May 4, 1937. E. B. WALTON 2,079,308

COMPOSITE ROOFING TILE

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Fig. 1.

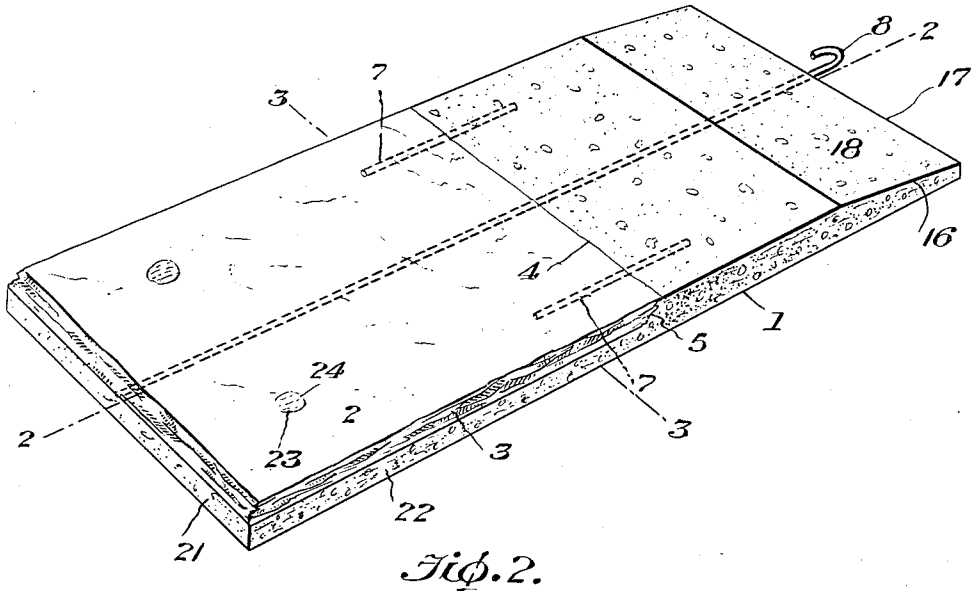
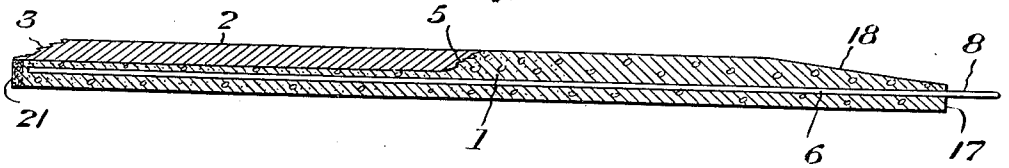



Fig. 2.



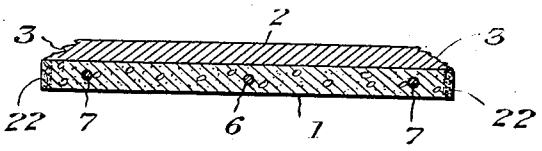




Fig. 3.

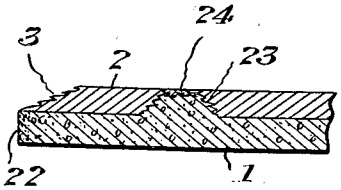



Fig. 7.

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Fig. 4.

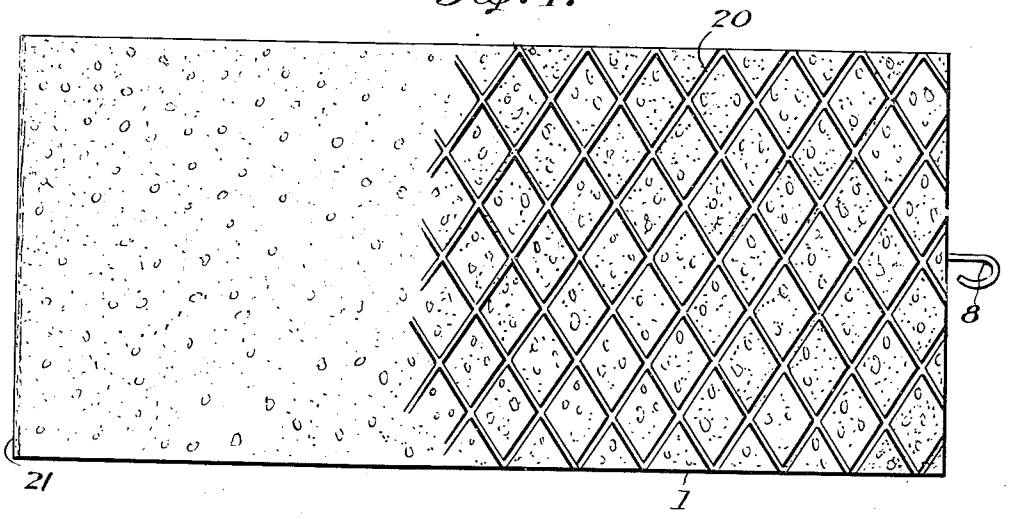



Fig. 5.

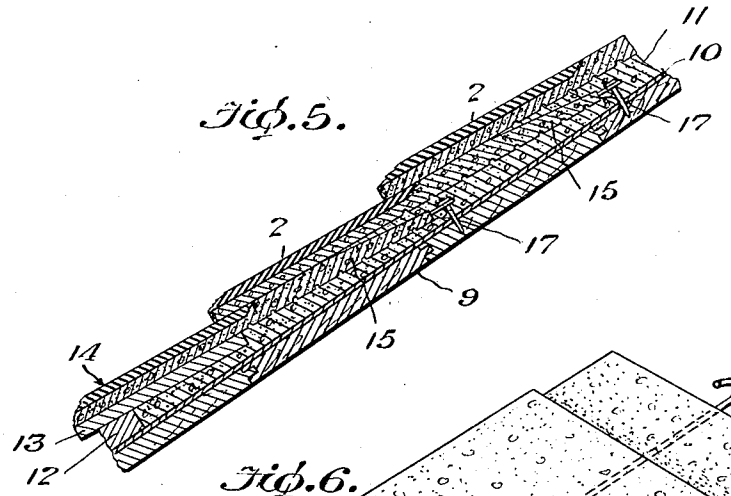
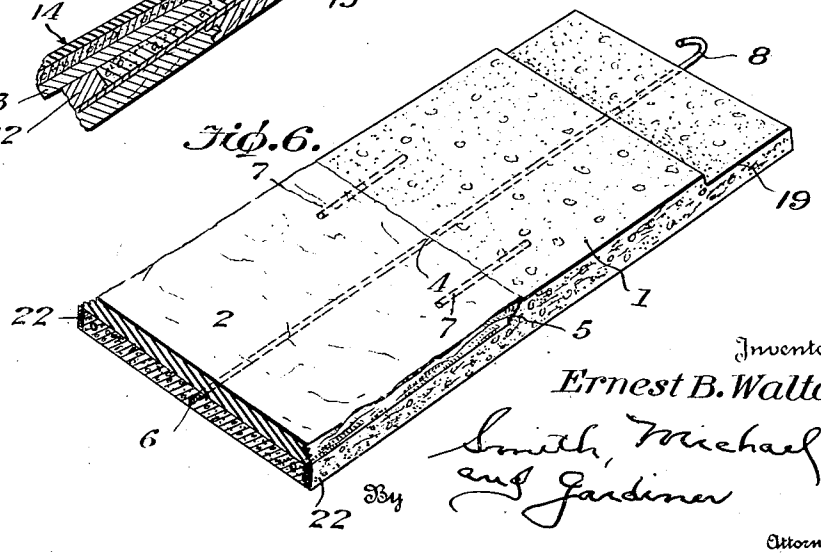



Fig. 6.

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# UNITED STATES PATENT OFFICE

2,079,308

## COMPOSITE ROOFING TILE

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Application January 30, 1936, Serial No. 61,622

12 Claims. (Cl. 108—3)

This invention is a roofing tile and relates more particularly to a tile in the form of a faced composite shingle.

As set forth in my copending application Serial No. 49,423, filed Nov. 12, 1935, entitled "Reinforced slate tile", of which this application is a continuation in part, it has become more or less common practice in recent years in certain types of architecture to utilize relatively thick heavy slate shingles, the shingles in many instances being a half inch or more in thickness at the butt end thereof. Obviously slate of this thickness is quite expensive when considered from a standpoint of unit area. The cost is rendered excessive not only because of the relatively greater cost of slate of this thickness per unit area, but also the increased cost of freight and transportation due to the excessive weight thereof.

With these facts in mind I have developed a composite shingle having a backing of cementitious material such as hydraulic cement and a relatively thin facing of slate embedded in one face of the cementitious backing material. The material of the back can be made of a thickness corresponding to the usual thickness of the heavy slate shingles hereinbefore referred to, and I contemplate treating the exposed edges of the composite shingle in a manner to blend and harmonize with the slate facing so that the finished shingle has not only the desired thickness but also the same general appearance as a natural slate shingle of the same thickness.

The invention contemplates providing a relatively thin slate facing or veneer suitably secured to or partially embedded in a backing of reinforced hydraulic cement such as Portland cement mortar, the side and end edges of which may have embedded therein finely ground or granulated slate or slate dust from slate of the same composition as that of the slate facing, so that the composite shingle when laid on a roof, will have the same general appearance as natural slate shingles of the same thickness.

My invention also contemplates novel means of securing the necessary bonding of the slate veneer or face to the material of the back in order to prevent separation of the slate facing from the back due to relative differences in expansion and contraction.

The invention also contemplates the provision of novel means for securing the shingles to a roof.

These and other objects of the invention will become apparent from a reading of the following specification in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of my composite shingle.

Fig. 2 is a longitudinal sectional view taken on the line 2—2 of Figure 1.

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a bottom plan view of the shingle.

Fig. 5 is a fragmentary sectional view of a roof showing my improved shingles laid thereon.

Fig. 6 is a perspective view partly in section of a modified form of my shingle, and

Fig. 7 is a fragmentary sectional detail view showing auxiliary means for bonding the slate facing to the material of the back.

In the accompanying drawings wherein I have illustrated preferred embodiments of my invention, and wherein like reference numerals are used to designate like parts throughout, the shingle comprises a suitable backing 1 formed of cementitious material such as hydraulic cement mortar of suitable consistency having embedded in one face thereof a sheet or veneer 2 of slate. The slate veneer 2 may be of any desired thickness but I have found that slate of approximately one-quarter of an inch in thickness will function admirably for the purposes of this invention.

The slate facing or veneer 2 is preferably trimmed as at 3 to provide the usual exposed rough beveled edge revealing the laminations or strata of the slate, and I employ this inherent laminated structure of the slate which may be exposed by trimming, for bonding or tying the slate facing to the material of the back. Thus the edge 4 of the slate facing is trimmed to provide a reversely beveled or undercut edge surface 5. This undercut edge surface 5, as clearly shown in Figs. 1 and 2, is embedded in material of the back 1 so that the multiplicity of exposed laminations and interstices formed therebetween by the trimming operation may function to receive integral portions of the backing material which are forced into these cavities and interstices during the manufacture of the shingle. Thus it is apparent that I utilize a natural and inherent physical characteristic of the slate to enhance the bond between the slate facing and the backing of cementitious material to securely fasten the slate facing to said back so as to preclude the possibility of separation between the two due to inequalities in the coefficients of expansion thereof.

The material of the back 1 may be suitably re-

inforced by reinforcing elements 6 and 7, as shown in Fig. 1. The reinforcing element 6 may extend substantially longitudinally of the shingle and project from the upper end of the shingle and there terminate in an exposed attaching device 8. As shown in the drawings, the element 8 may take the form of an open eye or loop but it is to be understood that any suitably formed attaching feature may be provided at this point. It is desirable that the reinforcing element 6 and particularly the attaching feature 8 may be disposed substantially on the longitudinal center line of the shingle to prevent canting and twisting of the shingle when the same is attached to the roof, as would be the case in the event such attaching means were appreciably off center. The reinforcing elements 7, 7 are preferably disposed across the line of juncture between the slate facing 2 and the material of the back 1, that is, said elements are disposed to bridge that portion of the shingle occupied by the upper edge 4 of the facing sheet 2. By thus disposing the reinforcing elements 6 and 7, I provide a very rugged construction which has been found to easily withstand the shocks and jars due to rough handling, shipping and laying the shingle.

In laying the shingle of my invention on a roof, I have found it desirable to employ a construction substantially such as illustrated in Fig. 5 of the drawings, wherein the roof surface upon which the shingles are to be laid is indicated at 9. It will be understood that the disclosure in this respect is purely representative and that the surface 9 may comprise any suitably formed surface or frame structure designed to support the roof proper. Upon the surface 9 is laid suitable cushioning material 10 such as felt, water-proof paper or the like, and upon the element 10 is disposed a bed of plastic, preferably cementitious, material such as Portland cement mortar 11. At the lower edge of the roof suitable structural elements 12 and 13 are provided to give the proper inclination to the shingles 14 of the first row, so that the exposed portion of the succeeding rows of shingles may be properly supported upon that portion of the cement backing of the shingle which extends beyond the upper edge of the slate veneer and lies substantially in the plane thereof while the upper ends 15 of this and succeeding rows of shingles are embedded in the plastic bed 11 of cementitious material. As shown in Fig. 1, I form or fashion the upper end of the shingle 1 in a manner to facilitate laying the same in the plastic bed 11 so that the upper edge of the shingle, together with the attaching feature 8, may be easily embedded in such bed. Thus, referring to Fig. 1, the upper edge of the shingle is suitably tapered as at 16 to provide an edge of substantially reduced thickness 17. This edge, as clearly shown in Fig. 5, is disposed so that the material of the bed 11 may be easily worked up and over said edge to completely overlie the inclined surface 18 forming said tapered portion 16. In roofs having only normal pitch, that is, up to five and one-half inches in twelve, I find that embedding the reduced upper end of the shingle in the cementitious material of the base is sufficient to maintain the shingles in place. However, in roofs of relatively steep pitch, it is desirable to drive some form of fastening element through the eye or loop 8 and into the roof frame 9 to further aid in securing the shingles in place.

In Fig. 6 I have disclosed a slightly modified form of shingle which is similar in all respects to the shingle disclosed in Fig. 1 except that the upper end of the shingle instead of being beveled as at 16 in Fig. 1, is provided with a suitable reveal 19 to provide a portion of correspondingly reduced thickness at the upper end of the shingle. It is clear that in this form of the invention the material of the plastic base 11 may be readily worked around and over that portion of the shingle which is reduced by the reveal 19 so that said reveal may be completely filled with the material of the base and the upper end of the shingle thus firmly embedded therein.

In order to further enhance the bond between the shingle and the cementitious base 11, I provide the bottom face of the shingle adjacent the upper portion thereof with a suitably roughened portion made by scarifying the backing, as indicated at 20, Fig. 4. This roughened portion of the shingle and the multiplicity of indentations and projections provided thereby unite firmly with the cementitious base 11 when the shingle is laid and thus aid in maintaining the same permanently upon a roof.

As hereinbefore indicated, my invention contemplates suitably treating or coloring the exposed edge surfaces of the backing 1 of the shingle in order to blend and harmonize with the slate sheet or veneer 2. Thus, as clearly indicated in Fig. 2, the butt end of the shingle has its exposed edge provided with a layer or facing 21 of cementitious material within which is admixed or embedded granules or fine particles of slate of substantially the same texture, coloring and the like as that comprising the sheet or facing 2. Thus, when viewed from the lower end, the shingle, due to the slate particles embedded in the exposed face of the butt edge of the shingle, has the same general appearance of a natural slate shingle having a thickness comparable to that of my composite shingle. I provide similar means for treating the side edges of the shingles. This is particularly important where the shingles are to be laid on a dormer or other roof portion from which the side edges are exposed to view. This feature of my invention is clearly illustrated in Fig. 3 wherein the longitudinal side edges of the shingle are shown as being provided with facings 22 characterized by having embedded or admixed therewith granulated slate corresponding in color and texture to that of the facing sheet 2.

I have found that for shingles of relatively small dimensions the bonding secured by embedding the undercut or reversely beveled upper edge surface 5 of the slate facing in the material of the base, as hereinbefore described, is sufficient to maintain a proper bond or union between the veneer and the back. However, in relatively large shingles it may be desirable to provide auxiliary means for enhancing the bond between the slate facing 2 and the backing 1, and to this end I provide the slate facing 2 with generally conical shaped openings or apertures 23, such as shown in Fig. 7. The side walls of these openings are characterized by the same multiplicity of cavities or interstices between the exposed laminations of the slate as are present in the trimmed edges 3 and 5 hereinbefore referred to, so that the material of the back 1 may penetrate thereinto and provide a multiplicity of integral keying or bonding features between the material of the back and the facing sheet 2. In shingles of a size such as to warrant this treatment, the apertures are provided at points preferably remote from the embedded undercut edge 5 of the shingle, such as indicated in Fig. 1. It is desirable to

make the holes 23 as inconspicuous as possible, such as by embedding or admixing with the exposed portion of the material of the backing which penetrates said apertures, granulated or ground slate of a corresponding color and texture, such as indicated at 24.

To further reduce the cost of the shingle forming the subject-matter of my invention, I dimension the slate sheet or facing 2 so as to cover only that portion of the finished shingle which is exposed to view when laid on a roof. Thus, as shown in Figs. 1, 2, and 6, the slate veneer or facing 2 extends only approximately one-half of the longitudinal extent of the shingle. Obviously, this of itself is an item of appreciable saving in the cost of the slate, as it is common practice in the trade to greatly reduce the cost of slate per unit area as the overall size of the unit is reduced. Thus I not only save in the cost of the slate insofar as the area of the piece required is concerned, but by utilizing slate veneer or facing of relatively small area, I am able to purchase the slate at a substantial reduction.

From the foregoing description of my invention it is apparent that I have provided a composite slate faced shingle having the same general appearance of a natural slate shingle of the same overall thickness and at but a fraction of the cost thereof. I have also provided a shingle fashioned at its upper edge to facilitate the laying thereof in a plastic cementitious base with the material of the base embracing and overlying the thin upper edge of the shingle. Furthermore, I have utilized the inherent physical characteristics of the slate to provide a multiplicity of cavities or interstices between the natural laminations thereof when trimmed for receiving bonding or keying features integral with the base, while the novel means disclosed for treating the exposed edges of the backing material and the exposed portions thereof penetrating the bonding apertures provided in the slate facing, renders it difficult to detect the composite nature of the shingle or to distinguish it from a shingle made from natural slate of substantially the same thickness.

Shingles in accordance with my invention may be made in any suitable manner, but I have found it convenient to place the slate sheet in a simple form of mold, shaped to provide the reduced or tapered portion of the upper end of the shingle, and to then fill and pack the mold with the material of which the back is to be formed, preferably Portland cement mortar. The side surfaces of the mold may previously be lined or faced with the ground slate mixture, to provide the desired appearance in the finished product.

Having thus described my invention, what I claim is:

1. A roofing tile comprising a rigid backing of cementitious material having secured to one face thereof a facing of slate, the material of the back extending appreciably beyond the slate facing in one direction of the shingle and having a portion of the exposed upper face thereof lying substantially in the plane of said slate facing.

2. A composite roofing tile comprising a base of cementitious material having secured to one face thereof a relatively thin veneer or sheet of slate, the outer face of said slate being provided with an exposed beveled edge surface extending above the backing material at the butt end thereof, the opposite end of said slate being undercut or reversely beveled and embedded in the material of the back, the exposed bottom edge of the material of the base adjacent to said exposed beveled edge having embedded therein granules of slate having texture and color corresponding to that of the veneer.

3. A composite roofing tile comprising a base of cementitious material and a sheet or veneer of slate secured to one face thereof, said veneer being provided with an aperture defined by walls characterized by a multiplicity of cavities between the exposed laminations of the slate, and the material of the base penetrating said cavities to provide a multiplicity of integral bonding or keying features between the material of the base and said slate.

4. The composite roofing tile described in claim 3 wherein the portions of the base exposed in said apertures at the surface of said slate sheet have embedded therein granules of slate of substantially the same color and texture of the slate sheet.

5. A composite roofing tile comprising a base of cementitious material having secured to one face thereof a sheet of slate, the slate sheet being of lesser surface area than the base and having one edge thereof undercut and reversely beveled to provide a multiplicity of cavities between the exposed laminations of the slate, the material of the base penetrating said cavities to provide integral bonding features between the base and said slate, said slate sheet at points remote from said embedded edge thereof being provided with one or more apertures extending entirely through said slate sheet, the material of the base penetrating said apertures and having integral keying features bonding with the exposed portions of the laminations of the slate within said apertures.

6. A slate facing or veneer for composite tile comprising a sheet of slate, the opposite faces of which are provided with reversely beveled edge surfaces, said sheet of slate intermediate its edge surfaces being penetrated by one or more apertures extending transversely of the laminations of the slate.

7. A composite tile comprising a rigid backing of cementitious material and a sheet or veneer of slate secured thereto, the slate being provided with one or more apertures penetrating opposite faces thereof and extending transversely of the laminations of the slate, the cementitious material of the backing penetrating said apertures and interlocking with the laminations of the slate.

8. The composite tile described in claim 7 wherein said apertures are generally conical and wherein said apertures are defined by generally conical walls characterized by the presence of a multiplicity of irregular interlaminae projections and cavities.

9. A roofing tile or the like comprising a rigid backing of cementitious material having secured at one face thereof a facing of slate, the material of the back extending appreciably beyond the slate facing in one direction of the tile and having at least a portion of the upper face thereof lying substantially in the plane of said slate facing, the end of said slate facing adjacent said extension of the backing material being provided with an undercut beveled edge surface embedded in the material of the back.

10. A roof comprising a supporting structure, a cementitious base overlying said supporting structure, and a plurality of roofing tiles laid in staggered superposed relation upon said cementitious base, said tiles having the upper ends

thereof embedded in said cementitious material whereby to secure the same to the supporting structure.

11. A roof comprising a supporting structure, a cementitious base overlying said supporting structure, and a plurality of roofing tiles laid in staggered superposed relation upon said cementitious base, the tiles each having the upper end thereof provided with a reveal or an area of reduced thickness embedded in said cementitious material whereby to secure the same to the supporting structure.

12. A composite shingle comprising a rigid backing of cementitious material having secured thereto a sheet or veneer of slate, the outer face of said slate being provided with exposed beveled edges extending above said backing material at the sides and butt end of the shingle, the cementitious material of the backing being thicker at the upper end of the slate veneer and extending beyond the same to provide a surface of appreciable extent lying substantially in the plane of the exposed face of the veneer.

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