

Sept. 5, 1933.

T. ROBINSON

1,925,282

ROOFING ELEMENTS AND METHOD OF APPLYING SURFACING MATERIALS THERETO

Filed Oct. 11, 1929

Fig. 1.

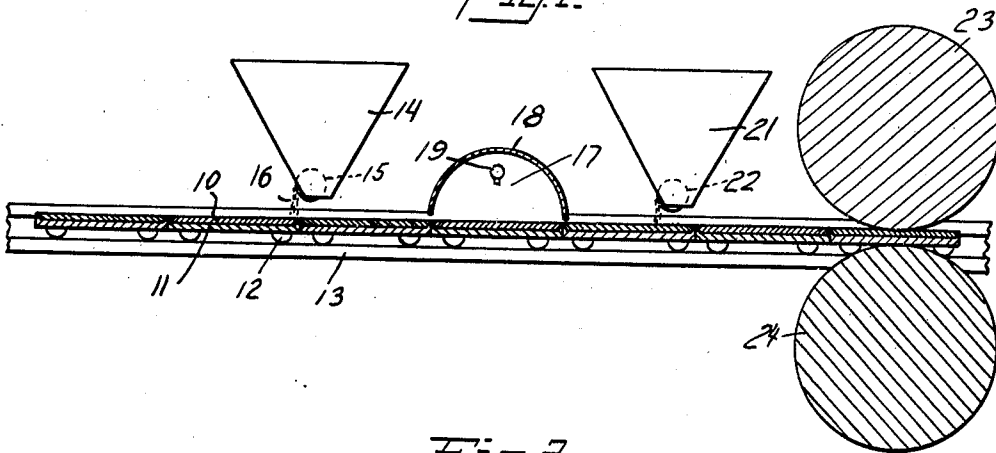


Fig. 2.

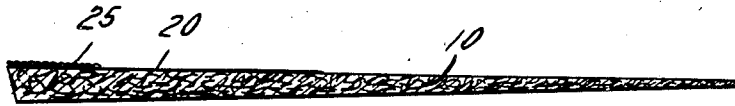


Fig. 3.

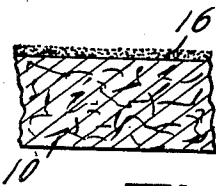


Fig. 4.

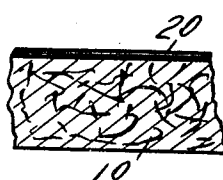


Fig. 5.

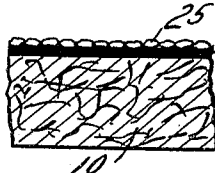


Fig. 6.

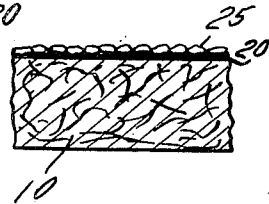


Fig. 7.

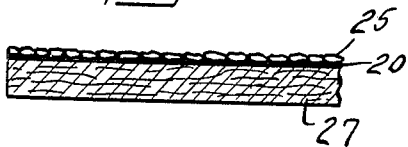


Fig. 8.

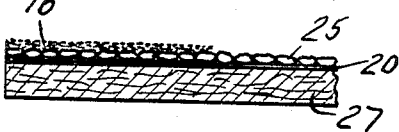
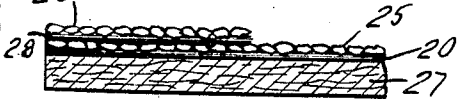


Fig. 9.



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1,925,282

ROOFING ELEMENTS AND METHOD OF AP-
PLYING SURFACING MATERIALS THERE-
TO

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corporation of Delaware

Application October 11, 1929. Serial No. 398,950

11 Claims. (Cl. 91—70)

This invention relates to roofing elements which include a base having a layer of surfacing material, such as crushed mineral, on one or more faces thereof, and to a method of applying this surfacing. More specifically, the invention is concerned with a roofing element having a base, a coating of a bituminous mixture on the base, and a layer of granular mineral affixed to the base by being partially embedded in the coating. The method by which the coating and mineral layer are applied to the base affords numerous advantages over the methods heretofore used, in that it reduces the cost of operations and considerably simplifies the equipment required.

In the manufacture of prepared roofing as heretofore practiced commercially, it has been customary to employ a base of felt as the main structural element of the roofing. This felt in the form of a wide web is first impregnated and saturated with asphalt, then given a relatively thick coating of asphalt on one face, crushed mineral material is embedded in the coating, and the web is then cut into units of the desired size and shape. The cutting of such a web is an extremely difficult operation and results in a considerable proportion of products which must be discarded because of their poor quality. The difficulty arises from the gummy nature of the asphalt, which clogs the cutting devices and from the presence of the grit which quickly dulls the cutting knives.

Felt roofing so made is considerably cheaper and more fire-resistant than wood shingles, but since the felt forms the major portion of such prepared roofing and is relatively thin, the roofing elements when laid do not have any substantial thickness at the butt, do not cast a considerable shadow and are, therefore, of an unattractive appearance. Also, the felt in the course of time rots or disintegrates so that the exposed ends of the elements warp and curl, thus rendering the roof unsightly and in some cases causing it to leak.

In order to overcome the disadvantages of felt roofing, I have developed an improved roofing element set forth and described in my co-pending application Serial No. 391,297, filed September 9, 1929, which element consists of a body of hardened plastic material shaped to proper form by molding operations. This element is provided with the usual layer of grit surfacing material and according to the process described in that application, the grit is embedded in the surface of the base, while the material of which the base is made is still in a relatively plastic condition.

I have found that an improved roofing material may be produced by adopting a novel method of affixing the granular material to the surface of the base and this method is suitable for use in the manufacture both of the ordinary felt shingles

and the roofing elements disclosed in the pending application.

The novel method of producing roofing elements according to this invention involves the preparation of these elements in final form either by molding the plastic material or cutting the units from a web of felt prior to the application of any coating or surfacing material thereon. Over the surface of these elements is then distributed a layer of dry powdered asphalt or the like to the desired depth, the asphalt being pulverized to pass through a screen of 20 to 45 mesh, for example. The powdered asphalt layer on the elements is then subjected to heat applied in such a manner and to such an extent as to cause the asphalt particles to become relatively soft and plastic and to stick together, while to some extent retaining their individual particular form, so as to form an asphalt layer having an irregular surface structure. Over the rough surface of the asphalt layer in heated condition, the desired granular surfacing material is distributed and partially embedded by suitable pressing devices, such as rolls. In this pressing operation, the asphalt is bound firmly to the base, the granular particles are firmly embedded in it and the asphalt is forced up into the interstices between the individual granules so as to bind the granules firmly to the base.

The new method of operation has numerous advantages over the methods heretofore employed, in that the equipment used is relatively simple and inexpensive and mixtures of asphalt and solid material may be used for the coating instead of asphalt alone. Such a mixture, for example, asphalt and sand or slate dust, offers advantages over asphalt alone in that the presence of the solid material stiffens and gives body to the coating. With the equipment heretofore used, in which asphalt is applied to the surface of the element base in a hot, fluent condition, it has not been practical to attempt to use a mixture of asphalt and solid material for coating purposes.

The present method is also applicable to the production of felt roofing elements of increased thickness. Heretofore in order to overcome the objection to prepared felt roofing based on the thickness of the felt, the elements with their coating of asphalt and grit have sometimes been dipped in asphalt to produce a coating over the surface of the grit and have thereafter been given a second layer of grit, the second asphalt coating and the additional layer of grit increasing the thickness of the products to a substantial degree. This method, which is commonly called "double dipping" is carried on by manual labor and is, therefore, quite costly. The method of the present invention lends itself admirably to the production of such double coated units and the cost

of production by the new method is substantially lowered.

For a better understanding of the invention, reference may be had to the accompanying drawing, in which

Fig. 1 is a longitudinal sectional view of apparatus for carrying on the proposed method in the production of shingles of the molded type;

Fig. 2 is a sectional view of a shingle produced in accordance with this method;

Figs. 3, 4, 5, and 6 are fragmentary sectional views, showing different stages in the operations; and

Figs. 7, 8, and 9 are sectional views illustrating different steps in the operation of producing a roofing element having a double coating of asphalt and grit affixed to the base.

Referring now to the drawing, the novel element illustrated in Fig. 2 is of the molded type and consists of a base 10, which is made of plastic material with which a substantial proportion of solid material has been mixed. The plastic material is preferably asphalt of a suitable melting point and with this asphalt is mixed fibrous material, such as chopped-up roofing waste, paper, wire grass, hay and various other substances of that sort. If desired, a proportion of finely divided inorganic solid material, such as crushed mineral, ashes, and the like, may also be incorporated in the mixture. This plastic mixture is molded to the desired shape in any suitable apparatus, preferably that disclosed in my copending application previously mentioned.

In affixing a granular coating to the base, apparatus such as that shown in Fig. 1 may be used. In this apparatus, the individual elements are mounted in conveyor cars 11, which have wheels 12 running on a track 13. In the course of their movement, the cars pass beneath a suitable device for distributing powdered coating material on the surface of the elements carried in the cars. For this purpose, a hopper 14 may be disposed above the track, this hopper being provided with a distributing roller 15 in its lower end. This roller is driven by suitable means and it distributes the coating material 16 on the surface of each element passing thereunder. The coating material employed may be asphalt of a suitable melt point crushed and reduced to a relatively fine condition or preferably a mixture of asphalt with a proportion of finely divided solids, such as fine sand. The mixture of asphalt and sand produces a coating which is relatively stiff, the solid material adding somewhat to the rigidity of the asphalt when it sets as well as reducing the cost. The thickness of the layer applied is determined by the rate of distribution of the asphalt and the speed of movement of the conveyor.

Beyond the distributing device, each element is passed beneath a heating device generally designated 17. This heating device may be of any suitable construction but preferably includes a hood 18 with a burner 19 therein directing its flame down toward the surface of the elements. Instead of a burner, an electrical resistance grid has also been found satisfactory. The elements in their passage beneath the source of heat are subjected to a rapid surface heating and the asphalt particles thereon are rendered relatively soft and plastic the particles sticking together and to the base, while to some extent retaining their individual particular form, thus giving the elements an irregular or rough surface structure. The elements with their asphalt coating 20 are

then advanced to a distributing device 21 which includes a hopper provided with a roller 22 and in this device, the mineral surfacing matter is distributed over the coating 20. This mineral surfacing may be crushed slate, gravel, or other similar materials commonly used for that purpose.

Beyond the device 21, the elements pass between a pair of rollers 23, 24 and these rollers serve to consolidate and compact the asphalt coating and to embed the grit particles 25 into it. Due to the condition of the asphalt, the particles thereof tend to fill the interstices between adjacent particles of grit, and the granules are consequently firmly bound in position on the base.

The lower roller in the apparatus illustrated engages the under surface of each car and supports the car during the application of pressure so that the rails 13 do not have to be of the rugged construction that would otherwise be required.

In the molded element illustrated in Fig. 2, it will be observed that the base consists of a mass of asphalt with fibrous material mixed therewith and on the surface of this base is a coating 20 of the nature of a mastic and made up of a mixture of asphalt and solid material in which is embedded a layer 25 of grit particles.

In practicing the invention in connection with the manufacture of felt shingles, the saturated felt web is passed through cutting devices and units of the desired shape and size severed from it. Since the web is not coated with asphalt and grit, the cutting operation is much simpler than that involved in severing units from a saturated and coated base having a layer of grit affixed thereto. These elements are then placed on a suitable conveyor of any desired construction and moved successively beneath the distributing device 14 where the elements receive a layer of the dry coating material 16, and beneath the heating apparatus and the device for distributing grit, and are finally acted on by pressure devices to embed the grit in the coating.

Heretofore in the manufacture of felt roofing, it has been the customary procedure to utilize asphalt in a fluent condition for the coating layer 20, and the apparatus involved in applying a coating layer of hot asphalt on the surface of a web is relatively complicated and expensive to operate, since the asphalt must be kept heated continuously. Also, with the former method, it has not been practicable to use solid material in the coating, since it would be very difficult to coat a felt web with a mixture of molten asphalt and solid material, due to the fact that in the distributing mechanism, the solid material would tend to settle out of the asphalt and thus constant agitation would be required in order to keep the mixture homogeneous. These several difficulties have been such as to preclude the practical use of a mixture of asphalt and solids in the coating, although such a coating offers advantages over one made of asphalt alone.

With the present method, the felt elements produced are further greatly improved, since part of the dry coating material falls on the edges of the elements and thus provides a sealing coating for the edges when subjected to the action of heat. Similarly, the grit particles tend to adhere to this edge coating so that part, if not all, of the edges of the elements are protected by the coating and grit, whereas in the ordinary shingle the felt is wholly exposed at the edges.

In utilizing the method of the invention in the production of "double dipped" shingles, each shingle receives a layer of dry asphalt with or without a proportion of solids. This layer is subjected to heat and grit embedded therein in the manner described. Each element is then passed through the apparatus a second time and over the first layer of grit particles 25 is distributed a second layer of the dry asphalt coating material 16. The second layer of asphalt is heated as before and a second layer of grit 26 is then embedded therein. The finished product as illustrated in Fig. 9 includes the base 27, the inner coatings of asphalt 20 and grit 25, an outer layer 28 of asphalt and an outer layer 26 of grit. The complete surfacing on such an element thus is of double thickness and the thickness can be increased to any desired extent by applying successive layers of coating and grit. These operations can all be performed by simple machinery so that the cost of applying the additional coatings is much less than is now involved in the production of such "double dipped" elements by hand.

What I claim:

1. A roofing element which comprises a base made up of fibrous material and asphalt, a coating on the base of individual asphalt particles adhering to one another and to the base, while retaining to some extent their individual particular form and having an irregular surface structure, and a layer of granular material over the coating, the granules lying partially embedded in the coating and the interstices between the asphalt particles being filled by the said granules.

2. A method of finishing roofing products which comprises distributing a layer of dry finely divided asphalt over the surface of each product, heating the layer to cause the particles to soften and adhere to one another, the said heating being sufficiently low to prevent destruction of the shapes of the individual particles of asphalt forming the said layer, and embedding granular material in the asphalt layer.

3. A method of finishing roofing products which comprises distributing on the surface of each element a layer of finely divided solids including dry asphalt, heating the layer to cause the asphalt particles to soften and become plastic and adhere to one another, the said heating being sufficiently low to prevent destruction of the shapes of the individual particles of asphalt present in the said layer, distributing a layer of granular material over the asphalt and partially embedding the granular material in the layer.

4. A method of finishing roofing products which comprises distributing a layer of finely divided solid filler material mixed with dry finely divided asphalt on the surface of each element, heating the layer to cause the asphalt particles to soften and become plastic and tacky, the said heating being sufficiently low to prevent destruction of the shapes of the individual particles of asphalt present in the said layer, and embedding granular material in the said layer.

5. A method of applying surfacing materials to a base which comprises distributing a layer of finely divided solid material rendered fluent on heating to the surface of the base, applying heat to the layer sufficient to slightly soften the particles of the said solid material while permitting them to retain their individual form thereby giving the layer an irregular surface structure, and embedding surfacing material in said layer.

6. A method of finishing roofing products which comprises distributing a layer of dry, crushed asphalt over the surface of a base, heating the layer just sufficiently to soften the particles and render them plastic and tacky, embedding granular material in the layer, distributing dry crushed asphalt over the granular material, heating the asphalt to cause the particles to coalesce to form a coating, and embedding granular material in said coating.

7. A roofing element which comprises a base made up of fibrous material and asphalt, a coating intimately bonded to the base and formed of a plurality of individual particles of a finely divided solid mixture of asphalt and a solid filling material, thereby giving the coating an irregular surface structure, and a layer of granular material over the said coating, the particles of the said granular material lying partially embedded in the coating and between adjacent particles of asphalt.

8. A roofing element which comprises a base made up of fibrous material and asphalt, a coating intimately bonded to the base and formed of individual particles of a dry finely-divided mixture of asphalt and a solid filling material, which particles retain their original form in substantial degree, a layer of granular material on the coating with the granules partially embedded in the coating, a coating formed of individual particles of a dry finely divided mixture of asphalt and filling material superposed upon the layer of granular material, the particles of the last-named mixture retaining their individual shape in substantial degree, and a layer of granular material on said last-named coating with the granules partially embedded therein.

9. A method of finishing roofing products which comprises distributing a layer of dry unmolten asphalt in finely divided form upon a surface of a previously-formed roofing element, heating the said layer sufficiently to cause the asphalt particles to soften somewhat and to adhere to each other while in substantial part retaining their individual forms, distributing a layer of granular material upon the thus-softened asphalt, bonding the asphalt to the surface of the roofing element, and embedding the granular material in the said asphalt layer.

10. A method of finishing roofing products which comprises distributing a layer of finely-divided solid filler material mixed with dry finely-divided unmolten asphalt upon a surface of a previously-formed roofing element, quickly heating the surface of the layer just sufficiently to cause the asphalt particles of the said layer to soften slightly and to become tacky while in substantial degree retaining their individual forms, thereby forming an irregular surface structure, and embedding granular material upon the irregular surface of the said layer.

11. A method of applying surfacing materials to a base which comprises distributing upon a surface of the base a layer of finely-divided solid material adapted to be rendered fluent by heat, applying sufficient heat to the layer to cause the particles of solid material to soften slightly and become tacky while maintaining a temperature sufficiently low to prevent destruction of the individual particles, thereby giving the layer an irregular surface structure, and distributing a layer of granular material upon the said surface of the thus-softened solid material.

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