April 10, 1928.

1,665,222

T. ROBINSON

ROOFING ELEMENT AND PROCESS OF MAKING SAME

Filed July 19, 1923

Fig. 1,

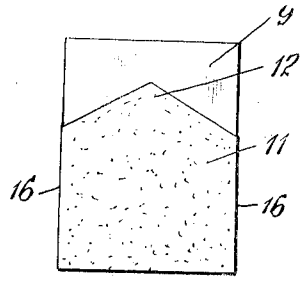


Fig. 2,

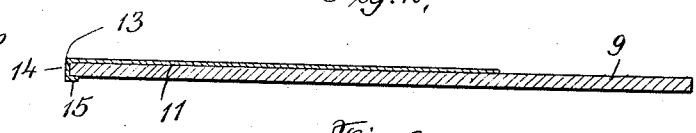


Fig. 3,

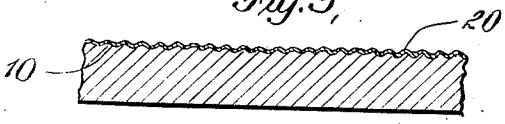


Fig. 4,

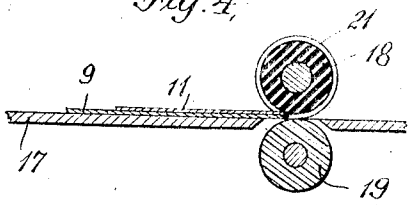


Fig. 5,

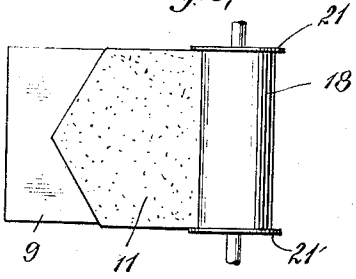


Fig. 6,

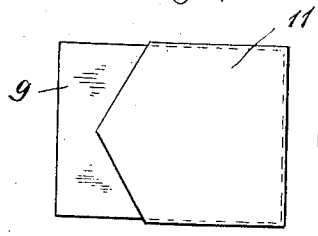
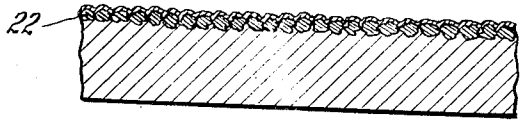


Fig. 7,



Fig. 8,



INVENTOR
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his ATTORNEYS

Patented Apr. 10, 1928. 1,665,222

UNITED STATES PATENT OFFICE.

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ROOFING ELEMENT AND PROCESS OF MAKING SAME.

Application filed July 19, 1923. Serial No. 652,563.

This invention relates to roofing elements in the form of shingles, boards, tiles, strips, and the like, and more particularly to elements which consist of a base such as is commonly used in so-called asphalt shingles, and a protective layer of metal applied to that portion of the base which is to constitute the exposed or weather surface.

Elements of the type referred to are shown and described in Letters Patent No. 1,449,058, issued to me on March 20, 1923, and also in my co-pending application filed February 10, 1923, and bearing Ser. No. 618,246.

As is set forth in detail in the above Letters Patent and application, roofing elements of various compositions are in wide use and these elements, or shingles as they will be referred to for convenience, are, in general, thoroughly satisfactory to take the place of ordinary wooden shingles. Under certain weather conditions, however, as for instance where there are wide temperature ranges, it has been found that such shingles have a tendency to warp or curl and the oils contained in the base have a tendency to volatilize which results in a deterioration of the base composition and shortens the life of the roof. Shingles made of metal overcome these disadvantages, have a longer life, and present an attractive appearance, particularly when made of a metal which lends itself to the production of various color effects. These metal shingles, however, conduct heat so rapidly that sheathing layers of unusual thickness must be used beneath them in order that the building may be properly insulated. These metal shingles, however, especially when made of such metals as copper or zinc which resist corrosion, are also somewhat expensive and require care in laying in order that leaks may not develop.

To overcome these several disadvantages, I have devised a composite shingle which consists of a base of various well-known compositions and a protective metal layer or coating applied to the base and serving as a wear-resisting weather surface. Such a layer may be made very thin, the necessary rigidity being supplied by the base itself, so that the cost of the metal is not prohibitive, and this layer may be applied in various ways so as to bind it firmly to the base and to hold it tightly thereon under extreme temperature conditions.

There are several methods for applying the metallic layer so that it will not separate or work loose from the base material, and one method is by electro-deposition. To carry on this operation the base must first be coated with a conducting material over which the metal is to be deposited electrolytically by well-known processes. The base used ordinarily is of the usual asphaltic composition and has a surface which is more or less irregular, the deposited coating being thin enough so it will conform to these irregularities. This produces several beneficial results, as, for instance, it gives the coating an irregular surface which has a distinctive and attractive appearance, and also the metal is bound to the base in such a way that expansion and contraction occurs in various directions in space so that the total effect is distributed in such a way that separation of the coating from the base is obviated.

While the application of the coating by electrolysis is satisfactory and the product fulfills all the requirements of a long wearing roofing of distinctive appearance, it is not always convenient, by reason of lack of facilities for securing the necessary power, to carry on the electrolytic operations. I have found, however, that various other methods are satisfactory for producing the desired result.

The object of this invention is to produce a roofing element of the type described in which a preformed metallic coating is used which is applied to the base by pressure in such a way that the two materials are firmly bound together without likelihood of separation due to temperature changes or other causes. As has been explained, the base used is made by well-known methods which need not be described, and the base is cut or otherwise formed to the desired size and shape. The surface of such a base may have certain irregularities in it due to the character of the material of which it is made, or the irregularities may be produced intentionally, as by applying a layer of granular material to the surface of the base during its formation. These slight irregularities, which are not sufficient in size, however, to interfere with the laying of the elements, are taken

advantage of in the new process of applying the metallic layer and in this process there is used a thin sheet of metal, preformed to the proper dimensions, which is laid on the base, whereupon the two are subjected to pressure by pressing devices which force the metal against the base and cause it to conform to the irregularities therein. The metal is thereby bound firmly to the base and the preformed sheet is preferably given dimensions slightly larger than the base so that it extends beyond the edges. The extending portions of the metal coating are thereafter bent down to enclose these edges and the element is finished and ready for shipment.

In the drawings there are shown various views of the roofing element formed in accordance with the new method, together with diagrammatic views of the apparatus required to practice this method.

In these drawings,

Fig. 1 is a plan view of the roofing element with its coating,

Fig. 2 is an enlarged cross-sectional view of the element shown in Fig. 1,

Fig. 3 is an enlarged cross-sectional view of a portion of the base with its coating, the irregularities of the base being magnified to make the construction more clear,

Fig. 4 is a cross-sectional view of pressure rolls used in forming the element,

Fig. 5 is a plan view of the apparatus illustrated in Fig. 4,

Fig. 6 is a view of an element with the coating laid thereon,

Fig. 7 is a magnified cross-section of the element illustrated in Fig. 6, and

Fig. 8 is a cross-sectional view of an element of slightly modified form.

Referring to the drawings, the shingle illustrated consists of a base 9 which may consist of various compositions such as felt or similar materials impregnated with bituminous mixtures, or wood fibre, asbestos fibre, and suitable granular material bound together by a fluid binder, etc. The material which forms the base may be of various mixtures and compositions which are well-known in the art and which may be referred to conveniently as asphaltic compositions, these asphaltic materials constituting an important element in the types most frequently used. The base material is manufactured ordinarily in the form of a flat web or strip and after being made in the desired width and thickness, this web is passed through cutting machines which cut out shingles in the desired dimensions. In Fig. 1 the base is illustrated in the form of a single shingle although frequently roofing elements are made with suitable cut-out portions which give the semblance of a plurality of shingles having a portion in common. For the purposes of the present description, however, it will be understood that the shape and dimensions of the base are unimportant.

On examination of Fig. 3 it will be seen that the surface of the base has many irregularities, such as 10, these irregularities having been somewhat magnified in Fig. 3 so as to permit of better illustration.

Applied to the base is the metallic layer 11 which extends over the weather surface of the base and which is preferably made with a projecting triangular portion 12. When the elements are laid in courses on the roof the triangular portion is designed to underlie the line of junction of two elements of the course next above so that there is no possibility of any portion of the element which is uncoated being exposed. At the edge 13 of the element 9 which is exposed when the element is laid in place, the metallic layer extends downwardly as at 14, then inwardly as at 15, to enclose this edge, and the edge of the shingle is also enclosed by a similar layer of metal along the sides 16, 16. In this way the metallic layer protects all portions of the base which are not covered by other shingles and thereby affords the maximum protection with the minimum expenditure of metal.

In the manufacture of these protected shingles the base 9 which has been cut to the desired dimensions, is laid flat on the table 17 of a press and a metallic sheet 11 of the desired dimensions is laid thereover. This metallic sheet is sufficiently thin so that it may be caused to adhere rigidly to the base by pressure, while at the same time affording the desired protection when the element is in use. With the sheet in place the base is passed between pressure rollers 18 and 19, the upper roller which comes in contact with the metal being formed of rubber. The degree of pressure which is applied is sufficient to cause the metal to flow slightly so as to conform to the irregularities of the base and when the shingle has been removed from the press it will be found that the metallic sheet has an irregular surface such as is illustrated at 20 in Fig. 3. The application of the pressure, therefore, not only serves to cause the metal to adhere firmly to the base by causing this conformance with the irregularities thereon, but it gives the metal an appearance altogether distinct from that of a plain metal shingle. After the base and the coating have been passed through the pressure rollers, the upper one of which is shown to be provided with guide flanges 21, which prevent displacement of the two parts during the application of pressure, the extending edges of the metal coating are bent down so as to enclose the edges of the base, as has been described, and the element is complete and ready for shipment. The bending of the extending edges may be carried on by

hand tools or by suitably designed presses, one of which has rolls to force the metal downwardly and the second of which forces the extreme marginal portion of the edge inwardly.

In Fig. 8 there is shown a magnified cross-section of a slightly modified form of shingle, the surface of which has been given a granular appearance by means of a layer 22 of a granular material which has been forced into the surface of the base while the latter is still soft. Crushed slate, crushed petroleum coke, or various materials are satisfactory for this purpose and are applied to the base by well-known methods. The application of the metallic layer is carried on as has previously been described, and the only difference between this shingle and the one previously described is that the irregularities of the surface are somewhat greater and the metallic layer pressed in placed thereon also has a somewhat pebbled or granular appearance. In other respects the coated element is the same.

Shingles formed of a plain or granular base to which a metallic layer is applied by pressure in the manner described are thoroughly satisfactory under all weather conditions, inasmuch as the metallic layer not only provides a wear-resisting surface but tends to lessen the volatilization of the oils of the base. Also the metals used may be subjected to treatment to produce various color effects, and accordingly the shingle has an appearance which is not only distinctive by reason of the color but also because of the peculiar character of the surface. It will be clear on consideration of Figs. 3 and 8 that the metal which conforms closely to the surface irregularities thereby overcomes expansion difficulties inasmuch as there are only small portions of the metal surface which lie in a plane and expansion or contraction does not act continuously throughout the layer but the effect is distributed in various directions so that the expansion of different portions of the base tend to counteract each other. The metal preferably used for the purpose is copper which is sufficiently malleable so that the pressure required is not excessive considering the thin sheets used. This pressure does not damage the base itself, but compacts it to an extent which improves its character. The process of applying the preformed layer is extremely rapid since the coatings may be cut to the desired shape and size in a machine and the application of pressure which causes these coatings to conform to the base is also rapidly carried on. The finished product has all the desired characteristics and serves the purpose equally well with the electrolytic products previously referred to.

I claim:

1. A roofing element comprising the combination of a base of a hardened plastic material, a layer of granular material embedded into one surface of the base and producing irregularities over that surface, and a preformed coating of a malleable metal adhering directly to the granular layer and conforming to the irregularities, the said coating of metal to extending into the interstices between the particles of the granular coating.

2. A roofing element comprising the combination of a base of a hardened plastic material, a layer of crushed slate embedded into the surface of the base and having portions extending therefrom to produce a multiplicity of surface irregularities, and a preformed copper coating adhering directly to the granular layer and extending into the interstices between the slate particles.

3. In a process of preparing roofing elements of the class described, the steps of partially embedding a layer of crushed slate in the surface of a base formed of a hardened plastic material, placing a preformed layer of copper upon the base, and subjecting the base and the layer to pressure to cause the metal to enter the interstices between the particles of the layer and thus conform to the irregularities of the surface of the base.

4. In the process of preparing roofing elements formed of a base of hardened plastic material having an irregular surface and a relatively thin preformed metal layer adhering closely thereto and conforming to the irregularities thereof; the steps of applying said metal layer to said base and subjecting said layer to yielding pressure means while held against the base to cause said layer to adhere to the base and conform to the irregularities thereof.

In testimony whereof I affix my signature.

THOMAS ROBINSON.