

June 24, 1930.

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1,765,796

SEALED LAMINATED ROOFING ELEMENT

Filed April 10, 1926

2 Sheets-Sheet 1

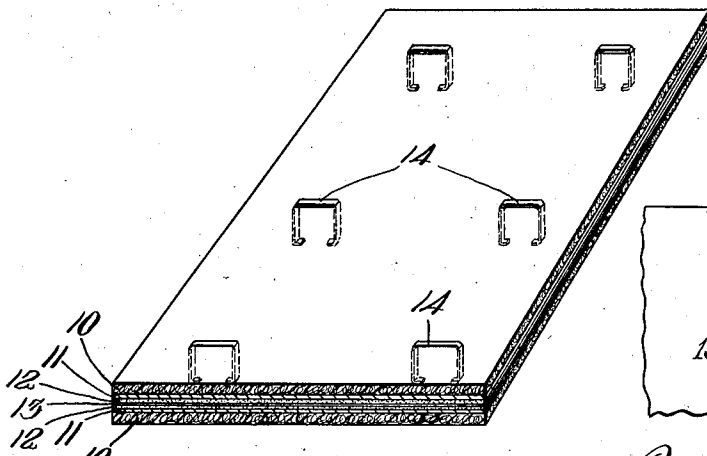


Fig. 1.

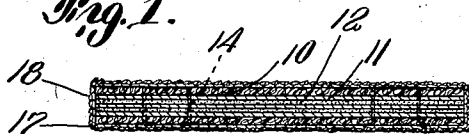


Fig. 1a.

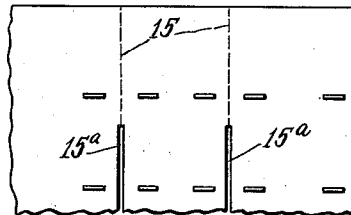


Fig. 2a.

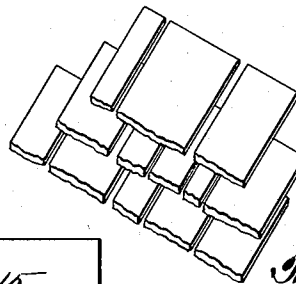


Fig. 3.

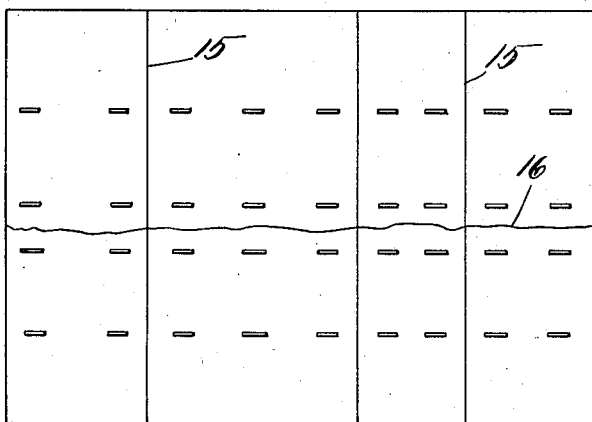


Fig. 2.

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June 24, 1930.

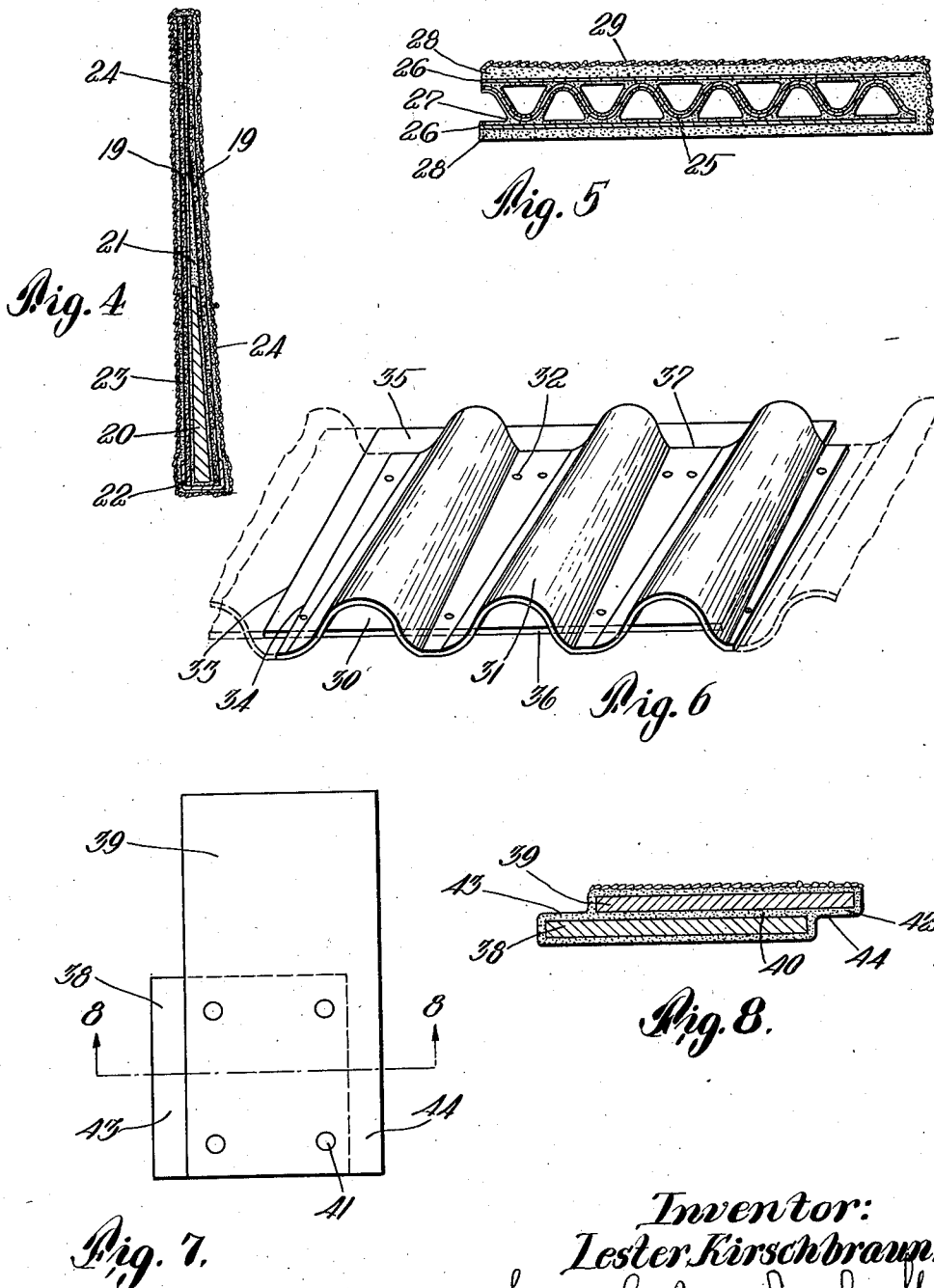
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SEALED LAMINATED ROOFING ELEMENT

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2 Sheets-Sheet 2



Inventor:
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UNITED STATES PATENT OFFICE

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SEALED LAMINATED ROOFING ELEMENT

Application filed April 10, 1926. Serial No. 101,097.

This invention relates to manufactured roofing and has for its chief object the production of relatively thick roofing material or units which may be built up of laminae of any desired kinds and so treated as to prevent subsequent delamination. Embodiments of my invention may include roofing material comprising a variety of characteristics and materials, or units of various shapes.

One of the materials commonly used in the manufacture of roofing of this general class is roofing felt, so-called. This is customarily made of fibrous material, such as rag or asbestos pulp, and is produced on a paper-making machine. The sheet of felt so made is usually sufficiently absorbent to be readily saturated with bitumen, pitch or equivalent substance, which can be rendered liquid by heat or otherwise. The felt, after saturation, is usually coated with high melting-point asphalt or equivalent impervious material, this coating being then surfaced with grit or the like to protect it from the deteriorating action of the elements, or by a powder, such as pulverized mica or chalk, to render the surface of the coat non-sticky. Roofing units made in this way are comparatively thin and limp, and when laid on a roof present a relatively flat and unsubstantial appearance. Many attempts have been made to produce a satisfactory thick material which would keep its shape and resist the weather successfully. Attempts to produce such roofing by sticking or cementing sheets of roofing felt or similar material together have been unsuccessful on account of the tendency of the fibers of the felt to absorb and exude moisture through the ends exposed where the finished unit was cut from the sheet of roofing material. The absorption of moisture, attended in some seasons by freezing and thawing, and its exudation in dry periods, tends to distort the laminae and to cause them to separate, thus greatly detracting from the protection afforded by the roof and giving the roof an unsightly appearance. By my invention, delamination of the roofing units is effectually prevented and the units retain their shape

and resist successfully the action of the weather. Not only may a plurality of felted sheets be built up into a laminated structure, but there may be a wide variety of combinations of materials employed in building up the thick material. For example, a sheet of roofing felt may be combined with rigid materials, such as slabs of cement, clay, tile, gypsum, paper wall-boards, corrugated board structures, or combinations of these or their equivalents. The lamination may be made more secure by the use of suitable fasteners, preferably metallic, which may be in the form of clips, staples, rivets, or the like, passing through some or all the plies, or secured about the edges of the lamination. In carrying out the process of my invention with ordinary roofing materials or their equivalents, stock of suitable weights and materials, including if desired granular surfaced stocks, may be assembled with a layer of cementitious material, such as hot asphalt or asphalt mastic, between the plies, the plies being pressed together while the cement is warm and held firmly until united. When the building up of the laminations has been completed and the individual roofing units have been partly or wholly cut from the sheet or otherwise formed to shape, the exposed face and edges of each unit are completely coated with a layer of impervious material which may be surfaced if desired with any of the comminuted materials suitable for roofing, such as grit, crushed slate or tile, or other granular mineral, preferably opaque to protect the coating material from the deteriorating action of the sun's rays. The coating of impervious material may be applied to cover not only the exposed edges and face of the unit, but may also extend over other portions thereof, for example, it may cover the whole of the upper face of the unit including the portion to be lapped by the course laid next above the roof; or part or all of the under face of the unit may be covered; or the whole unit may be completely enveloped. The essential point is to prevent delamination by protecting the exposed surface of the unit which includes a

portion of the upper face and all edges which are not lapped or sheltered by the course next above. Additional protection and security from the entrance of moisture may be obtained by extending the coating over more of the surface of the unit. If metallic fasteners are used to secure the laminæ together, it is preferable to extend the coating to cover the fasteners so as to protect them from corrosion. In applying the comminuted surfacing material to the coated areas, it is particularly desirable that the surfacing be thoroughly applied to the coating on the butt edge of the unit and on the edges of slots or cutouts, if any. The protection afforded by this surfacing layer is needed by the coating which seals the edges of the laminæ as well as by that on the exposed surface of the unit. The grit surfacing on the edges also adds to the appearance of the unit as a whole.

Among the various forms and embodiments my invention may take, some are illustrated in the drawing in which:

Figure 1 represents a slab of laminated roofing materials before coating.

Figure 1^a is a section of a completed unit.

Figure 2 indicates a method of dividing a sheet of material into units.

Figure 2^a is a fragmentary plan of a plurality of units showing another method of cutting them from the sheet.

Figure 3 suggests one of the effects which may be obtained in laying the finished units taken from a sheet as in Figure 2.

Figure 4 indicates in cross section the structure of a tapered roofing unit.

Figure 5 indicates in cross section a roofing material built on a corrugated base.

Figure 6 shows another form of roofing unit in which the upper lamination is corrugated.

Figure 7 is a further form of roofing.

Figure 8 is a section on the line 8—8 of Figure 7.

One form of my improved roofing material is illustrated in Figure 1. This may comprise a plurality of sheets of water-repellant felted fibrous stock 10 or roofing base, such as is commonly used in manufactured roofing. Instead of the felt stock, any similar or equivalent material, such as for example treated corrugated straw-board, may be used. In the form illustrated, the desired thickness may be obtained by the use of suitable materials between the sheets of the felted fibrous material. A convenient way to assemble such a sheet is to apply a layer 11 of blown asphalt, or other similar coating material, to each sheet 10. While the coating material is still hot and sticky, a bulky material, such for example as comminuted cork, may be applied to the surface so as to form a layer 12 of considerable thickness. The surfaced faces of the sheets

10 may now be pressed together with a layer 13 of asphalt or other adhesive material between them until all the layers are firmly united. This completes the structure shown in Figure 1. In order to secure the laminæ more firmly together, suitable fasteners, such as metal staples 14, may be clinched through, thus adding to the mechanical strength of the material. It is obvious that in place of the staples shown, any form of clips, rivets or edge clamps may be used, or the laminæ may be sewed with wire or any suitable strand. After the laminated sheet has been completed, it may then be separated into individual roofing units which may take the form of shingle strips or individual shingles or tiles. The separate units or elements may be cut from the sheet or separated therefrom by a combination of cutting and breaking or tearing. Figure 2 illustrates one method of dividing the sheet into individual elements. As there shown, the sheet may be cut on lines 15 to form double units of varying width which may be broken or torn apart as on the line 16, thus making more or less ragged edges, which will give an artistic effect to the roof when the elements are laid, as shown in Figure 3. Another method of forming the individual units is indicated in Figure 2^a. By this method, the sheet is preferably divided into strips as along the line 16 (Figure 2), then slots 15^a are cut in the strip extending from the butt edge entirely across the portion of the strip which will be exposed when the elements to be cut therefrom are laid on a roof. The slots 15^a are preferably just wide enough to permit thorough coating and slating of the cut edges thereof. This enables the handling of the elements in a continuous connected strip or groups of convenient size, the individual elements being cut from the strip or groups after coating and slating, as on lines 15. The coating should be applied on the exposed face and edges of each element, but may also be extended to the lower face of the element or the whole upper surface or may completely envelop the entire element. If the elements are cut as indicated in Figure 2^a, the edges formed by the cuts 15 will be uncoated, unless subsequently coated by an additional step, but as these edges are protected, when the element is laid by the course above, the lack of coating thereon is not as important. For coating material, asphalt of relatively high melting point, such as oxidized petroleum residuum, has been found satisfactory, but any equivalent waterproof material may be used instead. While the coating is still tacky, the coated areas of one or both faces and the edges are preferably surfaced with comminuted material, such as crushed slate, or a combination of various such materials, as desired, to impart to the shingle a further

protective covering 18 and any desired artistic effect. The several units or shingles may be surfaced to present different colors which will harmonize when the roof is laid.

5 Figure 4 illustrates a tapered unit which embodies one form of my invention. This is composed of separate slabs 19 of roofing base or its equivalent, which may be cut to the shape of the desired element and between
10 which may be inserted a third slab 20 of the same or different material, the latter being tapered or not, as desired. The slab 20, however, is preferably of about half the length of the slabs 19 so that the butt portion of the element will be thicker and
15 heavier than the head portion. It is preferable to cement the slabs 19 and 20 with a layer 21 of suitable cementitious material, such as blown asphalt or its equivalent, and
20 a metal clip 22 may be clamped about the butt edge of the shingle to provide additional strength thereto and to prevent delamination at that point. Metallic fasteners (not shown) may also be passed through the
25 slabs 19 and 20 in the same manner as illustrated in Figure 1. If preferred, the laminae 19 and 20, instead of being pre-cut to size, may be supplied in the form of continuous strips and may be brought together
30 with cementing material between them as a continuous operation, the individual elements thereafter being cut or shaped from the laminated strip. When each element has been formed or cut to shape and separated
35 from the sheet completely or to the extent indicated in Figure 2^a, impervious coating material is then applied to the exposed surface of each element, that is the portion of the upper face and the edges to which rain
40 and sunlight will have access when the element is laid on a roof with other elements in lapped courses. In addition to the exposed surface, the coated areas may include as much more of the faces and edges of the
45 element as desired. The exposed surface, including the exposed edges, is the minimum surface the sealing of which with an impervious coat will afford protection against the delaminating effect of moisture. Fur-
50 ther security from the entrance of moisture into the fibrous body of the element may be obtained by extending the impervious coat over more of the upper face of the element and/or over part or all of the lower face.
55 An outer surfacing 24 of any desired kind or kinds of comminuted material is preferably applied to the exposed coated areas for additional protection and to produce any artistic effect desired.

60 Figure 5 shows in cross section a roofing material which may be used to make up units or elements, such as heavy shingles, simulating tiles, or the like. This form of roofing material comprises as a base corrugated
65 board, the central ply 25 being corrugated,

the outer plies 26 being plane. Additional thickness may be obtained by building up a multiple corrugated board with two or more corrugated plies 25 alternating with plane plies 26. The plies may be of any desired and suitable material as dry felt, pre-saturated felt or other fibrous stock, to which may be added, if desired, a hydrocarbon emulsion like that described in my Patent No. 1,417,835 issued May 30, 1922. The corrugated board may be dipped into a liquefied cementitious saturating or coating compound, preferably waterproof, such as asphalt, which beside coating the exterior surfaces of the board, will also enter the cellular spaces and coat all the inner free surfaces, that is, the surfaces not in mutual contact. The excess material may be allowed to drain therefrom, leaving air spaces within the board and a coating 27 covering and saturating the surfaces of the corrugations as well as the surfaces of the plane plies 26, thus sealing the board inside and out; or if a heavier weight of roofing is desired, the ends of the corrugations may be crimped, plugged or otherwise closed in any suitable way so as to keep the spaces or cells within the board full of asphaltic material. The nature of the treatment will depend on the character of the product which it is desired to make. If the advantages of comparatively light weight and insulating air spaces are desired, the cell spaces will be drained. If a heavier or more rigid material is desired, the cells will be allowed to remain full of the coating material. Instead of using asphalt to fill the air cells, a slurry of Portland cement, gypsum, or the like may be employed with a suitable filler. The sheet may then be cut or divided into individual elements, the exposed surfaces of which are then sealed with a coating of impervious material 28, which may also extend over as much more of the element as desired, and surfaced by suitable comminuted material 29. The material used for the coating 28 is preferably thermoplastic, such as high melting-point asphalt, the temperature of which is so regulated that the material will be comparatively viscous and sluggish so as not to enter to any material extent into the cell spaces, but nevertheless sufficiently fluid to form an impermeable coating over the exterior of the unit to which grit or equivalent surfacing material may be readily
120 affixed.

Instead of corrugated board, boards or sheets of certain materials can be made having similar properties of light weight, rigidity and insulating qualities. Among such materials are unrefined bagasse, flax, or straw fibers, which may be made up into boards of any desired thickness. The coarse unrefined fibers are naturally water-repellent but may be superficially saturated with
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fluid bitumen, and in either event may be encased in an envelope of high melting-point asphalt or its equivalent, the resultant product being highly resistant to the action of the weather. Slabs or tiles of such material may be formed in units as illustrated in Figure 3, the units after being suitably surfaced with grit having the general appearance of rough hewn slate and possessing to a remarkable degree the desirable qualities of lightness, rigidity, and insulating properties against heat and cold.

A tile-simulating unit is illustrated in Figure 6, wherein is shown a structure in the form of a laminated roofing strip comprising a plane lamina 30 surmounted by an undulate lamina 31. These laminae may be of any suitable material, such as the usual felted fibrous roofing base or its equivalent. After the waves have been formed in the lamina 31, it may be secured to the lamina 30 as by metallic or other fasteners indicated at 32. The two laminae may be formed and combined in any desired way. As shown the waves of the lamina 31 are tapered slightly to permit their butt portions to fit closely over the head portions of corresponding waves in the course below which are lapped thereby. The two laminae 30, 31 are also preferably offset laterally so that when adjacent strips in the same course are laid abutting one another, the joints of the lamina 30, as at 33, will not register with the joints of the undulate lamina 31, as at 34. The lamina 31 is also preferably offset downward with respect to the plane lamina 30, so that the butt portion thereof projects below the butt edge of the lamina 30 leaving a part 35 of the head portion of the lamina 30 exposed. In laying the strips, the butt edge 36 of the lamina 30 is placed against the upper edge 37 of the lamina 31 of the course below lapping the exposed head portion 35 of the plane lamina 30 of the course below and permitting the projecting butt portions of the waves to lap over the head portions of the waves in the course below. Such construction produces a roof having an artistic tiled appearance with the additional protection afforded by the lapped plane laminae beneath. Strips made up in this way are also easily and accurately laid. When the strip has been formed and the laminae secured together, the whole strip may then be dipped in a coating compound which envelops substantially all the free surfaces of the strip (i. e. the surfaces not in mutual contact), both inside and out, and comminuted surfacing material may thereafter be applied if and as desired.

In Figures 7 and 8 is illustrated a further example of laminated roofing units made of any material suitable for use as a roofing base. In this form, the reinforcing lamina 38 is preferably secured to the butt portion

only of the shingle 39 (which may be of conventional shape as shown) by cementing the two laminae together with a layer 40 of any desired adhesive material or by fasteners 41, or both. The built-up unit is substantially enveloped in a coating 42 of impervious material, and a surfacing 45 of granular material may be applied to the upper face of the lamina 39. The laminae may be built up in laterally offset relation, as shown on the drawing, so as to provide for an overlap of adjacent shingles or units in the same course, thereby making a tighter roof. Such offset construction results in a projection of a portion 44 of the upper lamina which will lap the exposed portion 43 of the lower lamina of the next adjacent unit. The faces of these portions 43, 44 are preferably left without grit in order to permit a closer engagement and also in order that black lines, simulating spaces or shadows may show between adjacent shingles if laid slightly spaced laterally.

It will be apparent that the examples shown and described herein are illustrative only and that many others may be constructed which will fall within the purview of my invention. I therefore do not wish to be limited to the specific forms shown but only by the scope of the claims hereinafter appended.

I claim:

1. A roofing unit having a structure comprising a plurality of laminae of sheet material, a layer of binder between successive laminae, fasteners passing through said laminae and layers, and a sealing coat of waterproof substance enveloping the exposed portion of said structure including edges.

2. Sheet roofing material comprising at least one corrugated ply, a plane facing ply cemented thereto, a coating of waterproof compound over all free inner and outer surfaces of said plies, and a surface layer of grit on one side of the material.

3. A roofing unit comprising a corrugated ply, a plane facing ply cemented thereto, and a coating of waterproof compound impregnating all of said plies and covering all free inner and outer surfaces thereof.

4. A roofing unit comprising a corrugated ply, a facing ply cemented thereto, said plies being of fibrous stock impregnated with waterproofing material and forming between them tubular air spaces within the unit, a sealing coat of waterproofing compound covering the exposed surface and edges of the unit, and a layer of grit adhering to said coat.

5. A roofing unit comprising a corrugated ply of fibrous material, a plane facing ply cemented to said ply, a coating of waterproofing compound impregnating all

of said plies and covering all free inner and outer surfaces thereof, an additional coat of waterproofing material covering and substantially confined to the entire exterior surface and edges of said unit, and a layer of comminuted material adhering to one face of said unit and the exposed edges.

10 6. A roofing unit comprising a plane layer of roofing base, an undulate layer of roofing base attached thereto, and a sealing coat of waterproof compound covering all the free surfaces of said unit.

15 7. A roofing unit comprising a plane layer of roofing base, an undulate layer of roofing base secured thereto, said undulations being tapered, and a coating of impervious material enveloping substantially all the free surface of the unit.

20 8. A roofing unit comprising a plane layer of roofing base, an undulate layer of roofing base attached thereto, said undulations being tapered, metal fasteners gripping both said plies, and a sealing coat of waterproof compound covering substantially all the free
25 surface of said unit.

9. A roofing unit comprising a plane layer of roofing base, an undulate layer of roofing base superposed thereon, metal fasteners passing through the two layers at
30 points of mutual contact, and a coating of waterproofing material covering all the free surfaces of both layers, said layers being mutually offset so that the head portion of the plane layer projects beyond that of the
35 undulate layer while the butt portion of the undulate layer projects beyond the butt portion of the plane layer.

10. A roofing unit comprising a plane layer of roofing base, a second layer of roofing
40 base superposed thereon, said second layer being formed with a series of undulations tapering toward the head of the unit, metal fasteners passing through said layers at points of mutual contact, and a coating of
45 waterproofing material covering all the free surfaces of both layers, said layers being mutually offset so that the head portion of the plane layer projects beyond that of the second layer while the butt portion of the
50 second layer projects beyond the butt portion of the plane layer.

In testimony whereof I have affixed my signature.

LESTER KIRSCHBRAUN.

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