

March 16, 1937.

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2,074,147

PROCESS AND APPARATUS FOR SURFACING ROOFING

Filed Oct. 26, 1933

2 Sheets-Sheet 1

Fig. 10.

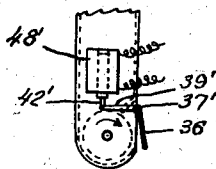


Fig. 1.

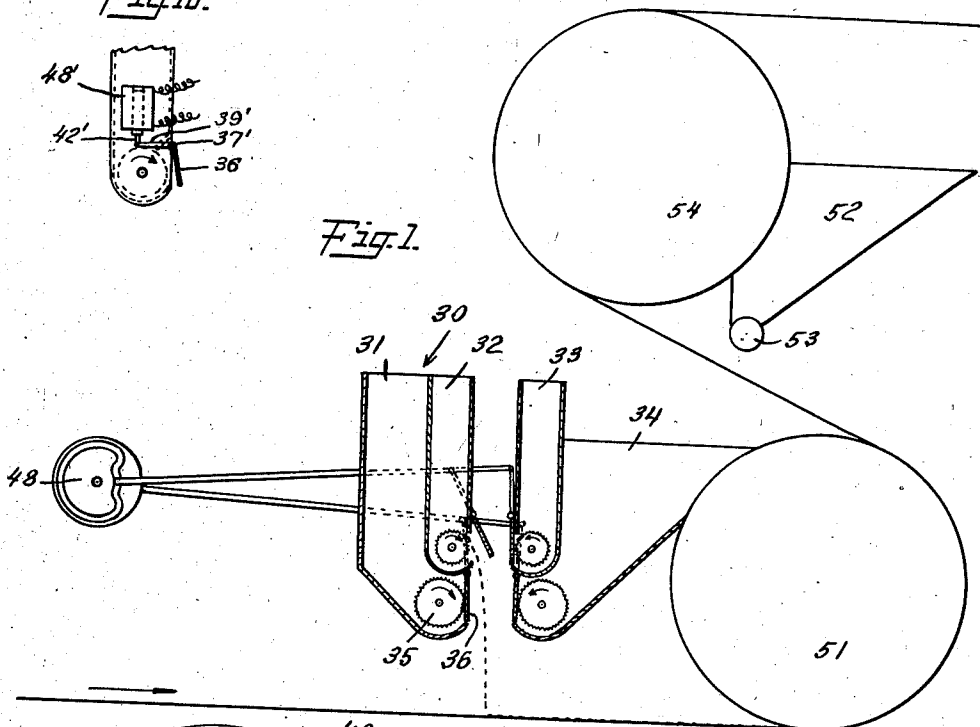


Fig. 2.

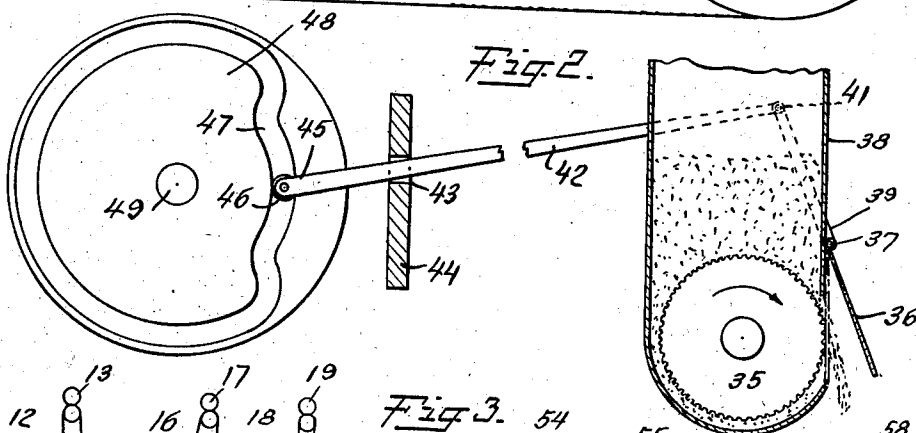


Fig. 3.

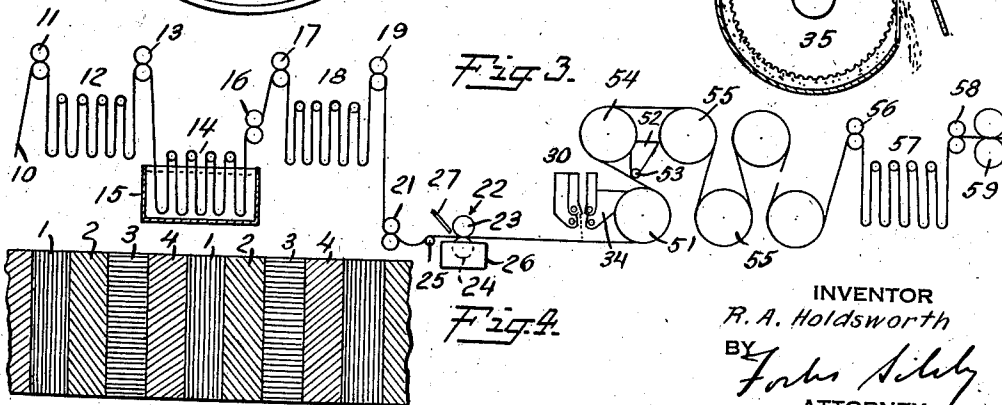
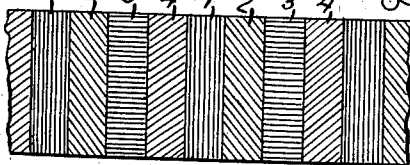


Fig. 4.



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2 Sheets-Sheet 2.

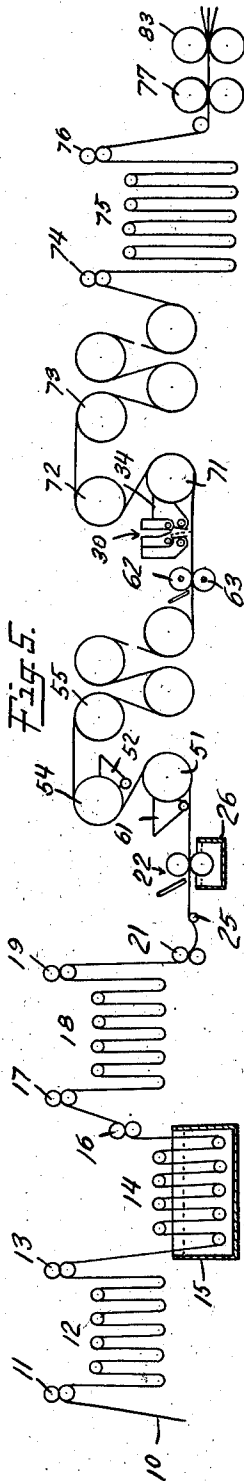


Fig. 5.

Fig. 6.

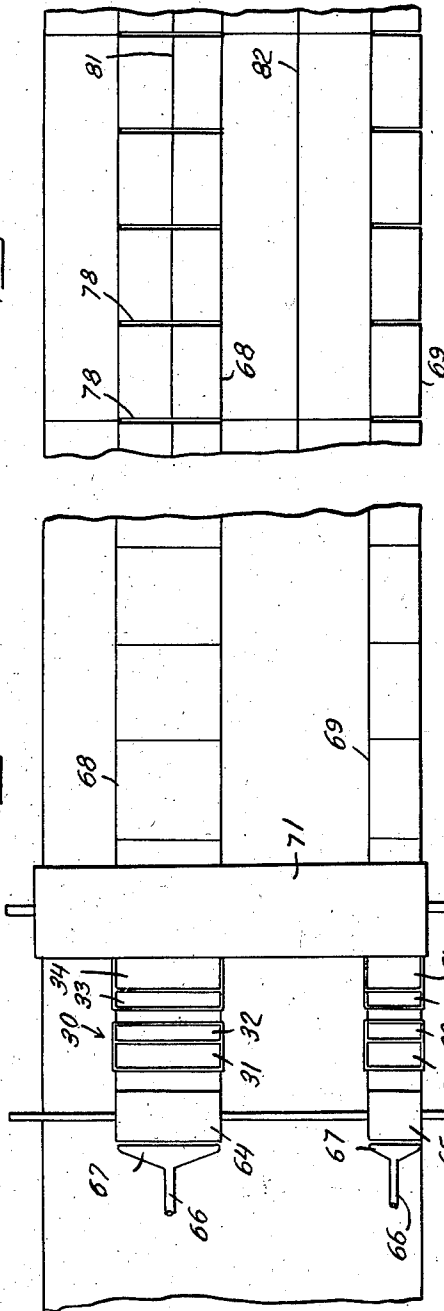
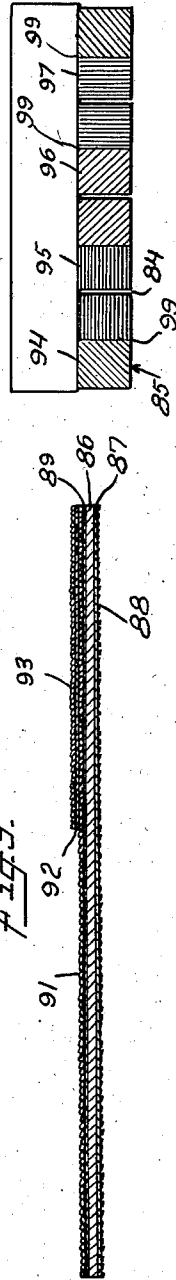


Fig. 6.

Fig. 7.



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PROCESS AND APPARATUS FOR SURFACING
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Application October 26, 1933, Serial No. 695,313

10 Claims. (Cl. 91—43)

This invention relates to the surfacing of roofing, and more particularly, to the formation of colored composition roofing, such as felt base roofing saturated with bituminous waterproofing material, coated with bituminous waterproofing material, and having colored granular material partially embedded in the coating on the exposed face of the roofing. The term "roofing material" is used in a broad sense and is intended to include material employed for roofing, siding, and other analogous protective or decorative purposes.

The application of granular material of one color or blend of colors to coated roofing material during the continuous passage of the roofing material through a roofing machine is well known. It has been proposed to feed a roofing sheet or web beneath a series of hoppers, containing differently colored granules and operated intermittently in such way that all the hoppers concurrently dropped granular material on the moving sheet while the sheet progressed a predetermined distance, thus forming transverse stripes on the sheet. Then the flow of grit from all the hoppers was interrupted while the sheet was moved a distance equal to the length of the roofing material on which grit had been showered from the hoppers. An additional hopper was provided to pour granular material over the whole sheet continuously so that any unsurfaced portions of the sheet were covered with granular material.

Such procedure has the disadvantages that excessive amounts of grit require handling, and color bands of desired color cannot be formed on the roofing since the grit applied from the hopper continuously feeding granular material onto the sheet commingles with the grit delivered from the other hoppers, thus affecting the color appearance of the grit on the roofing. Furthermore, the intermittent feeding of granular material simultaneously from a plurality of hoppers during the movement of the roofing is difficult to synchronize with the movement of the roofing; hence, contiguous portions of certain of the differently colored bands may blend into each other throughout to an undesirable extent, or may fail to meet on the felt, with consequent detriment to the appearance of the finished elements.

It is an object of this invention to provide a surfacing procedure for directly applying successive streams of differently colored granular material to a coated roofing web. Another object of this invention is to provide surfacing apparatus for applying transverse stripes of differently colored granular material, the apparatus being

comparatively simple in design and efficient and durable in operation.

Still another object of this invention is to provide a process and apparatus for making double thickness roofing or siding elements involving the continuous saturation, coating and surfacing of roofing material, followed by the application of overlay coating bands and the surfacing of these bands with granular material applied to form differently colored stripes, each transverse to the length of the overlay coating bands. The thus surfaced sheet may then be cut longitudinally of the fabric into strip shingle elements having tab-defining cut-outs along one longitudinal edge thereof. The tab-defining cut-outs may occur on the boundary lines of contiguous stripes of granular material or may be spaced from such boundary lines.

Other objects and advantages will appear from the following detailed description taken in connection with the accompanying drawings, in which—

Fig. 1 is a side elevation of surfacing apparatus embodying this invention;

Fig. 2 is a fragmentary side elevation, partly in section, on an enlarged scale as compared with Fig. 1, and shows the mechanism for operating a gate or valve controlling the discharge of granular material from a hopper;

Fig. 3 is a side elevation, somewhat diagrammatic in character, showing equipment for making composition roofing;

Fig. 4 shows a fragmentary plan view of roofing surfaced in accordance with this invention;

Fig. 5 is a side elevation somewhat diagrammatic in character showing equipment for making double thickness roofing elements;

Fig. 6 is a fragmentary plan view showing double thickness roofing surfaced in accordance with this invention;

Fig. 7 is a fragmentary plan view showing sheet layout for cutting strip shingles from the roofing of Fig. 6;

Fig. 8 is a plan view of a finished element;

Fig. 9 is a vertical section through the tab portion of the element of Fig. 8; and

Fig. 10 is a fragmentary vertical section through a hopper equipped with a solenoid operated valve gate or plate.

Referring to the drawings, with particular reference to Fig. 3, a sheet of fibrous material 10, which may be, and preferably is, of the usual roofing felt made of rag fiber, paper stock, or other fibrous material, with or without suitable fillers, as well known in this art, is fed by feed

rolls 11 from the usual paper making machine or feed roll into a looping device 12. From the looping device 12, rolls 13 feed the sheet into any suitable type of saturating apparatus, indicated generally by the reference numeral 14. Saturating tank 15 may contain suitable cementitious waterproofing composition, such as asphalt or other bituminous material, utilized for the impregnation and saturation of roofing felts.

Rolls 16 and 17 feed the saturated sheet to a second looping device 18. The passage of the saturated fibrous sheet or the base through the looping device 18 gives the saturant an opportunity to impregnate the base thoroughly and to cool. Rolls 19 and 21 feed the saturated sheet from the looping device 18 to the coating apparatus 22, involving a pair of coating rolls 23, 24, a guide roll 25 being interposed between rolls 21 and the coating apparatus 22. Coating roll 24 is rotatably mounted in a tank 26 which may contain bituminous material, such as asphalt or other cementitious waterproofing substance suitable for coating roofing felt. Bituminous material may be applied to the top of the sheet by means of a pipe 27 having a spout of a width approximately equal to that of the sheet. As the sheet passes between the coating rolls 23, 24, the underside is completely coated by roll 24. The coating material delivered by pipe 27 is spread uniformly over the top side by the coating roll 23, excess coating material passing over the edges of the sheet and draining into the tank 26.

Immediately after leaving the coating appliance 22 and while the coating material is still soft and tacky, the coated sheet passes through the surfacing apparatus indicated generally by the reference numeral 30. In the embodiment of the invention shown in Figs. 1 and 3, the surfacing apparatus involves four hoppers, 31, 32, 33, and 34, each having a discharge spout in which is rotatably mounted a distributing roll 35. The discharge spout of hopper 32 is disposed directly above that of hopper 31, as shown in Fig. 1, while the discharge spout of hopper 33 is disposed directly above that of hopper 34. Flow through each discharge spout is controlled by a pivoted gate or valve plate 36. Since the gates and the operating mechanism therefor for all four hoppers are of like construction, only one will be described in detail. As shown on Fig. 2, a gate 36 is pivoted on a shaft 37, journaled in the front wall 38 of the hopper. Secured to shaft 37 is a lever 39 pivotably secured as at 41 to a second lever 42 passing through a guide slot 43 in a support 44. End 45 of the lever 42 is provided with a cam roll 46 arranged to travel in the cam track 47 on the cam 48 keyed to shaft 49, rotatably mounted and arranged to be driven by a suitable source of power. Shaft 49 has one cam for each hopper and the cams are so arranged that the gates 36 of the hoppers 31 to 34 are operated in timed sequence, flow of grit from one hopper being interrupted by the closing of its valve plate 36 while flow of grit from a second hopper is simultaneously initiated by the opening of valve plate 36, associated with the second hopper. Differently colored grit is preferably supplied to each hopper.

Preferably, the drive for rolls 35 is geared to that for the rolls or drums 55, hereinafter described, which rolls pull the sheet through the apparatus; hence, the feed of granular material to the sheet is proportional to the movement of the coated sheet. Rotation of roll 35 in each hopper functions to agitate the granular material

in the hopper and when the gates or valves controlling the discharge of granular material are open to discharge a stream of granular material from the hopper. When the gate controlling the discharge of granular material is closed, the gate interrupts the discharge of granular material, the continued rotation of the distributing roll functioning to agitate the material at the base of the hopper maintaining the granules in a loose condition so that upon subsequent opening of the gate to the full line position shown in Fig. 2, discharge of the granules occurs immediately. It will be noted that the distributing rolls 35 are rotated in such direction that the moment the valve plates 36 are opened, an initial velocity is imparted to the granular material in the direction of fall.

In operation, as the coated sheet passes beneath the surfacing devices 30, grit of one color is fed from one hopper, say hopper 32, directly to the coated sheet during the movement of the sheet through one unit, in the instant case, the width of stripes 1, 2, 3, or 4 (Fig. 4). Thereafter, the valve plate 36 of the hopper 32 from which grit was fed to the coated sheet is closed and the valve plate 36 of another hopper, say hopper 31, simultaneously opened so that grit is delivered from the hopper 31 to the coated sheet during the travel of the sheet through a second unit. This operation of interrupting the feed of grit from one hopper and initiating the feed of grit from another hopper is repeated so that streams of grit are fed successively from each of the four hoppers to the sheet, each stream flowing during the movement of the sheet through one unit. Transverse stripes 1 to 4 (Fig. 4) of different colors are thus formed on the roofing sheet, each stripe extending transversely of the length of the sheet.

In the embodiment shown, the cams 48 are all keyed to one shaft and the valve plates are operated in timed sequence so that stripes of uniform width are formed. If desired, the cams or the electrical control of Fig. 10, hereinafter described, may be designed and arranged so that all valve plates do not remain open for the same time interval, but one or more of the plates are open for a longer time interval than the others so that the stripes formed are not all of the same width but of different widths.

After being surfaced, the sheet passes about reversing roll 51 which functions to partially embed the mineral granules in the plastic coating. Any excess granules fall from the surfaced sheet into the hopper 34, the granules in this hopper being, if desired, a blend of the granules of the other three hoppers so that one of the stripes is of color blend made of the colors of the other three stripes.

In the continued passage of the surfaced sheet, it travels next under hopper 52. Powdered talc, mica or other anti-stick composition capable of rendering the back of the sheet non-cementitious is disposed in hopper 52 and is discharged therefrom by distributing roll 53 onto the coating on the back of the sheet in the form of a talc surfacing layer covering substantially the entire width of the sheet. The talc covered sheet then passes over reversing roll 54, which partially embeds the talc in the sealback coating and imparts a smooth surface to the back of the sheet. Excess talc falls from the sheet as the latter passes from reversing roll 54 to the first of a series of calender rolls, each designated by the reference numeral 55.

From the calender rolls 55, the sheet in the embodiment of the invention shown in Fig. 3, is fed by feed rolls 56 through a looping device 57 where the coated and surfaced product is given an opportunity to cool. Feed rolls 58 feed the surfaced sheet into cutting cylinders 59 which cut the surfaced sheet into strip shingles.

In the embodiment of the invention shown in Fig. 5, in which parts corresponding to those of Fig. 3 have been given like reference numerals, the sheet, after leaving the coating appliance 22, is showered with granular material, which may be of a solid color, from the hopper 61. The thus surfaced sheet passes about the reversing roll 51, under hopper 52 containing talc or other anti-stick material, and thence over reversing roll 54 and the calender rolls 55. From the calender rolls 55, the sheet of Fig. 5, now having a single coating and single surfacing on the top and undersides, is passed between coating rolls 62 and 63 of a second coating device. Upper coating roll 62 is preferably divided, in the embodiment of the invention shown in Fig. 6, into two sections 64 and 65. Waterproofing material, such as asphalt, may be applied to the top of the sheet by means of feed pipes 66 equipped with discharge spouts 67. As shown in Fig. 6, these feed pipes and spouts are two in number and are positioned over the sheet so as to feed waterproofing material in the form of stripes extending longitudinally in the direction of movement of the roofing sheet. Coating material discharged from the spouts 67 is spread uniformly in the form of spaced coating stripes or lanes 68, 69 on the face of the surfaced base. Instead of spouts 67, coating rolls may be employed.

Immediately after leaving the second coating appliance, and while the second coating is still soft and tacky, the sheet passes under surfacing devices 30 hereinabove described in detail, one for each band or lane 68, 69, as shown in Fig. 6. Successive streams of mineral grit are fed from each of the hoppers of the surfacing device 30 forming bands 1 to 4 of differently colored granular material, each extending transverse to the stripes or lanes 68, 69. The thus surfaced sheet then passes about reversing roll 71 which functions to partially embed the grit in the lanes 68, 69 of plastic coating material. Any granules or particles which do not adhere to the plastic coating fall from the sheet as it passes about roll 71 into the hopper 34.

The double coated and double surfaced sheet next passes over reversing roll 72 and over the drying and pressing rolls 73. Feed rolls 74 feed the sheet from the pressing rolls 73 into a looping device 75 where the product is given an opportunity to cool. From looping device 75, the surfaced sheet is fed by rolls 76 to the cutting cylinders 77. These cylinders simultaneously cut rows of slots 78 in the double coated and double surfaced portions of the sheet as shown on Fig. 7. The individual slots of each row are of a length preferably equal to the width of the double surfaced bands 68, 69. The sheet is simultaneously cut longitudinally along longitudinal line 81 intersecting the slots 78 midway between the ends thereof and also along line 82 coinciding with the median line of the single thickness areas between the double coated lanes or bands 68, 69.

Preferably, the slotting and the longitudinal and transverse cutting operations are accomplished by passing the surfaced base through cutting rolls which substantially simultaneously make all the cuts, but they may be formed in

any desired order, the slotting operation preceding or following the cutting of the base into longitudinal stripes. From the cutting cylinders 77, the cut sheet passes through knocker and ejector cylinders 83 of any well known type, which remove any portions of the material cut out to form slots 84 (Fig. 8) which may adhere to the cut sheets. From the ejector mechanism, the strip shingles pass to suitable stacking appliance (not shown).

The shingle element resulting from the described operations of Fig. 5 is shown on Figs. 8 and 9. That portion of each element adapted to be exposed to the weather when laid is provided with a series of cut-outs or slots 84 defining a plurality of rectangular shaped tabs 85. Each element consists of a felt base 86 (Fig. 9) having a sealback coating 87 of bituminous waterproofing composition such as asphalt rendered non-cementitious by the application thereto of a layer of powdered talc or mica 88. The top side of each element is substantially completely covered by coating layer 89. A layer of granular material 91 of a solid color or blend of colors is partially embedded in the coating layer 89. An overlay coating layer 92 covers the tab portions; i. e., the portions adapted to be exposed to the weather of the granular layer 91. Coating layer 92 has partially embedded therein granular material 93 forming stripes extending transversely of the longitudinal direction of the element as appears from Fig. 8. In this figure, reference numerals 94 to 98 represent the stripes of differently colored granular material on the tab portions of the element. The dividing lines 99 between the differently colored stripes, it will be noted, occur on the face of the tabs.

Instead of the mechanical control of Figs. 1 and 2 for operating the gates or valves 36, each hopper may be equipped with a solenoid 48' (Fig. 10), the core of which is pivoted at 42' to a lever or arm 39', in turn pivoted at 37' to the gate or valve 36. The core of the solenoid is constructed and arranged, as well known in the electrical art, so that upon the interruption of the flow of current through the solenoid, the core drops, pushing down on lever 39' and causing the gate or valve 36 to swing outwardly to the full line position shown on Fig. 10. Upon energization of the solenoid, the core is moved upwardly to swing the lever or arm 39' upwardly, causing the gate 39 to move to a position preventing discharge of granular material from the hopper. The solenoids of the hoppers may be connected in parallel to a suitable source of E. M. F., and each solenoid has, in series therewith, a switch, all the switches being arranged to be opened and closed by cams in desired sequence. For a more detailed description of the electrically operated control, reference may be had to application Serial No. 695,312, filed even date herewith.

It will be noted that in accordance with this invention, streams of differently colored grit are successively applied directly from the hoppers to a coated roofing base, forming differently colored transverse stripes thereon in a simple and efficient manner.

Since certain changes in carrying out the above process and certain modifications of the apparatus may be made without departing from the scope of this invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. For example, instead of applying granu-

lar material of different colors, granular material of different degrees of coarseness or other physical characteristics might be supplied to the hoppers and fed therefrom onto the coated sheet.

- 5 If desired, each hopper might be provided with partitions dividing it into compartments, each of which is supplied with differently colored granular material so that each transverse band 1, 2, 3, and 4 (Fig. 4) instead of being constituted 10 of a single color, as shown in Fig. 4, will be constituted of contiguous portions of different colors and the formation of a plurality of such bands will result in the production of a "checkerboard" pattern.

15 I claim:

1. The process of surfacing roofing which comprises coating a felt base with cementitious waterproofing material, feeding the coated base longitudinally beneath a plurality of sources of supply of granular material of different characteristics, feeding a transversely extending stream 20 of granular material from one of said sources and allowing said stream to fall freely in a substantially vertical plane directly onto said base to form a transverse band thereon, interrupting said stream of granular material, initiating flow of a second transversely extending stream of granular material of different characteristics from another source, allowing said second stream 25 to fall freely in a substantially vertical plane directly onto said base to form another transverse band thereon, each of said bands being constituted of granular material from one of said sources, the successive flow of said streams 30 preventing substantial mixing of the granular material of said streams.

2. The process of making roofing elements which comprises coating a saturated felt base with waterproofing material, partially embedding 40 granular coating material in said coating, applying a longitudinal stripe of coating material on said granular material, feeding said sheet longitudinally beneath a plurality of differently colored sources of granular material, feeding a 45 transversely extending stream of granular material from a source of such material onto said roofing sheet to form a transverse band on a portion of said coating stripe, interrupting said stream of granular material, initiating flow of a 50 second transversely extending stream of granular material of different color from another source, applying said second stream to said roofing sheet to form another transverse band on another portion of said coating stripe, each of said 55 bands being constituted substantially entirely of granular material from one of said sources, the successive flow of said streams preventing substantial mixing of the granular material of said streams, and cutting the resultant base longitudinally into roofing elements, each having 60 transverse bands of different colors on the portion to be exposed to the weather.

3. The process of making roofing elements having tabs separated by narrow slots along one 65 longitudinal edge thereof which comprises coating a saturated felt base with bituminous material, partially embedding granular material in said coating, applying a stripe of bituminous coating material to said granular material, said 70 stripe extending longitudinally of the felt base and being of a width sufficient to cover the tab portions of two of the elements, continuously moving the thus coated web beneath a plurality of sources of differently colored granular material, 75 flowing a transversely extending stream of ma-

terial from one of said sources and allowing it to fall freely in a substantially vertical plane directly onto said coating stripe to form a transverse band thereon, interrupting said stream and simultaneously initiating the flow of a second transversely extending stream of granular material of a different color from another of said sources and allowing said second stream to fall freely in a substantially vertical plane directly onto said coating stripe to form a differently colored transverse band thereon, the flow of the stream from each of said plurality of sources being initiated substantially simultaneously with the interruption of a stream from another of said sources, whereby a continuous layer of surfacing material is applied to said coating stripe irrespective of changes in the rate of movement of the sheet with respect to the rate of initiation and interruption of said streams, each of said bands being constituted substantially entirely of granular material from one of said sources, and cutting the resultant surfaced base longitudinally along said coating stripe and transversely to form shingle elements.

4. The process of surfacing roofing which comprises coating a felt base with cementitious waterproofing material, feeding said coated base beneath a plurality of sources of supply of differently colored granular material extending transversely with respect to said base, feeding a transversely extending stream of granular material from one of said sources and allowing said stream to fall directly in a substantially vertical plane onto said roofing sheet to form a transverse band on one portion of said sheet, interrupting the flow of said stream, initiating a second transversely-extending stream of granular material of different color from another of said sources, allowing said second stream to fall directly in a substantially vertical plane upon another portion of said continuously moving sheet to form another transverse band on another portion of said sheet, the stream from each of said sources being initiated substantially simultaneously with the interruption of a stream from another of said sources whereby said streams form a continuous layer on said sheet irrespective of changes in the rate of movement of the sheet with respect to the rate of initiation and interruption of said streams, each of said transverse bands being constituted substantially entirely of granular material from one of said sources, the successive flow of said streams preventing substantial mixing of the granular material of said streams.

5. Surfacing apparatus comprising a plurality of stationary hoppers containing granular material of different characteristics and all arranged to separately feed streams of granular material therefrom, means for initiating flow of a stream from one of said hoppers, means for interrupting the flow of said stream, means for successively initiating flow of a stream from another of said hoppers and interrupting the flow of said last named stream whereby said streams flow successively and not simultaneously from said hoppers and means for feeding a roofing sheet beneath said hoppers whereby said streams fall directly in substantially vertical planes from said hoppers onto said roofing sheet.

6. Surfacing apparatus comprising a plurality of hoppers containing granular material and arranged in pairs, the individual members of each pair being disposed with the discharge outlets one above the other, valves for controlling the discharge of granular material from said hoppers,

a power driven rotatable member and means operated by said rotatable member for automatically operating said valves in timed sequence.

7. Surfacing apparatus comprising a plurality of hoppers containing granular material and arranged in pairs, the individual members of each pair being disposed with the discharge outlets one above the other, valves for controlling the discharge of granular material from said hoppers, a power driven rotatable member and means operated by said rotatable member for automatically operating said valves in timed sequence, including means for opening one of said valves and substantially simultaneously closing another.

8. Surfacing apparatus comprising a plurality of hoppers containing granular material arranged in pairs, the individual members of each pair being disposed with the discharge outlets one above the other, a distributing roll in each discharge outlet for discharging granular material therefrom, valves for controlling the discharge of granular material from said hoppers and automatic means for operating said valves to successively discharge granular material from said hoppers.

9. Apparatus for surfacing roofing comprising a plurality of hoppers, each provided with a discharge outlet, a distributing roll in each outlet, a valve controlling flow through each outlet, a power driven rotatable member, means operated by said rotatable member for automatically operating the valves in timed sequence whereby said distributor rolls successively and not simultaneously discharge streams of granular material, means for feeding roofing material beneath

said hoppers, said streams of granular material discharged from said hoppers falling freely in substantially vertical planes directly onto said roofing material to form differently colored bands thereon.

10. In apparatus for manufacturing shingle elements, means for coating a roofing sheet with cementitious waterproofing material, means for partially embedding granular material in said coating, means for forming a stripe of coating material on said granular material, a plurality of stationary hoppers each containing differently colored granular material, means for feeding said sheet beneath said hoppers, said hoppers extending transversely with respect to the direction of movement of said sheet, means for discharging a stream of granular material from one of said hoppers, said stream falling freely in a substantially vertical plane directly onto said coating stripe to form a transverse band on a portion thereof, means for interrupting said stream, means for initiating discharge of a stream from another of said hoppers, said second stream falling freely in a substantially vertical plane directly onto another portion of said coating stripe to form another transverse band thereon, each of said bands being constituted substantially entirely of granular material from one of said sources, said means for successively initiating and interrupting the flow of the streams preventing substantial mixing of the granular material of said streams, and means for cutting the surfaced base longitudinally and transversely into shingle elements.

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