Feb. 21, 1967 J. W. DONEGAN 3,304,667

ROOF CONSTRUCTION AND FLASHING MEANS THEREFOR

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FIG.1.

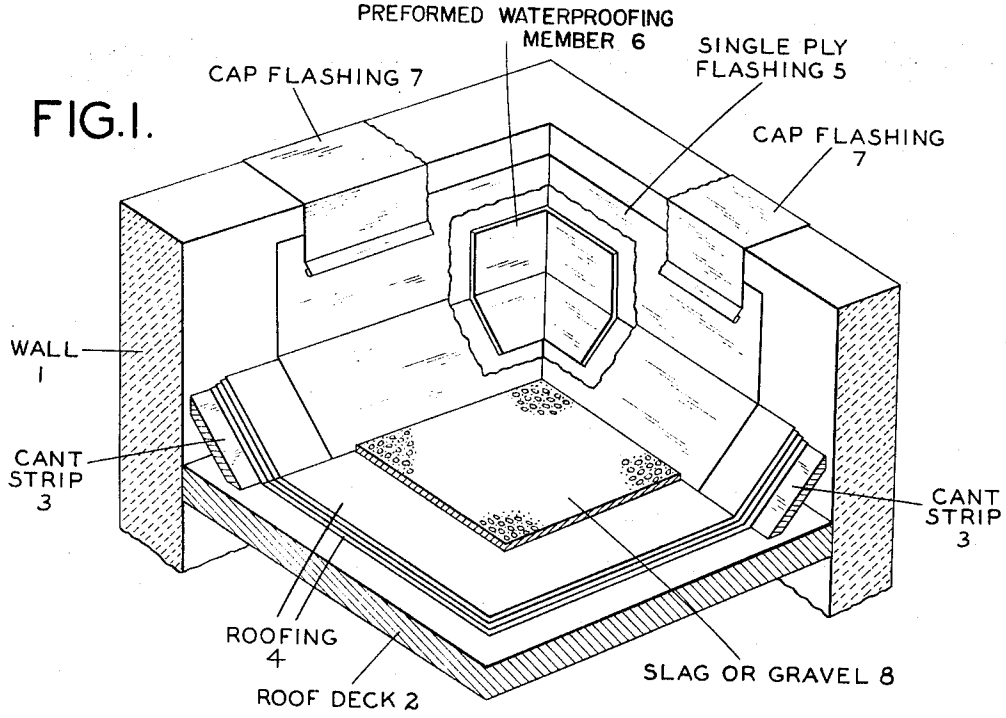
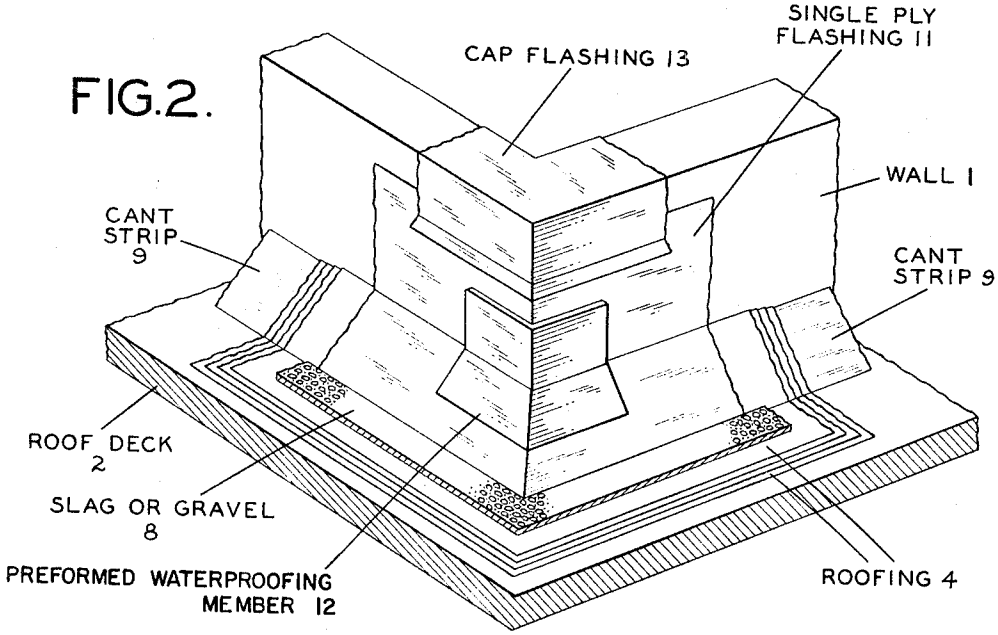


FIG.2.



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ROOF CONSTRUCTION AND FLASHING MEANS THEREFOR

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This invention relates to roof constructions which are weather resistant.

A typical roof construction encountered in buildings is comprise of a roof deck, upwardly extending members, e.g., walls, curbs and parapets, cant strips, roofing, flashing, and cap flashing. A more detailed description of the elements of the roof construction appears infra.

As will be appreciated, the industry is striving to produce a built-up roof, i.e., a roof member with a weather resistant roofing of a sturdier construction, which can be erected with less labor, in a shorter time, and with less material. One element of significance, which consumes a high proportion of labor and material in roof construction, is the flashing, which must be provided at the intersection of the roof with any parapet, curb, wall, vertical projection, or other member extending upwardly from the plane of the roof. Traditionally, these flashings have been made of metal or of multiple layers of bituminous-impregnated felt or fabric plied together with hot bituminous moppings or cold-applied cement. Whichever type of flashing has been used, the major problem has been the construction at locations where the parapet, curb, or other vertical projection changes direction, i.e., where laterally extending portions of the upwardly extending members intersect, so as to produce either an outside or inside angular intercept or joint between these abutting vertical elements. When metal flashing has been used, it has been necessary to employ large amounts of bituminous backing or surface-applied cement to guard against leakage occasioned by failure of the soldered joints. Bituminous flashings take advantage of the many layers of felt and waterproofing adhesive to block discontinuities which exist in any single layer thereof.

Single ply flexible polymeric flashings have also been used; however, a problem arose in that discontinuities which exist at joints in single layers of metal or bituminous flashings also exist in single ply flashing. Since no effective means for blocking the leaks which occur because of these discontinuities was known, such single ply flashings could not be used effectively. In bituminous flashing the great number of layers and the quantities of waterproofing adhesive prevent leaks arising from discontinuities in individual layers thereof. This, obviously, is not the case where single ply flashing is used.

Consequently, in designing a flashing system comprised of single layer sheeting, special provision must be made to insure watertightness at the point of discontinuity. In the application of single ply flashing, a sheet of flexible polymeric material is adhesively secured to the parapet, curb, or vertical wall and the abutting cant strip and is cut horizontally at the line of intersection when it becomes necessary to change direction, such as at an interior (the cut may also be vertical) or exterior corner of a parapet, curb, or vertical wall. A similar sheet coming from the other direction, intersecting and lapping over the first sheet, is also cut and pulled down over the cant. These two intersecting cuts super-imposed at the angle between the cant and the vertical wall permit a through

passage for water to the underlying roof or installation, i.e., a water pervious joint is formed.

It is an object of this invention to provide a roof construction which is economical, in that less materials are used and the labor requirements in man hours are low because of the simplicity of the construction and the smaller amount of materials involved therein. It is a further object of this invention to provide a roof construction which includes single ply flexible polymeric flashing, wherein all water pervious joints are effectively sealed against leakage. Other objects and advantages will be apparent from the description which follows.

In accordance with the present invention, there is provided a weather resistant roof construction comprising a roof member for supporting a weather resistant roofing surface; a member extending upwardly therefrom having intersecting laterally extending portions, cant strips disposed in the angle between and adjacent to said roof member and each of said laterally extending portions, and intersecting one another at the intersection of the portions to provide an intersection of four surfaces angularly disposed to each other; a single ply flexible polymeric flashing adhered to each of said cant strips and to the adjacent laterally extending portions, said sheets of flashing intercepting one another in said intersection to form a water pervious joint; and a preformed insert or waterproofing member providing four intersecting surfaces adhesively secured to the contours of said intersection disposed to breech the intersection between said upwardly extending portions, between said cant strips, and between said cant strip and said last named portions.

FIGURE 1 of the drawing shows a portion of a roof construction comprising an inside corner on a section of a flat roof with the insert disposed beneath the flashing.

FIGURE 2 of the drawing shows another portion of a roof construction comprising an outside corner on a section of the same flat roof with the insert disposed outside the flashing.

In FIGURE 1, wall (or parapet) **1** vertically abuts roof deck **2**. Cant strip **3** lies at an approximate 45° angle to roof deck **2** and to wall **1**. It is customary to provide such cant strips at the intersection between the roof deck and the parapet, curb, or vertical wall, to reduce the sharp angularity of this intersection. The angle of the cant is conventionally about 45°, but may vary within the range of 30° to 60° depending on the slope of the roof and other factors. Four ply built-up roofing **4**, which may be asphalt or tarred felt or other conventional roofing material, is adhesively secured to roof deck **2** and cant strip **3** with appropriate asphalt or coal-tar pitch, roofing **4** being cut and lapped at the corner of the roof deck and up the cant. Insert **6** is adhesively secured to vertical wall and cant strip at the angle where cant strip **3** meets wall **1** and both cant strip **3** and wall **1** change direction. Single ply flexible polymeric flashing **5** is adhesively secured to insert **6**, cant strip **3**, and wall **1**. Two sheets of flashing must be cut and lapped to accommodate the change of direction of cant strip **3** and wall **1**. Cap flashing **7**, which may be made of copper, is placed over the top of the wall or through the wall to protect the upper edge of flashing **5**. Slag or gravel **8** is set on top of roofing **4** with pitch or asphalt. The materials are adhesively secured with conventional roofing adhesives, examples of which are noted infra.

In FIGURE 2, roof deck **2**, roofing **4**, and slag or gravel **8** are extensions of the parts designated by the same reference characters in FIGURE 1. The outside corner

shown in FIGURE 2 may be the intersection of the curb for a skylight with the roof deck. Wall (or curb) **1**, cant strip **9**, single ply flashing **11**, preformed insert or waterproofing member **12** and cap flashing **13** occupy similar positions as their counterparts in FIGURE 1 except that they accommodate different angles or, as in the case of cap flashing **13**, are not merely extensions of the part noted in FIGURE 1.

Since intersections of parapets, curbs, walls, and similar elements can, as shown, form either external or internal angles, two principal forms of inserts are required, one having an inside contour, as shown in FIGURE 1, and the other having an outside contour, as shown in FIGURE 2. With very slight modifications in design any angular intersection may be accommodated.

The material used for the insert can be of the same or of different composition than the sheet material of which the single ply flexible polymeric flashing is comprised just so long as the insert material is capable of being preformed. The flexible polymeric material for both the flashing and the insert includes thermoplastic or elastomeric materials and can be of a reinforced nature, such as laminated, coated, or additionally supported films. Rigid material of these types would be suitable for the insert. Just as with other roof materials, the material used for the flashing or insert must meet weather resistant requirements. Examples of thermoplastics are plasticized polyvinyl chloride; chlorinated polyethylene; polyvinylidene-polyvinyl chloride copolymer; polystyrene; acrylic sheeting (methyl methacrylate); cellulose esters, such as cellulose acetate; polypropylene; and acrylo-butadiene-styrene. Examples of elastomeric materials are butyl rubber, neoprene, styrene-butadiene rubber, nitrile rubber, and silicones. Examples of reinforced materials are polyvinyl chloride and chlorinated polyethylene, each reinforced either with a reinforcing mesh, such as glass scrim, or with an asbestos backing. Other examples of reinforced materials are chlorosulfonated polyethylene over cured neoprene sheet; polyvinyl fluoride film on asbestos felt; butyl rubber on glass scrim; and asbestos sheeting with a surfacing of chlorosulfonated polyethylene. The aforementioned materials are in single ply form when they are applied to the roof as flashing or used as an insert, with thickness of the single ply typically ranging from 15 to 70 mils. The inserts may be formed by any of the conventional manufacturing processes such as vacuum forming, injection molding, press molding, etc., and such inserts may be attached by use of conventional molten or cutback asphalts or pitch which are normally used for bituminous flashing. Many waterproofing adhesives suitable for bonding plastic materials presently on the market may also be used. Cutback cements, synthetic elastomers and polymers in a suitable solvent, contact adhesives, and epoxys or urethanes are general examples; specific examples are cut-back asphalt roof cement and two-part, cold curing contact adhesive. The preformed insert can also be prepared with an adhesive backing. Though the insert material may be rigid, it is preferably flexible since a flexible insert not only fits the angular contours, but also adapts to various irregularities in roof construction.

It is preferred to have the insert disposed beneath the flashing, so that the edges of the insert will be protected thereby; however, it may be preferred to have the insert disposed on the outside of the flashing, which simplifies inspection of the roof construction in that it can be readily determined that no corners were neglected during the placing of the inserts.

As an example, a roof construction was built to accommodate the roof of an industrial building having 35 ventilator curbs and four external parapets. The roof construction corresponded substantially to the drawing with the inserts disposed beneath single ply plasticized polyvinyl chloride flashing as in FIGURE 1. One hundred and forty outside corner inserts for the curbs and four inside corner inserts for the parapets were requied. The inserts were designed to fit a 45° cant strip, were also made of plasticized polyvinyl chloride, and were set in hot bitumen. The roof construction was found to be wholly watertight.

If bituminous-impregnated felt flashing were used in the roof construction on this building, four separate applications of material would have been required and each layer would have had to be carefully cut and mopped at the corners. It is preferable, therefore, to use single ply flexible polymeric flashing as an economy measure since such single ply flashing has excellent weather resistant qualities; however, the shortcoming of single ply flashing is at the point of discontinuity, i.e., where changes of direction are necessary and cuts and laps have to be made. When single ply flashings are used without the insert, careful cutting and mopping at the corner is necessary just as with the bituminous-impregnated felt but a water pervious joint is not avoided, whereas a roof construction with single ply flashing and the required inserts gives complete assurance of watertight joints.

I claim:

1. In a roof construction, a roof member supporting a weather resistant roofing surface; a member extending upwardly therefrom having intersecting laterally extending portions; cant strips, disposed in the angle between and adjacent to said roof member and each of said laterally extending portions, intersecting one another at the intersection of the portions to provide a corner intersection of four surfaces angularly disposed to each other, said weather resistant roofing overlying at least a portion of said cant strips; a single ply flexible polymeric flashing adhered to the roofing on said cant strips and to the adjacent laterally extending portions, said sheets of flashing intercepting one another in said intersection to form a water pervious joint; and a preformed waterproofing member providing four intersecting surfaces adhesively secured at said corner intersection and extending over the intersection between said upwardly extending portions, between said cant strips, and between said cant strip and said last named portions.

2. The roof construction as defined in claim **1** wherein the waterproofing member is disposed beneath the flexible polymeric flashing and adhesively secured to the upwardly extending portions and the cant strips.

3. The roof construction as defined in claim **1** wherein the waterproofing member is disposed over and adhesively secured to the flexible polymeric flashing.

4. The roof construction as defined in claim **1** wherein the flashing is comprised of plasticized polyvinyl chloride.

5. The roof construction as defined in claim **1** wherein the flashing is comprised of chlorinated polyethylene.

6. The roof construction as defined in claim **4** wherein the flashing is comprised of reinforced plasticized polyvinyl chloride.

7. The roof construction as defined in claim **5** wherein the flashing is comprised of reinforced chlorinated polyethylene.

8. The roof construction as defined in claim **6** wherein the plasticized polyvinyl chloride is reinforced with glass scrim.

9. The roof construction as defined in claim **1** wherein the waterproofing member is comprised of plasticized polyvinyl chloride.

10. The roof construction as defined in claim **1** wherein the waterproofing member is comprised of chlorinated polyethylene.

11. The roof construction as defined in claim **9** wherein the waterproofing member is comprised of reinforced plasticized polyvinyl chloride.

12. The roof construction as defined in claim **9** wherein the waterproofing member is comprised of reinforced chlorinated polyethylene.

13. The roof construction as defined in claim **11** where-

in the plasticized polyvinyl chloride is reinforced with glass scrim.

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