March 3, 1964 C. C. FIGGE 3,122,862

METHOD OF ROOFING

Original Filed Dec. 27, 1955 2 Sheets-Sheet 1

FIG. 1

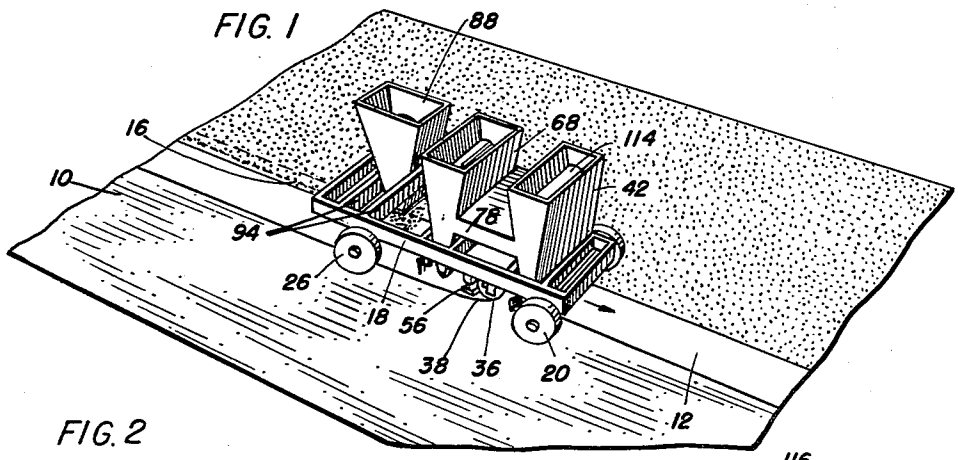


FIG. 2

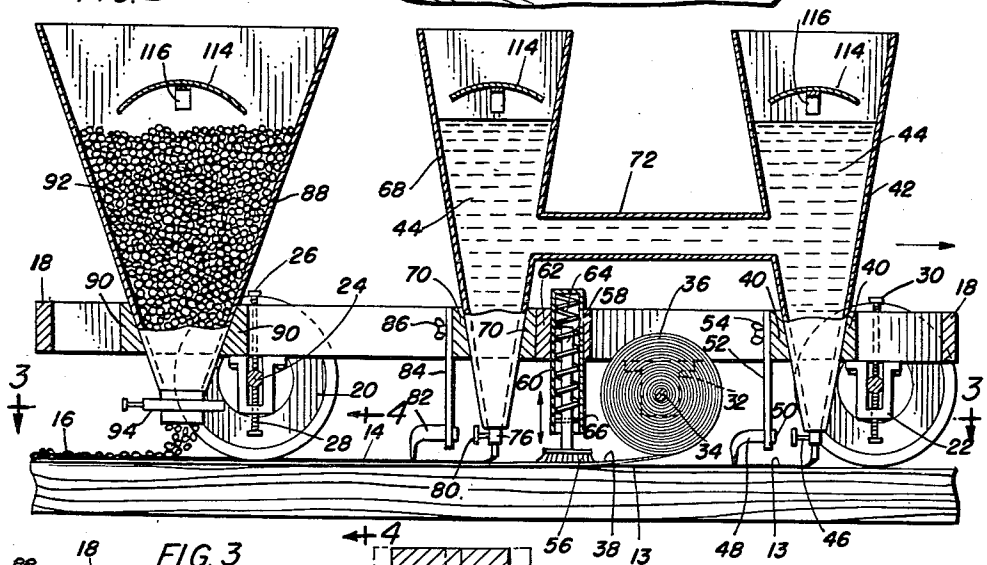


FIG. 3

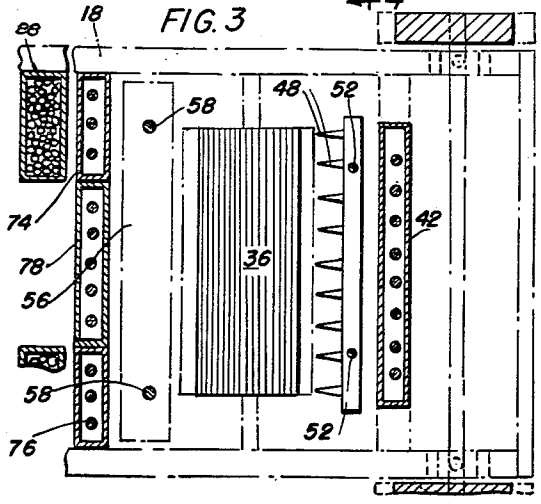
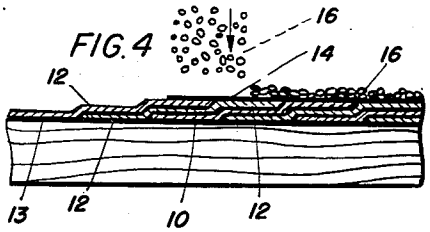


FIG. 4



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METHOD OF ROOFING

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FIG. 5

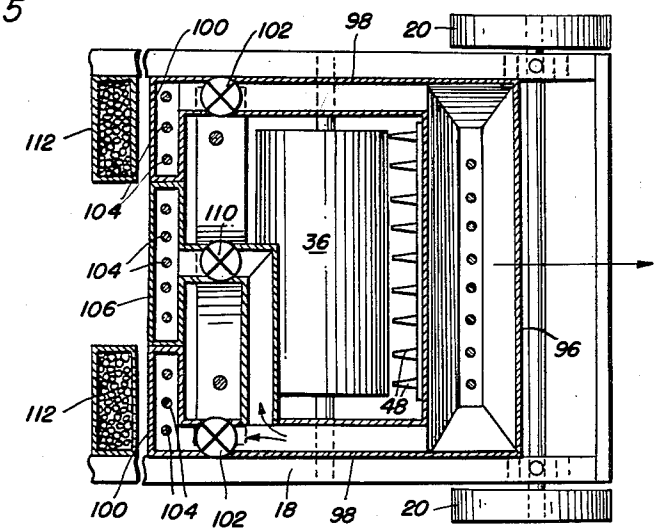


FIG. 6

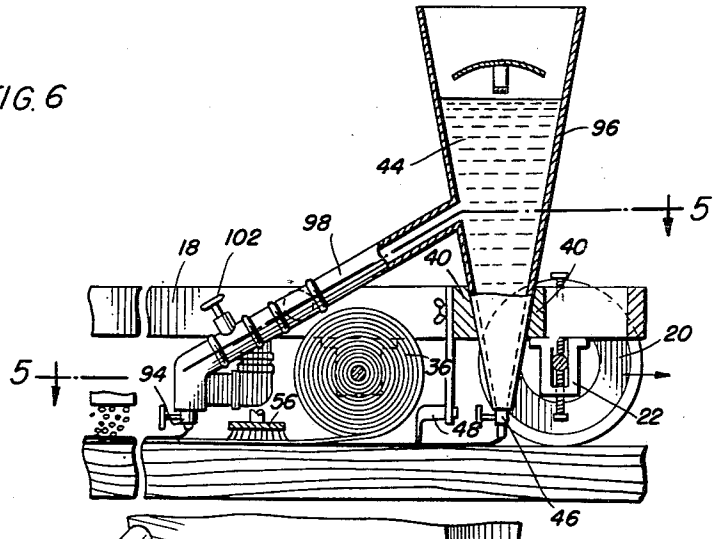
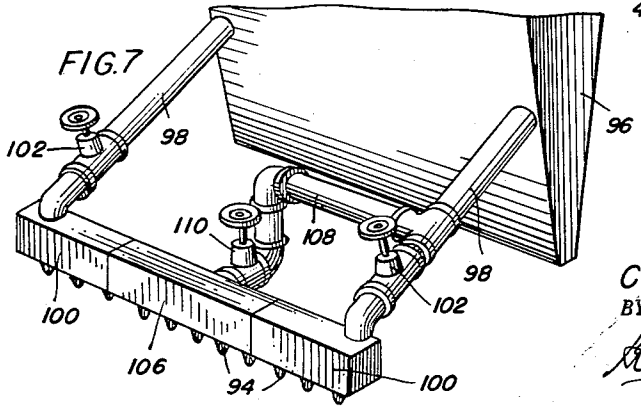


FIG. 7



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United States Patent Office 3,122,862 Patented Mar. 3, 1964

3,122,862

METHOD OF ROOFING

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Original application Dec. 27, 1955, Ser. No. 555,636, now Patent No. 2,949,206, dated Aug. 16, 1960. Divided and this application Oct. 12, 1959, Ser. No. 847,040

9 Claims. (Cl. 50—537)

This invention relates in general to the application of a lower bituminous layer of felt roofing material in overlapping strips and an upper offset and complete cover therefor in a continuous single operation and is a division of application Serial No. 555,636 filed December 27, 1955, and now Patent No. 2,949,206.

It has heretofore been the practice to apply a roof covering by first laying a number of sheets of felt in continuous overlapping relation, cementing them together and to the roof deck, and thereafter as a separate and distinct operation, to apply a top coating of bituminous material in which mineral aggregate is imbedded and applied to the exposed portions of the overlapping sheets. Often times the application of the mineral coating may be delayed for several days or at least until the overlapping layers have become cold, if they are applied with hot asphalt during which time the seams may open, the felts may wrinkle and mineral or other material may get under the exposed lap edges to impair the seal.

In the present invention, the upper or exposed lap edges of the sheets or layers are coated with an adhesive even before the cementing material for the layers has hardened, which insures complete welding of the seams, and the coating of mineral or other material is simultaneously applied following the adhesive coating of the exposed lap edges which completes the roof in one operation by the welding of the coating material applied to the upper or exposed lap edges only instead of to the entire width of the sheet or layer which is applied at that time.

An important object of the invention is therefore to provide a new and improved method of applying a roof of the laminated layer and top coating type, complete in one operation.

A further object of the invention is to apply a mineral covering layer to a laminated roof mat at the same time the last layer is being applied and to cover the net exposed portion of the overlap at the upper edge of the last lap only depending upon the number of layers which are being applied.

A further object of the invention is to provide an improved method of roofing in which successive plies of roofing material are cemented to a roof deck and to each other in overlapping relation, and a top coating is applied laterally beyond and upon the overlapping edge of the last ply, thereby welding it to the remainder of the cover at the same time that the last sheet is being applied so that a roof is always completed up to the extent of application of the last layer.

Still a further object of the invention is the method of applying a strip of roofing and also a strip of cover material extending laterally beyond and overlapping the inner edge of the strip thereon being applied to a roof and underlying layer of roofing material.

Still a further object of the invention is to provide a method of applying a strip of roofing to a roof deck or an underlying layer and also to apply a cover coating to extend laterally beyond and over the lapping edge of this strip in either direction of application relative to the length of the strip.

A further object of the invention is to provide a method for cementing a strip of roofing material in place on a roof deck and successively upon underlying plies of the material, and to adhesively apply a cover coating of material for a portion of the width of the strip of roofing at

the same time and extending beyond the overlap and sealing the inner exposed edge of the strip.

Further objects of the invention are applying roofing strips to the adhesive under tension, for subsequently applying an adhesive coating extending laterally beyond and overlapping the inner edge of a strip and the exposed portion of the roofing strip below it as the last strip is being applied; and thereafter applying a mineral coating to the adhesive on top of and extending laterally beyond the inner edge of the strip and sealing the inner lap edge of the strip.

Other objects of the invention will appear in the specification and will be apparent from the accompanying drawings in which:

FIG. 1 is a plan view of a roof showing an apparatus and illustrating the method in which the roof is applied in accordance with the present invention;

FIG. 2 is an inside elevation of the apparatus in accordance with FIG. 1 showing some of the parts in section;

FIG. 3 is a plan view of the apparatus in accordance with this invention as taken on the line 3—3 of FIG. 2 with some of the parts broken away and shown in section;

FIG. 4 is a sectional view of a roof covering as applied to a roof deck in accordance with this invention;

FIG. 5 is a sectional plan view of an apparatus in accordance with this invention having a modified adhesive feed, as taken on the line 5—5 of FIG. 6;

FIG. 6 is a side elevation of the structure shown in FIG. 5, with parts broken away and in section; and

FIG. 7 is a perspective view of part of the adhesive feeding means shown in FIGS. 5 and 6.

In carrying out this invention, a single machine is loaded with roofing material, adhesive, and a coating material and may be moved manually or by motor over a roof deck to be covered. As it is so moved, the roof will be completed, sealing all lapped and exposed edges as the machine is moved, and up to the last of such movement, leaving only that portion of the last layer which is not completely covered by the coating material, but may be finished by hand or in an operation separate from this machine.

Referring now more particularly to the drawings, a waterproof and protective roof covering is applied to a roof deck 10 by cementing a plurality of strips 12 of roofing material to the roof deck and to each other in overlapping relation by means of an adhesive coating 13 at the bottom of the strip and extending the full width thereof, and then applying an adhesive coating 14 on top of a portion of the strips overlying and extending beyond the inner edge of the strip last applied and applying a protective coating 16 if desired to the adhesive coating 14.

As heretofore practiced, these operations have been manual and separate, the strips being first adhesively applied to the deck in overlapping relation to the other strips, and after the application of all or a portion of the layers, a batch of adhesive coating was applied to an area and after this application a protective coating of gravel, cinders or other mineral material was applied to the outer adhesive coating as a separate or batch operation.

Sometimes these operations were hours and even days apart, and the overlying strips which are usually applied with a hot bituminous adhesive are cooled or become set before the outer adhesive coating and the protective coating are applied. In this manner, the overlapping edges of the uppermost coatings may become torn or projections may be lodged under them which tend to puncture or destroy the waterproof protection afforded by the roofing strips, and when the outer adhesive and protecting coatings are later applied, the projecting edges may not

be properly cemented down and attached to the roofing material.

In the present invention, the roofing strips 12 are applied in multiple overlapping relation and adhesive coating 13 is applied to the under side of each strip for its full width, and at the same time an adhesive coating is applied on top of this strip as it is being laid for a portion of the width thereof extending beyond and overlapping the innermost or uppermost edge of the last strip to which a protective coating of gravel or other material is applied covering the upper lapping edge of the last strip and extending laterally beyond it so that it is welded in place by the coating material in hot condition, and the roof is completed in one operation simultaneously applying a strip forming a body of the roof and a roof surfacing therefor extending beyond the upper or inner edge of the last strip and depending upon the amount of overlap of the last strip.

In considering the amount of overlap, the width of a roofing strip may be taken as approximately 36" so that for three thicknesses of roofing material, the net amount of overlap of each added strip to which the final surfacing is applied will be approximately one-third of 36" or 12"; for an overlap of four layers, the approximate net overlap will be about 9", etc. As shown in FIG. 4, the strips have a one-third net overlap, and the thickness of the main portion of the roofing is three layers of strips 12. In commencing the first, second and third layers of a roof, and likewise in finishing the last two or three layers of a roof, some manual operation may be necessary, but by employing a continuous operating and finishing method as described and shown herein, a large area of roof can be covered and completed at each operation, in which the strips 12, the adhesives 13 and 14 and the protective coating applied beyond the upper edge of the strip 12 and overlapping this edge, are applied continuously and simultaneously finishing the roof up to this point.

A suitable apparatus for carrying out this method and operation comprises a wheeled supporting frame 18 in which each wheel 20 is individually adjustable in a wheel mounting attached at the under side of the frame and having an axle 24 engaged by upper and lower adjusting screws 26 and 28, so that the height of each wheel may be varied in its mounting 22. This adjustment is valuable for maintaining the frame 18 in different spaced horizontal positions with respect to the roof depending upon whether the covering is composed of a single layer or many layers of material. This permits adjustments of the wheels on one side of the frame to run on the roof deck and the wheels on the other side of the frame to run on top of the applied layers, so that the roofing materials are evenly applied as the wheeled frame is moved over a roof deck in one direction or the other.

Supported at opposite sides of the frame 18 are bearings 32 for receiving a transverse shaft 34 upon which a roll 36 of roofing paper, felt or other material is mounted so that a continuous strip 38 of the roof material may be discharged from the roll 36 as the frame is moved over a roof deck in the direction of the arrow as shown in FIGS. 1 and 2.

In advance of the roll 36 and mounted in the frame 18 by suitable framing or cross pieces 40 is a receptacle 42 which may be graduated in width from the bottom to the top and constructed of suitable metal or other material for containing an adhesive 44 preferably hot bituminous material commonly used for cementing roofing upon roof decks. At the bottom is a suitable valve (or valves) 46 for controlling the discharge of adhesive 44 from the receptacle 42 preferably for the full width of the strip 38, but also distributing less than the full width if a number of valves 46 are employed.

A number of spreaders 48 are mounted between the receptacle 42 and the roll 36 which are connected to a cross piece 50. These spreaders engage the adhesive as it is discharged from the receptacle 42 and distribute the

adhesive more evenly for engagement with the under side of the strip 38 from the roll 36. The height of the spreaders is controlled by supports 52 attached at each side of the cross piece 50 and each having a wing nut 54 for adjustably attaching it to one of the cross pieces 40 of the wheel frame adjacent to the roll 36. Extending transversely of the frame 18 is a pressing device which may be in the form of a brush 56 extending the full width of a strip 58 and engaging the upper surface thereof. This brush may be supported by two or more upwardly extending rods 58 extending into a sleeve 60 closed at its upper end, the sleeve being supported by a cross piece 62 in the frame 18 and each sleeve having an extended coil spring 64 engaging the upper end of the sleeve at one end, surrounding the rod 58 and bearing on a projection or collar 66 mounted near the lower end of the rod. The arrangement of the brush and its mounting is such that it is pressed yieldingly against the upper surface of a strip 38 for sealing it more smoothly in the adhesive 13 at the under side of the strip as it is applied to a roof deck and to any strips which it overlaps.

Another adhesive receptacle 68 is mounted in the wheeled frame 18 by means of cross pieces 70. It may also be tapered toward the bottom and connected to the adhesive receptacle 42 by a transfer duct 72 which provides a wide passageway for the free movement of the adhesive from one receptacle to the other. At the bottom of this receptacle 68 are three discharge portions 74, 76 and 78, the two side portions 74 and 76 covering a limited portion at each edge of a strip 38 which is being laid and overlapping the edge, and the discharge portion 75 covering the central portion of the strip. Each of these portions is provided with suitable valves 80 for controlling the discharge and flow of adhesive for that particular discharge opening to which it is applied. In this manner, the discharge of the adhesive can be controlled to cover a limited portion at each side of the strip which is being applied to a roofing and over the edge thereof depending upon the direction of movement of the apparatus with respect to the strip, and also permitting application of adhesive to the central portion of the strip if desired.

Attached to the trailing cross piece 70 following the receptacle 68 are spreaders 82 similar to the spreaders 48 supported by rods 84 and adjustable by means of wing nuts 86. With this arrangement, the spreaders may be arranged depending upon which valves 80 are opened at any particular time.

At the rear end of the wheeled frame is a mineral adhesive receptacle 88 for containing sand, ashes, gravel or other mineral aggregate which is applied to the roof as a covering coating. This receptacle is tapered upwardly in size and is mounted in cross pieces 94 of the frame with inclined seating surfaces corresponding to the inclination of the receptacle 88 so that it may be bodily moved from one side to the other of the frame to discharge mineral ingredients 92 at the bottom through a suitable valve 94. This receptacle 88 is preferably less in width than the adhesive receptacles 42 and 68 as it is ordinarily intended to discharge the protective coating 16 over a limited width of the roofing material approximately equal to the net amount of overlap of each strip, but applied over the upper most edge portion of the last strip as it is being applied, extending laterally therefrom and partially overlapping the next strip below it as more clearly indicated in FIG. 4.

When the wheeled truck carrying the apparatus is moved in one direction over the roofing as it is applied, the mineral receptacle 88 will be located at one side of the frame 18 and when the movement of the wheeled truck is reversed in direction in applying the next strip, the mineral receptacle 88 is moved to the other side of the truck as indicated more clearly in FIG. 3.

Instead of having two separate receptacles for the adhesive 44, a single receptacle 96 may be provided for the wheeled frame as shown in FIGS. 5, 6 and 7. This re-

ceptacle may be mounted in cross pieces 40 as previously explained and has discharge valves 46 at the bottom, the spreaders 48, a roll 36 of roofing material, and a pressure device 56 similar to that previously described.

Instead of the separate receptacle for feeding adhesive on top of the strips as they are cemented in place, discharge pipes 98 are connected into the receptacle 96 at opposite sides of the wheeled truck but at the same and relatively inner side of the receptacle. These pipes lead to separate discharge casings 100 through control valves 102 therefor, the casings having openings 104 for discharging the adhesive therefrom. Between the side casings 100 is a separate central casing 106 which has a branch pipe 108 leading from one of the other pipes 98 through a valve 110 for separately controlling the supply of adhesive to this central casing.

With this arrangement, it is also contemplated that two separate mineral supply receptacles 112 are provided, one at each side of the wheeled frame and in line with the corresponding casing 100 for discharging adhesive at that side of the frame.

As in the previous arrangement of the parts, spreaders 82 will be located following the adhesive discharge from the casings 100 or 106. This latter arrangement obviates the necessity of a separate adhesive tank and thereby simplifies the apparatus mounted on the wheeled frame to that extent. In reversing the movement of this form, it is not necessary to move the mineral aggregate receptacle from one side of the wheeled frame to the other. If the central casing 106 is used for the application of adhesive in its path, a separate aggregate receptacle may be mounted to discharge between the two mineral supply receptacles 112 as shown in FIG. 5, but ordinarily this is not necessary as mineral supply from one or both of the receptacles 112 may be discharged from them and manually spread over the adhesive from the central receptacle 106 as desired.

With this latter arrangement of the parts as shown in FIGS. 5, 6 and 7, the method of operation is essentially the same as in the operation previously described except that it is somewhat simpler to supply and control the adhesive applied on top of a strip of roofing as it is being laid in place, and it is not necessary to move the mineral supply of receptacle from one side of the wheeled frame to the other when the wheeled frame is reverse in its direction of movement.

When this apparatus is in use, additional supplies of the adhesive and also the mineral aggregate may be applied to their respective receptacles while the wheeled frame is in motion, or while it is being reversed in direction at the end of its path. This is commonly done by manually emptying buckets of the material into the receptacles and to prevent splashing and loss of the materials, an anti-splash guard 114 is located near the top of each receptacle extending lengthwise therein and curved downwardly from the crown portion at the top leaving spaces at the sides for the material to run down into the receptacle. Each guard is supported at the ends of the receptacle by suitable brackets 116 for holding it firmly in place. With these guards, the materials may be deposited into the tops of the receptacles and they will run down the sides of the guard and against the adjacent sides of the receptacles without causing a splash or discharge of the materials outside of the receptacles which might land on the roof deck and interfere with the proper application of the roofing and its covering.

This invention is not limited to the laying of strips in successive overlapping courses but may be applied to felt strips laid in separate courses overlapping a small amount for each complete layer and then applying one or more other separate layers of this same kind in successive operations. It may likewise be applied to various other strip laying patterns. The adhesive material may be of either hot or cold application, the only requisite being that it flows freely and provides a satisfactory adhesive coating. In some cases, a mineral aggregate is not applied as a cover coating but an adhesive or bituminous coating either of limited width or the full width of the felt cover strip may be applied. The last sheet of a roof application may be coated on top for its full width and mineral aggregate may be distributed at opposite sides and separately spread to cover the middle portion if desired. Other patterns of sheet application and adhesive and cover coating layers are apparent and possible in this method and apparatus.

While a preferred method of completing a roof covering in one operation and apparatus for accomplishing this has been described in some detail, they should be regarded as illustrations or examples rather than as limitations or restrictions of the invention, since various changes in the construction, combination, and arrangement of the parts may be made without departing from the spirit and scope of the invention.

I claim:

1. A method of completely finishing a portion of a multi-layer roofing by simultaneously applying an overlapping ply of prepared roofing and a surface covering therefor, which comprises cementing successive layers of prepared roofing materials in overlapping relation on a roof deck and previously laid layers, and at the same time applying a layer of surface covering material upon the lap edge of the last layer spreading an adhesive underneath the layer for the full width thereof, spreading a layer of surface covering material overlapping the top edge of said roofing layer of a width equal to that portion of the cover material and laterally displaced therefrom to cover a portion of a previous layer in a width equal approximately to the net overlap of each layer.

2. The method of applying a portion of a roof covering complete in one simultaneous operation and in an adjacent location, which comprises cementing strip layers of roofing material in successive overlapping relation to each other and to a roof deck, and simultaneously applying an adhesive layer of covering material to the lap edge of the last layer at a distance from said cementing and partially overlapping the previous layer in a width equal approximately to the amount of contact of the last strip with the roof deck.

3. The method of completely finishing part of a multi-layer roofing by applying a complete portion thereof having roofing strip material and covering material in adjacent places by a joint operation which comprises applying successive layers of strip material from a common supply in overlapping relation to each other and to a roof deck, simultaneously applying a layer of covering material to the lap edge of the last layer and laterally displaced therefrom so as to extend inwardly beyond the edge in a width approximately equal to the net amount of lap of each overlapping layer, and applying an adhesive below each strip layer as it is applied to the roof and on top of a portion of the last strip layer and extending beyond the edge thereof beyond the upper lap edge and of a width equal to the net amount of the overlap.

4. The method of completely finishing a portion of a multi-layer roof wherein the body of the roof and the roof surfacing medium are applied simultaneously in adjacent places, which comprises applying separate strips of roofing material in successive overlapping layers and adhesively attaching the entire lower surface of each layer to a roof deck and to the layer below the contact of the last layer with the roof deck, measuring the width of the overlap of each strip, applying an adhesive to the top of the last strip, covering the exposed lap portion of this strip and extending laterally therefrom in a width substantially equal to the net overlap width of the strip as applied to the roof, and simultaneously applying a coating of covering material, to the adhesive applied on top of a portion of the width of the strip and extending over and laterally beyond the inner edge thereof.

5. In a method of completely finishing a portion of a multi-layer roof in accordance with claim 4, the step of

spreading the adhesive which is applied to the under side of the last layer so that it will be uniformly distributed and applied thereto.

6. In the method of completely applying a portion of a multi-layer roof covering in accordance with claim 4, the additional step of spreading the adhesive which is applied to a portion of the width of the top of the last strip and extending laterally therefrom so that it will be evenly spaced for the attachment of the coating of covering material which is applied to the outside of the last strip.

7. In the method of completely finishing a portion of a multi-layer roofing in accordance with claim 4, the step of pressing the last layer resiliently against the deck and the preceding layers to smooth the last layer for the application of the adhesive, and covering the material applied for a reduced width on top of the layer with a thin protective layer.

8. The method of completely finishing a portion of a multi-layer roofing by applying a portion of the body of the roof and a corresponding portion of the roof surfacing material in one simultaneous operation in adjoining locations, which comprises applying strip layers of roofing material in successive overlapping relation to each other and to a roof deck, depositing an adhesive below each layer as it is applied to the deck and a previous layer, spreading the deposited adhesive to equalize it in thickness for application to the layer, pressing the last layer resiliently against the deck and the preceding layers, applying adhesive material to the overlapping edge and for a portion of the width laterally spaced outwardly therefrom over the preceding layer in a width substantially equal to the net width of contact of this strip with the roof deck, spreading the adhesive applied to the overlap and to the limited width outwardly from the last layer in a uniform sheet, and applying a thin coating of protective material to the last adhesive coating to complete a portion of the roof up to that point equal to the amount of the overlap.

9. The method of completing a portion of a multi-layer roofing in one continuous and simultaneous operation which comprises moving a supply of sheet roofing material and adhesive therefor over a roof deck to be covered, discharging successive strips of the sheet material from the supply and applying them in successive overlapping layers to each other and to the roof, applying and spreading a coating of adhesive in advance of the roofing strips to adhesively secure them to each other and to the roof, resiliently pressing each strip in contact with the roof and a previously applied strip as the said roofing strip is applied, applying a coating of adhesive over the upper lap edge of each roofing strip and displaced laterally outwardly beyond the edge as it is applied to applied strips in a width substantially equal to the net amount of overlap of each strip, spreading the said lap adhesive as the roofing strip is applied, and continuously applying a protective coating which adheres to the last said layer of lap adhesive and thereby completing the last portion of the roof to this point.

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