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L. G. BONIN ETAL

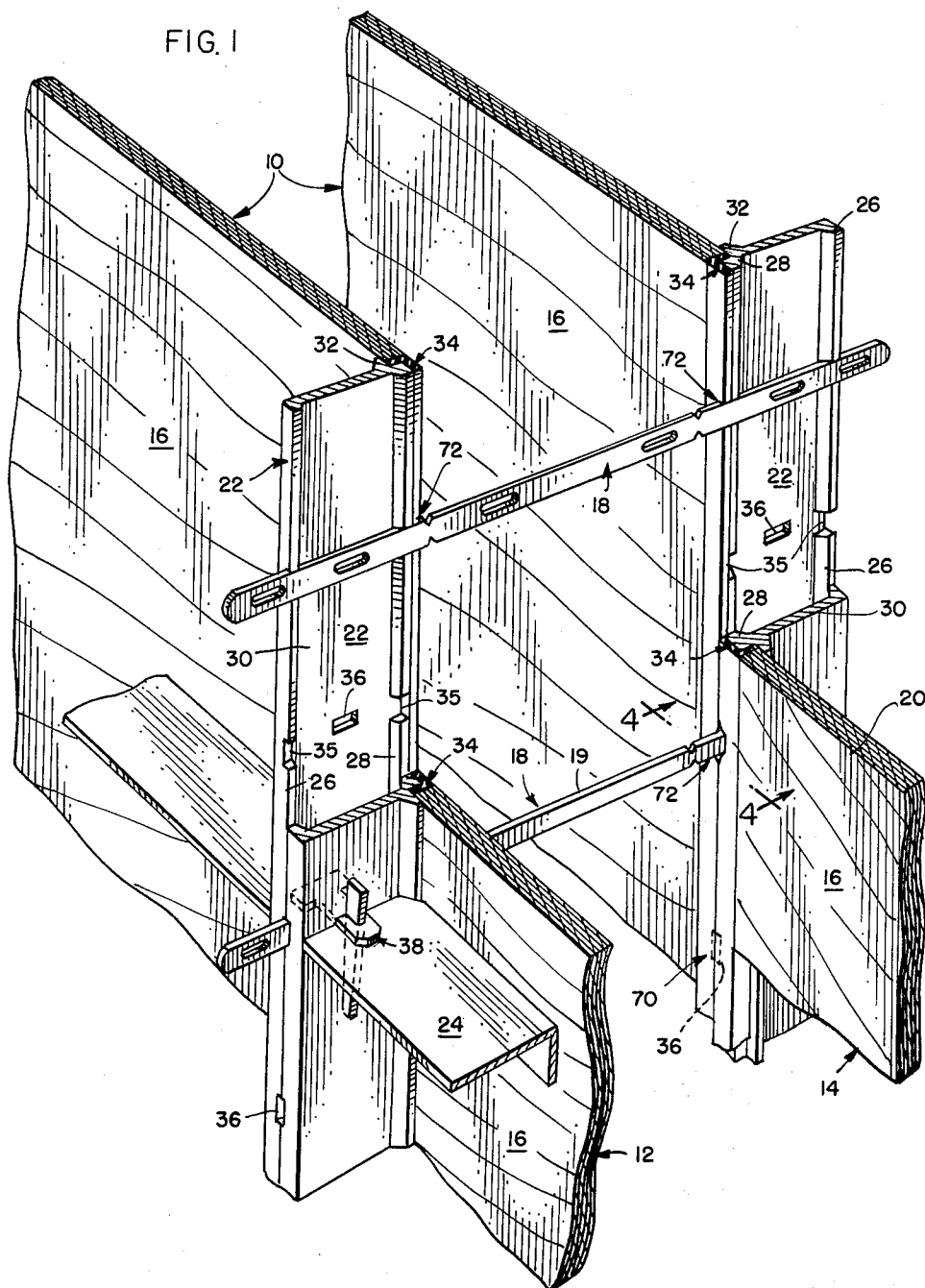
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CONCRETE WALL FORM PANEL WITH OVERSIZED PANEL FACING

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2 Sheets-Sheet 1

FIG. 1



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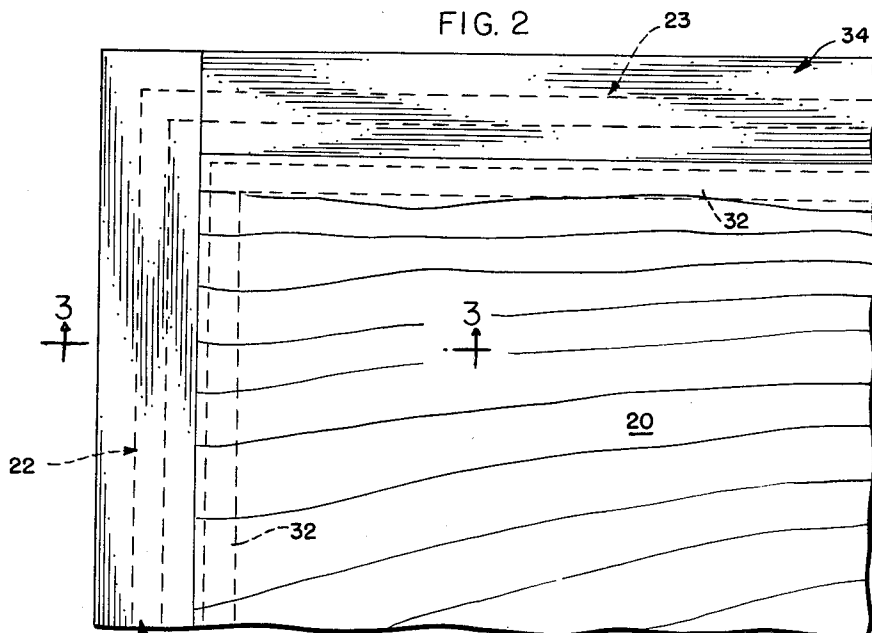
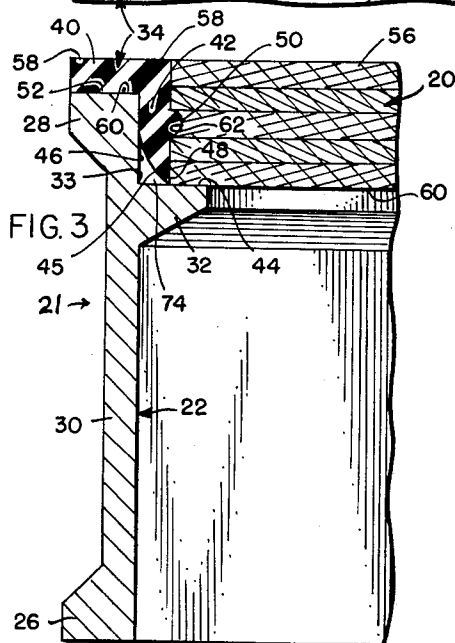
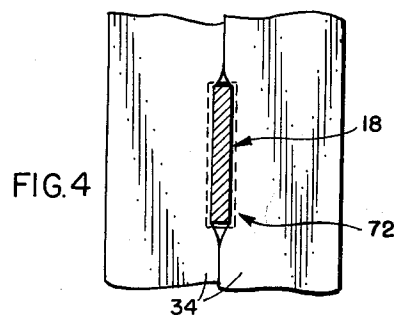
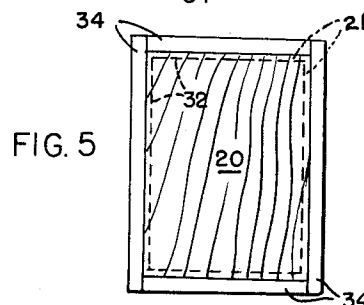
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CONCRETE WALL FORM PANEL WITH OVERSIZED PANEL FACING

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2 Sheets-Sheet 2



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CONCRETE WALL FORM PANEL WITH OVER-SIZED PANEL FACING

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The present invention relates to concrete wall form panels and has particular reference to that type of wall form panel which is commonly known as a "Steel-Ply" panel and consists of a rectangular plywood facing and a marginal reinforcing frame of steel or other metal. Wall form panels of this type are currently manufactured and sold by Symons Mfg. Company, of Des Plaines, Illinois.

"Steel-Ply" panels are capable of being easily set up or erected in edge-to-edge relationship in a concrete wall form installation and their special construction adapts them for use in connection with a wide variety of special concrete wall form hardware such as connecting bolt and wedge devices whereby adjacent panels on one side of the wall form may be connected together in accurate planar alignment; tie rods whereby oppositely disposed panels may be maintained in their proper spaced apart relationship; waler supporting brackets; and gang forming connecting devices whereby multiple panels may conveniently be connected together and the assembly hoisted or otherwise manipulated into place. All such hardware is of a special nature inasmuch as it is designed for use only with "Steel-Ply" panels. When so used, both the hardware and the wall form panels may be reused in a subsequent installation, the tie rods, of course, being excepted since portions thereof remain embedded in the poured concrete.

Heretofore, in connection with "Steel-Ply" wall form panels, considerable difficulty has been encountered in preventing outward bulging of the plywood facings of the panels under the thrust or pressure of the wet poured concrete. The plywood facings are set into marginal recesses in the forward or inside edges of the vertical and horizontal members or bars of the steel frames so that the effective planes of the facings lie flush with the forward edges of the aforementioned bars. Since, as manufactured, the depth of these marginal recesses is one-half inch, it has been considered necessary to employ plywood which is one-half inch in thickness. Plywood of such thinness is susceptible to undesirable outward bulging, as heretofore mentioned, and various means have been devised for minimizing or reducing such bulging. Bulging is somewhat curtailed by the use of intermediate steel crossbars, but due to weight limitations, the number of crossbars which may be employed for any given size of panel is limited. The use of thicker plywood, for example, five-eighths inch plywood, would appear to be an obvious solution to the problem of outward bulging, but to deepen the marginal recesses to accommodate such thicker plywood would be to render obsolete the many thousands of reusable panels now in use. Furthermore, with deeper marginal recesses and stronger or thicker plywood, the tremendous lateral thrust resulting from expansion of the plywood due to normal and usual moisture-absorption would lead to warping of the reinforcing frames as well as of the facings, and possible rupture of either or both. To set the thicker plywood facings in recesses designed to accommodate the thinner half-inch facings would not avoid frame or facing rupture. Furthermore, it would destroy the flush condition which obtains at the forward faces of the panels and would create a pattern of cross grooves in the assembled wall

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form, resulting in cross ridges in the hardened concrete wall.

The present invention is designed to overcome the above-noted limitations that are attendant upon the construction and use of conventional "Steel-Ply" panels utilizing half-inch panel facings, and toward this end, it contemplates the provision of a novel panel utilizing a thicker plywood facing than has heretofore been considered possible from the point of view of either economic or practical considerations, and also contemplates a panel in which provision is made for assimilating lateral expansion of the plywood facing due to moisture-absorption, and for nullifying the effect of forward projection or overhang of the thickness dimension of the facing beyond the forward edges of the vertical and horizontal bars of the steel reinforcing frame.

Accordingly, the invention contemplates the provision in a wall form panel of a novel facing mounting consisting of a series of elastomeric or other resilient strips of moldable or extrudable material, one for each of the four edges of the plywood facing. These strips are of irregular cross-sectional shape, as will be described subsequently. They fit against the forward rim of the rectangular reinforcing frame and also fit within the vertical and horizontal frame bars and extend into the marginal recess which is ordinarily provided for reception of the edges of a standard rectangular plywood facing having a thickness of one-half inch. In effect, the four strips, when in proper position on the reinforcing frame, constitute an adapter to enable the steel reinforcing frame to accommodate a plywood facing of greater thickness than that for which the frame was originally designed, for example, a five-eighths inch thick facing. When in position on the frame, the portions of the strips which fit against the frame rim, as aforesaid, serve as fill-in parts which preserve the continuity of the plane forward face of the panel as a whole, while the portions of the strips which extend into the marginal recess as aforesaid constitute compressible retainers for retaining the plywood facing in position against forward dislodgment and also constitute means for assimilating lateral expansion of the facing under the influence of moisture or for any other reason whatsoever, as well as of insulating the frame from direct contact with the poured concrete and thus inhibit loss of residual heat in the fresh concrete.

The provision of a wall form panel of the character briefly outlined above being among the principal objects of the present invention, it is a further object to provide, in connection with such a panel, an elastomeric or other resilient filler strip arrangement which is designed for the purposes outlined above and is capable of being formed by an extrusion process in a continuous length so that the strip may subsequently be severed into the correct lengths for fitting onto and existing conventional steel reinforcing frame, thereby rendering a conventional "Steel-Ply" panel susceptible to conversion for use with five-eighths inch thickness or other oversized plywood facing.

A further object of the invention is to provide a "Steel-Ply" wall form panel in which the resilient filler strips overlie certain tie rod-receiving dado notches in the vertical and horizontal bars of the frame thus excluding the entrance of concrete into these notches during concrete-pouring and setting operations. During normal procedure in erecting a wall form, certain of these dado notches are unused, while others are employed as clearance notches for passage therethrough of the tie rods which hold the opposed wall form panels of the complete form in their proper spaced-apart relationship. According to the present invention, the filler strips of the present invention completely overlie and block the entrance of concrete into

the unused notches, while in the case of such notches as receive therethrough the tie rods, the resilient filler strips automatically become deformed or displaced so that they closely hug the surfaces of the tie rods and thus prevent the passage of concrete along the rods and into the notches.

Another object of the invention is to provide a concrete wall form panel which is capable of assembly not only at the factory but also in the field in order that conversion of a conventional or standard "Steel-Ply" wall form panel may be effected by a customer without requiring that the panel be shipped back to the factory for the conversion.

With these and other objects in view, which will become more readily apparent as the nature of the invention is better understood, the invention consists in the novel construction, combination and arrangement of parts shown in the accompanying two sheets of drawings.

In these drawings:

FIG. 1 is a fragmentary perspective view, partly in section, of a concrete wall form installation showing a number of the panels embodying the present invention operatively assembled;

FIG. 2 is an enlarged fragmentary front elevational view of one of the panels and showing a corner region thereof;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken substantially along the plane indicated by the line 4—4 of FIG. 1 and in the direction indicated by the arrows; and

FIG. 5 is a reduced front plan view of one of the panels of the present invention.

Referring now to the drawings in detail, a fragmentary portion of a composite concrete wall form of conventional construction has been illustrated therein and designated in its entirety by the reference numeral 10. The wall form 10 is made of two series 12 and 14 of rectangular panels 16 with the panels of each series being arranged in edge-to-edge relationship. The panel units 16 of the two series are maintained in spaced parallel relationship by means of combined spreader and tie rod assemblies 18. Such assemblies include tie rods 19, and two such assemblies are illustrated as being associated with two adjacent panel of each series 12 and 14 in the production of a concrete wall (not shown). It will be understood that the wall will result from the pouring of wet concrete between the two sides of the composite form and the subsequent hardening of such concrete.

The individual panels 16 are of the aforementioned "Steel-Ply" type. They are prefabricated and comprise plywood facings 20 and marginal rectangular steel reinforcing frames 21 around the edge portions of the facings. The frames 21 consist of vertical and horizontal frame bars, only the vertical frame bars 22 being illustrated in FIG. 1. However, one of the horizontal frame bars 23 appears fragmentarily in FIG. 2. At appropriate levels in the form structure, suitable horizontal intermediate crossbars 24 of angle shape design may, if desired, extend across each panel between the opposed vertical frame bars 22.

Specifically, the vertical and horizontal frame bars 22 and 23 are in the form of structural steel members, each of which is generally of shallow U-shape cross section and comprises spaced, marginal, outwardly extending, parallel ribs 26 and 28 and a connecting base or web portion 30. On the side of each web portion 30 that is opposite the ribs 26 and 28, there is a longitudinally and inwardly extending rib 32 which defines an angular recess 33. Where conventional "Steel-Ply" panels are concerned, the angular recesses 33 are designed to receive therein the edge portions of plywood facings having a thickness precisely equal to the depth of the recesses 33 measured horizontally in a direction parallel to the vertical plane of the web portions 30. In the present instance, however, each recess 33 receives a portion of a filler or

adapter strip 34 which constitutes one of the principal features of the present invention and by means of which the associated plywood facing 20 may be held in position with but a limited edge region thereof projecting into the recess, this facing being somewhat thicker than conventional plywood facings and possessing certain advantages over conventional facings, as will be described subsequently.

The ends of the horizontal frame bars 23 and the cross-bars 24 are welded to the inside faces of the vertical frame bars 22, the ribs 26 and 28 are provided with notches 35 to accommodate the tie rods 19 of the tie rod assemblies 18, while the web portions 30 of the bars 22 are formed with rectangular openings 36 in horizontal register with the notches 35 for reception therethrough of conventional connecting bolt and wedge assemblies 38 by means of which adjacent panels are fastened together, all in a manner well-known in the art.

As previously stated, the present invention involves the idea of using in each panel 16 a thicker-than-conventional plywood panel 20, together with the adapter strips 34 by means of which the facing may be set into the marginal recesses 33 and held therein against dislodgment. The adapter strips 34 are something more than merely a means whereby the oversized facing 20 may be adapted for connection to the steel reinforcing frame 21. These strips function not only to retain the facing against dislodgment but also to assimilate longitudinal and transverse expansion of the facing.

Since the steel frame 21 of each panel 16 is comprised of four frame bars, there are four of the filler or adapter strips 34, one for each frame bar 22 or 23, as the case may be. Each of these filler strips 34 is comprised of an elongated length of filler strip stock of irregular but generally angular cross-sectional shape as best seen in FIG. 3. The filler strips 34 are formed of an elastomeric material, such as rubber, either natural or synthetic, a rubber substitute, or any moldable plastic material possessing the required degree of elasticity and compressibility for enabling the strips to perform the functions required of them.

Considering one of the strips 34 as existing in the environment selected for its cross-sectional portrayal as shown in FIG. 3, the strip is generally of L-shape in cross section and includes a flange 40 which directly overlies the inside rib 28 of the associated vertical frame bar 22, and a flange 42 which projects into the recess 33. The flange 40 has a horizontal extent equal to the height of the rib 28 while the flange 42 has a vertical extent slightly less than the depth of the recess 33 measured vertically. The flange 42 thus terminates short of the bottom face 44 of the recess 33. One side of the flange 42 is transversely curved as at 45 and slopes away from the side face 46 of the recess 33, the flange 42 terminating in a feather edge 48. The other side of the flange 42 is formed with a laterally projecting tongue 50 which constitutes the tongue part of a tongue and groove connection which the flange 42 makes with the adjacent edge of the plywood facing 20.

Considering now specific dimensions, a conventional "Steel-Ply" panel is invariably manufactured to accommodate a plywood facing of one-half inch thickness so that the depth of the recesses 33 is one-half inch, thus permitting the outer face of the panel facing to lie flush with the forward rim 52 of the rectangular steel frame 21 when the edge regions of the facings are seated upon the bottom faces 44 of the recesses 33. According to the present invention, the plywood facing 20 is somewhat thicker than the conventional facing. Specifically, it has been found that five-ply plywood having a thickness of five-eighths of an inch is suitable for the purposes intended and, therefore, the flange 40 of each filler strip 34 is constructed to have a thickness of one-eighth of an inch to make up for the difference in panel thicknesses and to allow the outer face 56 of the oversized or thicker

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facing 20 to lie flush with the outer face 58 of the flange 40 when the inner face 60 of the facing is seated upon the bottom face 44 of the recess 33.

The four edges of the plywood facing 20 of each panel are formed with grooves 62 which are designed for reception therein of the tongues 50 on the strips 34.

The filler or adapter strips 34 of each panel are preferably cemented in position on the rim region of the rectangular steel frame 21 and may also be cemented to the edges of the plywood facing 20. Various adhesives have been found suitable for this purpose, one such adhesive being an adhesive which is manufactured by United States Plywood Corporation, of New York, N.Y., and sold under the trade name "Weldwood." Another adhesive which has been found to be capable of effective use for effecting a bond between the filler strips 34 and the adjacent surfaces of the steel reinforcing frame 21 is an adhesive which is manufactured by Goodyear Tire & Rubber Co., of Akron, Ohio, and sold under the trade name "Pliobond."

Referring now to FIG. 1 of the drawings in conjunction with FIGS. 3 and 4, when a panel 16 embodying the principles of the present invention is in actual use in a concrete wall form such as the form 10 of FIG. 1, the wet concrete which is poured between the two series 12 and 14 of panels exerts an outward lateral thrust upon the panel facing 20. Since the filler strip flanges 40 which extend along the forward faces of the ribs 28 overlie the dado notches 34, the edges of adjacent flanges 40 on adjacent panels 16 meet each other and establish a complete seal against entrance of wet concrete into the rectangular slots which are formed by each pair of registering notches 35. Such a seal appears specifically in the regions designated by the arrowed lead lines 70 in FIG. 1. Where one of the tie rods 19 projects through the rectangular slot which is formed by a pair of registering notches 35, the meeting edges of the resilient flanges 40 will part slightly to admit the tie rod therethrough as indicated by the arrowed lead lines 72 in FIGS. 1 and 4. The edges of the flanges 40, however, closely hug the tie rod 19 so that wet concrete is prevented from seepage along the tie rod and through the aforementioned rectangular slot. By thus excluding seepage of concrete into both the used and the unused slots, the presence in the finished concrete wall structure of fins which otherwise would require smoothing or grinding-off, is prevented.

Insofar as the flanges 42 of the filler or adapter strips 34 are concerned, the curvatures 45 establish voids 74 with the recesses 33, thus allowing for lateral or planar expansion of the plywood facing 20 occasioned by moisture assimilation or by other phenomena. The tongues 50 of the filler strip flanges 42 interlock with mating grooves 62 in the edges of the facing 20 and thus the tongue and groove connection resulting therefrom, together with the adhesive bond between the flanges 40 and the facing edges, prevents forward dislodgment of the facing when the panel 16 is in its free state, as, for example, during handling and shipment.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the

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details of construction may be resorted to without departing from the spirit or scope of the invention. For example, while the filler or adapter strips 34 of the present invention have been shown and described as accommodating the use of a five-ply plywood facing having a thickness of five-eighths of an inch, obviously these strips may be so constructed that they will accommodate facings having a greater or lesser number of plies or of greater or lesser thickness if desired. Therefore, only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

Having thus described the invention, what we claim as new and desire to secure by Letters Patent is:

1. For use in a concrete wall form installation, a panel including a rectangular plywood facing and a marginal rectangular metal reinforcing frame therefor, including spaced parallel opposed longitudinally and transversely extending frame bars, said frame bars defining a rectangular frame opening, each frame bar being formed with an inwardly and forwardly facing angular recess in the forward edge thereof presenting a bottom face and a side face, the various recesses defining a continuous marginal groove in the forward rim of the rectangular frame, said plywood facing having its edge regions seated on the bottom faces of said recesses with the edges proper spaced inwardly from the side faces of the recesses, said plywood facing being of a thickness greater than the depth of the recesses so that the plane of the forward face of the facing lies forwardly of the rim of the rectangular frame, and elastomeric filler strips of generally right angle cross sectional configuration having lateral flanges overlying the forward edges of the frame bars, and compressible flanges interposed between the side faces of the recesses and the opposed edges proper of the panel facing.

2. A concrete wall form panel as set forth in claim 1 and wherein the thickness of said lateral flanges of the filler strips is equal to the distance between the plane of the forward rim of the rectangular frame and the plane of the forward face of the plywood facing whereby the forward faces of the various flanges are coplanar with the forward face of the plywood facing.

3. A concrete wall form panel as set forth in claim 2 and wherein the compressible flange of each elastomeric filler strip has a coextensive tongue and groove connection with the adjacent edge proper of the panel facing.

4. A concrete wall form panel as set forth in claim 2 and wherein each elastomeric filler strip is bonded by an adhesive to the surfaces of the associated recess.

5. A concrete wall form panel as set forth in claim 2 and wherein the compressible flange of each elastomeric filler strip has a coextensive tongue and groove connection with the adjacent edge proper of the panel facing, and in addition, each compressible flange tapers rearwardly to a feather edge.

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