Jan. 20, 1942. L. KIRSCHBRAUN 2,270,734

SHINGLE AND LIKE MATERIAL

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Fig. 1.

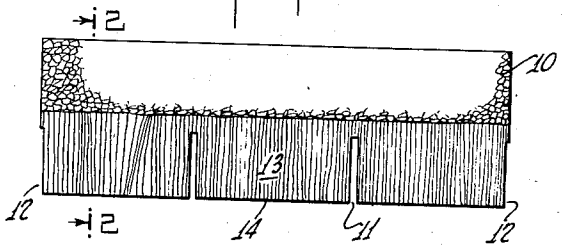


Fig. 2.

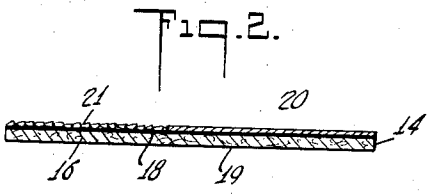


Fig. 3.

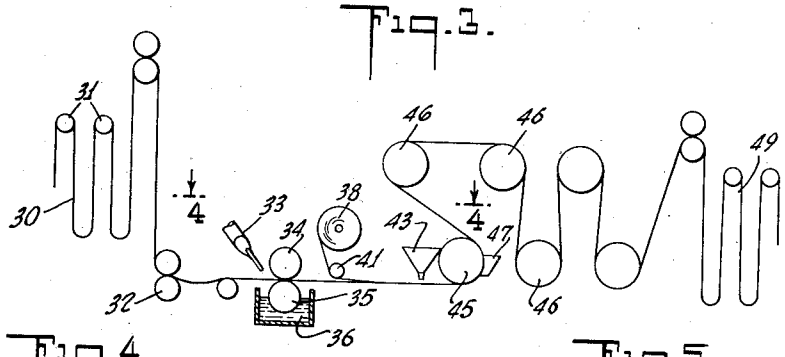


Fig. 4.

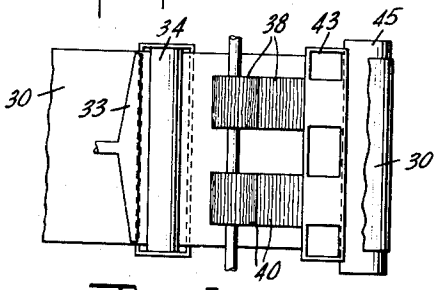


Fig. 5.

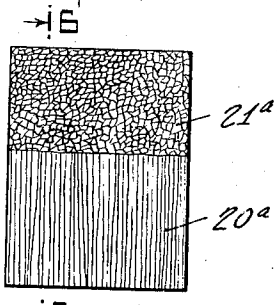


Fig. 6.

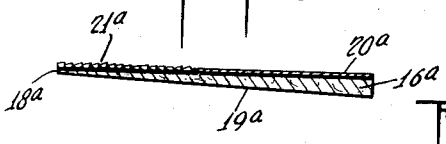


Fig. 8.

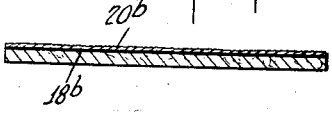
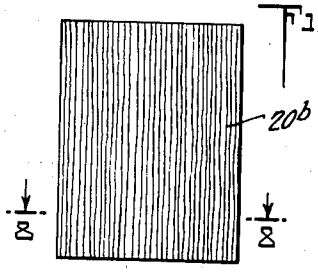


Fig. 7.



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SHINGLE AND LIKE MATERIAL

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Fig. 9.

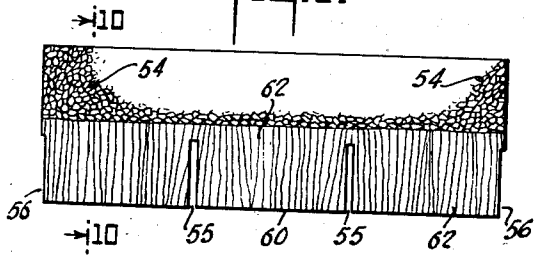


Fig. 10.

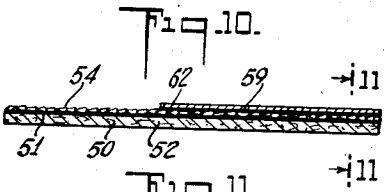


Fig. 11.

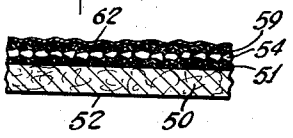


Fig. 12.

Fig. 13.

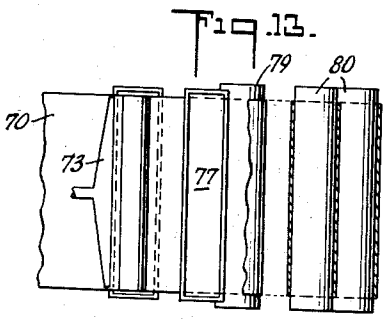


Fig. 14.

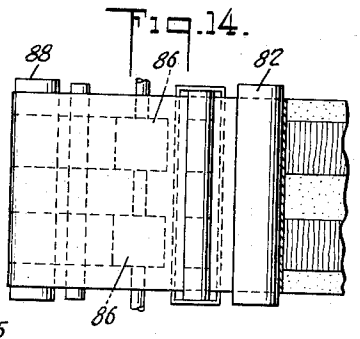
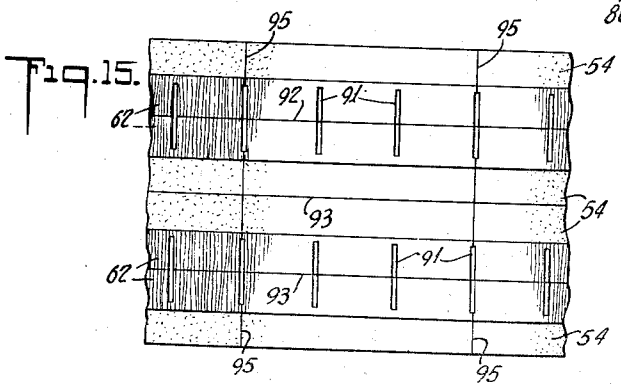


Fig. 15.



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UNITED STATES PATENT OFFICE

2,270,734

SHINGLE AND LIKE MATERIAL

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Application April 11, 1941, Serial No. 388,007

5 Claims. (Cl. 108—7)

Th's invention relates to improvements in composition building material intended to be used in the form of shingles, shingle strips, slabs and the like, as coverings for roofs and side walls of buildings and similar structures. In particular, it has relation to improvements in this type of building material wherein a base is provided with a weather protective coating of bituminous material, such as asphalt. In this type of material, which has long been known and used for the covering of roofs and sides of buildings, mineral granules have been commonly employed as a surfacing for the bituminous weather protective coating layer. These granules, which are of various colors, are partially embedded in the coating layer by projecting the same onto a coated sheet while the coating is hot so that they are affixed thereto by adherent contact of the granules with the bituminous coating layer. The mineral granules so employed are graded so as to pass an 8 to 10 mesh screen and be retained on a 35 mesh screen, and are intended to function, by their masking effect, to protect the coating layer from the deteriorating effect of light and other weather influences which tend to destroy the bond which holds the granules to the bituminous coating layer. While the granules that have usually been employed for this purpose are themselves opaque to light, I have observed that the bituminous coating material in the interstitial spaces between adjacent granules as thus affixed to the coating is directly exposed to the action of light and other weather influences. These interstitial spaces, where the bituminous coating is directly exposed to the action of the light often constitute as much as 30 to 35% of the area of the surfacing. Consequently, these granular surfacings inadequately protect the bituminous coating layer and are subject to deterioration through the direct exposure of a substantial portion of coating to the action of light and weather.

The principal object of my invention is to provide an improved form of composition material of the general character described, wherein the weather surface consists of a weather-resistant and ornamental layer of unbroken continuity which is continuous in its opacity to light to thereby completely mask the layer of weatherproof coating material applied to the face of the product which in use will be exposed to the weather.

According to the invention, sheet material which will provide a continuous barrier to the action of direct light upon the weatherproof bituminous layer is applied at least to those portions of the bituminous layer which are in the area of the material to be exposed to the weather in use. This sheet material comprises a felted web of asbestos fibers, the web being treated as presently to be described in detail, so as to render the same permanently unaffected by moisture and exposure to light. The treatment of the asbestos felt or paper web for rendering the same weather-resistant is designed also to stiffen and strengthen the web, thereby increasing the rigidity of the finished material especially where the base is of a flexible nature. To those ends, the treatment of the asbestos web employed as the weather surfacing in accordance with the invention comprises the impregnation of the web with a solution of a soluble silicate, such as silicate of potassium or silicate of sodium, the impregnated soluble silicate being transformed in situ within the web into an insoluble metallic silicate.

Further objects and advantages of the invention will be apparent from the more detailed description which is to follow and from the accompanying drawings in which—

Fig. 1 is a plan view showing the upper face of one form of composition shingle embodying the invention;

Fig. 2 is a cross-sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is a diagrammatic illustration of apparatus, for the most part conventional, that may be utilized for the production of shingles such as shown in Figs. 1 and 2;

Fig. 4 is a partial plan view of the apparatus shown in Fig. 3, taken along line 4—4 of Fig. 3;

Fig. 5 is a plan view showing another form of shingle embodying the invention;

Fig. 6 is a longitudinal section through the shingle of Fig. 5, taken along line 6—6 of Fig. 5;

Fig. 7 is a plan view showing still another form of shingle embodying the invention;

Fig. 8 is a transverse section of the shingle shown in Fig. 7, taken along line 8—8 of Fig. 7;

Fig. 9 is a view similar to Fig. 1 showing another form of shingle embodying the invention;

Fig. 10 is a cross-sectional view taken along line 10—10 of Fig. 9;

Fig. 11 is an enlarged detail in cross-section taken along line 11—11 of Fig. 10;

Fig. 12 is a diagrammatic illustration of apparatus, for the most part conventional, adapted for the production of shingles of the form shown in Figs. 9 to 11;

Fig. 13 is a plan view of a portion of the apparatus shown in Fig. 12 taken along line 13—13 of Fig. 12;

Fig. 14 is a plan view of another portion of the apparatus of Fig. 12 taken along line 14—14, and Fig. 15 is a fragmental face view of a parent sheet made according to Figs. 12 to 14 and showing how shingle strips of the form shown in Fig. 9 may be severed therefrom.

Inasmuch as the invention is particularly applicable to composition material of the flexible base type, I have shown in the drawings and shall herein describe several embodiments of the invention in the form of shingles and shingle strips made from a continuous web of fibrous felt. However, the invention is not limited to use in the production of flexible base material. The weather-resistant surfacing herein described will provide considerable advantage when used in connection with other types of base material, such as wood, fiber insulation board, waterproof mastic compositions, etc., which are provided with weather protective coatings of the nature of asphalt to adapt them for use under conditions of exposure to the weather. An illustrative embodiment of the invention in this form is also shown in the drawings and described herein.

Referring now to Figs. 1 and 2, there is illustrated a roofing or siding element in the form of a strip shingle 10, comprising an elongated piece of material provided in the lower half section with rectangular slots 11 intermediate the ends thereof and semi-rectangular notches 12 at the ends. These slots and notches define tabs 13 constituting the exposed portions of the element when it is laid in customary fashion with other like elements on a roof or side wall in successive, partially overlapping courses, the butt edge 14 of the elements in one course being aligned or registering with the upper ends of the tab-defining slots and notches of the strips in the preceding course. The base of the element, indicated by the numeral 16, comprises any of the usual grades of felt customarily employed for this type of building material, and may consist of felt made from rag fibers admixed in suitable proportions with wood fibers, waste news fiber or the like. In accordance with customary practice also, the base is saturated with a water-resistant material such as asphalt of a melting point of the order of 140° F. The upper face of the element, namely, that face which is intended to be exposed to the weather, is provided with a weather-protective coating layer 18. In accordance with customary practice, this weather-protective medium consists of relatively high melting point asphalt, say 220° F. melting point, preferably combined with finely divided filler material such as slate dust. This weather-protective coating layer 18 has applied thereto surfacing material of weather and wear-resistant character. In accordance with the invention, this surfacing material, at least on that portion of the element comprising the tabs 13 and preferably also over an area extending about an inch above the upper ends of the tab-defining slots, comprises a sheet of asbestos felt or paper 20 treated as hereinafter described, the remaining areas of the coating layer 18 being surfaced with granules 21 of any of the common varieties that are now employed as a surfacing for bituminous coatings in shingles of this class. The asbestos felt comprising the surfacing layer 20 is preferably a creped sheet, with the crepes running in a general direction at right angles to the butt edge 14 of the shingle strip. With the creped form of sheet, asphalt of the hot coating layer 18 is displaced into and conforms with the configuration of the crepe paper at the interface between the sheet and the coating layer, thereby insuring a very secure bond of the asbestos paper layer to the coating layer. The creped form of the layer 20 also imparts a desirable texture to the surface of the finished product, simulating the grain of wood shingles.

I have found that asbestos paper of a caliper of 0.010" to 0.030" and weighing from about 5 to 10 pounds per 100 square feet, is satisfactory for the surfacing sheet when treated as hereinafter described. Where it is desired that the portions of the element to be exposed, namely the tabs 13, shall be of a color other than the normal whitish color of asbestos paper, the asbestos paper comprising the surfacing layer 20 may be suitably colored during its manufacture, as by pigmenting the fibrous stock from which the paper is made.

Since asbestos paper as normally produced cannot be exposed to the weather for long periods of time without becoming disintegrated, under the washing action of rain etc., the asbestos paper employed as the weather-resistant surfacing in accordance with the invention is treated to render the same permanently unaffected by moisture and light exposure. I prefer to subject the asbestos paper to such a treatment prior to its application to the bituminous coating layer in the manufacture of shingles or other forms of roofing etc. As will presently be described, however, this treatment may, if desired, take place after the asbestos paper has been applied to the coating layer. This procedure, however, results in a tendency of the asbestos paper to shrink and cause curling of the flexible base sheet and accordingly the pretreatment procedure is preferable.

As already indicated, the treatment for rendering the asbestos paper suitable for use as surfacing for the coating layer 18, comprises the impregnation of the sheet with a solution of a soluble silicate such as potassium silicate or sodium silicate. I have found that such treatment not only binds the fiber of the asbestos paper together more permanently against disintegration by water, but that the soluble silicate becomes insolubilized by reaction with the lime constituent of the asbestos paper. The insolubilized reaction product serves to stiffen and strengthen the asbestos paper layer 20 and thus rigidifies the finished shingle, this rigidifying effect being much greater than would be obtained from the asbestos paper in the absence of its treatment with the silicate.

Where the asbestos paper that is employed in carrying out the invention is one that has been pigmented to obtain a desired color other than white in the exposed section of the finished shingle, it is preferable to employ potassium silicate rather than sodium silicate, because of the tendency of sodium silicate to deposit under certain conditions encountered in service, a whitish material or efflorescence sometimes referred to as a "bloom." Although bloom-forming constituents deposited when sodium silicate is employed become removed under the continued action of the rain, the appearance of the bloom is nevertheless objectionable. Potassium silicate does not deposit any bloom-forming constituents and on this account is preferable where colors other than white are desired in the finished product. On the other hand, where the finished product is to have a white or nearly white color, sodium silicate may be employed for impregnating the asbestos paper, for in that instance the bloom, being a

white deposit, does not detract from the appearance of the finished product.

In practice I have obtained satisfactory results when using for the surfacing layer 20, asbestos paper of the weight and caliper above stated and treated by spraying one face of the asbestos paper with 30° Baumé potassium silicate at the rate of about 1½ to 3 pounds of the silicate, mixed with an equal weight of water, per 100 square feet of the asbestos paper. The higher the amount of silicate, within the above range, the harder and tougher will be the surface, and the less will be the tendency for the asbestos layer to disintegrate at the surface or to shrink and cause the shingle to curl. If the silicate with which the asbestos paper is sprayed is too concentrated, or the amount too great, the paper has a tendency to shrink, and consequently when using silicate of the Baumé gravity mentioned, it is desirable to dilute it with about an equal weight of water.

This silicate treatment of the asbestos paper, as above stated, preferably precedes the application of the paper to the layer of coating material in the manufacture of the shingles. If desired, this pretreatment of the asbestos paper with the silicate may be carried out at any convenient point during the manufacture of the paper as, for example, along the driers of the asbestos paper making machine. While elevated temperatures are not required for securing the insolubilizing reaction between the soluble silicate and the lime constituents of the asbestos paper, this reaction can be hastened by the application of elevated temperatures, such as those that would prevail if the soluble silicate is applied while the asbestos paper is passing over one or more of the driers at the end of the asbestos paper making machine. Also, if desired, in order to obtain certain colors in the exposed surface of the finished product, suitable pigments may be incorporated in the soluble silicate with which the asbestos paper is impregnated. However, the ornamentation that may be provided in the finished product by mixing pigments with the soluble silicate is not as durable on exposure to the weather as is the ornamentation that is provided when the asbestos paper itself is colored by incorporation of pigments with the fibrous stock from which the asbestos paper is formed.

Shingle strips of the form shown in Figs. 1 and 2 and embodying the invention as hereinabove described may be produced by cutting them from a parent sheet prepared by apparatus diagrammatically illustrated in Figs. 3 and 4. The base sheet is indicated by the numeral 30 and comprises a continuous web of felt of the kind commonly employed in the manufacture of flexible type shingles. Thus, the felt may be composed of rag fibers admixed with suitable proportions of other vegetable fibers and is impregnated with low melting point asphalt or other water-resistant saturant. The saturated felt web is fed from a conventional looping device 31 through guide rolls 32 to a coating device. The coating device is arranged to apply, as by means of a feed pipe 33, asphaltic coating material to the upper face of the web 30, the thickness of this layer being regulated by the doctor roll 34 so as to provide a thickness of the order of 0.050". A relatively thin layer of asphaltic coating is applied to the bottom face of the web by the coating roll 35 rotating in a pan of asphaltic coating material 36. In actual practice, the width of the web 30 is a multiple of the width of the strips to be severed widthwise of the web. In the particular embodiment illustrated in Fig. 4, the width of the web is such as to produce four rows of such strips widthwise of the web.

After the asphaltic coating material has been applied to the web and while this coating material is in hot molten state, there is affixed along those areas of the coating layer which are to constitute the exposed portions of the strips to be severed from the web, a ribbon or ribbons of asbestos paper to constitute the surfacing layer 20 of the finished shingles, the remaining areas of the coating layer being surfaced with granules constituting the granular surfaced area 21 of the strip, as indicated in Figs. 1 and 2. In the particular arrangement of the apparatus illustrated in Figs. 3 and 4, two separate ribbons 38, 40 of asbestos paper are applied to the layer of coating material on the web, each of these ribbons being of a width twice that of the asbestos paper on the finished shingle. Thus, when the web is severed longitudinally through the median line of each ribbon applied to the web and also longitudinally midway between the opposed edges of the two ribbons, four rows of shingle strips will be produced. The ribbons of asbestos paper to be applied to the coated web may be fed from supply rolls located above the sheet and guided to proper position on the coating layer by means of guide rolls 41. These ribbons of asbestos paper may be either of the normal whitish color of asbestos paper or may be suitably colored, as by mixing suitable pigments with the stock from which the paper is formed. Preferably, these ribbons of asbestos paper are treated, prior to being applied to the coating layer, with sodium silicate and the sodium silicate insolubilized in the manner already described.

Immediately following the application of the ribbons of asbestos paper 38, 40 to the coated web, the web passes under a hopper 43 containing any desired mineral granules which are fed from the hopper and showered onto the sheet whereby they will adhere to the zone of the coating layer not covered by the asbestos paper ribbons. The web may then be passed around press rolls 45, 46 to cause the mineral granules as well as the ribbons of asbestos paper to be pressed into firm adherence with the coating layer. During the passage of the web over the press roll 45, non-adherent material such as powdered mica or talc may be applied to the coating layer deposited on the bottom face of the web by the coating roll 35, this non-adherent material being applied to this coating layer as from a supply box 47. Surplus granular material deposited on the web from the hoppers 43 is returned to this hopper as the web is reversed in its passage around the press roll 45. After the ribbons of asbestos paper and granular material have been adequately pressed into the coating layer, the web is led into another looping or festooning device 49 for cooling the same to substantially normal atmospheric temperatures, following which it may be fed to suitable cutting devices for severing the strips from the web in accordance with present practice.

Figs. 5 and 6 illustrate an embodiment of the invention comprising an individual shingle, formed with a relatively rigid base 16a. Thus, the base 16a may comprise a hardened mastic composed of asphalt mixed with fiber and mineral or other filler, formed in tapering cross-sectional thickness. Or the base 16a may be composed of fiber board such as is commonly used as insulating board. In this case, the tapered base 16a may be provided by skiving boards of

the desired size of uniform thickness to produce from each such board two pieces tapering in cross-section as illustrated in Fig. 6. The tapered base 16ª thus formed may be rendered water-resistant by impregnation with asphalt or the like.

The upper face of the base 16ª is provided with a layer of bituminous coating material 18ª and a relatively thin layer of bituminous coating material 19ª may be provided on its lower face. The coating layer 18ª has affixed thereto, along slightly more than the lower half of the shingle, the creped asbestos paper layer 20ª, this asbestos paper being colored, if desired, and impregnated by the silicate treatment herein described. The remaining areas of the coating layer 18ª may be surfaced with mineral granules 21ª partially embedded in the layer of coating material at these areas.

Figs. 7 and 8 illustrate an embodiment of the invention in the form of an individual shingle made from a web of felt base roofing prepared as described in connection with Figs. 1 to 4, except that in this embodiment the asbestos paper layer 20ᵇ applied to the coating layer 18ᵇ on the upper face of the shingle covers the entire area of the shingle instead of only the lower section thereof as in Figs. 1 and 2. In the production of the web from which shingles of the form shown in Figs. 7 and 8 are to be cut, the asbestos paper would be applied to the coated web as a single sheet of the same width as that of the web 30, no mineral granules being supplied to the coating layer from the hopper 43. As will now be apparent, the same procedure may be employed to produce shingle strips of the form shown in Figs. 1 and 2, but with the surfacing layer 20 of asbestos paper covering the entire upper face of the strip.

Still another embodiment of the invention is shown in Figs. 9 to 11. The form of shingle there shown for illustrating this embodiment is of the same configuration as the form shown in Figs. 1 and 2. The base 50 comprises asphalt saturated felt and has a layer of bituminous coating material 51 on the upper face thereof and a relatively thin layer of coating material 52 on the bottom face thereof. The coating layer 51 has partially embedded therein over its entire area a layer of mineral granules 54. In this embodiment the butt section of the strip is thickened by a superposed layer of bituminous coating material 59 which extends from the butt edge 60 upwardly for a distance about an inch above the upper ends of the tab-defining slots and notches 55, 56, the coating layer 59 having the layer of asbestos paper 62 affixed thereto to constitute the weather-resistant and ornamental surfacing for the coating layer 59. This layer of asbestos paper is preferably of the creped variety and contains the insolubilized reaction product resulting from impregnation of the asbestos paper with sodium or potassium silicate as already explained.

In Figs. 12 to 15 there is illustrated diagrammatically a more or less conventional arrangement of apparatus that may be employed for producing the shingles shown in Figs. 9 to 11, from continuous webs of felt base material. The web of felt, impregnated with asphalt saturant, may be fed from suitable loopers 70 by the guide rolls 71 to coating devices for applying the asphaltic coating material to constitute the layers 51, 52 of the finished product. Thus, the coating on the upper face of the shingle may be applied to the sheet through a feed pipe 73 while the coating on the lower face may be applied by means of the coating roll 74 rotating in a supply box 75. The layer of coating on the upper face of the sheet is then surfaced over its entire area with mineral granules as it passes under the hopper 77, to provide the granular layer 54 of the finished product and powdered mica or talc may be supplied to the coating layer on the lower face of the sheet from the supply box 78 during passage of the sheet around the press roll 79. After passage over suitable additional press rolls 80, the sheet may be reversed around a reversing roll 82 and the butt thickening layer of bituminous coating, to constitute the coating layer 59 of the finished product, is then applied to the sheet in the form of spaced bands as illustrated in Fig. 14, by means of coating rolls 84 rotating in the supply tank 85. While these bands of coating material are still hot and in molten adhesive condition, ribbons of the asbestos paper to constitute the surfacing layer 62 of the finished product are affixed to the spaced coating bands, the asbestos paper being fed as from supply rolls 86 and caused to adhere to the bands of coating material and pressed into firm engagement therewith during passage of the sheet over the press drums 88. Following this the sheet may be cooled in the cooling looper 90 and then passed through suitable cutting devices for forming the tab-defining slots 91, slitting the sheet longitudinally along the median lines 92 of the asbestos paper ribbons and also midway between the opposed edges of the two ribbons applied to the sheet, and for severing the sheet transversely at intervals 95 to cause the separation of the strips from the parent sheet as illustrated in Fig. 15.

Although it is preferred that the asbestos paper be pretreated with the silicate before it is applied to the bituminous coating, it may be feasible in certain cases to subject the asbestos paper to treatment with the silicate after the paper has been applied or while the paper is being applied to the layer of coating material.

I claim:

1. A shingle or like element for exposure to the weather, comprising a base and a weather-protective bituminous coating layer on the face thereof intended to be exposed to the weather, said coating layer having affixed thereto on at least that portion of the area of the base which is intended to be exposed to the weather in use, a layer of asbestos paper impregnated with a substantially insoluble metallic silicate.

2. A shingle or like element for exposure to the weather, comprising a base and a weather-protective bituminous coating layer on the face thereof intended to be exposed to the weather, said coating layer having affixed thereto on at least that portion of the area of the base which is intended to be exposed to the weather in use, a layer of asbestos paper impregnated with the insolubilized reaction product of a water-soluble silicate and the lime content of the asbestos.

3. A shingle or like element for exposure to the weather, comprising a base and a weather-protective bituminous coating layer on the face thereof intended to be exposed to the weather, said coating-layer having affixed thereto on at least that portion of the area of the base which is intended to be exposed to the weather in use, a layer of asbestos paper impregnated with the insolubilized reaction product of a water-soluble silicate and the lime content of the asbestos, the

asbestos paper being creped, the lines of the crepe extending generally in a direction at right angles to the butt edge of the base.

4. A shingle or like element for exposure to the weather, comprising a base and a weather-protective bituminous coating layer on the face thereof intended to be exposed to the weather, said coating layer having affixed thereto on at least that portion of the area of the base which is intended to be exposed to the weather in use, a layer of pigmented asbestos paper hardened by the insolubilized reaction product of potassium silicate and the lime content of the asbestos.

5. A shingle or like element for exposure to the weather, comprising a flexible base and a weather-protective bituminous coating layer on the face thereof which is intended to be exposed to the weather, said coating layer on the area of the base which is intended to be exposed to the weather in use having affixed thereto an ornamental surfacing in the form of a layer of asbestos paper hardened and rendered weather-resistant by the presence of an insolubilized metallic silicate, said layer serving also to rigidify the base in the exposed area thereof, the coating having mineral granules partially embedded therein on the area of the base which is to be overlapped in use.

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