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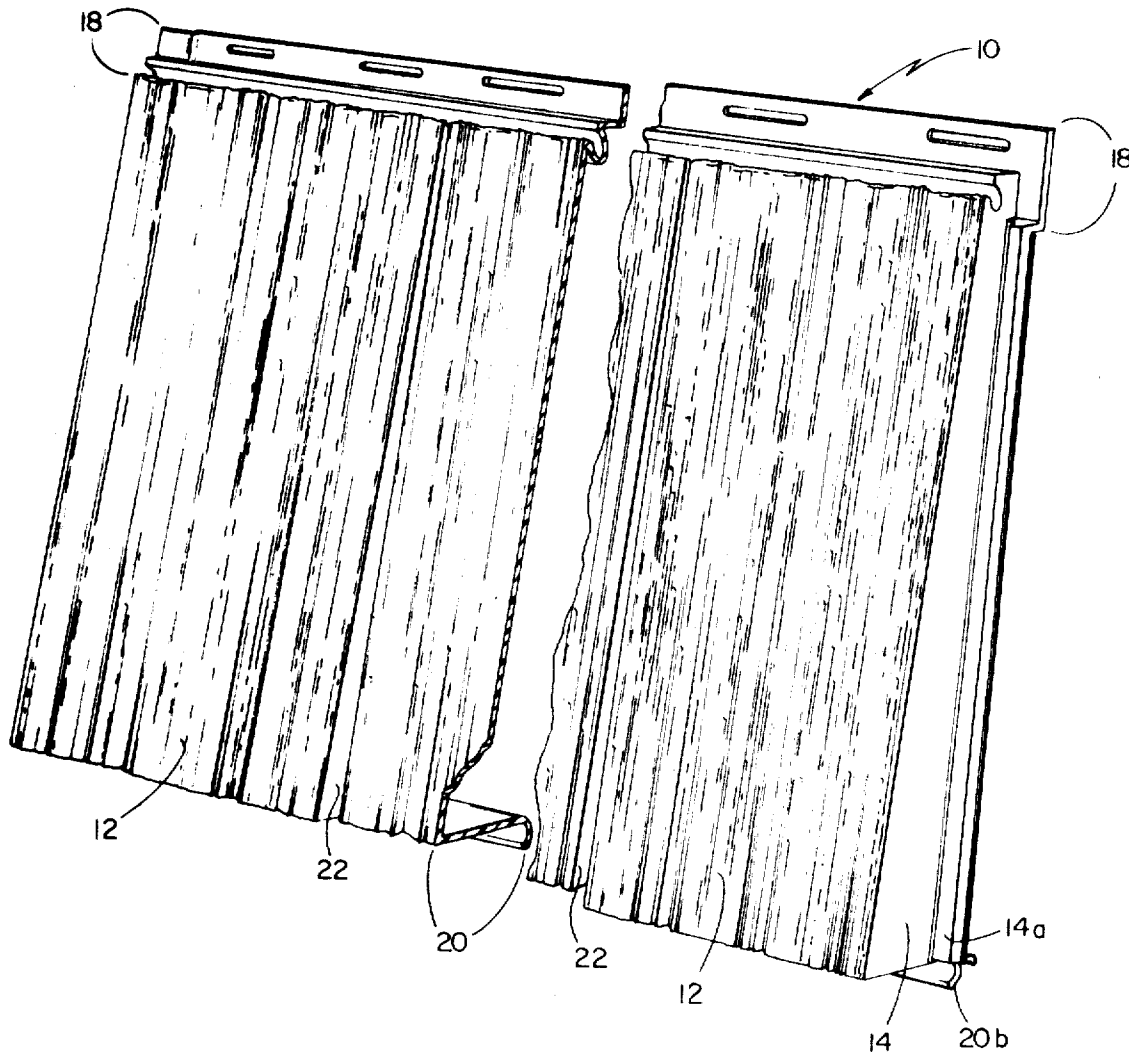
[54] **MOLDED PLASTIC SIDING UNITS**  
 3 Claims, 13 Drawing Figs.

[52] U.S. Cl. .... 52/313,  
 52/531, 52/555  
 [51] Int. Cl. .... B44f 9/02  
 [50] Field of Search ..... 52/555,  
 529—531, 313, 521, 316, 558, 518, 554, 535, 588

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**ABSTRACT:** Generally rectangular, hollow-open-backed, ornamental wood-simulating siding units of molded rigid plastic material, for weather-protective exterior application in overlapping horizontal courses to houses, etc., the preferred novel forms of said units being characterized by wood-grain-replica decorative indentations of wood shake shingles with the edge portions of the rectangular units being formed and adapted to overlap and interlock with other like units, of the same and adjacent courses, to prevent ingress of rain and wind-lifting of the offset weather-exposed butts thereof.



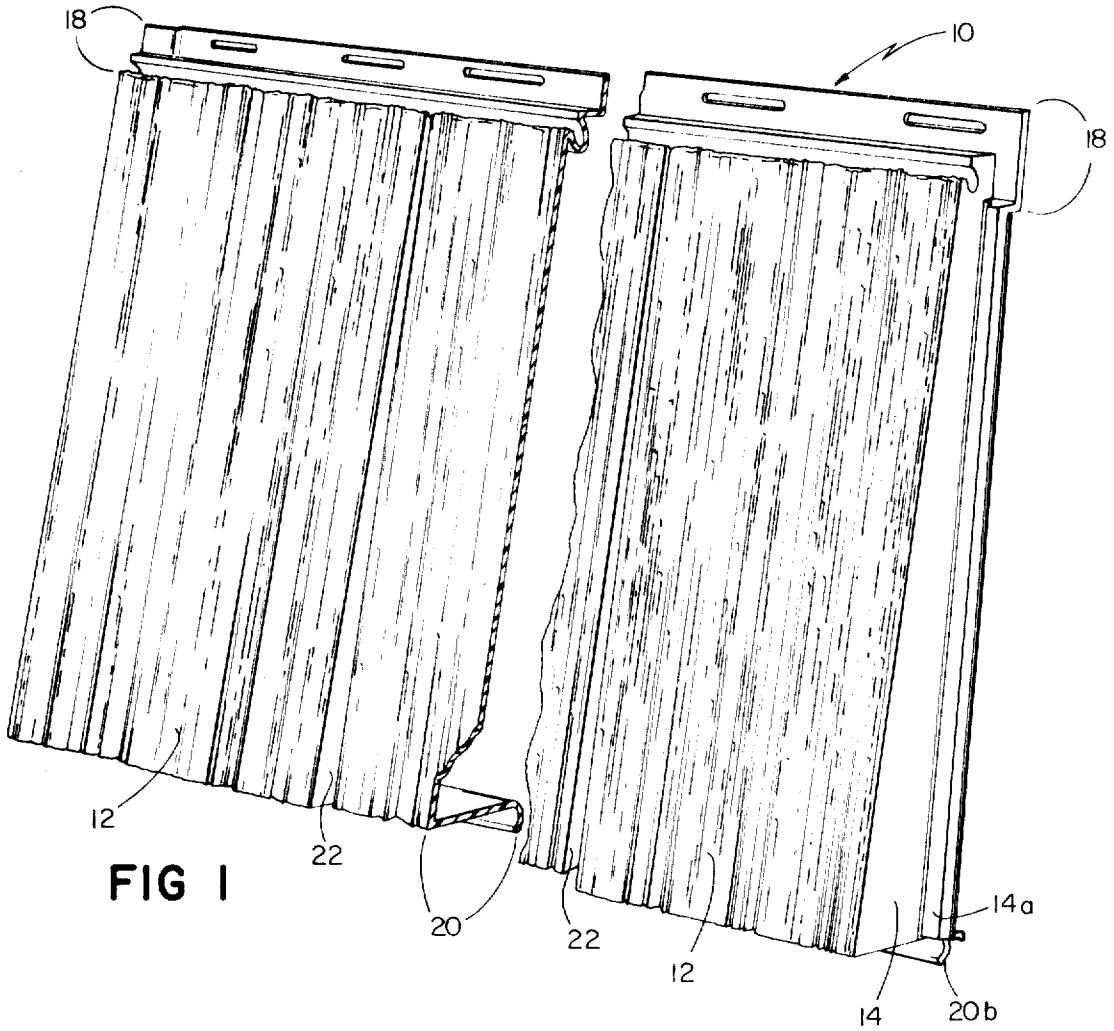


FIG 1

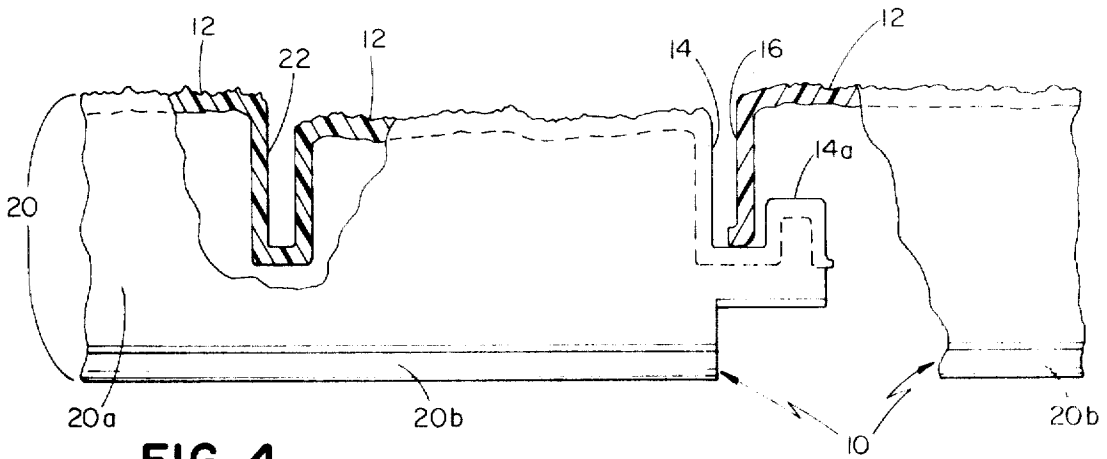


FIG 4

FIG 3

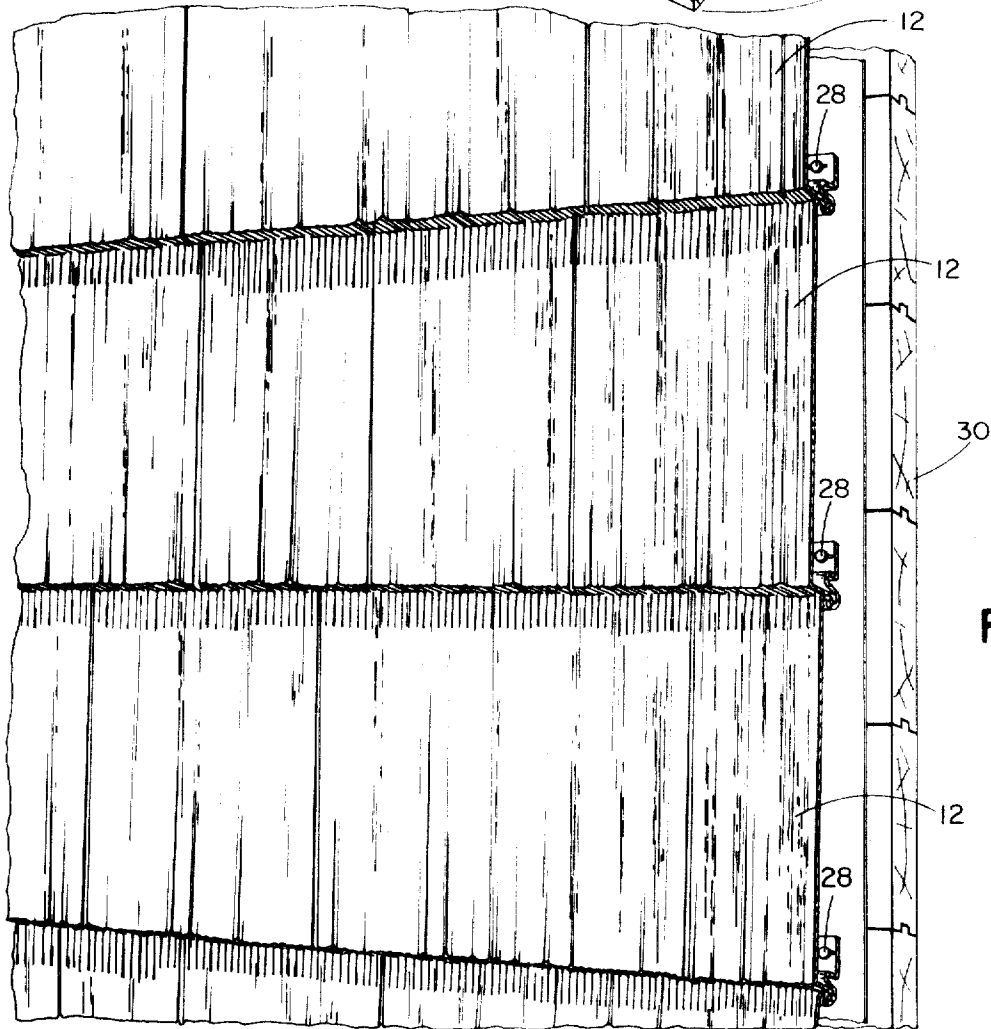
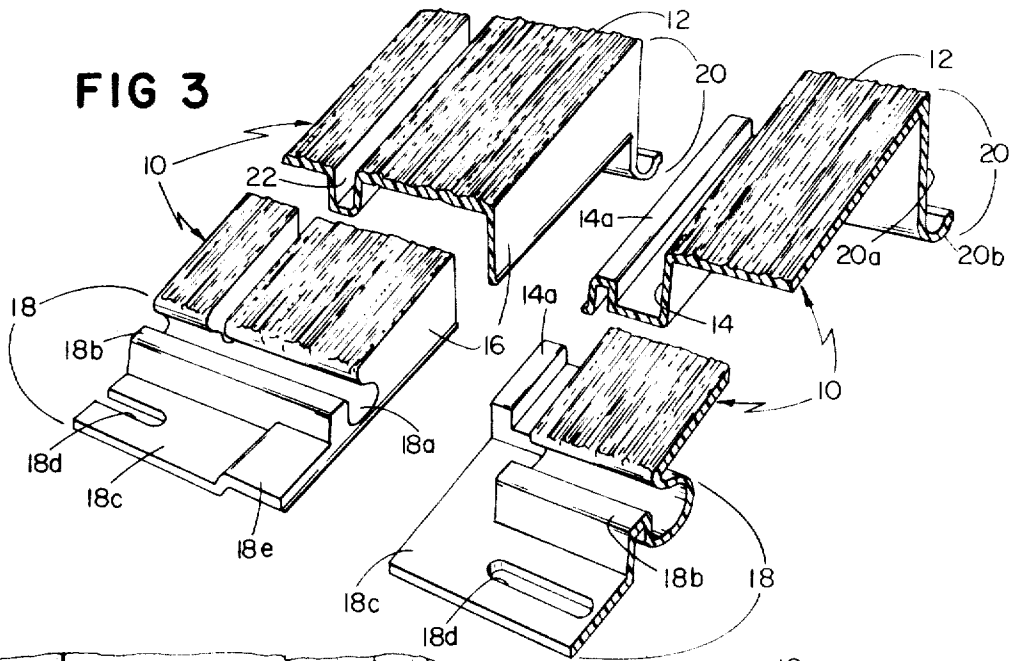


FIG 2

FIG 7

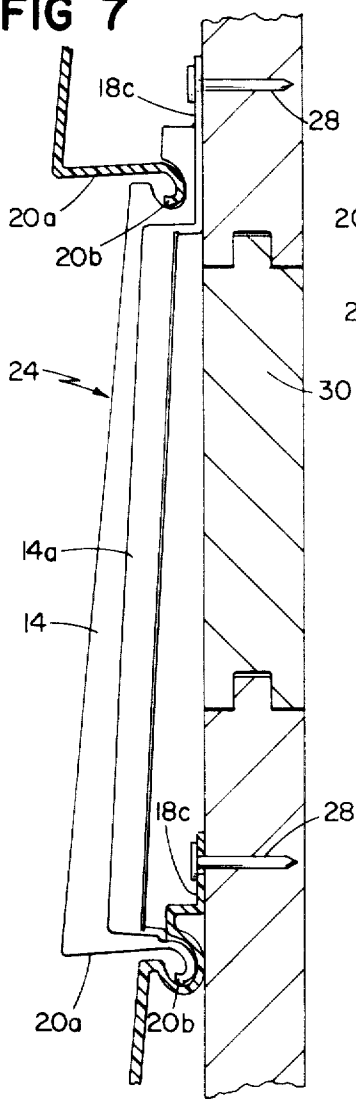


FIG 7a

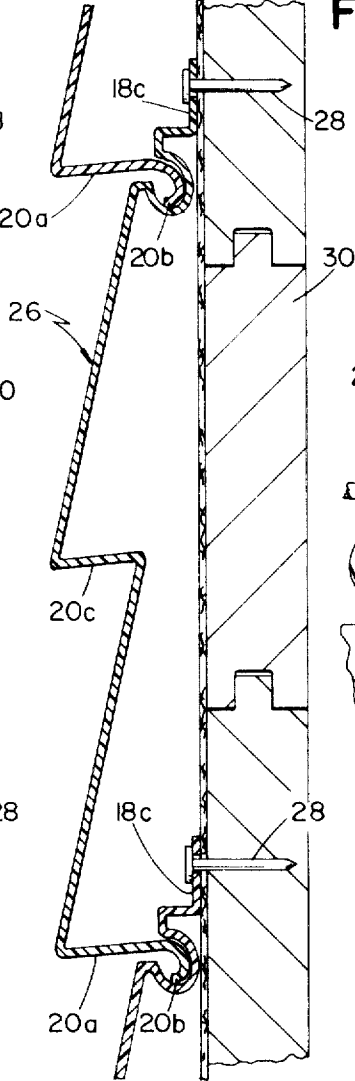


FIG 6

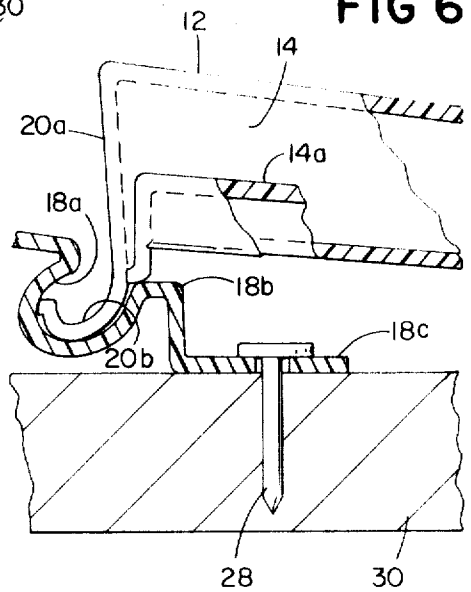
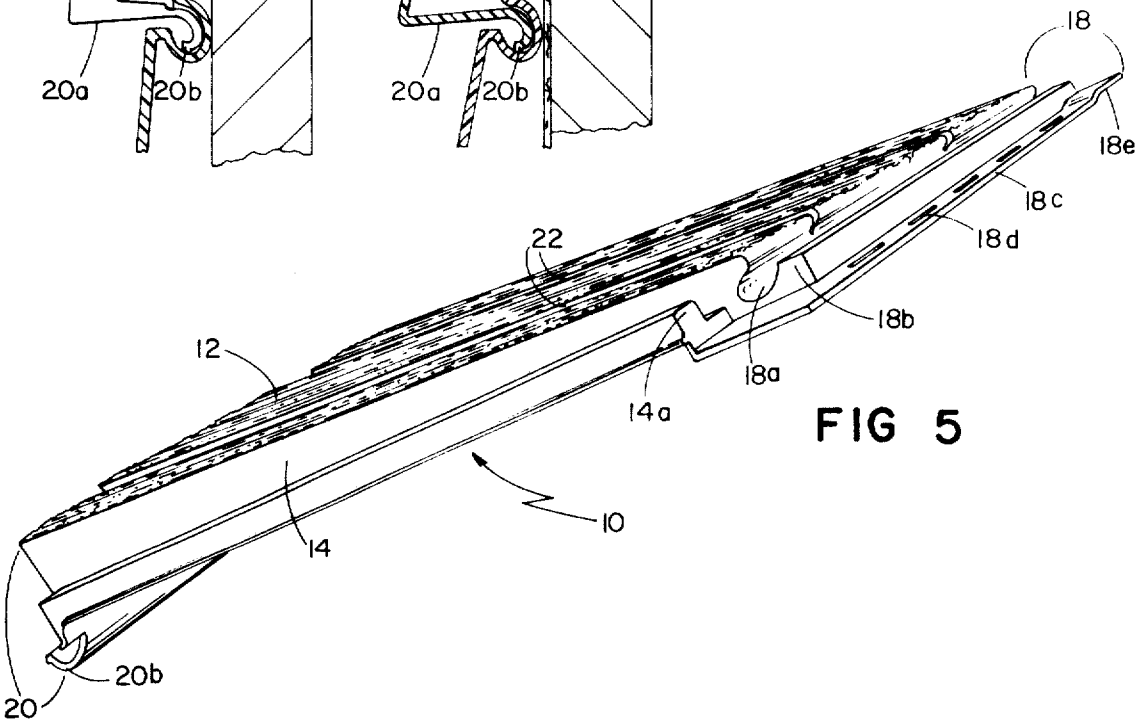
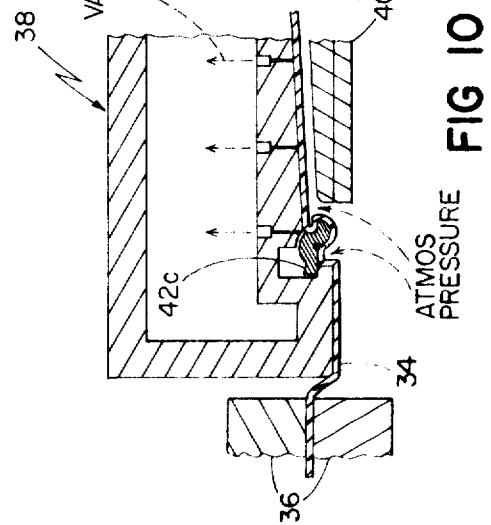
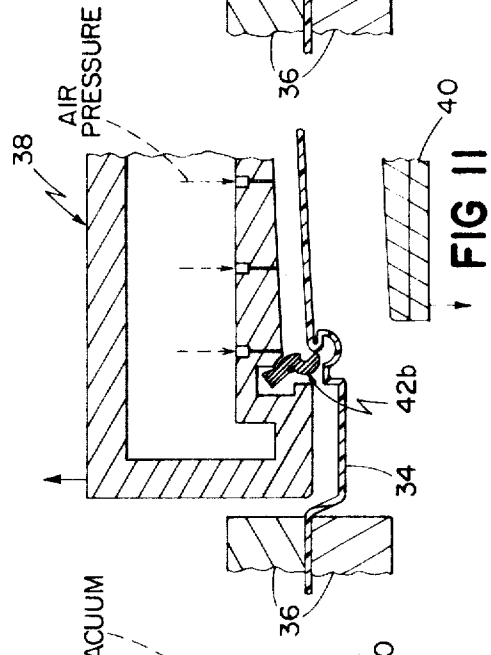
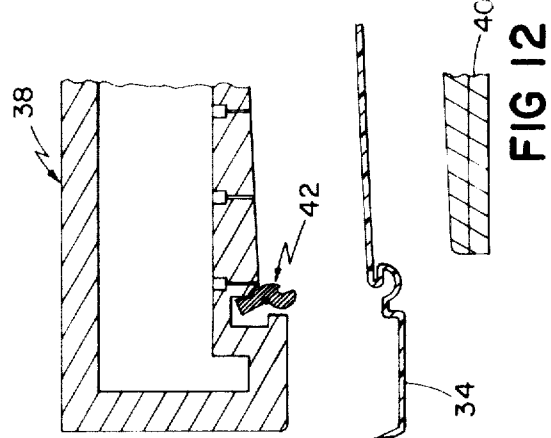
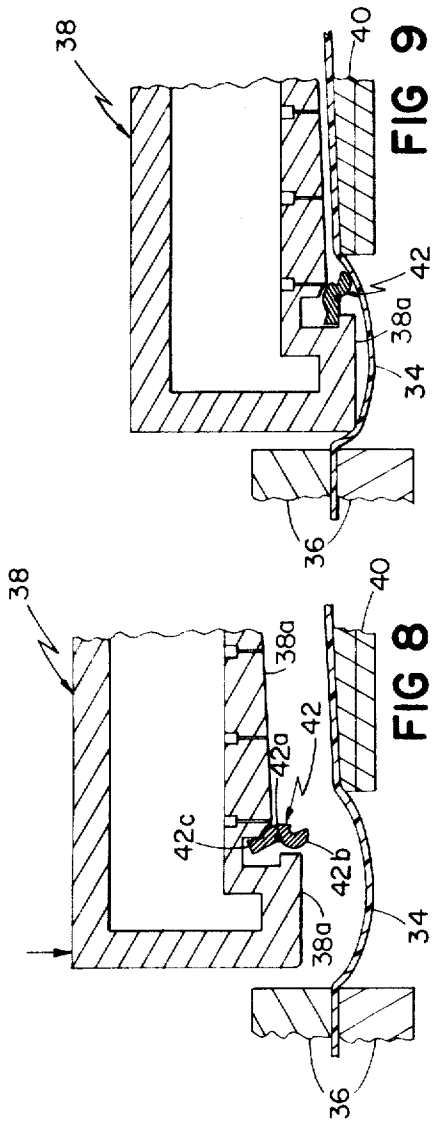


FIG 5





### MOLDED PLASTIC SIDING UNITS

This invention relates to novel unitary molded rigid plastic siding units adapted to be laid in overlapping courses with similar units to provide a weather-protective ornamental exterior siding for houses and various other buildings. The invention also relates to novel molding apparatus for vacuum molding from thermoplastic preheated sheet materials of various articles and, specifically, for directly molding and substantially completely forming such siding units, ready for application, from preheated sheet plastic material.

Heretofore, plastic materials such as rigid vinyls have been formed by extrusion methods to provide simulated wooden clapboard units for home exteriors (for example as in U.S. Pat. No. 3,304,676), but such methods necessarily result in products of uniform extruded cross section with resultant inherent limitations in form to which the individual hollow-backed vacuum molded units of this invention are not subject. Thus, the rigid, self-supporting, decorative plastic siding units of this invention may be completely formed by molding sheet material of uniform thickness to provide highly desirable interlocking and superior weather-resistant connections with adjacent similar units of the same and adjacent courses that prevent ingress of rain and also prevent wind-lifting of the offset weather-exposed butts thereof. The invention, in one preferred form, as shown and described herein, provides, for example, hollow-backed molded siding units closely simulating the vertical striated wood grain appearance (by difference in relief) of wooden shingles (sawed or split) in surface characteristics and appearance. Also, alternatively, the molded units may simulate one or more wooden clapboards (painted or natural), either plain surface or horizontal wood grain simulating, as may be preferred. In either case, the hereinafter-described novel units are so formed as to be readily and rapidly placed and affixed, as by nailing in proper assembled interlocking position so as to provide weather resistance and an attractive decorative synthetic moldable uniform appearance for home exteriors. Any suitable thermoplastic material may be employed, rigid vinyls are presently preferred, and any such plastics (whether vinyls, polyethylene, polyvinyl fluoride, acrylic resins, acrylonitrile, butadiene styrene, or heat-laminated combinations of the same to utilize the best properties of each plastic), may commonly include pigments, white, black, or colored, as may be desired, uniformly extending throughout the thickness of the units, or at least a surface weather-exposed lamination thereof.

The invention also relates to novel molding apparatus for directly forming hollow-backed siding units from preheated sheet plastic material, which is desirable because of (1) less complication and expense involved and (2) a laminated sheet may be employed permitting the use of a thin top layer bonded to a heavier base layer of plastic. In this way, for example, with an acrylic resin top or weather-exposed layer, better color fade resistance may be obtained.

In the drawings, illustrating preferred forms of the siding units and apparatus for making the same:

FIG. 1 is a perspective view of a molded wood grain shake siding unit (with a central portion broken away);

FIG. 2 is an isometric view of an outside portion of a building wall including overlapping courses of the units of FIG. 1 attached thereto, with vertical edges broken away;

FIG. 3 is an isometric view of portions of two adjacent units with opposing "tongue and groove" side edge portions separated (exploded) to better show their means for overlapping (after assembly) to prevent ingress of rain therebetween;

FIG. 4 is a vertical elevation (partly broken away) of the butts of two adjacent units with their opposing side edge portions overlapped and assembled in place, also showing (on the left) a molded vertical groove in one of such units;

FIG. 5 is a different perspective view of the molded unit of FIG. 1 looking towards one side edge portion and the top edge portion, showing a reentrant locking recess therein;

FIG. 6 is a detail, partly in elevation and partly in cross section, showing (on the right) the bottom edge portion of a unit of one course interlocking in the reentrant recess of the top portion of a unit of a next lower course, the latter being nailed in place on the wooden sheathing of a residence;

FIGS. 7 and 7a show unit modifications to simulate wooden clapboard siding, with Fig. 7 presenting (in elevation) the appearance and form of one wide clapboard, and FIG. 7a presenting (in cross section) the appearance and form of two narrow clapboards per unit, with the complete central unit in each case being interlocked above and below with similar units of adjacent upper and lower courses; and

FIGS. 8—12 show a series of diagrammatic vertical cross-sectional views illustrating successive portions and details of the apparatus of the invention for directly and completely molding, from preheated plastic sheet material of uniform thickness, units with the reentrant locking recess as in the molded plastic siding units of the previous figures of the drawings.

Referring to the drawings in which the figures show, particularly FIGS. 1—6 thereof, the preferred wood-simulating molded plastic shake siding unit of the invention there shown, generally designated 10, includes a weather-exposed main panel portion (or portions) 12, tapered side edge portions 14 and 16, top edge portion 18, and thick-butt bottom edge portion 20, with each of said four edge portions, by reason of their rearward molded depth and respective conformations, provide a stiffening and reinforcing formation for the panel portions of the units (without undue expense of employing a thicker plastic sheet), as is also true of the stiffening channels 22 providing grooves separating the exposed main panel portions 12 of a given unit. Alternatively, if desired, stiffening ribs may be formed on the back side of the panels by slightly grooving the sheet-contacting surface of the plug-assist molding member. Thus, the entire perimeter of the unit 10 as well as its body made up of panel portions 12 may be strengthened and made more rigid so as to better resist mechanical strain and impact incident to handling, application, and subsequent use when assembled in place, of the attached units, including expansion and contraction due to temperature, particularly parallel in each course, inasmuch as an individual unit may be, for example, about 11 inches high by 38 inches long. Provision is made for such horizontal temperature expansion and contraction as well as for preventing ingress of rain between side edge portion 16 functioning as a tongue cooperating in the groove formed by wall 14 and rib 14a of the opposing edge portions, of the two units, the tongue being free slidably to expand or contract in said groove, left or right, with and in the direction of the overall horizontal changing (with temperature) length of the units of the same course. Also, the open grooves thus provided, as between 14 and 16 (FIG. 4), when normally assembled (FIG. 4), is of about the same width as that of the randomly spaced grooves formed by molded channels 22 and this construction and assembly is advantageous, serving to enhance the decorative effect, tending to "mask" or render the actual vertical joints visually indistinguishable from the vertical grooves molded in each unit to represent various random widths of individual wooden shingles (FIGS. 1—6).

FIGS. 7 and 7a show modified forms of units designed and formed to simulate the appearance of conventional tapered wooden clapboards (painted or not) applied in horizontal overlapping courses, as employed in residential construction. In said figures, the bottoms of clapboard units are numbered 20a (as were the butts of the shingle units) where the intermediate bottom of the two clapboard unit is numbered 20c, the courses of units being attached, as by nails 28 passing through slots 18e in the nailing flanges, and driven into conventional wooden sheathing 30.

The top and bottom edge portions of all of the siding units, illustrated in the drawings, are alike in that said portions, in addition to reinforcing their respective edges as previously referred to, are formed to provide integral molded means adapted (when assembled and attached in place) to overlap

and cooperate with units of an adjacent horizontal course, to prevent ingress of rain therebetween and also to interlock therewith to prevent any wind-lifting by outward movement of the weather-exposed offset butts of the bottom edge portions of the units, now to be further described.

As collectively shown in FIGS. 1, 3, 5-7 and 7a, the top edge portions 18 of the respective units include a unitary molded open reentrant recess 18a (preferably totaling at least 270°) with spaced parallel edges, said recess terminating the top horizontal edge of main panel portions 12 with the opposite (upper) edge of the recess being formed by the rib 18b (which also serves greatly to stiffen and reinforce the entire top edge portion 18), a nailing flange 18c slotted at 18d to receive nails 28 (preferably not fully driven "home"), and an offset portion 18e formed and adapted, when assembled, to overlap the end of the nailing flange of an adjacent unit.

Also, the reinforcing bottom edge portions 20 of the units include a butt 20a with a locking edge 20b formed and adapted, when inserted and overlappingly assembled by a rolling motion, to interlock in the reentrant recess of an overlapped unit of the adjacent lower course. Any undesirable wind-lifting of the weather-exposed thick butt portion 20a is thus prevented, though it is preferred (to allow for vertical temperature expansion and contraction of the assembled, attached units) that the interlocking mating portions 18a and 20b be so formed and/or with a clearance (see FIG. 6), so as to permit a slight vertical sliding movement either up or down of, say, about one thirty-second inch.

The preferred novel apparatus of the invention and the successive steps in the use thereof in vacuum molding, from preheated sheet plastic material of uniform thickness, the preferred siding units of the invention as above described, will appear from the drawings of FIGS. 8-12, 12, illustrating the successive positions of the apparatus in forming articles of the invention, for example, as in FIGS. 1-6.

FIG. 8 illustrates the conventional holding of a preheated plastic sheet 34 (laminated or not) by means of paired sets of sheet clamps 36 (right-hand ones omitted), four sets or portions of which are normally employed around the perimeter of a rectangular portion of the sheet as here, with the preheated sheet horizontally held in position underneath the vacuum pressure female mold 38, about to be vertically moved by conventional means (not shown) relatively to the mold 38 in a direction transverse to the sheet material 34. Also, when a laminated sheet is employed for molding, the layers thereof are solidly heat bonded together (to provide the sheet 34) prior to its engagement by the clamps 36. Normally (though not necessarily), a plug-assist 40 is employed as shown in FIG. 8 and successive figures.

In order to produce the siding unit of the invention, including in its weather-exposed surface the reentrant recess thereof, a novel vacuum pressure molding apparatus was developed which incorporates, wholly within the fixed molding (here uppermost) surfaces 38a of the female mold itself, a sheet-actuated pivoted movable molding means, generally designated 42, for molding said recess. Such means 42, as shown in cross section in FIGS. 8-12, is entirely included and embedded within the innermost (and, in the drawings, uppermost) molding surfaces 38a of the mold 38 itself, and involve a member pivoted at 42a having two molding wings 42b and 42c. The molding wing 42b is lightly biased so as normally to depend downwardly (as in FIGS. 8, 11 and 12) when not engaged by the sheet 34 but, upon relative vertical movement of the female mold and plug-assist members to and from one another cause the heated sheet initially to contact and move the curved exterior molding surface of the wing 42b rotating (counterclockwise) about the pivot point 42a, - the rounded exterior surface of the wing 42b being cammed to rotate and move upwardly by plastic sheet contact as the latter is relatively moved vertically with respect to the female mold (FIG. 9). From the position shown in FIG. 9, the preheated sheet is further moved, and then molded by atmospheric pressure and vacuum, applied via passages through the mold as indicated in

FIG. 10, so as to conform both to the surfaces 38a of the mold and to both wings (42b and 42c) of the movable mold member to produce the shape shown in FIG. 10, specifically showing the forming by element 42 of the complete reentrant recess 18a and hollow rib 18b but, for simplicity, omitting the molding of the tongue-and-groove side edge portions and the bottom edge butt-and-hook portions of the preheated sheet. Following the molding as illustrated in FIG. 10, the female mold and plug-assist are separated so that air pressure (as indicated in FIG. 11) may downwardly remove the molded article (shown fully free in FIG. 12) and with the movable downwardly biased mold member wing 42b returning to its original depending position, as in FIGS. 8 and 12. Though the molding result can be accomplished (depending upon size) in the absence of a plug-assist, it is preferred to employ a vertically movable plug-assist, here shown as tapered because of the desired tapered formation of the side edge portions of the molded unit.

Though the heated and presoftened sheet is described herein as "thermoplastic," as is physically in fact the case during formation of the molded article, it may be constituted of material chemically thermosetting at some late stage of or after molding.

Throughout this application the plastic units have been referred to as "siding" units, but it is contemplated that in some forms and circumstances, they may be employed as roofing elements and the claims are to be construed accordingly.

Having described our invention, we claim:

1. The combination of a plurality of generally rectangular weather-resistant plastic siding units adapted to be affixed to a building with similar units in overlapping horizontal courses with the units of each course lying in closely adjacent edge-to-edge overlapping relation and with them simulate the appearance of overlapping butt-exposed courses of conventional wooden siding elements, each of said units comprising:

an integral hollow-backed self-supporting piece of molded rigid plastic formed from sheet material of uniform thickness presenting a weather-exposed ornamental exterior relatively stiff main panel portion:

reinforcing side edge portions rearwardly extending from said main panel portion of the units with each of said edge portions having means formed to overlap and cooperate respectively with opposing side edge portions of adjacent similar units of the same course to prevent ingress of rain between said side edge portions and their adjacent similar units, said side edge portions including flat parallel rearwardly extending planes generally perpendicular to the plane of said main panel portion but tapering in increasing depth from the tops toward the bottoms of said side edge portions with one side edge portion providing an inwardly extending tongue and the other an outwardly facing groove interlocking with the tongue of a like unit of the same course, said groove being wide enough to limitedly horizontally slidably interlock with the tongue of a like unit of the same course with clearance therebetween to allow for horizontal temperature expansion and contraction of the assembled units,

reinforcing top and bottom edge portions rearwardly extending from said main panel portion of the units with the bottom edge portion providing a substantially plane weather-exposed offset butt at about a right angle to said main panel portion, said top and bottom edge portions having means interlocking with similar units of adjacent horizontal courses above and below to prevent ingress of rain therebetween, with said top edge portion of the units having a downwardly and outwardly directed parallel open reentrant recess with spaced parallel edges, an opposing male rib thereabove facing, and forming a part of, said reentrant recess being formed to retain in interlocked position the terminal bottom edge of a similar unit of an adjacent next higher overlapping course and to prevent wind-lifting of such bottom edge and its adjacent offset butt and a terminal upwardly extending nailing flange above and beyond said recess and rib,

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said bottom edge portion terminating in a downwardly and outwardly directed hook limitedly vertically slidable in the reentrant recess of an adjacent next lower course of said units with clearance therebetween to allow for vertical temperature expansion and contraction of the assembled units.

2. A siding unit as claimed in claim 1 wherein wood-grain indentations run vertically of said main panel portion to simu-

late wood shake siding and are separated into individual appearing shingles by at least one vertical groove formed by opposing parallel surfaces of a vertical U-shaped stiffening rib.

3. A siding unit as claimed in claim 1 wherein wood grain indentations run continuously horizontally of said main panel portion to simulate clapboard siding.

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