March 16, 1937. B. S. PENLEY ET AL 2,074,131

PROCESS AND APPARATUS FOR SURFACING ROOFING

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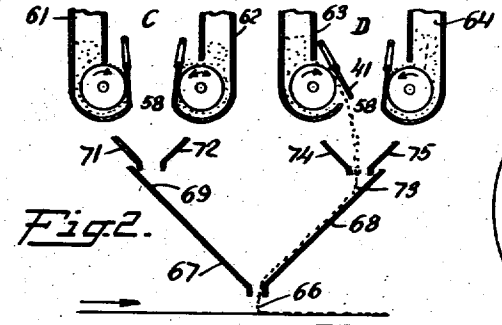


Fig. 2.

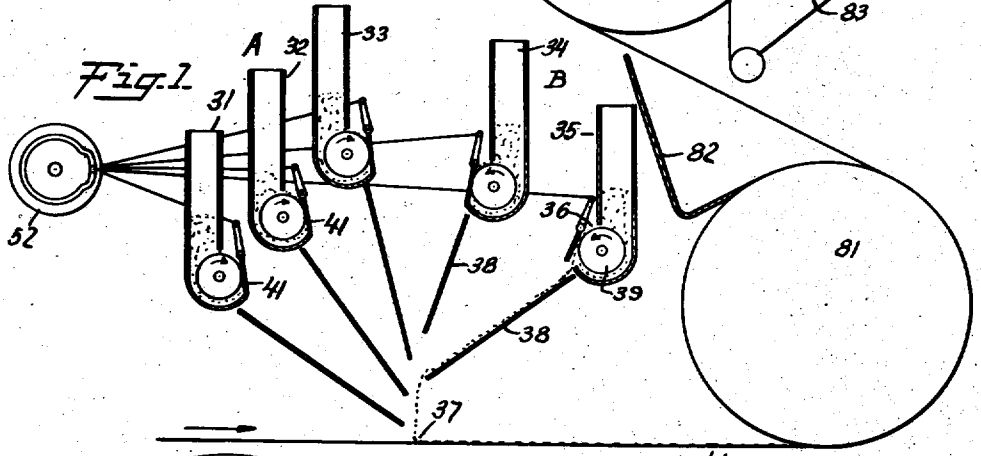


Fig. 1.

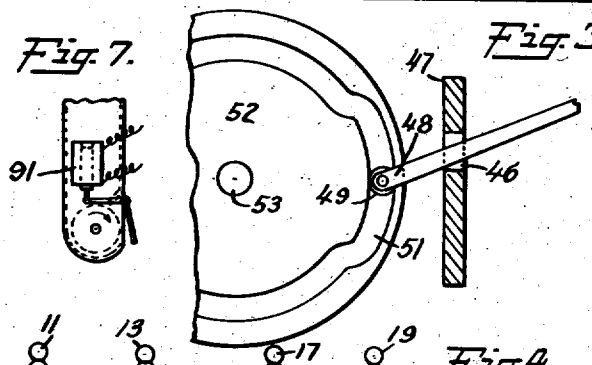


Fig. 7.

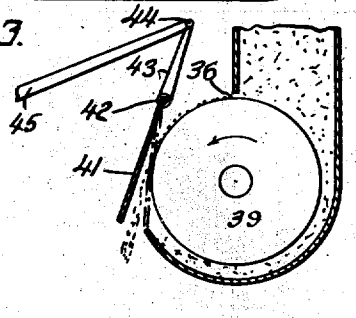


Fig. 3.

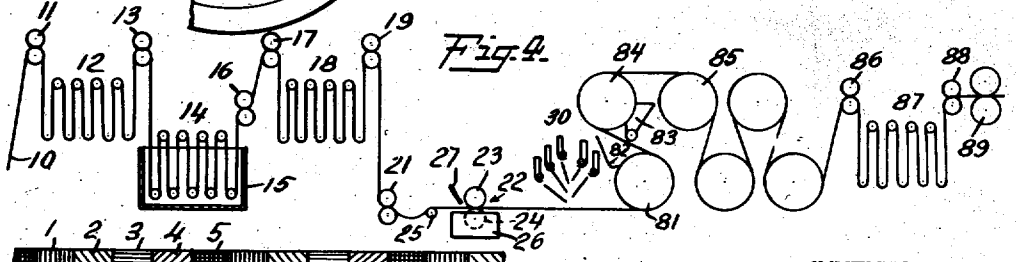


Fig. 4.

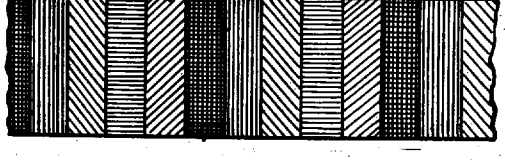


Fig. 5.

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Fig. 6.

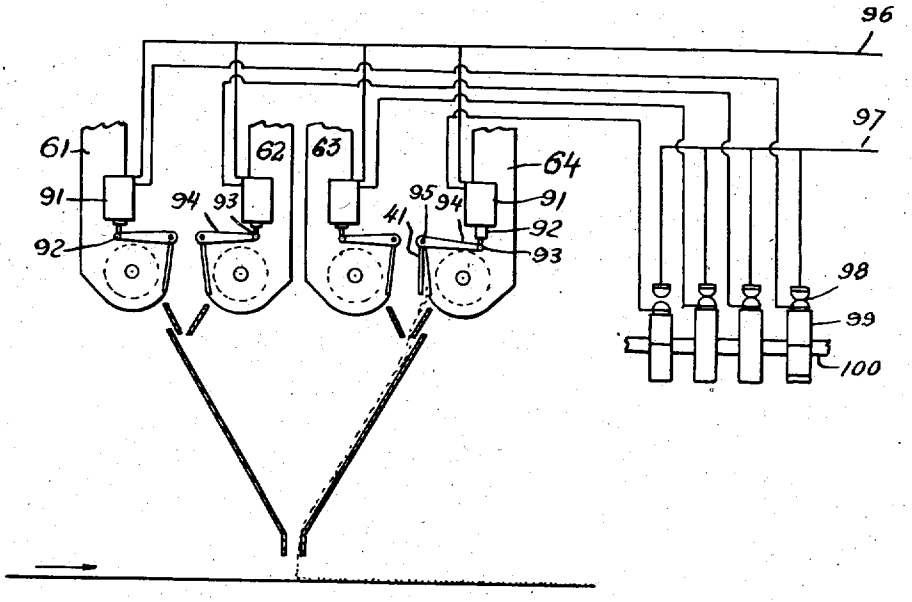
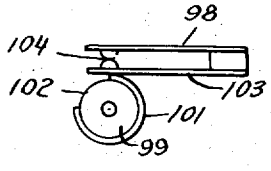


Fig. 8.



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PROCESS AND APPARATUS FOR SURFACING ROOFING

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Application October 26, 1933, Serial No. 695,312

14 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 an efficient and economical surfacing procedure for applying transverse stripes of differently colored granular material to a moving roofing web with little or no overlapping or blending of the granules defining contiguous stripes. In accordance with this invention, streams of differently colored granular material are fed successively directly onto a moving roofing web, the time interval for the passage of each grit particle of each stream from its source to the web being substantially the same. Hence, upon the interruption of the flow of one stream with the simultaneous initiation of the flow of the second stream, the particles of the second stream are deposited on the roofing web contiguous to the particles of the first stream. During the continued surfacing of the roofing web, differently colored streams are successively deposited onto the web, resulting in the formation of well defined contiguous transverse stripes or bands of different colors.

Another object of this invention is to provide surfacing apparatus of comparatively simple design and construction and which is durable and efficient in operation for forming well-defined transverse stripes of granular material on a roofing web.

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 of a modified form of surfacing apparatus embodying this invention;

Fig. 3 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. 4 is a side elevation, somewhat diagrammatic in character, showing equipment for making composition roofing;

Fig. 5 is a fragmentary plan view of roofing surfaced in accordance with this invention;

Fig. 6 is a side elevation, partly in section, illustrating a modified form of surfacing apparatus embodying this invention;

Fig. 7 is a fragmentary vertical section through one of the hoppers of Fig. 6; and

Fig. 8 is a detailed showing of a front elevation of one of the cams and an associated switch of the electrically operated control for operating the gates or valves which control the discharge of granular material from the hoppers.

Referring to the drawings, with particular reference to Fig. 4, 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 felt 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 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 hot, 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 Fig. 1, the surfacing apparatus involves five hoppers, 31, 32, 33, 34, and 35, each provided with a discharge outlet 36 and each arranged to deliver granular material to the deposit point 37. For this purpose, a guide plate 38 is suitably associated with each hopper to guide the granular material discharged by a distributing roll 39 rotatably mounted in the discharge outlet of each hopper from the discharge outlet to the deposit point 37. The guide plates may be of steel or other metal and are preferably equipped with electrically or mechanically actuated vibrators to prevent adherence of dust thereto and to facilitate the flow of grit therealong.

The distributor rolls 39 may be continuously rotated in the directions indicated by the arrows thereon by means of any suitable drive (not shown). Preferably, the drive for rolls 39 is geared to that for the rolls or drums 85, 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 39 in each hopper functions to agitate the granular material therein and when the gate or valve controlling the discharge of granular material therefrom is open to discharge a stream of granular material therefrom. Due to the rotation of the distributing rolls 39 of the hoppers to the right of the deposit point 37 (Fig. 1) in a counter-clockwise direction and those to the left in a clockwise direction, an initial velocity is imparted to the granular material in the direction of fall thereof the moment the valve plates are opened. When the gate controlling the discharge of granular material is closed, as shown in dotted lines on Fig. 3, 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. 3, discharge of the granules occurs immediately.

Granular material of different colors is preferably supplied to the hoppers. The flow of granular material from each hopper is controlled by a plate valve or gate 41 pivoted at 42 and secured to an arm or lever 43, as shown on Fig. 3. Since the gates and the operating mechanism therefor for all hoppers are of like construction, only one will be described in detail. Lever or arm 43 has an end secured to pivotally mounted plate valve 41 and the other end pivoted as at 44 to a relatively long arm or lever 45. Lever 45 passes through a guide slot 46 in a support 47 and has mounted in its end 48 a cam roll 49. This cam roll is arranged to travel in the cam track 51 of the cam 52 keyed to shaft 53 rotatably mounted and arranged to be driven by a suitable source of power. Shaft 53 has one cam 52 for each hopper and the cams are so arranged that the gates 41 are operated in timed sequence, flow of grit from one hopper being interrupted while flow of grit from a second hopper is simultaneously initiated by the actuation of valve plate 41. When the valve plate 41 is in the position indicated in dotted lines on Fig. 3, i. e., in the position away from roll 41, the grit showered by the distributing roll 49 is intercepted by the plate 41 and flow of grit from the hopper is prevented. Actuation of plate 41, into the full line position shown in Fig. 3, removes the plate from the path of flow of grit showered by the rotating roll 39 and permits the grit to fall onto the guide plate associated with the hopper and thence onto the coated sheet.

The hoppers of Fig. 1 may conveniently be regarded as divided into two groups, A and B, group A being constituted of hoppers 31, 32, and 33 and group B of hoppers 34 and 35. The two groups of hoppers, it will be noted, are disposed on opposite sides of a vertical plane passing through the grit deposit point 37. Hopper 31, which has its discharge outlet disposed the furthest distance horizontally from this vertical plane has its discharge outlet disposed the closest distance vertically above the deposit point 37 where the grit is deposited onto the moving coated web. The discharge outlet of hopper 32 is disposed at a higher level than that of hopper 31, but is spaced closer to this vertical plane. Hopper 33, which has its discharge outlet spaced the greatest vertical distance above the deposit point 37, is positioned closest to this vertical plane. The vertical and horizontal distances of the hoppers 34 and 35 with respect to deposit point 37 bears a like relationship to the vertical and horizontal distances of hoppers 31 to 33 with respect to deposit point 37. The spacing of all the hoppers is such that the time required for the delivery of each particle of grit from the discharge outlets of each hopper to the deposit point 37 is substantially the same. By this arrangement of hoppers, operation of the cams 52 to interrupt the flow of grit from one hopper to the deposit point 37 and initiate the flow of grit from a second hopper to the deposit point 37 results in the grit streams being deposited contiguously on the roofing web with little or no overlapping between contiguous bands and with the entire sheet surfaced with transverse, colored bands numbered 1 to 5 on Fig. 5.

In Fig. 2, a modified arrangement of hoppers is shown. The hoppers of this figure, instead of having the discharge outlets at different levels, as in Fig. 1, have all the discharge outlets 58 disposed in the same horizontal plane. In the embodiment of the invention shown in Fig. 2, four hoppers, numbered 61, 62, 63, and 64, are employed, arranged in pairs C and D, pair C being constituted of hoppers 61 and 62 and pair D of hoppers 63 and 64. The pairs of hoppers C and D are disposed equi-distances on opposite sides of the vertical plane passing through the deposit point 66 where the grit from the hoppers is delivered onto the coated sheet. A guide plate 67 is arranged to receive grit from hoppers 61, 62 and a second guide plate 68 is disposed to receive grit from the other two hoppers 63, 64. As in the case of Fig. 1, these guide plates may be of steel and may be equipped with suitable vibrators.

Hoppers 61 and 62 are disposed equi-distances on opposite sides of the point represented by reference numeral 69 where grit is deposited from these hoppers onto the guide plate 67. Guide plates 71, 72 are associated with hoppers 61, 62, respectively, to guide the discharge of grit from these hoppers onto the guide plate 67. Hoppers 63 and 64 are disposed horizontally equi-distances from deposit point 73. Guide plates 74, 75 are associated with hoppers 63, 64, respectively, to guide the flow of grit from these two hoppers onto the guide plate 68. With the arrangement of hoppers shown in Fig. 2, the path of movement of the granules from each of the hoppers to the deposit point 66 is substantially the same in extent. Accordingly, a like time interval is required for the flow of the grit particles constituting each of the streams from their source to the deposit point, the speed of rotation of the distributing rolls in all the hoppers being substantially the same. As in the case of the hoppers of Fig. 1, those of Fig. 2 are equipped with valve plates 41 and operating mechanism therefor, similar to valve plates described hereinabove, in connection with the apparatus of Fig. 1,

In operation, as the coated sheet passes beneath the surfacing device of Fig. 1 or Fig. 2, grit of one color is fed from one hopper, gravitating down the inclined guide plate associated therewith and being deposited directly onto the coated sheet during the movement of the sheet through one unit, in the instant case the width of stripes 1 to 5 (Fig. 5). Thereafter, the valve plate 41 of the hopper from which the grit was fed to the coated sheet is closed and the valve plate of another hopper simultaneously opened so that grit is delivered from this other hopper 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 hoppers, each stream flowing during the movement of the sheet through one unit and only one stream flowing at any one time. Transverse stripes 1 to 5 of different colors are thus formed on the roofing sheet, each striped extending completely across the width of the sheet in the case where the hoppers are of a width equal to that of the sheet.

In the embodiment shown, the cams 52 are all keyed to one shaft 53 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 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 are of different widths.

After being surfaced as hereinabove described, the surfaced sheet passes about reversing roll 81 which functions to partially embed the mineral granules in the plastic coating. Any excess granules fall from the surfaced sheet into a hopper 82 and may be returned from this hopper to one of the hoppers 31 to 35 or may be otherwise disposed of.

In the continued passage of the surfaced sheet, it travels next under a hopper 83. Powdered talc, mica or other anti-stick composition capable of rendering the back of the sheet non-cementitious is disposed in hopper 83 and is discharged therefrom 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 84, which partially embeds the seal back coating and imparts a smooth surface to the back of the sheet. Excess talc falls from the sheet as it later passes from reversing roll 84 to the first of a series of calender rolls 85. From the calender rolls 85, the sheet may be fed by feed rolls 86 through looping device 87 where the coated and surfaced product is given an opportunity to cool. Feed rolls 88 feed the surfaced sheet into cutting cylinders 89 which cut the surfaced sheet into individual or strip shingles; i. e., shingles having tabs along one longitudinal edge thereof of rectangular or other desired shape.

Figs. 6 and 7 disclose a modified form of apparatus for applying granular material to the sheet, the modification involving the same arrangement of hoppers as depicted in Fig. 2, which, however, are equipped with an electrical control for operating the gates or valves 41. The electrical control of Figs. 6 and 7 is preferred since it functions to operate the gates more quickly than the cam mechanism of Figs. 1 and 2. Each hopper is equipped with a solenoid 91, the core 92 of which is secured at 93 (Fig. 6) to an arm 94, in turn pivoted at 95 to the pivotally mounted gate or valve 41. 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 arm or lever 94 and causing the gate or valve 41 to swing outwardly to position shown on Fig. 7. Upon energization of the solenoid, the core is moved upwardly to swing the lever or arm 94 upwardly, causing the gate 41 to move to a position preventing discharge of granular material from the hopper.

One circuit for energizing and deenergizing the solenoids will now be described. Electrical conductors 96, 97 (Fig. 5) communicate with a suitable source of E. M. F. Solenoids 91 are connected in parallel with the conductors 96, 97 by suitable conductors and each solenoid has connected in series therewith and individual thereto a switch 98. When the switch individual to a solenoid is closed, as will be understood, the solenoid is energized, causing the core to move upwardly to close the valve plate 41 operated thereby. The switches are arranged to be opened and closed by cams 99, each individual to a switch and all keyed to a shaft 100 arranged to be rotated at a constant speed by an electric motor (not shown)

or other suitable source of power. Each cam 99 has a raised portion 101 and a depressed portion 102, the raised portion being arranged to contact with the lower leaf spring 103 of the switch 98 to cause engagement of the contacts 104 thereby closing the switch. When the depressed portion 102 of the cam comes below the leaf spring 104 of the switch 98, the switch opens. The raised and depressed portions of the cams on shaft 100 are arranged in desired relation to open and close switches 98 in desired sequence.

As shown on Fig. 6, the switch at the extreme left is open so that the solenoid associated with hopper 64 is deenergized and the gate of this hopper maintained in open position whereas the other switches are closed; hence, the solenoids in circuit therewith are energized and the gates of the remaining hoppers maintained closed. Upon rotation of shaft 100, the switch at the extreme left (Fig. 6) is closed and another of the switches opened, causing deenergization of the solenoid in circuit with the open switch and the opening of the gate or valve of the hopper having the solenoid in circuit with the open switch.

The surfacing apparatus of this invention may be employed to surface a roofing base constituted of the usual felt coated on both sides with asphalt or other bituminous material, surfaced on both sides with granular material and having overlay spaced coating stripes of asphalt or other bituminous material on the granular surfacing. Such roofing base may be surfaced with transverse stripes of differently colored granular material applied to the overlay coating stripes, using the surfacing procedure of this invention, and the resultant surfaced base may then be cut longitudinally of the overlay coating stripes and also between the overlay coating stripes into shingle elements having the exposed portion thicker than the upper unexposed portion and having the exposed portion surfaced with transverse stripes of differently colored granular material.

It will be noted that the surfacing apparatus of this invention is comparatively simple in design. The surfacing procedure herein described results in the formation of well defined contiguous transverse stripes of granular material and this with the handling of the granular material reduced to a minimum.

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 granular 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. 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, 4, and 5 (Fig. 4) instead of being constituted of a single color, as shown on 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.

We claim:

1. The process of surfacing a longitudinally moving sheet of roofing material which comprises providing a plurality of sources of granular material of different colors, flowing a stream of material extending transversely with respect to the direction of movement of said sheet from one of said sources directly onto said sheet to form a transverse band thereon constituted substantially entirely of granular material from said source, interrupting the flow of said stream and substantially simultaneously initiating the flow of a second stream of differently colored granular material extending transversely with respect to the direction of movement of said sheet from another of said sources, depositing said second stream directly on said sheet to form a second transverse band thereon constituted substantially entirely of granular material from said second named source, the time interval required for the flow of the second stream from its source to the sheet being substantially the same as that required for the first stream.

2. The process of applying transverse bands of surfacing material of different characteristics to a roofing sheet which comprises moving the roofing sheet longitudinally beneath a plurality of sources of surfacing material of different characteristics, flowing a stream of surfacing material extending transversely of the roofing sheet from one of said sources directly onto said sheet to form a transverse band thereon constituted substantially entirely of surfacing material from said source, interrupting the flow of the stream of surfacing material from said source, initiating the flow of a second stream of surfacing material of different characteristics extending transversely of the roofing sheet from another of said sources and depositing said second stream directly on said roofing sheet to form a second transverse band thereon constituted substantially entirely of surfacing material from said second source.

3. The process of surfacing a longitudinally moving sheet of roofing material which comprises providing a plurality of sources of granular material of different characteristics, flowing a stream of granular material extending transversely of the direction of movement of said sheet from one of said sources directly to a deposit point through which said roofing sheet moves, whereby said stream is deposited directly from said source onto said sheet, interrupting the flow of said stream of granular material and substantially simultaneously initiating the flow of a second stream of granular material of different characteristics extending transversely of the direction of movement of said sheet from another of said sources, flowing said second stream directly from its source to said deposit point through which said roofing sheet moves, whereby said second stream is deposited directly from said source onto said sheet consecutively and contiguously to said first named stream, 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 the sources, again initiating flow of the stream from said first source upon interruption of the last of said plurality of streams whereby all of said streams form a continuous stream and completely surface said sheet with transverse bands of surfacing material, each constituted substantially entirely of granular material from one of said sources irrespective of changes in the rate of movement of the sheet with respect to the rate of initiation and interruption of said streams.

4. Surfacing apparatus for roofing material comprising means for moving a roofing sheet, a plurality of stationary sources of differently col-

ored grit and means for intermittently and successively flowing differently colored grit streams from said sources directly onto said moving sheet, said means for successively flowing differently colored grit streams being arranged with respect to the path of movement of the sheet so that the time required for the flow of the individual particles of each stream from their source to said sheet is substantially the same.

5. Surfacing apparatus comprising a plurality of stationary sources of granular material of different colors, means for moving a sheet of roofing material beneath said sources, said stationary sources of granular material extending transversely of the direction of movement of said roofing sheet therebeneath, means for flowing a stream of granular material from one of said sources, means for depositing said stream, while still flowing, directly onto said sheet, means for interrupting the flow of said stream and substantially simultaneously initiating the flow of a second stream of differently colored granular material from another of said sources and means for depositing the second stream of granular material, while still flowing, upon said sheet, said streams forming transverse bands of surfacing material on said sheet, each of said bands being constituted substantially entirely of granular material of one of said streams, said depositing means being constructed and arranged with respect to the path of movement of the roofing sheet so that the time intervals required for the flow of the individual particles of said streams from their sources to the sheet are of substantially the same length.

6. Surfacing apparatus comprising in combination, means for continuously moving a roofing web, a plurality of stationary sources of differently colored granular material, said sources of granular material extending transversely of the direction of movement of the roofing web, means for depositing a flowing stream of granular material from one of said sources directly onto said web during movement thereof to form a transverse band thereon constituted substantially entirely of granular material from said source, means for interrupting the flow of said stream of granular material and substantially simultaneously initiating the flow of a second stream of differently colored material from another of said sources, means for depositing the second stream of granular material on said web during movement thereof to form a second transverse band thereon constituted substantially entirely of granular material from said second source, means for interrupting the flow of said second stream and substantially simultaneously initiating the flow of another stream of granular material from another of said sources to form another transverse band on said web, the streams of granular material from all of said sources substantially covering the entire roofing web with transverse bands of different colors, the means for depositing the streams of granular material being constructed and arranged with respect to the path of movement of the web so that the time intervals required for the flow of the individual particles of all of the said streams from their sources onto the web are substantially the same.

7. Surfacing apparatus comprising a plurality of stationary hoppers containing granular material of different characteristics and all arranged to separately feed flowing streams of granular material therefrom, means for conducting the streams of granular material, while said streams are still flowing, from all of the hoppers directly to the same deposit point, said hoppers and conducting means being disposed with respect to said deposit point so that the time of travel of the particles of granular material from all of said hoppers to said deposit point is substantially the same, means for successively discharging granular material from said hoppers to form said streams, and means for moving a sheet of roofing material through said deposit point.

8. Surfacing apparatus comprising a plurality of hoppers, each containing differently colored granular material and all arranged to separately feed flowing streams of granular material therefrom, means for conducting the streams of granular material, while the streams are still flowing, from said hoppers directly to the same deposit point, said hoppers and said conducting means being disposed with respect to said deposit point so that the time of travel of grit particles to said deposit point is substantially the same, a valve plate for controlling the discharge of granular material from each hopper, a distributing roll rotatably mounted in the outlet of each hopper, and means for successively operating said valve plates to control the discharge of granular material from said hoppers.

9. Apparatus for surfacing roofing, comprising, in combination, a plurality of stationary hoppers containing different colored granular material and arranged with the discharge outlets at different levels, all of said hoppers being arranged to feed flowing streams of granular material directly to the same deposit point, those hoppers having the discharge outlets spaced the least vertical distance from the deposit point being disposed horizontally the furthest distance away from said deposit point and those hoppers having the discharge outlets spaced vertically the greatest distance away from said deposit point being disposed horizontally the closest to said deposit point, and means for discharging granular material from said hoppers.

10. Apparatus for surfacing roofing comprising, in combination, a plurality of stationary hoppers containing differently colored granular material and arranged with the discharge outlets at different levels, all of said hoppers being arranged to feed granular material to the same deposit point, those hoppers having the discharge outlets spaced the least vertical distance from the deposit point being disposed horizontally the furthest distance away from said deposit point and those hoppers having the discharge outlets spaced vertically the greatest distance away from said deposit point being disposed horizontally the closest to said deposit point, and means for successively depositing granular material from said hoppers onto a moving web passing through said deposit point.

11. Apparatus for surfacing roofing comprising, in combination, a plurality of hoppers each provided with a discharge outlet, said hoppers containing differently colored granular material, the hoppers and discharge outlets being arranged at different levels, guide plates arranged to feed streams of granular material from said hoppers to the same deposit point, those hoppers having the discharge outlets spaced the least vertical distance from the deposit point being disposed horizontally the furthest distance away from said deposit point and those hoppers having the discharge outlets spaced vertically the greatest distance away from said deposit point being disposed horizontally the closest to said deposit point,

distributing rolls rotatably mounted in the discharge outlets of said hoppers for discharging said streams of granular material from said hoppers onto said guide plates, said guide plates conducting said streams without stopping the flow thereof directly to said deposit point, valve plates for controlling the discharge of granular material from said hoppers and means for successively operating the valve plates.

12. Apparatus for surfacing roofing material, comprising four hoppers having the discharge outlets disposed in substantially the same horizontal plane and arranged to deliver granular material to the same deposit point, said hoppers being arranged in pairs, each pair having the outlets spaced equi-distances from said deposit point, a guide plate for each pair of hoppers for guiding the granular material to said deposit point, the individual hoppers of each pair being spaced equi-distances on opposite sides of the point of delivery of granular material from said hoppers to said guide plate.

13. Apparatus for surfacing roofing material, comprising four hoppers having the discharge outlets disposed in substantially the same horizontal plane and arranged to deliver grit to the same deposit point, said hoppers being arranged in pairs, each pair having the outlets spaced equi-distances from said deposit point, a guide plate for each pair of hoppers for guiding the granular material to said deposit point, the discharge outlets of the individual hoppers of each pair being spaced equi-distances on opposite sides of the point of delivery of granular material from said hoppers to said guide plate, a valve plate controlling the discharge of granular material from each hopper, a distributing roll rotatably mounted in the discharge outlet of each hopper, and means for successively operating said valve plates.

14. Apparatus for surfacing roofing material, comprising four hoppers having the discharge outlets disposed in substantially the same horizontal plane and arranged to deliver grit to the same deposit point, said hoppers being arranged in pairs, each pair having the outlets spaced equi-distances from said deposit point, a guide plate for each pair of hoppers for guiding the granular material to said deposit point, the discharge outlets of the individual hoppers of each pair being spaced equi-distances on opposite sides of the point of delivery of granular material from said hoppers to said guide plate, a valve plate controlling the discharge of granular material from each hopper, a distributing roll rotatably mounted in the discharge outlet of each hopper, and electrically operated control means for opening and closing said valve plates in desired time sequence.

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RICHARD A. HOLDSWORTH.

CERTIFICATE OF CORRECTION.

Patent No. 2,074,131. March 16, 1937.

BENJAMIN S. PENLEY, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, second column, line 49, claim 10, after the word "feed" insert flowing streams of; same line, after "material" insert the word directly; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of June, A. D. 1937.

(Seal)

Henry Van Arsdale
Acting Commissioner of Patents.

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