June 13, 1933. N. P. HARSHBERGER 1,913,667

SHINGLE ELEMENT AND METHOD OF MAKING SAME

Filed Feb. 4, 1933 2 Sheets-Sheet 1

Fig. 1

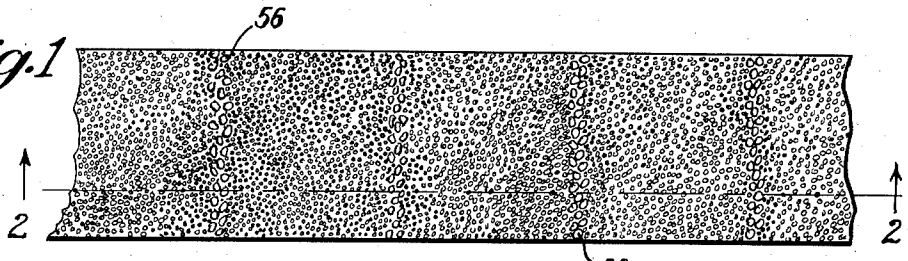


Fig. 2

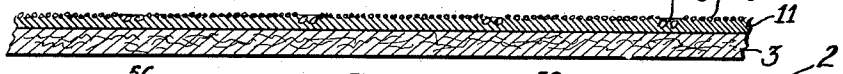


Fig. 3

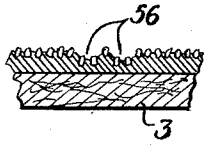


Fig. 4

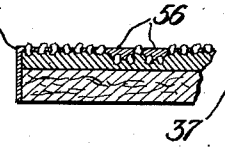


Fig. 5

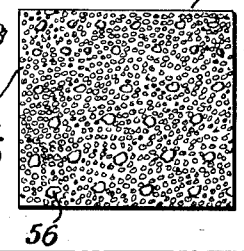


Fig. 6

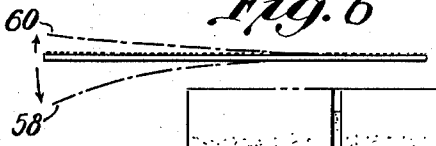


Fig. 7

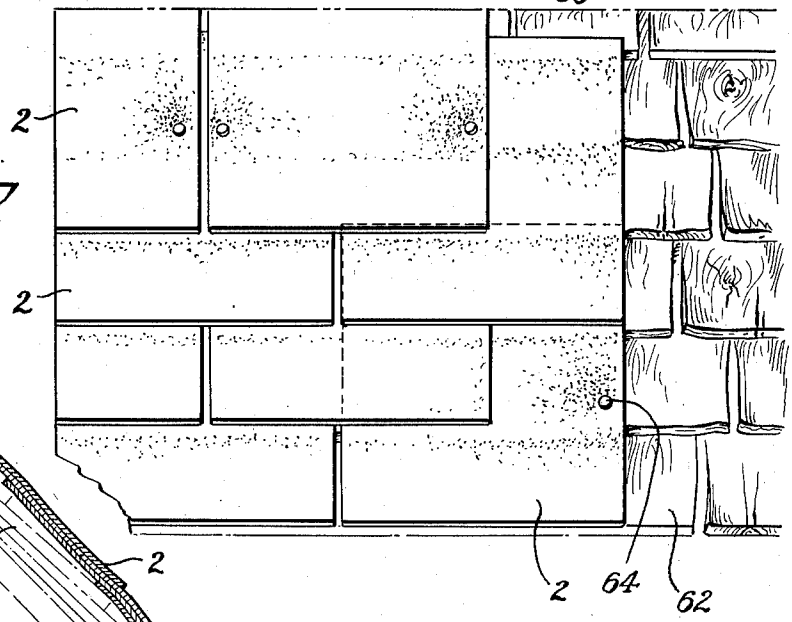
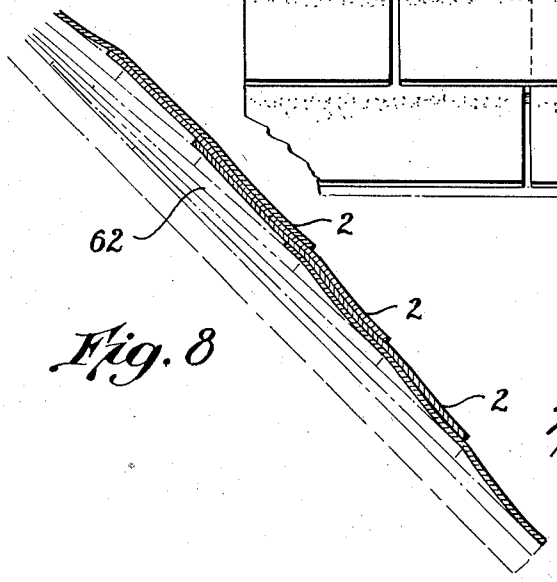


Fig. 8



Inventor

Norman P. Harshberger

Fay Oberlin & Fay

Attorneys

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SHINGLE ELEMENT AND METHOD OF MAKING SAME

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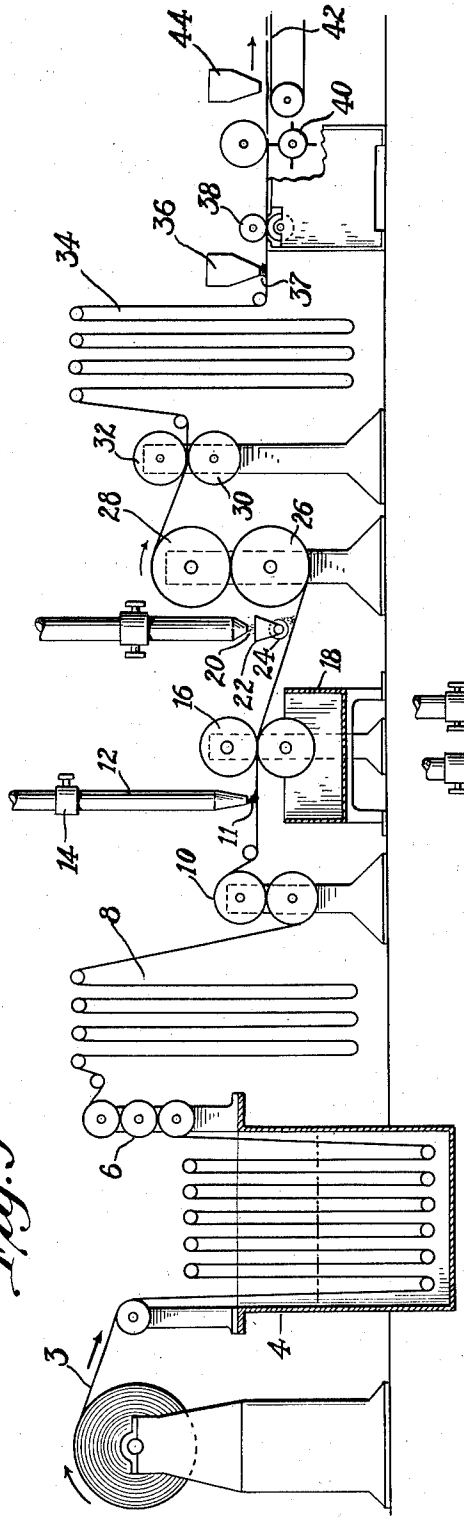


Fig. 9

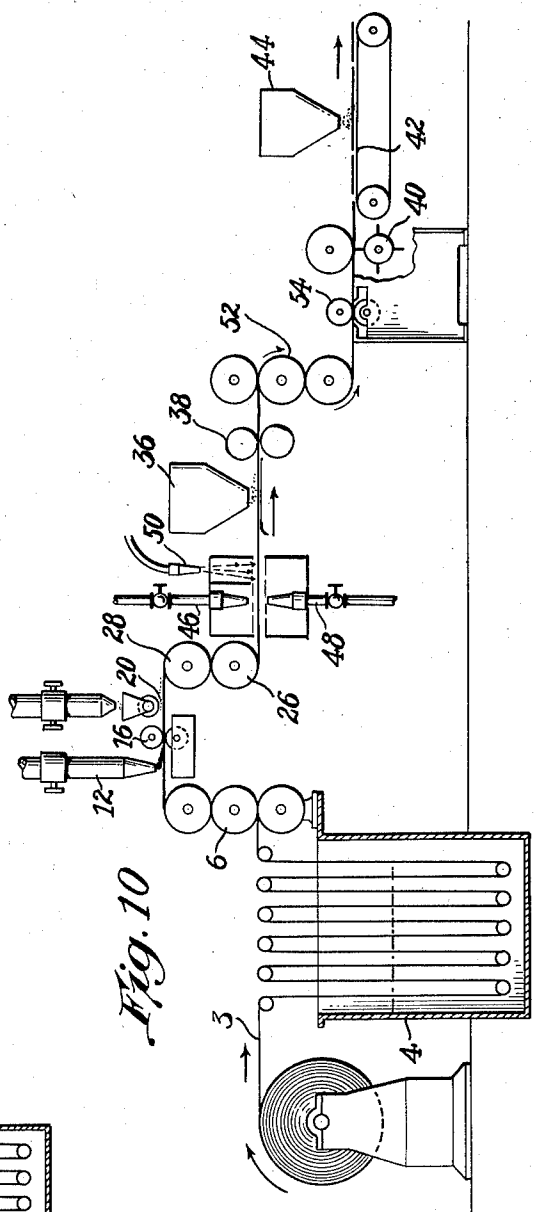


Fig. 10

Inventor
Norman P. Harshberger
By Fay Oberlin & Fay
Attorneys

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UNITED STATES PATENT OFFICE

NORMAN P. HARSHBERGER, OF SCARSDALE, NEW YORK, ASSIGNOR TO BAKELITE BUILDING PRODUCTS COMPANY, INC., OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

SHINGLE ELEMENT AND METHOD OF MAKING SAME

Application filed February 4, 1933. Serial No. 655,284.

This invention relates to a pliable shingle and the decoration thereof.

In the roofing industry up to the present time, thin pliable shingles have been made consisting of the ordinary saturated felt base having a bituminous coating with a layer of particles such as slate, to give them a presentable surface and to somewhat protect the base. This type of material is quite flabby and has been open to the objections of lifting very easily under the action of the wind, curling after a short time due to evaporation of the volatile oils in the base causing contraction, loss of the mineral particles due to the flapping of the base or by force of rain or hail, and the clogging of the roof drainage systems as a result thereof.

Other proposed types of roofing materials are rigid tiles or monolithic roofs. The former has only a limited use because of its extremely high cost, its inability to be laid over roofs having irregular contours, unless a number of different shapes are used, its difficulty of fitting and cutting, the necessity of applying fasteners at some particular point that was not the best, the fact that its weight limits its use to a roof built to stand the strain of a heavy mass and the fact that it could not be used over roofs that required complete repairing or when desired for siding purposes. The concrete monolithic construction was open to expansion and contraction difficulties, the cost of applying, and the massiveness that required a special roofing under structure for its application. This type of surface also could only be satisfactorily applied to a new roof.

Decorations have also been applied to roofing material in the past to give varied tone effects or to simulate individual shingles or figures. These have been produced by branding, or by printing, or by the application of a coloring material through a stencil. Also, the roofing sheet has been depressed below its normal surface in some instances, or effects have been produced by the use of colored stones.

Where branding has been used it has been done at the expense of the life of the base material. It has never been very satisfactory. Printing and the use of stencils required the use of paints, etc., that soon would lose their hold on the base and deteriorate due to the drying out of the oils present. Also, in the summer months the asphalt coating, on especially hot days, would run and smudge the decoration. The use of stencils made the operations more costly and it was difficult to produce sharp outlines. Where the base has been depressed, the felt was stretched and strained, and on some parts compressed, taking the life out of the same. Further, and unless care was taken, the sheet would be cut through. Also, when these were made into shingle elements, and assembled on the roof, the unreinforced weakened portions caused an uneven expansion, and surface contact at the lap portion was then never assured. Also, pockets were formed for the accumulation of water or ice.

The use of colored mineral particles has never been entirely satisfactory as in only a few cases were the colors stable. In most cases they stained easily, and desirable colors available were few in number.

It is the object of the present invention to overcome the faults and defects of the prior roofing materials, as well as to provide a better and more serviceable product at a lower cost.

I accomplish this by treating a web of a flexible fibrous material, such as the ordinary vegetable, wool, or hair felt by saturating same in a bath of waterproof material and thereafter apply to it, an additional adhesive layer. Before the latter has set I embed therein a layer of mineral particles such as are formed in nature, or those which contain minerals as their principal chemical ingredients, or any other organic or inorganic materials of a granular nature, which can be one of an irregular contour to form a rough surface. In this respect I prefer to use particles of a porous nature, for instance, porous slag, as I have found that it is gripped much better by the materials in which it is embedded or which are applied to it. I then apply to this surface a coating comprising hydraulic cement and before or after it has taken its initial set, cut into shingles or shingle strips.

When the surfacing so applied has set and hardened, it presents a very weather resistant surface, and more particularly gives to the element a means of resisting curling, lifting in the wind and deterioration, yet leaves its structure such that it can be bent, formed to hug irregular surfaces, easily pierced by nails, and generally easy to apply without destroying the aforementioned desirable properties.

More specifically the objects of my invention may be enumerated as:

To provide a roofing element that will provide the character and weather durability of rigid tiles, or monolithic roofs at a much lower cost.

To provide a shingle element that is extremely serviceable, that is adapted for any type of structure irrespective of position, contour or climatic location.

To provide a pliable shingle element having the characteristics of resisting winding up, or curling of its edges.

To provide a roofing element having a wholly flexible base and a rigidifying coating but in which the resulting article remains quite pliable.

To provide a surfaced roofing element in which the hardened coating controls the expansion or contraction of the elastic base.

To provide a coated shingle element having freedom of expansion in the plane of its hardened coating.

To provide a serviceable shingle element using inexpensive base materials with a hardened hydraulic cement coating which is well adapted for re-roofing purposes.

To provide a shingle having a semi-rigid coating, yet sufficiently pliable to be laid over irregularly formed surfaces.

To provide a roofing material that is simple to manufacture and in which large production can be accomplished at low factory costs.

To provide a roofing material in which the fabrication will not require a large variety of raw materials, a multiplicity of machines, or many operations, but one that will require only a relatively small floor space.

To provide a shingle element that can be ornamented by simple means.

To provide an element that will have a long life and which will be of a formation that will result in no excessive accumulation of snow at the intersections of the shingles to cause drainage difficulties.

To provide a shingle element that will possess a textured surface and will be of pleasing character.

To provide a shingle element that may be made with any of the aforementioned objects in view on moving shingle material, and also which may be a continuous process.

To provide hydraulic cement coated shingle elements that may be shipped with low transportation rates because of their light weight.

To provide a novel method of producing colors or designs on roofing sheets in which a wash of material is applied to the roofing web or strips, the latter having a plurality of high and low areas therein into which the wash will flow to cover up the surfacing in the low areas and rigidly reinforce them, the surfacing in the high areas projecting above said wash and thereby producing a contracting effect on the roofing sheet.

To provide a novel method of producing colored designs on roofing sheets in which the coloring material is mixed with a binder such as hydraulic cement to strengthen the roofing sheet and render the same more weather resistant.

To provide a method of producing colored designs on roofing material which is simple to carry out, effective and well adapted for the purpose described.

These, and other objects and features of the invention, relating to the improved article, the improved method of processing the same, the improved method of producing colored designs for ornamentation on roofing sheets, and all its parts and combinations, will in part be obvious and in part be pointed out in the subsequent detailed description and in the claims, taken in conjunction with the accompanying drawings wherein—

Figure 1 is a plan view of a roofing strip manufactured in accordance with the improved method and having one form of ornamentation.

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

Figure 3 is an enlarged fragmentary sectional view of the material before the wash is applied thereto.

Figure 4 is a similar view after the wash has been applied.

Figure 5 is a plan view of an individual shingle in one of the possible forms showing the two-tone effect which may be produced by the improved method of ornamentation.

Figure 6 is a side view of a single shingle element illustrating its greater pliability when its surface coating is flexed under tension than under compression.

Figure 7 is an assembly of a plurality of shingle elements upon a roofing surface illustrating their application over an old warped shingled roof and indicating their adaptability for nailing at any suitable position.

Figure 8 is a side sectional view of Figure 7, indicating how well applicant's article is adapted to hug irregular surfaces.

Figure 9 shows one method of processing a moving web into finished roofing elements; and

Figure 10 shows a preferred and simplified method of processing said web.

In carrying out the method of making my shingle elements 2, according to one embodiment of the invention, a continuously moving composition roofing sheet or web 3 is utilized. This usually consists of a base made from vegetable fibres, wool, or hair, alone or in combination, or with other materials. Ordinarily any material commonly known as felt and preferably made up in continuous strips or webs, is employed for my process. I may, however, make the following operations a continuous part of the fabrication of the basic material.

The web 3 is treated to resist water and decay, for instance by being fed by any suitable means into a vat 4 of saturant such for example as a low melting point asphalt, in a series of loops where it is saturated to any desired degree. The web is then led through a group of pull and squeeze rolls 6 where any excess material is eliminated and thence over a group of loopers 8 for cooling and seasoning.

At any point after passing around a set of pull rolls 10 the web is coated with an agglutinant 11 for example by passing below a spout, hopper, spray, or trough 12 containing or having fed to it a supply of the agglutinant for example, a hot high melting point bituminous material and by means of proper controls 14 attached therewith, deposit or spread a layer of said material of any desired thickness upon the web. The web is then preferably passed between a set of leveling rolls 16 where any excess material is removed and drops into the basin 18 below. The web then has a suitable roughening material 20 applied to it for example by passing below a hopper 22 fed with a supply of such material. Some suitable types of roughening material which may be used are mineral particles, in the form of crushed slag, pebbles, crushed slate, crushed brick, coke, crushed glass or granulated petrified material. The hopper is equipped with controlling means 24 for depositing a measured amount of material.

Where the hopper 22 is the full width of the web, the particles 20 will completely cover the sheet, but it may be desirable to coat only a portion of the sheet so that when cut into shingle elements the coated portions form the butt or weather exposed portions of a roofing assembly. In that case the hopper may be partitioned off, or one or more narrow hoppers may be employed. The mineral particles are now preferably, before the coating has set, partially, or when desired, as in some parts, wholly embedded in the adhesive coating 11 by passing in contact with the rolls 26 and 28 or 30 and 32.

The web may now pass over a looper 34 from which it passes to a cement coating device 36, for example a hopper having fed to it a wash 37 of hydraulic cement of natural color, colored hydraulic cement, or hydraulic cement and other aggregates, and which is applied over the face of the web and either runs or may be rolled into the spaces between the mineral particles by a set of calender rolls 38, thereby partially filling said interspersed spaces. The web is then passed between the cutting rolls 40 where the material is cut into shingle sizes or strips, of any desired outline and thereafter passes onto the conveyor belt 42 for further manipulation.

In the later steps of the processing it may be preferred to surface the material with the hydraulic cement coating after the web is cut into shingle sizes, and yet perform same in a continuous process. In that case the cement coating device 36 may be eliminated, and one at 44 be substituted.

In the steps herein described, while I have called for the use of hot asphaltic or pitchy binders I may if I desire employ other agglutinants, as for example, those of a resinous type for that purpose.

I have found that a better article is produced where mineral particles of a porous slag nature are employed as the principal binding medium for the hydraulic cement coating. Due to its irregular pores and deep craggy depressions the sticky adhesive coating will flow into and fill the spaces of that part of the particles that are pressed into it, so that when it sets not only will a cementitious bond exist but also the adhesive material will be dovetailed in place to produce a sure anchorage. These facts are also true of the hydraulic cement coating and in addition, due to the lime content of the slag, a chemical reaction will take place between it and the hydraulic cement wash, causing them to harden into a solid mass.

Other advantages I have found to be possible because of my wash coating are that the hydraulic cement wash can be used to cool the hot sheet. The absorption of heat from the asphaltic coating also hastens the chemical reaction taking place in the cement coating, thereby setting it more rapidly.

In the past the cooling of the hot web has been effected by the loopers and by cooling the rollers, as shown in Fig. 9, and by means of spraying the back of the sheet with water. The latter method requires a great deal of care as inevitably the mineral coated surface becomes stained by the oils of the hot base being floated by the cooling water to the mineral particles and remaining thereon when the water evaporates, and in addition the finished sheets become moldy if packed wet. I have found it possible to subject the sheet to a water bath for instant cooling, any water remaining on the sheet being absorbed in the cement coating.

Thus, by taking advantage of these properties of my coating I may speed up production considerably and save a great deal of floor space by eliminating a portion of the

apparatus shown in Fig. 9 such as the loopers 8 and 34, which usually have a combined length of about 120 ft.

In Fig. 10 I have shown the condensed apparatus as I prefer it to be used. It will be seen that after passing around the pull rolls 6 the web is immediately given its adhesive coating at 12 then passes through the leveling rolls 16, and thence is given its coating of mineral particles 20. The web thereafter passes around the pressing rolls 26 and 28, and then is either wholly submerged in a water bath or has both sides sprayed with water by the spraying devices 46 and 48. An air blast 50 may thereafter be employed to blow off the excess water if desired. The web is then given the coating of hydraulic cement preferably passed between a set of calender rolls 38, then around the pull rolls 52 and between rolls 54, between the cutting rolls 40 and thereafter onto the conveyor 42. The hydraulic cement coating as hereinafter mentioned may be done after the web is cut by using the hydraulic cement supply at 44, instead of that at 36. I may also use the rolls 52 and 54 as a set of calender rolls or place additional calender rolls anywhere in the system as I have found desirable in some instances.

Where it is desired to produce ornamental effects the mineral surfaced sheet is run through suitable mechanism for forming a plurality of depressed areas or spaced apart dotted indentations 56 arranged to form lines of demarcation, designs, or arranged over the entire face of the web as desired. These indentations may be produced by running the web between rollers, one of which has projecting portions thereon arranged to produce the desired indented design on the upper surface of the web. The mineral surfaces in the indentations will be depressed below the mineral surfacing on the portions of the web which are not depressed, as shown in Fig. 3.

The rollers with the projecting portions for ornamentation may be the rollers 26 or 32, or the rollers 26 and 28 may merely be pressure rollers and the ornamentation rollers may immediately follow them, being for instance the roller 32, Fig. 9, making the ornamentation a part of the continuous process.

It is preferred that the hydraulic cement wash 37 applied over the face of the web in this instance be of a different color from the mineral coating. It may, however, be of natural color with or without pigments. The wash will fill in the indented portions and will cover over the mineral material within said indentations, as shown in Fig. 4. The mineral surfacing material on the portions of the web which are not intended, however, will project above said wash, and therefore a varied tone effect will be produced between the depressed portions of the web and the other portions thereof. If the wash is colored, the indented portions of the web will have this color effect only and the other portions will have a combination of the color of the wash and the color of the mineral surfacing which projects above the wash. By the use of the method described it may be readily seen that any number of effects can be produced. By providing staggered indentations over the entire face of the web, as shown in Fig. 5, the entire sheet will have a two-tone effect, and by applying the indentations along narrow lines to define the edges of individual figures, as shown in Figs. 1 and 2, the definition lines will give a different effect from the other portions of the sheet.

As a result of the foregoing methods, a shingle element is produced having a thin flexible base made of saturated felt, an adhesive coating and mineral particles and to which has been applied a coating of hydraulic cement. The result when the coating has fully set is a thin shingle which still has the pliable characteristics of the original base but which is rigidified to some extent and at the desired place by the coating.

It is relatively pliable when bent in such direction as to put the cement coating under tension as at 58, Fig. 6, but resists flexing when bent in such a way as to compress the cement coating as at 60.

The shingle is substantially flat and can be laid as ordinary flexible felt base shingles, giving a large coverage for the amount of roofing material used and providing an inexpensive roofing material but, however, having sufficient rigidity and fireproofness to make it much better than the ordinary felt base shingles heretofore used.

Figs. 7 and 8 show an assembly of the finished shingle elements 2 as they are mounted upon roofing surfaces. Fig. 8 more particularly shows how these shingle elements are used to re-roof an old distorted shingled roof 62, and how they hug the irregular surfaces. As the shingles are laid with the hydraulic cement coating forming the butt or portion exposed to the weather, they firmly resist the effect of the wind in lifting them or turning up their edges, and the consequent accumulation of snow thereunder. Also, the rigidity of the hydraulic cement coating resists any tendency of the shingle to curl due to the action of the sun. Even though the coating is relatively thin, it prevents the volatile oils from drying out from the base, thereby preventing deterioration of the shingle elements.

In securing these shingles, short inexpensive nails 64 may be used due to the relative thinness of the shingle, and they may be inserted at any point where most effective. This is not true in the prior art tiles because they are thicker, and more massive and the short inexpensive nails I use either would not

reach the roof deck or would not penetrate the deck sufficiently to firmly secure them in place. Also, because there is a considerable portion of the nail above the roof deck in a thick tile, the effective moment of any force tending to move the tile is greatly increased over a thin shingle lying flat against the roof deck. Further than this, with the arched tiles of the prior art it is impossible to always strike a nail at the places where nails might be desirable and at the same time get any hold on the roof deck. On the other hand, in my shingle the nails may be driven at any desired point.

A great advantage of my shingles are that only one shape of shingle need be delivered to a job. It is impossible to make a complete roof of one shape of the rigid tile, as the type suitable for the main body of the roof can not be made to fit all of the hips, valleys and projections. The shingles of the present invention, however, can easily be adapted to roof decks and other surfaces which have irregularities, such as, for example, chimneys and dormers which must be properly flashed. My shingle of the type described can readily be bent, cut and formed to fit, by the roofer without any special bending and cutting machines, serving as a flashing in itself by reason of its pliability and wide nailing range.

The surfacing which characterizes the basic principal of this invention makes it particularly well adapted to shingles of the interlocking type of which there are many disclosed in the prior art. By reason of the pliable and rigidifying characteristics of my coated element the locking tabs are more easily inserted in the receiving means of the adjacent shingle, and will better hold their shape. Also, the locking parts will be more securely held in place after engagement.

From a consideration of the foregoing description of my invention and process, it can readily be seen that I am enabled to use less expensive base materials, lighter weight and lower cost mineral ingredients, and a more rapid process. The finished article thereby produced can be manufactured for practically the same or less cost than those flexible shingles made up to the present time. I thus produce a vastly improved product at a lower price than has heretofore been practicable.

In view of the prior description and that in my copending application Ser. No. 444,331, filed April 14, 1930, of which the present application is a continuation in part, it is evident that many changes may be made in the shingle and the process of making same. It is, therefore desired that the invention be construed including equivalent and as broadly as the claims taken in conjunction with the prior art may allow.

I claim:—

1. As an article of manufacture, a substantially flat pliable shingle element comprising a water resistant flexible base, a granular surface roughening material adhesively secured to said base, and a coating comprising hydraulic cement over said surface, said coating being of no greater thickness than said granular material, whereby said shingle is rigidified so as to render it substantially non-curling but retaining sufficient pliability and flexibility to be laid over irregular surfaces.

2. As an article of manufacture, a substantially flat pliable shingle element having a butt portion adapted to be exposed to the weather, comprising a water resistant flexible base, a surface roughening material comprising mineral particles adhesively secured to said base on the butt portion and a coating comprising hydraulic cement over said butt portion, said coating being of no greater thickness than said mineral particles, whereby said butt portion is rigidified so as to render it resistant to curling but retaining sufficient pliability and flexibility to be laid over uneven surfaces.

3. As an article of manufacture, an ornamented semi-rigid shingle element comprising a base, mineral particles adhesively secured to the base and gripping a hardened coating comprising hydraulic cement of no greater thickness than the mineral particles, said shingle presenting high and low substantially flat surface areas arranged in designs whereby the shingle element presents a textured surface comprising hydraulic cement and mineral particles with the designs distinguishable by the contrast of the texture, said hardened hydraulic cement serving to rigidify said shingle element and give it non-curling properties.

4. In a method of making a cement surfaced pliable shingle element, the steps comprising providing a moving flexible base, applying an adhesive layer on said base, applying a surfacing on said adhesive layer comprising mineral particles and partially embedding said mineral particles in said adhesive layer before it has finally set, said mineral particles having applied thereto a coating comprising hydraulic cement sufficiently thin to preserve the texture of said mineral particles to produce a shingle element rigidified so as to render it substantially non-curling but retaining sufficient pliability and flexibility to be laid over irregular surfaces.

5. In a method of making substantially flat cement surfaced pliable shingles, the steps comprising providing a water resistant flexible base, applying an agglutinous layer on said base, applying a surface roughening material on said agglutinous layer and adhesively securing said roughening material in place, applying a thin wash coating comprising hydraulic cement of no greater thickness than said mineral particles and thereafter cutting into shingle sizes, said

coating at least covering and rigidifying the butt portion of said shingle elements to render them resistant to curling but retaining sufficient pliability and flexibility adapting them to be laid over uneven surfaces.

6. A method of making an ornamented semi-rigid shingle element comprising providing a flexible base, securing mineral particles to said base in designs presenting high and low surface portions and applying a coating comprising hydraulic cement of no greater thickness than said mineral particles to said surface portions to produce a textured surface comprising hydraulic cement and mineral particles with the designs distinguishable by the contrast of the texture, said hydraulic cement when hardened serving to rigidify said shingle element and give it non-curling properties.

Signed by me, this 3rd day of February, 1933.

NORMAN P. HARSHBERGER.