July 21, 1936. S. P. MILLER 2,048,663

ROOF COVERING

Filed Dec. 22, 1933 2 Sheets-Sheet 1

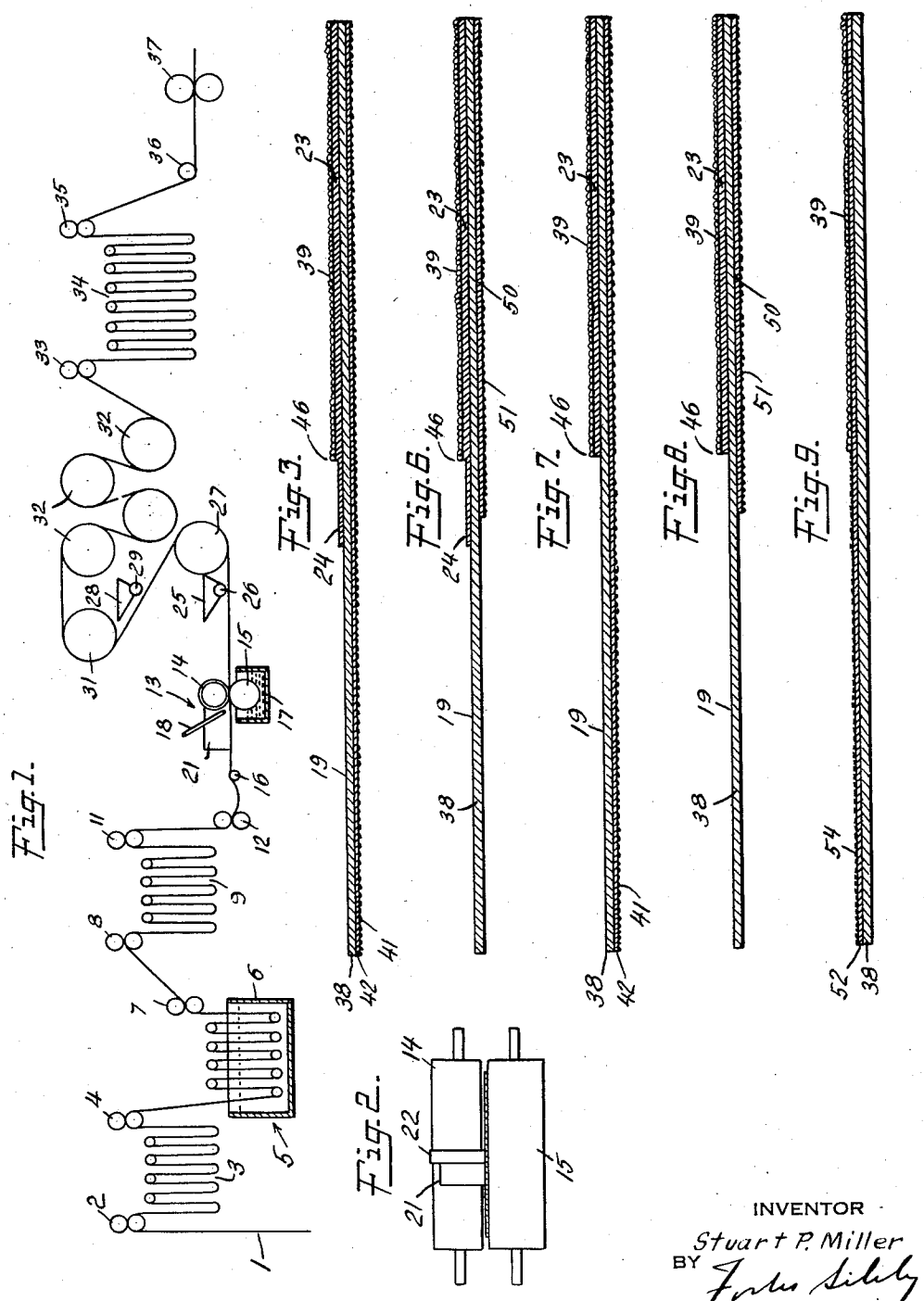


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

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Fig. 4.

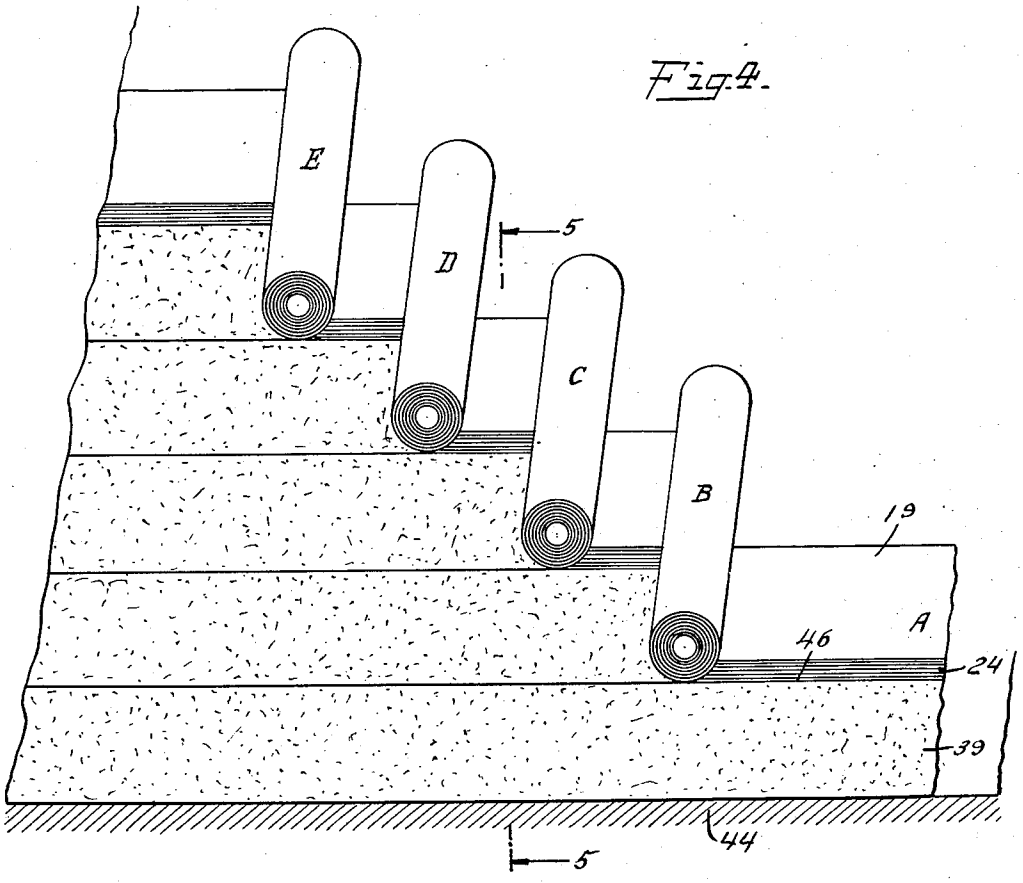
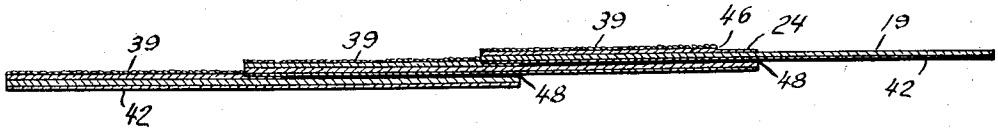


Fig. 5.



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Patented July 21, 1936 2,048,663

UNITED STATES PATENT OFFICE

2,048,663

ROOF COVERING

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Application December 22, 1933, Serial No. 703,591

4 Claims. (Cl. 108—7)

This invention relates to roofing and more particularly to the manufacture of selvage roofing of the felt base type and to methods of laying such roofing on a roof or other surface.

One object of this invention is to provide an improved method of sealing together overlapping edge portions of bitumen-coated roofing sheets by the application of cement at atmospheric temperature, i. e., by the application of cement which does not require heating to render it fluid.

Another object of this invention is to provide selvage roofing sheets which can be laid in overlapping relation and effectively joined together along the overlapping edge portions by means of such cement to provide a well bonded roof covering.

Other objects and advantages will appear from the following detailed description of the invention.

Prior to this invention, it was common practice to manufacture selvage roll roofing by applying a coating of water-proofing material, such as asphalt or bitumen, to the lower or forward half of the top side of a saturated felt base and surfacing this coating with crushed slate or other granular mineral material. The upper half of the top and the entire bottom of the saturated felt base were left uncoated and unsurfaced. There was thus produced sheet roofing having a raised portion substantially parallel to the longitudinal edges of the base where the coated and surfaced forward portion met the uncoated and unsurfaced selvage portion. Such roofing was customarily laid in parallel rows or courses with the uncoated and unsurfaced selvage area of one course underlying the coated and surfaced area of the overlying course, the forward edge of the overlying course abutting against the raised area of the underlying course. Before applying the next succeeding course, hot molten asphalt was mopped by the roofer onto the selvage area of the preceding course to cement the two sheets of roofing together, or, alternatively, the hot molten asphalt was mopped on the undersurface of the overlying sheet, which was then slapped down and pressed on the underlying sheet.

This method of laying the roofing had the disadvantage that large quantities of hot coating material had to be employed to get the necessary bonding action between the adjacent sheets. In addition, such method involved high labor costs, the expense of the fuel required to raise the coating material to the proper temperature for application, and the use of special equipment, such as heaters and melting pots, required for this purpose. Moreover, there was always a fire hazard to be considered.

Other disadvantages of the hot asphalt method of application are: chilling of asphalt in cold weather before complete adhesion is effected, resulting in poor bond; extra labor required in carrying buckets of hot asphalt, and spills and smears on roof resulting from this step; smears of asphalt on roof due to dripping of hot asphalt from mops. Furthermore, rapid cooling of asphalt encourages hurried work which is, therefore, frequently of poor quality.

I have found that the usual bituminous and other cements which can be applied in fluid condition at atmospheric temperatures can not satisfactorily be applied to such selvage roofing to obtain a well bonded roof covering. This may be attributed to the absorption of the cement by the felt base leaving little or none of the cement to bond the overlapping portion of one sheet with the underlapping portion of an underlying roofing sheet.

In accordance with my invention an improved type of roll roofing is produced which can be effectively sealed and bonded together in overlapping relation by means of a bituminous or other waterproof cement which is fluid at atmospheric temperatures and which may be applied by brushing or painting. Such roofing differs from the usual type of selvage roofing described above in that either the underside of the overlapping sheet or the top side of the underlapping sheet or both of these areas are provided with a coating of asphalt or other bituminous water-proofing material. For example, the sheet may comprise a 32 inch wide base of saturated felt, asbestos, or other suitable fibrous material, having the underside completely coated with bituminous material and dusted with mica flakes, talc, soapstone, or other anti-stick material, and having on the top side a 15 inch wide coating layer of asphalt surfaced with granular material and a 3 inch wide portion contiguous to the 15 inch wide portion coated with asphalt but unsurfaced. The remaining 14 inch wide portion on the top side of the sheet may be uncoated and unsurfaced.

I have discovered that when such roofing is laid in parallel rows or courses in a manner similar to that described above, the overlapping sheets can be effectively joined or sealed together by means of a bituminous cement fluid at atmospheric temperatures. The cement may be mopped onto the unsurfaced portion of the top

side of each sheet after it is applied and thereafter the overlapping sheet placed in desired relation to the underlapping sheet or it may be mopped onto the back of each sheet as it is placed over the underlapping sheet. A suitable cold cement may be made by mixing together a cut-back asphalt with asbestos fibers.

When applied in this manner, the roofing sheets become securely bonded together by the cement upon setting, the layer of coating material on the saturated base preventing the absorption of the cement by the saturated base and itself providing a bond or key in addition to the cement. The sheets can be readily applied to a roof and the use of melting pots, fuel for heating the asphalt, fire hazard, and inconvenience and possible injury to workmen are avoided. The workmen can take adequate time to do a satisfactory job, unhurried by fear of the cement setting before the sheets are in place. The amount of cold cement necessary to secure a proper bond is much less than the amount of hot asphalt customarily used and labor costs are substantially reduced. In actual practice the use of a cold cement in accordance with this invention results in considerable saving in the roof construction (under present market conditions the saving is of the order of about 10 cents per square of roof laid) and in a well bonded and efficient roof covering. It has been found that so firm a bond may be established between adjacent layers of roofing that the layers cannot be separated after setting of the cement without tearing the felt.

In the accompanying drawings forming a part of this specification and showing for purposes of exemplification preferred forms of this invention, without limiting the claimed invention to such illustrative instances,

Fig. 1 is a side elevation of apparatus for making the selvage roll roofing in accordance with this invention, the figure being somewhat diagrammatic in character and showing the steps involved in the manufacture of the roofing;

Fig. 2 is a front elevation of apparatus for applying the layer of coating material to the saturated felt base;

Fig. 3 is a transverse vertical section through a preferred form of roll roofing embodying this invention;

Fig. 4 is a perspective view showing several sheets of the roofing of Fig. 3 being applied to a roof or other surface;

Fig. 5 is a section taken along the line 5—5 of Fig. 4; and

Figs. 6 to 9 are transverse vertical sections through modified types of roofing made in accordance with this invention.

Referring to the drawings, with particular reference to Fig. 1, numeral 1 denotes a sheet of fibrous material, for example the usual roofing felt made from rag fiber and paper stock with or without suitable fillers as well known in this art. Instead of such roofing felt the sheet may be made of asbestos felt, or other absorbent fibrous material. Sheet 1 is fed by feed rolls 2 from the usual paper making machine, felt roll, or other suitable source of supply into a looping device 3. From the looping device 3, rolls 4 feed the sheet into any customary type of saturating apparatus, indicated generally by the reference numeral 5. Saturating tank 6 may contain suitable cementitious waterproofing composition, such as asphalt or other bituminous material, utilized for the impregnation and saturation of roofing felts.

Rolls 7 and 8 feed the saturated sheet to a second looping device 9, thus giving the saturant the necessary opportunity to dry and thoroughly impregnate the fibrous base. Rolls 11 and 12 feed the saturated sheet from the looping device 9 to the coating appliances indicated by the reference numeral 13. Feed rolls 12 are preferably driven at substantially the same average peripheral speed as that of coating rolls 14 and 15. A sufficient amount of slack should be provided and maintained between the driven rolls 12 and guide roll 16 over which the sheet passes before entering the bite of the coating rolls 14 and 15 to prevent the sheet from being injured or torn upon slight momentary variations in the relative rates of rotation of driven rolls 12 and coating rolls 14 and 15. Coating roll 15 is rotatably mounted in a tank 17 which may contain bituminous material, such as asphalt or other cementitious waterproofing substances, suitable for coating roofing felt.

The base or under side of the sheet 1 is completely coated by roll 15. Simultaneously, waterproofing material is applied to the top of the sheet by means of pipe 18. This pipe is arranged to feed coating material to form a stripe or layer on only the lower or forward portion of the base (see Fig. 3). Flow of coating material onto the upper selvage portion of the base, indicated by the reference numeral 19, is prevented by a plate 21 which may be hollow for the introduction of steam thereinto to heat the plate. To produce the type of roofing shown in Fig. 3, coating roll 14 may be provided with a narrow metal collar 22 extending thereabout at a point contiguous to plate 21. This collar is of such thickness that a small clearance is provided between the collar and the felt base 1. Plate 21 is suitably supported so that the felt base in its passage thereunder, under tension exerted by the feed rolls, contacts with the base of this plate and prevents the coating from spreading.

The coated sheet leaving coating rolls 14, 15 has on the lower portion of the upper surface a relatively wide layer or stripe of coating material 23 of substantially uniform thickness. Contiguous to the wide layer 23 is a relatively narrow layer 24 of coating material, which layer may be thinner than layer 23. The longitudinal edges of the coating layers 23 and 24 are substantially parallel to each other and also parallel to the longitudinal edges of the base. The remaining portion of the base is constituted of the uncoated selvage area 19.

Upon leaving the coating appliances, and while the coating material is still tacky, the sheet passes under hopper 25, containing granular material, such as crushed rock, slate, or other comminuted mineral material customarily used in surfacing roofing. The granules are showered by means of the usual distributing roll 26 onto the coating stripe 23 of the base passing therebeneath. Hopper 25 is of a width such that granular material is fed only onto the coated stripe 23. If desired, a guide plate may be provided beneath hopper 25 to insure that no granules fall on the relatively thin coating stripe 24. The surfaced sheet then passes about reversing roll 27, which functions to partially embed the granular material in the plastic coating stripe 23. In the continued passage of the sheet, excess granules fall off therefrom into hopper 25 from whence they were delivered onto the base 1.

The rear surface of the sheet 1 then passes

under hopper 28. Mica dust, talc, or other composition capable of rendering the back of the sheet non-cementitious is deposited in hopper 28 and discharged therefrom by distributing roll 29 onto the back of the sheet. The mica covered sheet then passes over reversing roll 31, which imparts a smooth surface to the back of the sheet. Excess mica falls off from the base as it passes from roll 31 to the drying and pressing rolls 32. Hopper 28 is preferably so positioned that the excess mica falls back thereinto as shown in Fig. 1.

Feed rolls 33 feed the sheet from the pressing rolls 32 into a looping device or rack 34 where the product is given an opportunity to cool. From the looping rack 34, the completed roofing passes between feed rolls 35, about guide roll 36, and is fed by pull rolls 37 to a suitable winding device (not shown), where the roofing is rolled up into the usual roll of commerce.

Roofing resulting from the operations above described, is shown in vertical section in Fig. 3. From this figure it will be noted that the roofing is composed of a base 38 of saturated felt or other fibrous material. The upper portion of the face or top of the base is constituted of the selvage area 19. Relatively thick coating stripe 23, the forward edge of which coincides with the forward edge of the base, covers the lower portion of the top of the base. Narrow coating stripe 24 is disposed contiguous to stripe 23. Granular material 39 is partially embedded in coating stripe 23, and mica dust or talc 41 is dusted over the coating layer 42 covering the back of the sheet to render coating 42 nonadhesive. Since coating stripe 24 is substantially thinner than the combined thickness of coating layer 23 and granular surfacing 39, the roofing of Fig. 3 may be rolled without danger of plastic coating 24 causing adhesion of successive convolutions of the roll.

In the manufacture of sheet roofing 32 inches wide, the coated stripe 23 is preferably made 15 inches wide and the coated stripe 24, three inches wide, leaving the uncoated selvage portion 19, fourteen inches wide.

Instead of simultaneously producing the relatively thin narrow and wide thick coating stripes 24 and 23 respectively by the apparatus shown in Fig. 1, a stripe of uniform thickness and of a width equal to the combined widths of stripes 23 and 24 may be first applied to the saturated base. The coated sheet may then be engaged by a scraper which removes a portion of the coating to form the coating stripe 24.

The sheet roofing described above may be laid in successive overlapping courses on a roof or other surface in the manner shown in Figs. 4 and 5. The first sheet A is unrolled along the roof 44 or other surface and attached thereto in any suitable manner, such as by means of cement, nails, etc. The next sheet of roofing, denoted by letter B, is then applied with its forward edge abutting against the upper edge 46 of the granular surfaces portion 39 of the underlying sheet. A suitable cold cement 48 is painted or mopped onto the unsurfaced areas of the top of sheet A, i. e., selvage area 19 and coating stripe 24, or onto the coating 42 on the forward portion of the bottom of sheet B before this sheet is contacted with the underlying sheet. Other sheets of roofing C, D, and E are then laid in a similar manner until the desired surface is covered.

Although other cold bituminous cements, such as asphalt mixed with a suitable asphalt solvent may be used, I prefer to employ a cement composition made by mixing a cut-back asphalt with asbestos fibers. The relative amount of asbestos in the composition preferably lies within the range of from 2 to 10%. I have found that a mixture containing 95% cut-back asphalt, i. e. asphalt plus solvent, and 5% asbestos fibers gives excellent results. The cut-back asphalt preferably has a specific Engler viscosity of approximately 10 to 15 at 50° C. The solvent component of the cement composition is preferably sufficiently volatile that it will evaporate at substantially atmospheric temperature.

Such bituminous cement has excellent brushing qualities and can be readily applied to the roofing at ordinary temperatures by painting or mopping. The cement quickly dries to produce an effective bond between the overlapping sheets. By actual test it has been found that the felt itself will tear before the cemented sheets will part at the joints. The excellent bond produced is largely due to the fluxing or solvent action of the cement on the coating layers on the sheets. When hot, molten asphalt is employed to cement roofing, it is difficult and often impossible to effect with it a good bond between surfaces covered with soapstone flakes, talc or like non-cementitious substances. The cold, cut-back asphalt cements described above, however, penetrate layers of such non-cementitious materials as are used to prevent sticking of adjacent plies of roofing in rolls or packages, and well-bonded joints result. Since soapstone flakes, talc or the like may be applied to those areas of the roofing which in laying are to be cemented, manufacturing, shipping and handling of the roofing of this invention is greatly facilitated.

The narrow seal coating stripe 24 on the top of the sheet improves the weathering properties of the resultant roof structure. Even though the workmen carelessly apply the cold cement to the top of the sheet and fail to apply cement contiguous to the granular surfaced edge 46, as has frequently been the case in practice, and even though, due to irregularities in edge 46 and the forward edge of the overlying course, portions of the roofing above edge 46 are left exposed to the weather, the portions thus left uncovered or exposed are protected by stripe 24.

Figs. 6 to 9 show sections through modified types of roofing sheets which may be manufactured and laid in accordance with this invention. Each of these sheets, like that of Fig. 3, has a layer of coating material at least on those portions of the top and/or bottom faces of the sheet adapted to be overlapped when laid, thereby preventing the cold bonding cement from being absorbed by the saturated felt base. Those modifications having a coating layer covering the entire under surface are heavier (other things being equal), afford better roof protection, are more effectively sealed against absorbing moisture from the underlying roof deck, and are longer lived. Where conditions justify, roofing within the scope of this invention may be used having both its upper and under surfaces completely covered with asphalt coating.

The roofing shown in Fig. 6 differs from that of Fig. 3 in that the under side of the saturated base 38 is provided with a coating layer 50, dusted with mica 51, covering only the forward edge of the sheet, i. e., that portion adapted to overlie an adjacent sheet, instead of the entire width of the sheet. If the combined width of the selvage area 19 and the narrow stripe 24 on the top of the sheet is 17 inches, the coating layer 50 on the back of the sheet is preferably also 17 inches.

The modified sheet of roofing depicted in Fig. 7 is similar to that shown in Fig. 3 with the exception that no narrow stripe of coating **24** is provided on the upper face of the saturated base **38** adjacent the edge **46** of the coated and surfaced area. Similarly, the roofing of Fig. 8 is the same as that of Fig. 6 with the exception that the coating stripe **24** is omitted.

Fig. 9 shows a sheet of roofing comprising a saturated base **38** having a coating layer **52** covering the entire face thereof. A surfacing of mineral granules **39** covers the coating on the forward portion of the sheet, the coating on the selvage area having fine mica flakes **54** or other equivalent material applied to the surface thereof. The under side of the sheet is uncoated and unsurfaced.

Numerous other modified types of roofing may be made and applied in overlapping relation in accordance with this invention. For example, both the selvage area and the entire bottom or both the selvage area and the rear portion of the bottom of each sheet may be coated with waterproofing material.

As has been pointed out above, the cement is preferably applied at substantially atmospheric temperature without external heating. Under some conditions, however, especially in winter when the outside temperature is very low, I may use the cement at moderately elevated temperatures, e. g., under 100° C. to improve its brushing qualities.

Instead of using cements comprising a mixture of asphalt and a volatile component, i. e., a cutback asphalt, I may employ bituminous emulsions. For example, I may use an emulsion containing volatile components as the continuous phase, such components being sufficiently volatile to evaporate at temperatures below 100° C.

It will be noted that the laying of the roofing made in accordance with this invention by means of a cold cement is simple, rapid, and efficient. The overlapping sheets can be cemented together with less inconvenience to workmen than has heretofore been possible. All danger of fire hazard and personal injury is removed. My invention permits a substantial economy to be effected since very little time is required to apply the cement by mopping or painting and the use of fuel and heating equipment is avoided. A substantially continuous roof deck is formed owing to the strength and durability of the cemented joints.

While it is usually preferable to apply coating during the manufacturing process to the surface or surfaces to be cemented, according to this invention such coating may alternatively be applied as a separate step, and may even be applied by the roofer on the job before laying. In such an operation the roofer may apply a sufficiently heavy coating of a bituminous cement to an uncoated portion of the joint to be lapped, allow the cement to dry or otherwise set, and then proceed as described above. The cement applied for coating may be of the same type as that used for uniting adjacent layers of roofing.

Since certain changes in carrying out the above process, and certain modifications in the roofing which embody the invention may be made without departing from its scope, 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.

I claim:

1. A roof covering comprising a plurality of bitumen saturated selvage edge felt base roofing sheets, each having the exposed portion coated with bituminous waterproofing material which is rendered non-cementitious by the application of comminuted material thereto, said sheets being laid in overlapping relation with the said bituminous coated portion of one sheet overlapping the selvage portion of another sheet, at least one of the lapping portions having a layer of bituminous coating material thereon other than said coating layer on the exposed portion, and a fibrous bituminous cement containing a volatile component, applied cold in readily brushable condition, between the overlapping portions of the sheets, the volatile component of said cement fluxing with the bituminous coating between the lapped portions, thereby forming a firm bond between the sheets.

2. A roof covering comprising a plurality of bitumen saturated roofing sheets, each having a portion to be exposed and a selvage portion, a coating layer extending over the top side of the portion to be exposed and over at least a part of the selvage portion, a layer of granular surfacing material partially embedded in the said portion of the coating layer on the said portion to be exposed, the said portion of the coating layer on the selvage portion being free of granular material, the underside of each sheet having a coating layer of bituminous material thereon, said sheets being laid in overlapping relation with the surfaced portion of one sheet overlapping the selvage portion of an underlying sheet so that the coating layer on the underside of the overlapping sheet is superposed on the selvage portion of the underlying sheet, and a fibrous bituminous cement containing a volatile component applied cold in readily brushable condition to the overlapping portions of said sheets, the volatile component of said cement fluxing with the said coating layer superposed upon the said selvage portion of the underlying sheet, thereby forming a firm bond between the sheets.

3. A roof covering comprising a plurality of bitumen saturated selvage edge felt base roofing sheets, each having a top side comprising a coated and surfaced exposed portion and a selvage portion, and the underside of each sheet having a coating layer completely covering the said underside, said sheets being laid in overlapping relation with the surfaced portion of one sheet overlapping the selvage portion of an underlying sheet, and a fibrous bituminous cement containing a volatile component applied cold in readily brushable condition between the overlapping portions of said sheets, the volatile component of said cement fluxing with the coating on the underside of the overlying sheet, thereby forming a firm bond between the sheets.

4. A roof covering comprising a plurality of bitumen saturated roofing sheets, each having a portion to be exposed and a selvage portion, a coating layer extending over the top side of the portion to be exposed, a layer of granular surfacing material partially embedded in the said coating layer on the said portion to be exposed, the underside of each sheet having a coating layer of bituminous material thereon extending over substantially the entire area of said underside and covered with finely divided antistick material, said sheets being laid in overlapping relation with the surfaced portion of one sheet

overlapping the selvage portion of an underlying sheet so that the coating layer on the underside of the overlapping sheet is superposed on the selvage portion of the underlying sheet, and a fibrous bituminous cement containing a volatile component applied cold in readily brushable condition to the overlapping portions of said sheets, the volatile component of said cement penetrating said antistick material and fluxing with the said coating layer superposed upon the said selvage portion of the underlying sheet, thereby forming a firm bond between the sheets.

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