Jan. 21, 1969 G. C. HARRISON 3,422,589

CONSTRUCTION OF LAPPED PANELS HAVING FLEXIBLE EDGE PORTIONS

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FIG. 1

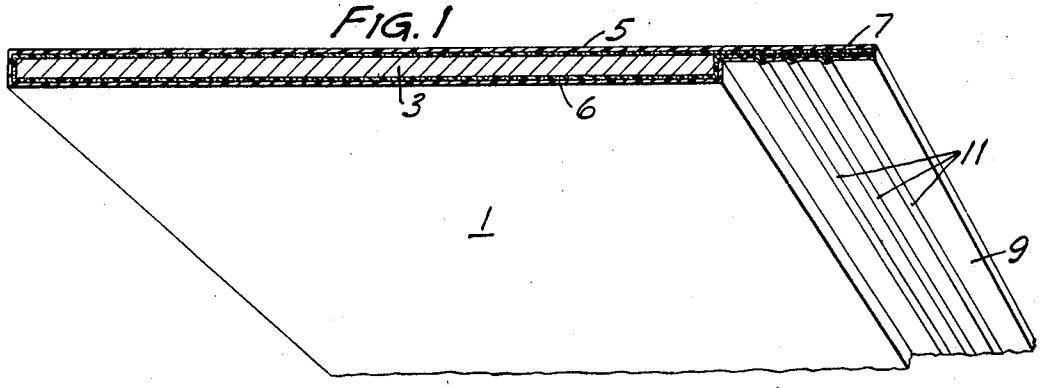


FIG. 2

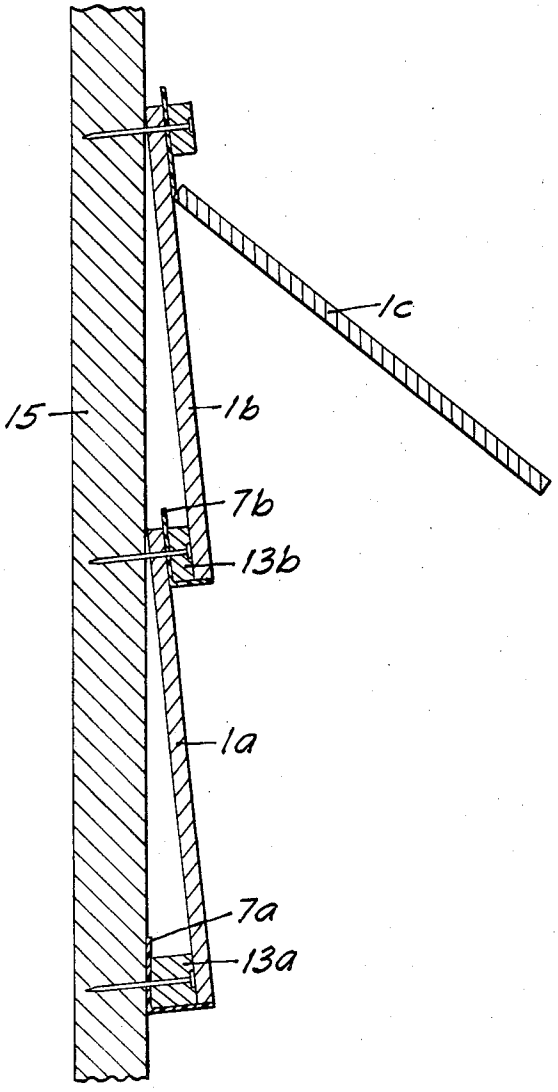
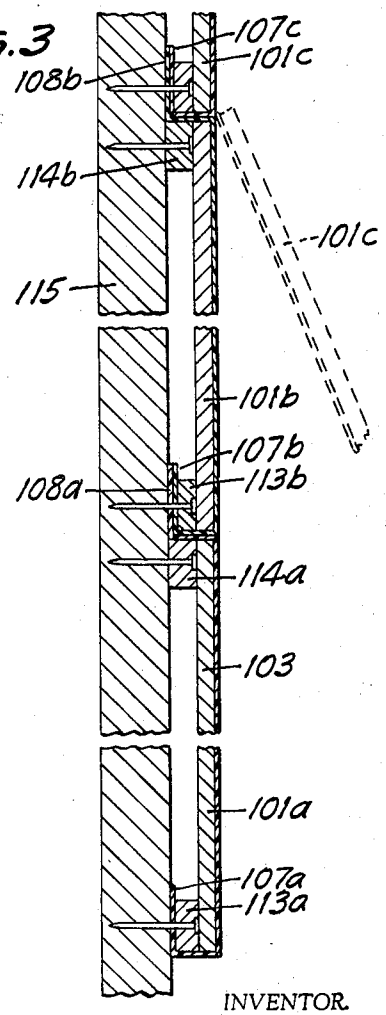


FIG. 3



INVENTOR.
GEORGE C. HARRISON
BY
Carpenter, Kinney & Coulter
ATTORNEYS

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George C. Harrison, Roseville, Minn., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn., a corporation of Delaware

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ABSTRACT OF THE DISCLOSURE

Structural surfaces formed from a plurality of panels composed of backing strip and polymeric sheet bonded thereto with flap of said polymeric sheet overextending entire edge of panel, adapted to be assembled into surface with nails or other fastening means concealed by driving nail through spacer strip, then through flap into substrate, and folding panel over so that flap just covers spacer strip and edge of panel, each successive panel secured in similar fashion.

This invention relates to panels adapted to be formed into structural surfaces, methods of securing such panels to supporting structures and to structural surfaces so produced.

Various substitutes for conventional wood siding have been used in the building trades, often for the purpose of reducing the amount of care or refinishing necessary to the maintenance of the structure.

The present invention provides a novel construction which utilizes a plurality of panels having a tenaciously adhered surface layer of durable polymeric film over a rigid backing, which readily can be applied in such a manner that the nails or other fastening means are not visible. The panels of the present invention can be adapted to form either overlap siding, generally applied with the length of the individual panels positioned horizontally, or edge-abutting siding or paneling, generally applied with the length of the panels positioned vertically. The fastening means are, in either case, fully covered. The exposed faces of the panels present unbroken surfaces to the elements to form constructions which can withstand weathering in exterior use and normal cleaning in interior use. Further objects and advantages of the invention will be apparent from the detailed description and drawings wherein:

FIGURE 1 is a broken-away perspective view of a panel of the present invention with an end thereof in cross section;

FIGURE 2 is a cross-sectional side view of panels of the present invention being applied to a supporting structure in accordance with one embodiment of the invention; and

FIGURE 3 is a cross-sectional top view of a further embodiment of the invention.

Referring more particularly to the drawings, there is seen in FIGURE 1 a panel **1** comprising a rigid backing strip **3** having laminated to the sides thereof flexible polymeric film sheets **5** and **6**. The polymeric film sheets **5** and **6** extend beyond at least one edge of the backing strip **3** to form a flap **7**. For convenience of application, flap **7** may have a coating of pressure sensitive adhesive **9** on one surface thereof and lines **11** may be impressed thereon to assist the user in applying a spacer strip when using the panel.

A plurality of panels may be assembled as shown in FIGURE 2 to form a structural surface. In forming the overlap type siding shown in FIGURE 2, the lowermost panel **1***a* is first applied by nailing a spacer strip **13***a* and

flap **7***a* to a supporting structure **15** as shown. The free end of the panel is then folded upwardly over the spacer strip, and the next panel, **1***b*, is positioned so that spacer strip **13***b* and flap **7***b* overlie the upper edge of panel **1***a* and the assembly is nailed into position as shown in FIGURE 2. The procedure is repeated using panel **1***c*, etc., until the top of the surface to be covered is reached.

To form edge-abutting paneling as shown in FIGURE 3, somewhat modified panels **101** are provided having flaps of polymeric film projecting from each side of backing strips **103**, i.e., a flap **108** is provided opposite flap **107**. These panels are then applied by using a spacer strip at each edge as shown. A spacer strip **113***a* is first applied over flap **107***a* and nailed to a supporting structure **115** as shown in FIGURE 3. A second spacer strip **114***a* is then nailed into position beneath the opposite edge of panel **101***a* and the procedure is repeated by nailing spacer strip **113***b* and flap **107***b* over flap **108***a* and folding panel **101***b* over the strip **113***b* as shown. The process is then repeated using panel **101***c*, etc., until the entire desired surface area is covered.

The panels of the present invention may be constructed from a variety of materials, for example, backing strips **3** or **103** may be wood, plywood, hard board, flakeboard, or other lignocellulosic material, or rigid plastic material, either solid or cellular. In making the overlap siding of FIGURE 2 the backing strip **3** should be of a nail penetrable material. This is not necessary, however, in the embodiment of FIGURE 3.

The flexible polymeric film sheets used for surfacing the panels of this invention may also be formed from a variety of materials such as polyvinyl chloride, polythylene terephthalate, polypropylene, and various other polymers depending on the severity of the environment to which the panels are intended to be subjected. A very weather resistant yet economical combination of materials comprises polyvinyl chloride film overlaid with polyvinyl fluoride. The film may be reinforced by laminating a non-woven fabric web thereto before application to the backing strips. It will be apparent that a variety of decorative finishes can be provided by printing and/or embossing the film. Panel **1** is shown in FIGURE 1 to be overlaid on both sides with polymeric film sheets **5** and **6**. This construction is preferred for panels intended for exterior use in order to minimize moisture absorption by the backing strip, particularly where the latter is formed from a lignocellulosic material. It will be understood that in many cases only the exposed visible surface of the panel need be so overlaid, for example in the case of paneling intended for interior use or exterior paneling in which the backing strip is made from nonmoisture-absorbing material such as foamed polystyrene or the like.

It is essential that the polymeric film be permanently and tenaciously bonded to the backing strip, particularly in the case of panels intended for exterior use. Therefore, high bond strength adhesives such as polyurethanes are preferred. A particularly suitable combination of materials involves the use of a lignocellulosic board such as wood or chip board and film **5** of a polyvinyl chloride modified by the addition of material such as a polyvinyl alcohol to contain hydroxyl groups in the polymer chain, with a catalyzed "one shot" polyurethane composition containing a slight excess of isocyanate groups being used as the bonding material. Suitable polyurethane compositions are disclosed, for example, in U.S. Patent 3,201,136 to Harrison et al., issued Aug. 17, 1965, and are two-part systems in which the two parts are mixed to initiate the reaction shortly before use. Part "A" comprises a hydroxyl-containing material preferably a polyalkyleneether glycol and/or more functional polyol such as a triol to provide crosslinking in the product. This part "A" may

also contain an amine such as 4,4'-methylene bis(2-chloroaniline). Part "B" contains an organic diisocyanate, for example, toluene diisocyanate, and, if desired, a small proportion of the polyol to assist in mixing. Parts "A" and "B" are mixed to provide a slight excess of diisocyanate which appears to chemically react with the hydroxyl groups in the adjacent surface portions of the film and the lignocellulosic backing strip thereby forming a strong tenacious bond. A catalyst for the hydroxyl-isocyanate reaction is added, generally to part "A," to cause the reaction to proceed rapidly at ambient temperatures. An example of a suitable two-part polyurethane formulation is as follows:

Part A

	Parts by weight
Polypropylene ether glycol (2000 M.W.)	322.0
4,4'-methylene bis(2-chloroaniline)	42.0
Catalyst (usually an organo-metallic compound or metal organic salt or mixture thereof)	2.4
Fillers, preservatives, and other additives	33.6

Part B

	Parts by weight
Toluene diisocyanate	62.3
Polypropylene ether glycol (400 M.W.)	31.4
Polypropylene ether triol (400 M.W.)	6.3

It will be apparent to those skilled in the art that other adhesives, for example, rubber-phenolic compositions can be substituted for the preferred polyurethanes.

As shown in the drawings, the spacer strips **13** are considerably narrower than the backing strips **3** and are positioned so that the edges of strips **3** and **13** are substantially parallel. The distance between the edges of strips **3** and **13** should be approximately equal to their combined thickness so that the flap when the panel is folded over will neatly fit over the edges of the panels. Strips **13** may conveniently be formed from wood or other suitable rigid nail-penetrable material. In case of overlap siding, the apparent thickness of the panels can be varied using spacer strips of different thicknesses.

It will be apparent from an inspection of the drawings that a further advantage of the constructions of the present invention is that the assembled panels can undergo considerable expansion and contraction due, for example, to fluctuations in temperature and humidity without damage. This is possible because the flexible polymeric film is free to stretch to permit considerable sliding of the backing strips **3** or **103**.

What is claimed is:

1. A construction panel adapted to be used together with a plurality of similar panels to form a visible structural surface in which the fastening means are concealed comprising a first rigid backing strip having laminated to at least one broad surface thereof a continuous flexible organic polymeric sheet of polyvinyl chloride film, said sheet extending beyond a lateral edge of said first strip a distance sufficient to form a flap of sufficient dimensions to be folded over the edge of said first strip and a spacer strip positioned under said edge when assembled into a structural surface, and to be further folded under said spacer strip, said polyvinyl chloride film and said first backing strip containing free hydroxyl groups, said film being bonded to said backing strip by means of an elastomeric polyurethane bonding material, said polyurethane material being chemically reacted with hydroxyl groups in the surface portions of the materials comprising said film and said backing strip.

2. A panel according to claim **1** wherein said sheet also extends beyond the opposite lateral edge of said first strip a similar distance.

3. A structural surface in which the fastening means are concealed comprising a plurality of parallel panels, each of which has a first rigid strip having laminated to at least one broad surface thereof a continuous flexible organic polymeric sheet, said sheet extending beyond both lateral edges of said strip to form first and second flaps, each of said flaps being of sufficient dimensions to be folded over the edge of said first strip and a spacer strip positioned thereunder and to be further folded under said spacer strip, the panels being assembled into said surface with said flaps being folded over the edges of said strip, relatively narrow spacer strips being positioned under said panels, the edges of said spacer strips being parallel with the edges of said first strips, said one of the flaps of said polymeric sheet on each panel being further folded over the edge of said spacer strip and under the surface of the spacer strip furthest from said first strip, a fastening means securing said spacer strip and the portion of the flap contacting said spacer strip to a supporting structure, the edge of an adjacent panel being secured in similar fashion, the fastening means passing through the spacer strip of said adjacent panel passing through the second flap of said first mentioned panel and through the first flap of said adjacent panel.

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HENRY C. SUTHERLAND, *Primary Examiner.*

CHARLES G. MUELLER, *Assistant Examiner.*

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