

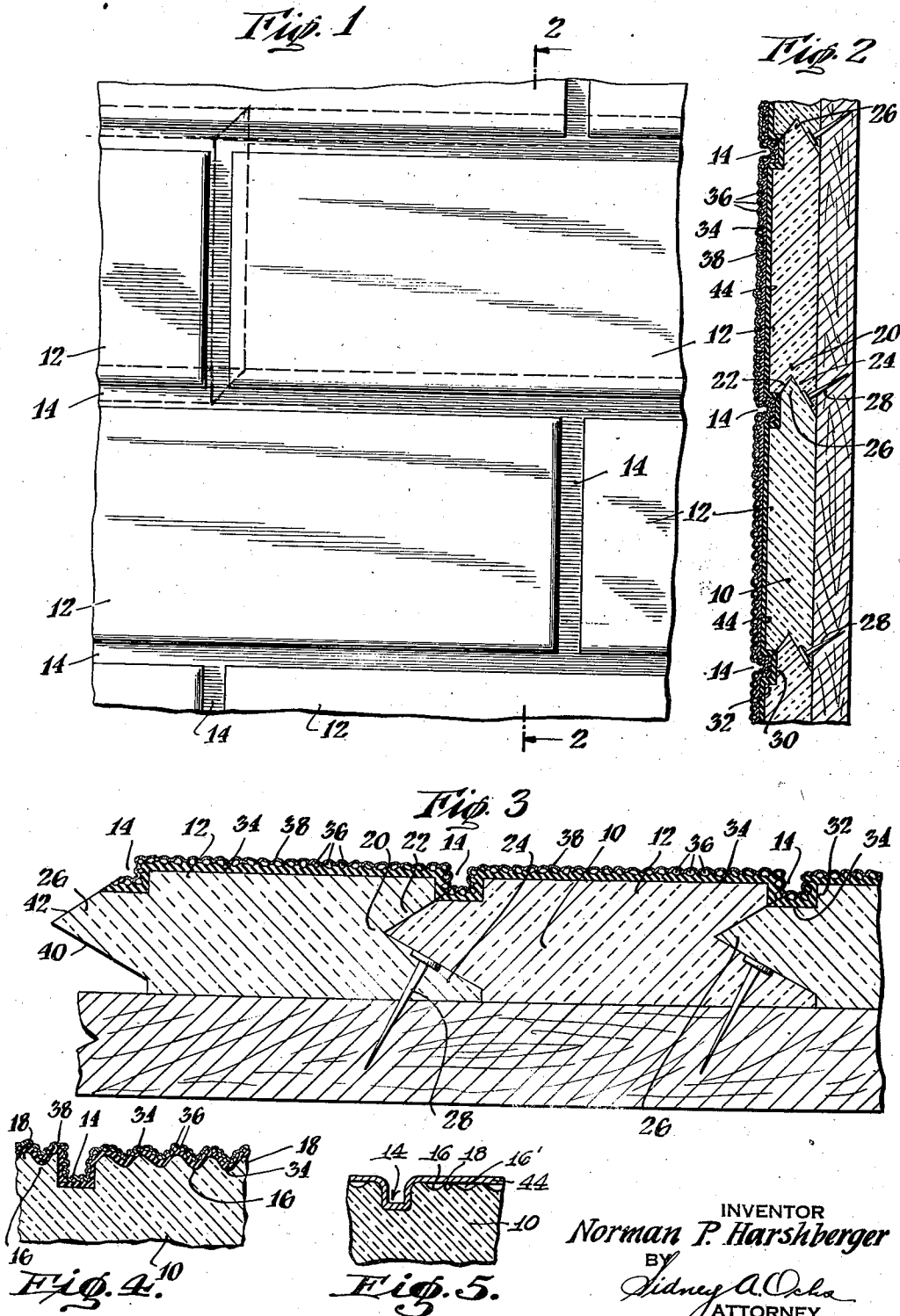
Oct. 10, 1944.

N. P. HARSHBERGER

2,359,845

SURFACE COVERING MATERIAL AND PROCESS OF MAKING THE SAME

Filed Feb. 11, 1941



INVENTOR
Norman P. Harshberger
BY
Sidney A. Oscho
ATTORNEY

UNITED STATES PATENT OFFICE

2,359,845

SURFACE COVERING MATERIAL AND
PROCESS OF MAKING THE SAME

Norman P. Harshberger, Old Greenwich, Conn.,
assignor to Carbide and Carbon Chemicals Cor-
poration, New York, N. Y., a corporation of New
York

Application February 11, 1941, Serial No. 378,346

11 Claims. (Cl. 20-5)

This invention relates to building material, in particular to improvements in weather resistant fiber board insulation panels for covering siding and the like exposed building surfaces, and is a continuation-in-part of my copending application, Serial No. 168,389, filed October 11, 1937, now Patent 2,231,006.

The invention further relates to materials of this character, the exposed surfaces of which provide a simulation of well defined masonry configurations, for instance, courses of raised bricks, separated by depressed mortar spaces which may be of contrasting visual effect.

It is an object of the invention to overcome certain disadvantages of bitumen coated insulating panels, in particular those that present grit surfaced bitumen masonry configurations which it has been the practice to form in a mastic bitumen layer or by overlays of such material. Also the shape and appearance of the bitumen mastic configurations are susceptible to physical alteration in handling, storage, and application of the insulation material, particularly at warm temperatures, because of the relative softness and flowability of the bitumen mastic employed. There has also been in certain cases a tendency for the mastic layers to separate from their body portions, the bond being entirely in one plane. Moreover, because of these factors the thickness of the mastic layer in the face of the board and hence of the configurations was necessarily limited.

In addition, bitumen saturation of the fiber-board material has heretofore been relatively slow and inefficient. Moreover, where the panels have been thinned at the edge portions to provide weather laps between adjacent units these portions have been susceptible to warping in exposure. It has been necessary to use a substantial number of fasteners, such as nails, to obtain adequate mounting and resistance to warping and mounting of the panels has generally been by exposed fasteners.

According to the present invention it is proposed to form the masonry configurations as an integral part of the fiber board base, and of the fiber composition itself. It is proposed to either mold the masonry configurations, of the fiber pulp at the time of forming the board, or by pressing such configurations into the face of a formed wet pulp layer, or preferably produce the configuration by routing one face of the dry fiber board material with suitable cutters. Obviously the configurations may now be any desired depth in the face of the board and their outlines

may be made sharp and distinct. It has been found that when the configurations are outlined by cutters the cut fibers will improve penetration of coating material subsequently applied.

Thus, for instance, penetration of bitumen during impregnation is more rapid and more efficient due to the cut areas, the cut fibers appearing to aid materially in this result. To take full advantage of this new result the entire face of the board is preferably cut with narrow furrows or grooves. The board is then impregnated to any degree desired with a liquid bitumen and the configured face additionally coated with a bitumen of higher melting point than the impregnant. Of course, the entire base may be coated. Also, the impregnating step may be omitted.

By reason of the new base structure the coating layer may now be a thin one merely of sufficient thickness to adequately seal the face of the fiber board and to anchor a grit surfacing layer. Moreover, the bitumen layer now forms in effect a shallow shell fitted over and bonded to the many face portions of the raised configurations of the fiber board material and thus is better anchored to the fiber board and substantially free of delamination. The anchorage is even better where the coating is anchored to the cut fiber portions. Furthermore, the fiber treated configurations are better able to withstand the effects of handling, storage, and application than when entirely of bitumen; there can be no tendency to slide since they are part of the fiber board per se; and while the exposed bitumen portions will be subject to weathering as before, nevertheless the underlying fiber configurations will improve to a substantial extent the permanency of the configurations. Of course the bitumen layer may be provided with suitable grit surfacing material to protect the exposed bitumen and such material will preferably cover the entire exposed face of the board, including the side edges of the configurations and will preferably be of a contrasting color or size in the depressions from that of the exposed configurations in order to enhance the effect produced.

As a further feature the invention proposes to provide over the treated board a layer of rigidifying material of sufficient thickness, for instance of a suitable synthetic resin composition such as a phenolic resin or preferably a hydraulic cement, which may be anchored to a grit facing and will provide further weather and fire protection for the face of the board, impart considerable additional stiffness and rigidity, and retain the same at all working temperatures.

The additional coating will likewise improve resistance of the board to warping in exposure and provide shape retainment for formed or thin portions such as lap edges where such are provided. The coating will also enable more satisfactory handling of panels of substantial size and will, therefore, be a better commercial product.

The present invention proposes as a modification to affix to the configured face of the fiber board a sheet of flexible waterproof felted material that may include a bitumen bonded grit facing, the sheet being preformed to constitute a cap sheet for the board or being formed on the board to fit the raised configurations. Obviously this layer may be treated as aforesaid with a coating of rigidifying material, and the simulation of masonry configurations be also provided.

It is also proposed to form the board of sufficient thickness whereby a side and end edge portion may be provided with a groove, flanked by a pair of projecting lips coextensive with said edges, the rear lip projecting from the edge a greater distance than the front lip; also to form the side and end edges opposite the grooved edges of the board with a projecting tongue to interlock with the grooves of adjacent units. The preferred construction improves assembly and improves registration of the panels; reduces the extent of fastening necessary to retain the boards in position; and provides additional means for maintaining the units in a flat plane. Moreover, the rear lip of the formed grooves provides an exposed fastening face, for such fasteners as nails, that will be covered when the adjacent board is assembled therewith.

The invention has among its further objects the provision of a weather resistant product comprising a substantially stiff or rigid sheet-like layer of insulation material and a layer of covering material upon the portion to be exposed, improving the insulating properties of the surface layer and providing weather and fire protection for the composite unit;

The provision of a cement surfaced brick siding panel in which masonry configurations, such as brick figures, are produced in relief and are of a realistic character;

The provision of a bitumen treated fibrous wallboard layer with a hydraulic cement composition layer whereby greater rigidity is obtained by reason of the hydraulic cement coating and warping and exposure is avoided, and whereby large sections may be readily handled and fastened to a supporting structure by a minimum of fasteners;

The provision of a coated wallboard panel the surface of which simulates structural configurations, for instance brick figures separated by mortar bands, and which panels are assembled in edge-to-edge relation to form a continuous planar surface with the configurations in each panel arranged to complete the desired pattern and provide a realistic structural effect, and which panels are provided at certain edge portions with tongue and groove arrangements, enabling concealed nailing of the panels and the application of such fastening means to readily accessible positions.

Other objects and advantages of my invention, with particular relation to the combination of materials and structure, and the novel formation of surface coverings, will more readily appear or be apparent to those skilled in the art from the following detailed description and from the accompanying drawing, forming a part there-

of, wherein certain embodiments of my invention are presented for better understanding thereof, although it will be understood that I do not desire to be limited to the specific embodiments hereinafter disclosed.

Referring to the drawing, wherein similar parts are identified by similar identifying numerals:

Figure 1 is a partial face view of a siding construction made in accordance with my invention;

Figure 2 is a cross sectional view taken through 2—2 of Figure 1, illustrating a form of the invention using a cap sheet;

Figure 3 is a cross-sectional view of the preferred form of the invention;

Figure 4 is a partial cross-sectional view of a preferred modification of the invention applicable to the construction of Figures 2 and 3; and

Figure 5 is a cross-sectional view similar to Figure 4, but of a modified construction.

Referring to the drawing, the base 10 of my new surface covering unit comprises an element of stiff or rigid characteristics, preferably comprising a body of compressed or cemented vegetable and/or mineral fibrous material, for instance, bagasse, wood, substantially pure cellulose, paper, asbestos, mineral wool, animal hair, and others, usually used alone, or in combination, or adapted to be used in making products generally known to those skilled in the art as wallboard, or insulating board. One form of board of this character which I may use and which is made from a relatively coarse cellulose containing fiber stock, the fiber of which is derived from, for instance, sugar cane, bagasse, licorice root, and corn stalks, is marketed under the name Celotex. The fibrous base may be constituted of a solitary layer, or may, for the advantages obtained in certain constructions, comprise a plurality of separate sheet-like plies of similar material bonded face-to-face by suitable cements to form an integral structure. A base between 1/4" to 1" in thickness will generally be found satisfactory. However, bases of other thicknesses may be desirable in certain cases.

The face of the base 10 is provided with one or a plurality of raised surface portions 12 spaced apart as by the band-like depressions 14, to simulate a surface of masonry configurations, for instance bricks in relief and separated by mortar joints. The base may be preformed with these facial configurations by depositing the pulp of fibrous composition material of which the base member is made in a mold having a filter bottom formed with the desired configurations, or may be formed by embossing a wet matrix of the composition. Preferably, however, the configurations will be formed by cutting a face of a dry preformed board with suitable cutters of the desired width so as to produce the depressions 14, the cutters routing out material in these portions to the extent desired. It has been found that the latter method renders the fibrous surface of the board more exposed and receptive to penetration and anchorage of coating material such as liquid bitumen, the cut fibers apparently acting as a media to conduct the coating material into the face of the fiber board material. It is preferred that substantially the entire surface of the board be brought to this cut condition and to produce this result the faces of the raised configurations may be cut as illustrated in Figure 4, with narrow shallow grooves or furrows 16, which may extend in either direction and which produce a series of narrow raised ribs 18 separated by the cut furrows. With the sur-

face in this condition any coating treatment will be particularly effective, that is penetration of the coating into the base material will be more rapid and complete when the surface has been cut in the recited manner. It will be noted that in this condition substantially the entire fiber face has been cut and that a greater surface area is exposed by reason of the hills and dales produced for reception of coating material, this further increasing the efficiency of coating penetration. The furrows will preferably be shallow in character and in one construction I have found $\frac{1}{4}$ inch deep furrows on $\frac{1}{4}$ inch centers and forming flat top ribs to be satisfactory for the intended purpose. It will be understood that the ribs 18 may be continuous or interrupted by cross furrows of similar or other character, the cross furrows obviously increasing the extent of cut surface fiber exposed. In the preferred procedure where it is desired to produce a board with brick or other configurations the shallow V grooves or furrows 16 will preferably be cut over the entire surface of the board and thereafter secondary deeper cuts will be made routing out the material in the areas to produce the mortar or other demarcations 14 for the configurations. In this manner the shallow grooves will be substantially obliterated in the mortar grooves. Obviously the furrows 16 may be of other shapes and extent than that illustrated and it will be understood that the configurations 12 produced may be any desired. It will also be understood that the facial configurations 12 may be produced in one ply of the base 10 where the same is constituted of a plurality of preformed layers of fiber material bonded together.

In order to provide for suitable weather joints between adjacent boards when the same are applied to a weather surface, the edges of the base members are formed with suitable lips and rabbeted portions to provide co-operating tongue and groove portions. Preferably, each base 10 will be provided at its lower edge face with a V-shaped recess 20 creating projecting front and rear shoulders or lips 22 and 24, respectively, and the opposite or upper edge face of the base will be formed with a tongue projection 26 substantially complementary in shape to the recess of the opposite edge face and will interlock with such corresponding recess of an adjacent course of units when assembled. It will be understood that the end edge faces of the bases are similarly formed, that is one end edge face has a similar recess 20 and is provided with lips similar to 22 and 24, and the other being formed with a similar projecting tongue 26, so as to provide a vertical interlock between adjacent units in the same course of units. It is preferred that the rear lip 24 project a sufficient distance beyond the front lip 22 to permit accessible fastening of the base to the supporting structure. It will be noted that by this construction fastening of the units may be limited to fasteners such as nails 28 through the projecting lip portions, the interlock between adjacent edges providing suitable holding means for the edges opposite those through which the nails are applied. Buckling due to multiple nailing and face nailing of the units, which is undesirable since it mars the appearance of the finished surface, may thus be overcome. It will also be seen that the tongue 26 is formed at one side by two short intersecting faces 30 and 32, the portion 30 having a width substantially that of the mortar spaces 14 and being distant from the outer faces of the con-

figurations 12 an amount substantially equal to the depth of the depressions 14 this being substantially the width of the face 32. In other words, the portion 30 provides a narrow flat face whose function is to provide a depressed band adjacent the outer face of the base to simulate a depressed joint. Correspondingly the forward or short lip 22 of the recessed edge portion has a thickness at its outer edge substantially equal to the depth of the depressed portions 14 as represented by the width of the face 32.

The base 10 may be rendered waterproof and/or fire resistant by treatment with suitable agents, for instance a silicate, bitumens such as molten asphalt, tar or pitch, but is preferably treated with a synthetic resin composition, for instance a phenol-aldehyde or other synthetic resin composition adapted to produce water insoluble and impervious films such as upon evaporation of suitable solvents combined therewith. The treatment may extend into one or more faces and edges of the base 10 and throughout the base structure and may be carried out by coating, saturating, or impregnating, utilizing steps conventional in the art. The treatment will be particularly effective when the surface fibers of the base have been cut as previously described, the penetration of the coating substance into the base material being more rapid and complete under such conditions and the coating, if a layer, obtaining a vastly improved anchorage over that secured with a base surface that has not been cut in the stated manner.

If the base 10 be of laminated character, one or more plies, preferably the outer plies, may be treated, the inner plies remaining untreated and thus producing a base structure of greater porosity with its advantages of heat and sound insulation and lightness of mass. Treatment of the base may also be confined, if desired to certain sections for example where such areas are to back weather joints. Moreover the base fibers may be rendered water resistant by incorporating a water emulsion of bitumen or synthetic resin with the fibrous pulp suspension prior to forming the same into board form.

Subsequent to the aforesaid treatment the base 10 may, as illustrated in Figures 2, 3 and 4, have applied directly thereto upon the side to be exposed to the weather or upon such additional faces and edges as may be desired, an additional coating layer 34, of waterproof adhesive of any of the substances previously described. Such a coating may, for instance be a coating of a high melting point bitumen. The coating 34 will preferably be applied as to produce a layer of substantially uniform thickness following such projections of the board surface as may exist thereon. The coating may be applied by conventional coating devices, for instance a printing roll conforming to the contour of the board surface, or a layer of coating may be spread over the face of the base to be treated, in an amount to substantially or entirely fill any depressions there existent and thereafter a roll of proper design conforming to the surface configurations be passed thereover while the coating is still plastic to force the excess material from the depressions and other surface portions and to render the thickness of the layer substantially uniform throughout the surface.

The coating 34 will also be preferably surfaced and have partially embedded therein suitable granular material 36, for instance, granules of brick, slate, tile or cement. Where the depth

of the projecting configurations is considerable it is preferred that the edge faces 32 of the figures be likewise surfaced with adhesive coating and granular material. If it be desired to emphasize the effect to be produced the granular material in the face of the projecting portions 12 may be of a contrasting visual effect, i. e. color or size, than the granules in the depressed portions 14. Moreover, the granular material 36 may be secured to the layer 34, if desired, by a synthetic resin coating film.

In order to provide additional rigidity for the board, fire resistance, resistance to warping and a realistic masonry simulation where the same is desired, the granular surfaced base may be coated with one or more layers 38 of argillaceous cement material of which Portland and Oxchloride cements are examples. However, I preferably use an aluminate cement, for instance a high aluminate hydraulic cement composition possessing high strength and bitumen compatibility and which has the many properties described in my Patent No. 2,096,242, granted October 19, 1937.

The cement layer 38 will be applied over the granular surfacing 36 and covers the adhesive layer 34 between the granules. A coating in the order of twenty pounds per hundred square feet of surface will provide considerable rigidity. Obviously coatings of increased thickness, say forty pounds or greater will enhance the rigidity factor to a measurable degree. It will be understood that the coating may be applied in two applications, a base coating of one color being laid down and followed by a second coating which may be of contrasting color; and which may be confined to the surface of the projecting portions 12, if desired, or alternatively to the depressions 14. It is also within the scope of the invention to limit the cement coating application to one or more coats limited to the depressions 14 to enable the obtaining of a realistic mortar simulation not possible with the usual grit surfacing. In this form of construction the brick portions may present other surfacing material, such as the granular surfacing previously mentioned, and which will be of a contrasting color to the cement mortar simulating material.

As illustrated in Figure 4 the coating 38 preferably will be applied such that the furrows 16, if such form a part of the base construction, will not be entirely filled by the coating materials. In other words, the prominence of the raised portions and depressions will be retained. This has the many advantages described in my copending application, Serial No. 86,877, filed June 23, 1936, now Patent 2,250,482, among them the minimizing of surface cracking of the cement layer due to expansion and contraction of the base materials. It will be understood that the cement coating may be of any color and may include any of the extending materials referred to in my said Patent No. 2,096,242, and may be applied as there described, or according to the process presented in the patent to Brady No. 2,156,901.

It will be further noted that the cement coating 38 extends as disclosed in Figures 2, 3 and 4, over the raised portions 12 and their side edge faces 32 and over the depressed faces 30, but does not coat faces 40 and 42 of the tongue 26 or the complementary faces of recesses 20 of the joint portions. It will be understood that the joint portions may be treated with liquid cement, preferably a waterproof cement, to prevent seepage of any moisture beyond the joints when the units are assembled. Extending the cement coating over a

portion of the tongue, as disclosed in Figure 3 will substantially enhance the rigidity of this portion. The same may be said of the lip 22 of the opposite edge of the board where the cement coating will aid in preventing any breakage of this portion.

While I have described the preferred form of my invention it will be understood that the base 10 may have applied to it a thin cap sheet 44 disclosed in Figure 2, which may be a flexible felted fibrous layer of any of the fibrous materials heretofore mentioned and preferably impregnated or saturated with a low melting point asphalt, for example, composite roofing, having a bituminous or resinous layer into which is partially embedded and bonded a layer of individual granules such as of slate, brick, tile, or cement. The sheet 44 will be embossed so that its rear face is pushed out to conform to the configurations of the base 10 and will be secured to the base 10 by a liquid cement which may be the base 10 saturant or a coating of bitumen such as the coating 34. The rear face of the sheet 44 may be perfectly flat where it contacts the projecting portions 12 of the base so that if these latter portions have been formed with the furrows 16 these may, if desired, be retained in the assembly so that closed air spaces 16' are produced as shown in Fig. 5, enhancing the insulation value of the entire assembly of the complete structure. Obviously the surface of the sheet 44 will be preferably coated with one or more of the layers 34, 36 and 38, described with respect to the structure of Figure 3; for example, the face projections may have applied thereto a coating of waterproof adhesive which will be subsequently surfaced and have partially embedded therein crushed granular material. If it is desired to emphasize the effect to be produced, the granular material in the faces of the projecting portions may be of a contrasting visual effect, i. e., color or size than the granules in the depressed portions. It will be understood that the sheet 44 may also be a preformed sheet already containing these additional coating layers.

As noted in Figure 2 the sheet 44 will extend over the raised portions 12 and over the depressed faces 30 so that when the adjacent units are assembled the entire board surface will be covered by sheet material 44.

It will be recognized that since the sheet 44 provides a water barrier for the base member it will in most cases be unnecessary to saturate or even coat the base member 10 with waterproofing materials except perhaps in localized areas such as the rear face and the engaging tongues and grooves.

From a consideration of the foregoing description of my invention, it will be seen that I have produced a novel insulating siding and assembly thereof. It will be understood that the disclosed construction may be made in many forms, that is in large or small boards and present as many configurations as may be desired. Also that in illustrating the forms of construction the relative size of the parts have necessarily been somewhat exaggerated. It will further be understood that many changes in the exemplified constructions will suggest themselves to those skilled in the art without departing from the scope and spirit of my invention. Accordingly I desire my invention to be construed as including all equivalents and as broadly as the scope of the following claims may allow.

I claim:

1. As an article of manufacture, a weather exposable insulation unit comprising a relatively stiff base of cellular fiber board material, a plurality of depressed areas in said material on a face of said base and defining raised configurations, and a plurality of spaced furrows of no greater depth than said depressed areas in said material of said raised configurations.

2. As an article of manufacture, a weather exposable insulation unit comprising a relatively stiff base of cellular fiber board material, a plurality of grooves in said material on a face of said base and defining masonry configurations in relief, a plurality of narrow furrows separated by narrow ribs on said configurations, and a rigidifying coating extending over said grooves, ribs and configurations and conforming to the surface contour thereof.

3. As an article of manufacture a weather exposable insulation unit comprising a relatively stiff base of cellular fiber board material, a plurality of depressions in said material on a face of said base, defining spaced masonry configurations in relief, a plurality of closely related furrows in said material of said configurations and defining shallow ribs, a coating of waterproofing material extending over said configurations and depressions, said coating being of a substantially uniform thickness and maintaining the visual prominence of said configurations and said ribs thereon, and a layer comprising hydraulic cement over said coating and anchored thereto, and of such thickness as to also maintain the visual prominence of said base configurations and ribs.

4. As an article of manufacture a weather exposable insulation unit comprising a relatively stiff base of cellular fiber board material, a plurality of depressions in said material on a face of said base, defining raised masonry configurations, a water resistant fibrous cap sheet bonded to said base and shaped to conform to said base depressions and configurations, and a weather resistant rigidifying coating over said cap sheet and extending over the depressions and configurations thereof while maintaining the visual prominence thereof.

5. As an article of manufacture, a surface covering unit comprising a relatively stiff base of fiber board insulation material, a plurality of furrows extending in said material across one face of said base, and a cap sheet secured to said furrowed face and forming enclosed air cells defined by said furrows and the adjacent face of said cap sheet.

6. As an article of manufacture a surface covering unit comprising a relatively stiff base of fibrous insulation material, a plurality of depressions in a face of said base defining raised masonry configurations, a plurality of spaced shallow furrows in said configured face, and a water resistant cap sheet shaped to conform to said depressions and configurations and forming enclosed air spaces defined by said furrows and the under face of said cap sheet.

7. As an article of manufacture an insulated surface covering unit adapted to simulate masonry blocks separated by mortar joints comprising a relatively stiff rectangular base of fiber insulation board, a plurality of depressions in a face of said base defining raised masonry configura-

tions, certain of said depressions extending along a pair of adjacent edges of said base and forming a projecting edge portion of lesser thickness than the normal section of the base, there being undercut portions extending along the edges opposite said edges having the depressions and forming overhanging lips adapted to overlap portions only of said projecting edge portions of other similar units when assembled so as to leave said depressions exposed, and a coating extending over said configured face of the base from the edges forming said undercut edges to said edges having said depressed portions but extending only over the part of the width of said depressed edge portions forming said depressions to provide a band representative of the mortar joints between configurations of the units.

8. A siding unit comprising a slab of fibrous insulation material having raised facial configurations simulating structural units, an edge face of said slab having front and rear lips forming a locking groove and the rear lip being accessible for fastening means to secure the slab to a support, the opposite edge face of the slab having a projecting tongue to interlock with the groove of an adjacent slab in assembly; the said configurations on the slab having exposed side edges and depressed faces demarking the same when said tongue and groove are interlocked, one of said depressed faces extending adjacent to said tongue and a side edge face of a configuration extending along said front lip; there being a hardened and non-softening rigidifying coating over the faces of said configurations and over said depressed faces and exposed side edges demarking the same.

9. The improvement in the process of coating fiber board material with a waterproofing substance comprising roughening substantially the entire area by cutting furrows in closely adjoining relation across at least one face of said board to produce raised portions and depressions with the depressions presenting open-work surface of cut fiber, to accelerate penetration of coating and improve anchorage thereof.

10. An insulating siding panel of the brick simulating type comprising a base member of substantial thickness and stiffness, a water-proof sheet adhesively secured to said base member, the outside of said sheet being provided with a weather resistant granular surface, narrow portions of said sheet being depressed into preformed grooves in the base member to represent the mortar joints of brickwork, the brick elements of which are represented by the remaining portions of the sheet.

11. An insulating siding panel of the brick simulating type comprising a base member of substantial thickness and stiffness, a water-proof sheet adhesively secured to said base member, the outer side of said sheet being provided with an ornamental surface pattern consisting of brick-simulating areas with narrow mortar-joint-simulating areas exposed therebetween, portions of the sheet underlying mortar-joint-simulating areas of said surface pattern being depressed into preformed grooves in the base member so that all of the brick-simulating areas are thereby brought into greater relief than would otherwise be the case.

NORMAN P. HARSHBERGER.