whether or not similar.

Composition shingles and shingle slabs have heretofore been made with bitumen saturated felt or similar base covered with a thick bituminous coating and then surfaced with various kinds of grit, which grit has sometimes been applied in colors to obtain an ornamental effect. Roofing material of this nature is known as "asphalt" roofing and has been to some extent satisfactory, but various disadvantages have manifested themselves during the many years' test to which such roofing has been subjected. One of the principal objections to asphalt roofing in shingle or slab form is the fact that owing to its flexible characteristics it does not lie rigidly on the roof, and during unfavorable weather conditions it is blown up at the lower ends, allowing water to penetrate therebeneath. Moreover, the constant flexing thus caused often weakens the body of the shingle unit and lessens its serviceability.

It has also been found that the grit surfacing applied to asphalt roofing cannot be made to adhere satisfactorily, and after considerable exposure to weather conditions the grit is washed away thus causing considerable trouble and inconvenience in clogging gutters, drains, etc. After exposure for a period of time instances have been known where almost the entire grit surfacing has been washed away by the corrosive action of the elements, thus removing the artistic coloring designs originally applied thereon as well as reducing water-proofness by permitting the weather directly to attack the base material.

One of the objects of this invention is to provide a shingle slab which is relatively stiff and which cannot be displaced by high wind or driving rain.

Another object of this invention is to provide a shingle slab to which coloring material can be permanently applied so that it cannot be dislodged or worn off by exposure to weather conditions.

Another object of this invention is to provide a relatively stiff shingle unit which can be easily applied to the roof, and which when applied gives the appearance of individually laid shingles.

A further object of this invention is to provide a roofing material which when applied gives a realistic simulation of individually laid, expensive slate, stone, wood or tile units, at a fraction of the cost of real slate shingles or tiles.

A further object of this invention is to provide a roofing material which gives the appearance of individual shingles of appreciable butt thickness.

A further object is to provide a roofing unit which will interlock with each adjacent unit and which can be securely attached to the roof frame to provide a thoroughly tight and waterproof roof.

A further object is to provide a realtively stiff and rigid roofing unit of considerable span so that it is possible to construct a water-proof roof by securing it directly to the rafters, eliminating the necessity of sheathing boards.

A still further object is to provide a roofing material possessing all the advantages of known roofing material, which is fire-proof, weather-proof, and wear-resisting, and which can be manufactured in simple manner, at low cost, and which can be readily handled in the field in convenient units.

These and other objects and advantages will more clearly appear when reference is had to the accompanying drawings, in which

Figure 1 is a plan view of a portion of a roof covered with a plurality of shingle units constructed in accordance with this invention.

Figure 2 is a perspective view of an individual shingle unit like one of those shown on the roof in Figure 1.

Figure 3 is a side elevation of the unit illustrated in perspective in Figure 2.

Figure 4 is a plan view of a portion of a roof on which a plurality of my novel roofing elements, slightly dissimilar from those shown in Figures 1, 2 and 3, have been applied.

Figure 5 is a perspective view of an individual shinge unit like any one of those shown in Figure 4.

Figure 6 is a transverse sectional view taken along line 6—6 of one of the elements of Figure 4.

Figure 7 is a longitudinal sectional view taken along line 7—7 of Figure 4.

Figure 8 is a plan view of a portion of a roof covered with a modified form of shingle unit constructed in accordance with this invention.

Figure 9 is a perspective view of one of the shingle units shown in Figure 8.

Figure 10 is a transverse sectional view of the assembled units of Figure 8 taken along line 10—10 of that figure.

Figure 11 is a perspective view of an individual unit like one division of the unit shown in Figure 2.

Figure 12 is a perspective view of an individual unit like two divisions of the unit shown in Figure 5.

Figure 13 is a transverse sectional view of one of the shingle elements of Figure 1 taken along line 13—13 of Figure 1.

Figure 14 is a longitudinal sectional view, with a portion cut away, of one of the shingle elements shown in Figure 1, taken along line 14—14 of that figure.

Figure 15 is a transverse sectional view of a portion of a roof on which a plurality of different shingle elements constructed in accordance with this invention, have been fixed.

Figure 16 is a perspective view of one of the shingle elements used in the construction shown in Figure 15.

Figure 17 is a transverse section on line 17—17 of Figure 1.

Figure 18 is a cross section on line 18—18 of Figure 4.

The new shingle slab is constructed with a base, 1, of cement or other plastic material capable of hardening, and fiber, such as asbestos, shredded wood chips, bagasse, hemp, cotton, hair or the like. The particular composition comprising base 1 is, however, not to be limited to the materials above mentioned as it is contemplated that a satisfactory base can be made of reenforced composition of saturated felt or other plastic material. This base material is procured in wet, flexible condition and may be molded or pressed to give a side elevational contour as shown in Figures 3, 6 and 10. The bottom edge of this base is shown as underturned as at 5. On the top surface of this base may be applied a coating of cementitious material 12, which coating may be applied as indicated in Figures 2 and 5 so that it is slightly thicker at the bottom edge of the slab which is beveled or rounded off to present the generally slanting or curved surface 6. The top surface may be molded or pressed into a form simulating expensive slate shingles, tiles or other heavy, substantial roofing. The edge surface 6 may be made with rough longitudinal lines thereacross to give the strata effect apparent in the edges of heavy slate shingles. The top surface 2 of the coating 12 is preferably roughened, but these surfaces may be lined in relief to give the effect of slate surfaces if desired, or may be molded, pressed, trowelled or cut to simulate any other kind of heavy, substantial roofing material.

Transverse grooves 7 are formed in the cement coating dividing the outer surface into sections which simulate individual shingles, as shown by reference character 2. These grooves make appreciable spaces to divide the outer surface or coating of the shingle units and may be formed by pressing dies into the unit, while in soft and moldable condition, to provide transverse humps 17 (Figure 14) on the under side of each unit to strengthen the units in an up and down direction. The ridges may serve the additional purpose of providing key humps like those hereinafter to be described.

Each shingle simulating section 2 may be given a different color in order to strengthen the illusion of individually laid shingles. The color may be obtained by mixing desired pigments with the cement coating. Iron oxide produces a satisfactory red, ultramarine blue may be used in producing various shades of blue or green, and lamp black may be mixed with other pigments or applied in dilute form to produce different shades varying from the basic colors. These pigments are mentioned merely to illustrate how I produce some color effects, and I do not wish it to be understood that the pigments recited are the only ones which can be used in the practice of this invention.

The coating 12 of each unit, instead of being made of cement, roughened, colored or uncolored, may be made of crushed mineral material, pressed into and bound to the base sheet 1 or to a cementitious coating thereon, or may be made of emulsified asphalt veneered with colored cement, or colored throughout, or with other materials.

The sections 2 are shown of equal width and length in Figures 1, 2 and 8 but it is contemplated that the dimension shown be varied without departing from the principles herein laid down. A more realistic simulation of some forms of individually laid roofing is obtained by making sections 2 of different or unequal width, and it is also possible to obtain a roof of very pleasing appearance by making these sections of varied or unequal length and height. Such a construction is illustrated in Figures 4, 5, 6, 7 and 12 which show the shingle simulating sections made with an unequal contour in three directions. It should be noted that the varied height of each section is obtained by commencing at a base line immediately below rib 8 where all the surfaces are in the same plane and extending the portions from this line to the various heights desired. The lines of demarcation 7, being indented into the coating, serve effectively to create the illusion that the roof is constructed of individually laid shingles and the varied width, length and height of the shingle simulating sections, presents an appearance, on the finished roof, of heavy, expensive, individually laid roofing units. When these features are combined with the feature of making each section of a different color, the illusion is complete and it is almost impossible to tell that the roof is not made of expensive, individually laid shingles or other heavy material. It is to be noted that the width of the spaces 7, between the shingle simulating sections 2, sometimes called "shadow lines" may also be varied in width to give the effects desired, and to still further add to the illusion hereinbefore described.

The elements are laid in rows or courses, and in order that they may effectively interlock to produce a satisfactory, tight and water-proof roof, I provide a ridge 8 along the top of each unit. This ridge is illustrated as being straight but may be curved in order to serve any purpose of this invention. Over this ridge overturned portion 5 of the next adjacent row of units above, fits. The rib serves as a dam between the overlap portion 11 and the surface exposed to the weather and also as a support on which the under side of the next adjacent unit above rests. Along one side of each unit is extended a fin or flange 3 which comprises the bare base material 1 and which extends beneath the unit next adjacent in the same row. Cut out portion 14 is provided in base material 1 at this end of each slab so that the end of the overturned portion 5 of the next adjacent slab may fit snugly over the fin 3 into groove 15, and the surface of the adjoining slabs may be in proper alignment. Rib 8 is extended on fin 3 as at 9 so that raised portion 4, shown clearly in Figures 2, 3 and 5,

on the interfitting end of the adjacent unit may rest thereon. Rib 9 is slightly less in relief than is rib 8 so that portion 4 may properly rest thereon yet rib 9 is not so low that it cannot provide a dam so that water cannot penetrate onto the overlap portion 11. The top surfaces of raised portions 4 which occur intermediately of the ends of the slab, serve also as supports for the undersides of the units in the next adjacent course above. Fin 3 is provided with a depression 15 (Figures 2, 3 and 7) parallel to grooves 7, into which rib or key hump 13 on the under side of the adjacent unit fits. This rib may extend into the notch between ribs 8 and 9 to further secure a tight fit between adjacent units and to lock the adjacent elements together. Rib 13 serves the additional purpose of preventing water from penetrating onto fin 3 from whence it would naturally run over the edge and into the house. Any water which collects in groove 15 is carried down the face of the slab and empties onto the surface of the adjacent slab on the next lower course, as shown in Fig. 4.

Overlap portion 11 is perforated by holes 10 at suitable points, through which fastening means are driven into the rafters or sheathing boards to hold the elements securely to the roof. Fastening these elements with nails through such holes is not an essential manner of fastening, as clips or other suitable fastening means may be employed. Moreover, the provision of holes in my new units is precautionary merely, as when nails are used they can usually be driven through the base material without risk of splitting or cracking.

The type of units shown in Figures 4 and 5 are made so that the shortest sections are of equal length and the under sides thereof, as of 5, butt securely along ridge 8. Thus when the top of the element is secured to the roof boards or rafters, each element is prevented from tipping sidewise or moving up and down and is effectively locked in place as if anchored in three points not in the same line. Moreover the workmen in the field can butt each upper row against the ridge 8 of the adjacent lower row and be assured that the elements are properly aligned and spaced. The elements are thus made self-spacing and fool-proof.

The new shingle unit may be cut with saws in the same manner as is wood, and it is not necessary that any unusual cutters be provided to the contractors who apply them to the roof. I may score the underside of each unit in a direction parallel with the grooves 7 so that odd sized units may be obtained by merely breaking each large unit along a desired score over a straight edge.

By virtue of the curved end of base sheet 1 and the beveled or rounded edges 6, the new shingle unit appears to have great body, and a roof covered with these units gives the illusion that it is covered with individual shingles of extremely heavy, expensive and durable material. In fact, cement mixed with fibrous material as herein described, does produce a durable and almost everlasting covering, yet by this invention it can be made cheaply in relatively thin strips and still give the appearance of being of such considerable weight and thickness as may be desired.

The material from which the novel unit is made is relatively light and does not weigh a great deal more than does ordinary asphalt roofing of the same size. A certain amount of flexibility manifests itself in this new slab and it can withstand the shocks concomitant with rough handling. Yet the materal is predominantly rigid and thus differs from composition roofing heretofore made, and from this fact flows advantages not before obtainable in the art. The slight flexibility of the material is procured either by virtue of the inherent pliancy of the fibrous component of the cement-fiber material or other material or by the resiliency of the reenforcement used in reenforced material.

The provision of a base sheet with formed grooves therein, and the fact that the surface material is built up from the base sheet, insures a rigid, durable and unitary piece, not weakened by any cut-out portions between the shingle simulating sections and therefore not subject to the inferior water-proofing qualities inherent in shingle units having such cut out portions. Moreover longitudinal ribs 8 and transverse ribs 13 and 17 serve further to renforce each unit. This adds to the rigidity of the individual slabs and makes it possible to reduce the head lap which consumes so much material in the composition units now in use. This feature allows units made in accordance with this invention to be manufactured at reduced cost, offsetting to an extent the additional cost of material and machinery necessary to the manufacture thereof, and bringing the product within the range of the competition presented by roofing units made of cheaper and inferior materials.

It is contemplated that shingle elements as herein described be made of several standard shapes so that, if made by means of molding or pressing apparatus, the same dies can be used to give these standard shapes, in different colors. The units may be stacked in packages in a predetermined manner so that a satisfactory arrangement in color combination and in placement may be obtained by merely unpacking and applying the units in the order in which they are packed for shipment.

By reason of the clear cut spaces between the sections 2, the raised contour of some of the shingle simulating elements, and also because of the thick-appearing butt effected by the construction shown, the much sought after "shadow effect" desired by architects and designers is procured. To further this illusion the spaces 7 between the shingle simulating sections may also be made of varied widths. This effect is only obtained by the actual fact of, or by creating the illusion that the roof is covered by individual and irregular units of material of appreciable thickness.

Figure 7 shows clearly how the raised portions appear in longitudinal section although if this section were taken along rib 8 no variation in height between the different shingle simultating sections could be perceived.

The units of the next adjacent upper row are of course staggered so that the joints between adjacent units in one row are offset from the joints between adjacent units in the rows beneath. It is not necessary to particularly describe this construction as it is well known in the art to stagger the joints between units in this manner.

Alternate rows of units like those shown in Figure 2 may, if desired, be placed between alternate rows of units like those shown in Figure 5 to give a satisfactory and well-appearing result.

Figures 8, 9 and 10 illustrate how a modified form of shingle element is constructed and laid. These elements are made to be handled as individual shingles with an extra length of head

19, which fits snugly under the adjacent elements above. The exposed portions of this type of element may be surfaced with a colored veneer (Figures 15 and 16) pressed into the base sheet or may be made entirely of one color of semirigid plastic or reenforced composition material. The veneer above mentioned may be made of cement and the plastic composition may be emulsified asphalt. These materials are however merely illustrative of one form of coating material which can be used. The long head lap illustrated may be desirable for rigid construction but this lap may be made so that portion 19 extends only a short distance above overturned portion 5 of the units in the course next adjacent above.

Figures 11 and 12 illustrate how individual units like those shown in Figures 1, 2, 4 and 5 may be made so that odd areas on a roof may be covered without breaking a full sized slab.

By this invention it is possible entirely to eliminate the roof sheathing heretofore necessary in all roof constructions. The units shown in Figures 2 and 5 are wide enough to extend over successive rafters and by suitable design these new slabs may be applied directly to the roof beams, thus effecting a considerable saving in building construction cost.

Obviously this invention is not limited to the particular embodiments herein described. It is not indispensable that all the features herein disclosed be used conjointly as various features may be effectively utilized in various combinations and subcombinations.

Having thus described my invention, I claim:

1. A shingle simulating element comprising a body so formed that the surface of the portion to be exposed of the element is raised above the normal plane of the element and having the reverse side of said portion correspondingly countersunk to form a relatively uniform thin body in said portion, the body of said portion having the butt simulating edge thereof formed with a bend with respect to the surface of said portion to provide means for interlocking with an element upon which said edge is to be overlapped, said portion to be exposed of the element being connected at the edge thereof opposite to said butt edge to a flange for underlying the portion to be exposed of an overlapping element, said flange being provided with a ridge extending along the line of joinder of said flange to the portion to be exposed of the element and so formed as to provide for interlocking with said bent edge of an overlapping element, said flange at least at the end thereof adjacent an edge of the element extending transversely of said bent edge being formed to provide a raised portion so positioned thereon and of such area and at such a height above the normal plane of the element as to extend under and to bear against a substantial part of said countersunk surface of the portion to be exposed of an overlapping element and to support the central portion thereof, the reverse side of said raised portion of the flange being countersunk to provide a shape fitting to the flange of a laterally adjacent element when lapped thereon.

2. A roofing element comprising a unitary body formed in the portion thereof to be exposed to demark a plurality of shingle simulating sections in laterally adjacent arrangement defining a single course of shingles, the surface to be exposed of at least some of said shingle simulating sections being raised above the normal plane of the element and having the reverse side of said sections correspondingly counter-sunk to form a relatively thin body in said sections, the body of said sections having the butt simulating edge thereof formed with a bend with respect to the surface to be exposed of said sections to provide in at least some sections means for interlocking with an element in a subjacent course upon which said edge is to be overlapped, said sections being connected at the edge thereof opposite to said butt edge to a flange for underlying the portion to be exposed of an overlapping element, said flange being provided with a ridge extending along the line of joinder of said sections to said flange, said ridge being so formed as to provide for interlocking with said bent edge of the sections of an overlapping element, said flange at least at the end thereof adjacent an edge of the element extending transversely of the course being formed to provide a raised portion so positioned upon the flange and of such area and at such a height above the normal plane of the element as to extend under and to bear against a substantial part of said counter-sunk surface of a section of an overlapping element and to support the central portion of said section, the reverse side of said raised portion of the flange being countersunk to provide a shape fitting when lapped thereon to the flange of an element laterally adjacent in the course.

3. A roofing element comprising a unitary body formed in the portion thereof to be exposed to demark a plurality of shingle simulating sections in laterally adjacent arrangement defining a single course of shingles, the surface to be exposed of at least some of said shingle simulating sections being raised above the normal plane of the element to a height which is different in at least some of said sections, at least some of said sections having the reverse side of said sections correspondingly counter-sunk to form a relatively thin body in said sections, the body of said sections having the butt simulating edge thereof formed with a bend with respect to the surface to be exposed of said sections to provide in at least some sections means for interlocking with an element in a subjacent course upon which said edge is to be overlapped, said sections being connected at the edge thereof opposite to said butt edge to a flange for underlying the portion to be exposed of an overlapping element, said flange being provided with a ridge extending along the line of joinder of said sections to said flange, said ridge being so formed as to provide for interlocking with said bent edge of the sections of an overlapping element, said flange at least at the end thereof adjacent an edge of the element extending transversely of the course being formed to provide a raised portion so positioned upon the flange and of such area and at such height above the normal plane of the element as to extend under and to bear against a substantial part of said counter-sunk surface of a section of an overlapping element and to support the central portion of said section, the reverse side of said raised portion of the flange being counter-sunk to provide a shape fitting when lapped thereon to the flange of an element laterally adjacent in the course.

4. A roofing element embodying the features recited in claim 2 in which the flange is provided with a plurality of said raised portions, certain of said raised portions being so positioned on the flange and of such area and at such a height above the normal plane of the element as respectively to extend under and to bear against a sub-

stantial part of the counter-sunk surface of a plurality of sections of an element in an overlapping course and thereby to support the central portion of said sections.

5. A roofing element comprising a unitary body formed to demark upon the portion to be exposed thereof a plurality of laterally arranged shingle simulating sections defining a single course of shingles and all connected along a common line of joinder extending course-wise of the element to a flange to be overlapped by a roofing element in an adjacent superimposed course, the surface to be exposed of at least some of said sections being at different heights in relation to said flange, said element having adjacent the line of joinder of said sections to said flange a ridge extending in the course-wise dimension of the element, the butt simulating edges of at least some of said sections being so formed in the element as to provide an edge to be exposed of the element capable of fitting to said ridge and with said ridge to provide a weather-tight construction when a plurality of elements are assembled in courses.

6. A roofing element embodying the features as recited in claim 5 in which some of the sections have at least one of their dimensions of course-wise width and of length transverse to the course-wise dimension of the element different in the different sections.

7. A roof construction comprising a plurality of roofing elements laid in courses with the courses in overlapping arrangement, each of said elements having a unitary body formed to demark upon a portion to be exposed thereof a plurality of laterally arranged shingle simulating sections defining in said element a single course of shingles, said sections in each element being connected along a common line of joinder extending course-wise of the element to a flange overlapped by a roofing element in an adjacent superimposed course, the surface to be exposed of at least some of said sections upon at least some of said elements being at different heights in relation to said flange, said elements each having adjacent the line of joinder of said sections to said flange a ridge extending in the course-wise dimension of the element, the butt simulating edges of at least some of said sections in each element being so formed in the element as to provide an edge to be exposed of the element capable of fitting to said ridge and with said ridge to provide a weather tight construction in the assembly of the elements in the courses forming the roof construction.

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