

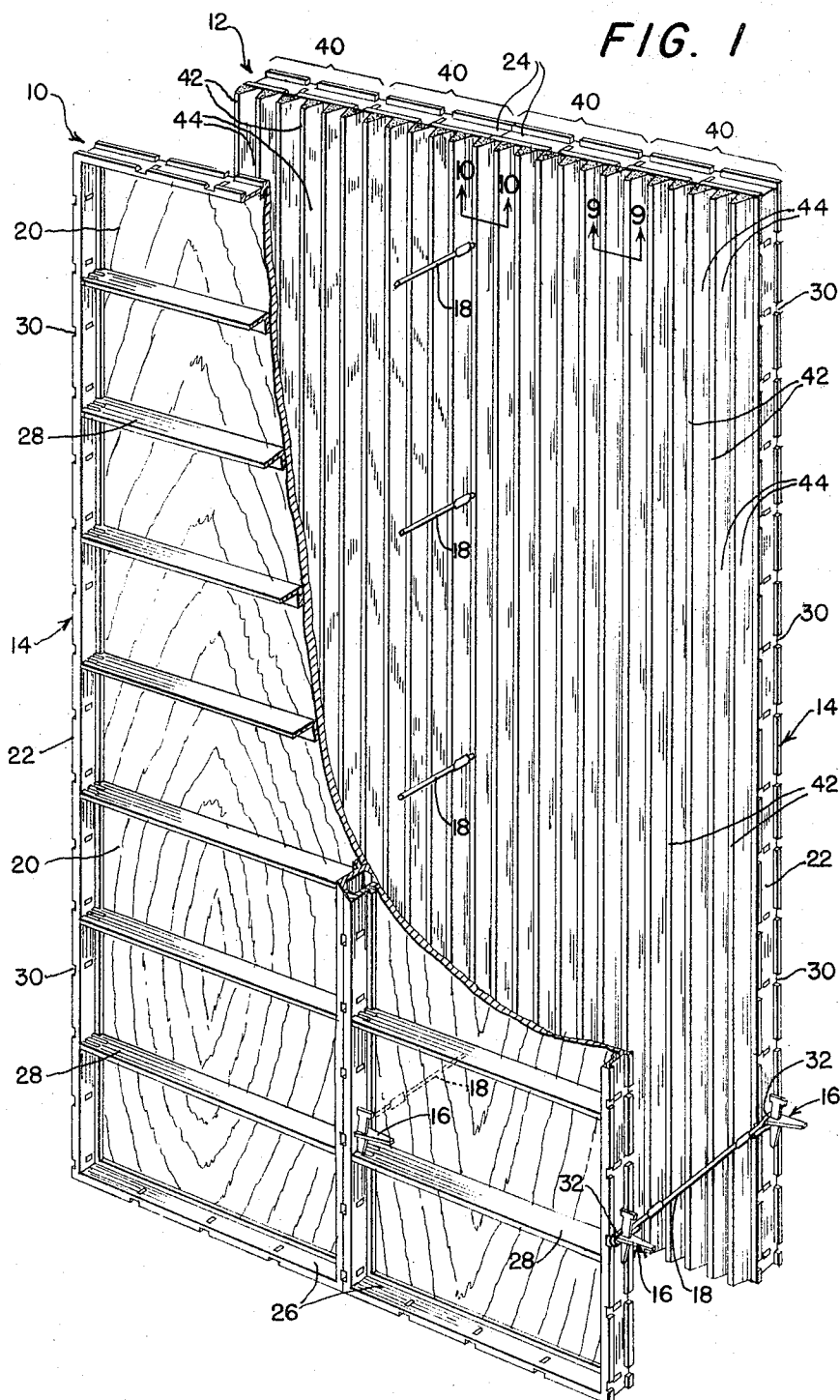
May 23, 1972

J. D. MAYNEN ET AL
CONCRETE WALL FORM LINER

3,664,630

Filed June 19, 1970

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

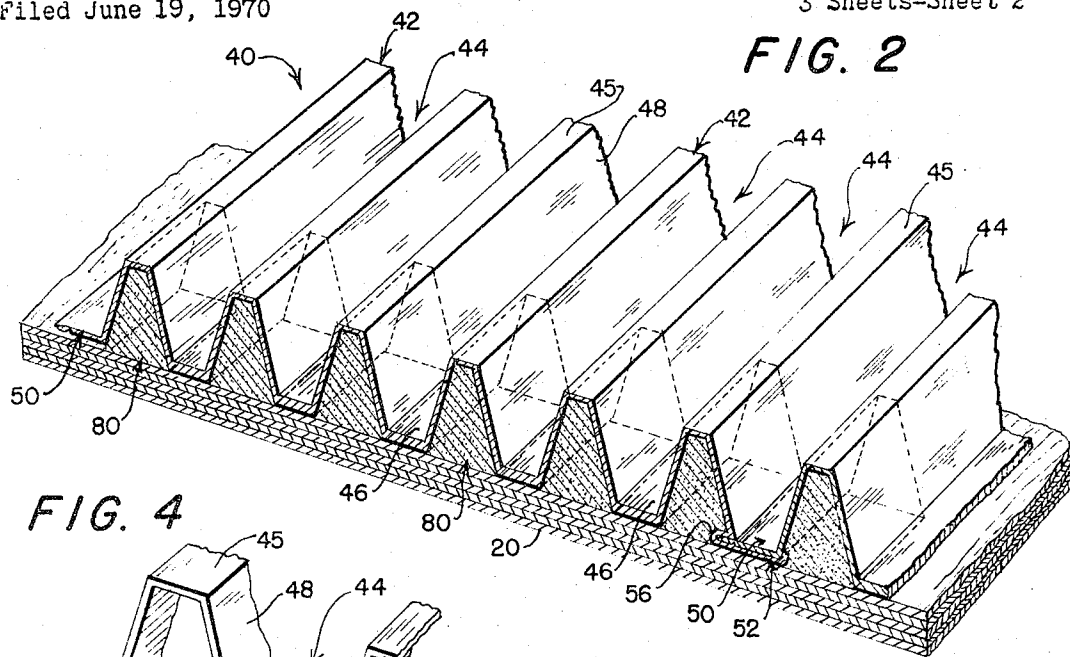


FIG. 4

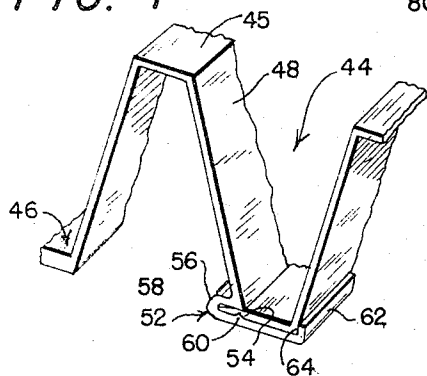


FIG. 5

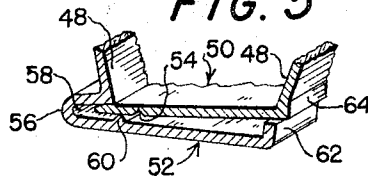
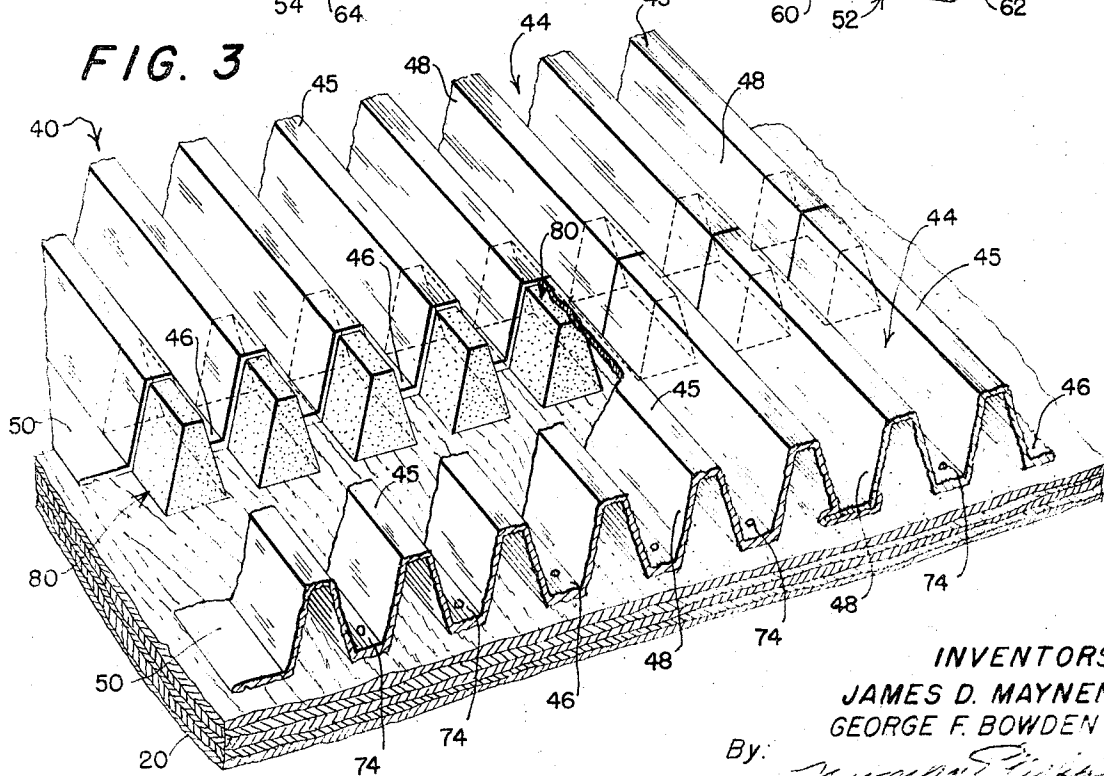


FIG. 3



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3 Sheets-Sheet 3

FIG. 6

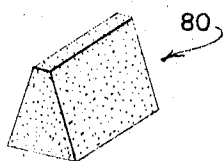


FIG. 7

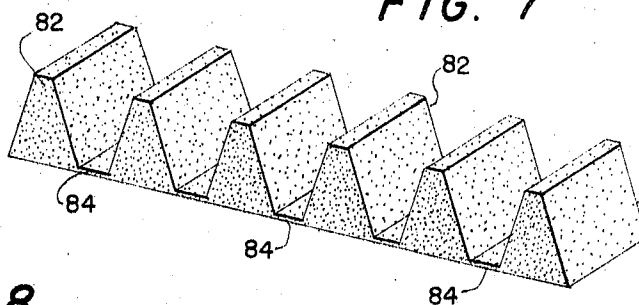


FIG. 8

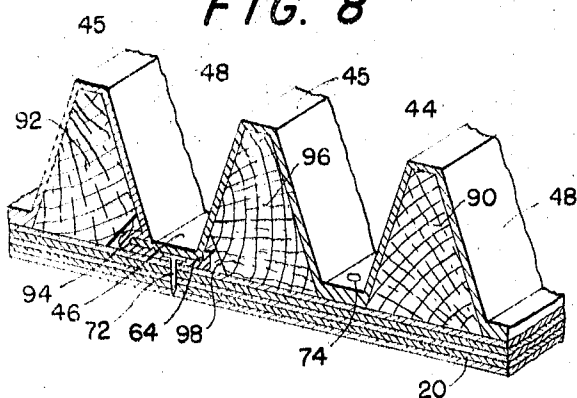


FIG. 9

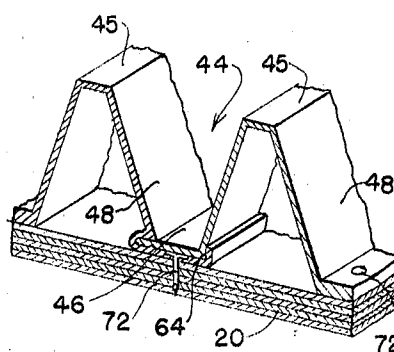


FIG. 10

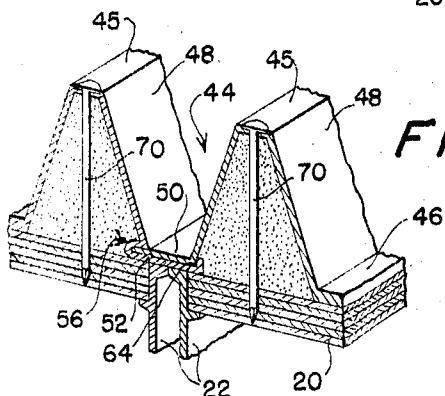


FIG. 11

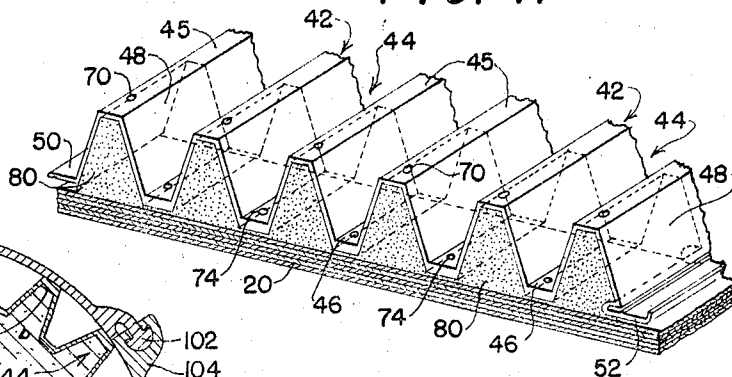
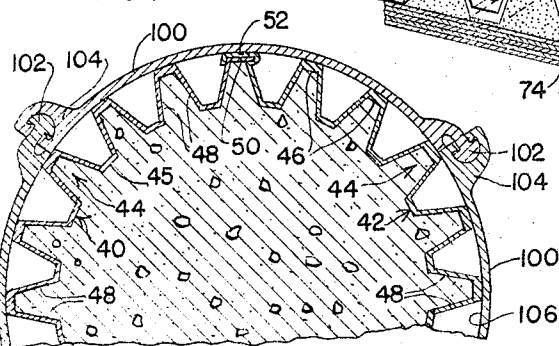


FIG. 12



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3,664,630

CONCRETE WALL FORM LINER

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Int. Cl. B28b 7/36

U.S. Cl. 249—112

2 Claims

ABSTRACT OF THE DISCLOSURE

A concrete wall form liner for producing a ribbed concrete wall side surface, formed of sheet plastic material, having generally sinuous contour, and provided with complementary overlapping and interlocking end edge regions by means of which side-to-side continuity of adjacent liners may be attained. End-to-end continuity may be effected by the use of special filler blocks which align the sections longitudinally.

The present invention relates to a novel concrete wall form liner which is in the form of an extruded sheet plastic material, has a generally sinuous configuration and, when positioned on the normal pouring surface of a concrete wall form and arranged in edge-to-edge relationship with respect to similar liners, establishes a new pouring surface for the production of a concrete wall having a correspondingly shaped, ribbed side surface. The invention further relates to a novel filler block by means of which end-to-end alignment of adjacent liners is attained in order to afford rib continuity in the finished concrete wall.

The invention is particularly concerned with a novel interlock which is disposed between the meeting side edges of adjacent liners and prevents such liners from separating under the pressure and consequent spreading action of the poured concrete, the interlock being so designed that, despite the overlap which takes place when the interlock is effected, there is no discrepancy or variation in the height of the particular concrete rib which is cast or created in the vicinity of the overlock to the end that all of the ribs are of equal height, while the troughs therebetween are of equal depth, thus contributing to uniform concrete wall surface characteristics.

The aforementioned interlock is a compound interlock which affords numerous additional advantages, principal among which is the provision of a lap seam joint between adjacent liners, such joint affording a tight and leak-proof concrete joint, the tightness of which is a function of the pressure of the poured concrete against it.

In carrying out the invention, the particular compound interlock affords triple interlock facilities including a main reentrant interlock which encompasses or straddles the side edge of one adjacent liner; a second rib-and-groove interlock which is disposed in the immediate vicinity of the main reentrant interlock and not only prevents lateral separation of the main interlock by holding the same intact but also establishes a tear-off strip for an extra length of material which, under certain circumstances, constitutes excess or not-needed material; and a third or corner interlock which is located at the side edge of the other liner and assists in preventing lateral separation of the main and second interlock and holds the overlaps of the lap seam joint in their nested face-to-face relationship. The three interlocks of the compound interlock cooperate with one another in providing a triple barrier against egress of concrete or moisture past the lap seam joint, all in a manner that will be made clear when the nature of the invention is better understood.

The provision of an improved concrete wall form liner

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such as has been briefly outlined above constitutes the principal object of the present invention.

Other objects and advantages of the invention, not at this time enumerated, will readily suggest themselves from a consideration of the following description.

The invention consists in the several novel features which are hereinafter described and are more particularly defined by the claims at the conclusion hereof.

In the accompanying three sheets of drawings forming a part of this specification or description, one illustrative form of liner together with several forms of filler blocks therefor is disclosed.

In these drawings:

FIG. 1 is a fragmentary perspective view of an erected concrete wall form employing rectangular steel-studded panels which are arranged in opposed and spaced apart relationship and to which liners embodying the present invention are operatively applied preparatory to a concrete pouring operation;

FIG. 2 is an enlarged fragmentary sectional perspective view of one side of the concrete wall form of FIG. 1, the section being taken transversely and horizontally through such side of the form along a seam line between adjacent liners;

FIG. 3 is a perspective view similar to FIG. 2, the view encompassing the quadrilateral corner regions of four adjacent liners and with a portion of one of the liners being broken away to reveal the nature of the filler blocks by means of which adjacent liners are aligned;

FIG. 4 is a further enlarged fragmentary, detail perspective view showing the interlock seam area between a pair of adjacent liners;

FIG. 5 is a fragmentary view similar to FIG. 4 but illustrating the manner in which the interlock between adjacent liners is effected;

FIG. 6 is a perspective view of a resilient filler block which is employed in connection with the invention;

FIG. 7 is a perspective view of a gang of the resilient filler blocks which are capable of being employed in connection with the present invention;

FIG. 8 is an enlarged sectional view taken transversely through the horizontal juncture regions between a pair of adjacent liners having modified wooden filler blocks installed therein;

FIG. 9 is an enlarged horizontal sectional view taken on the line 9—9 of FIG. 1;

FIG. 10 is an enlarged horizontal sectional view taken on the line 10—10 of FIG. 1;

FIG. 11 is a fragmentary end perspective view illustrating the use of filler blocks as an end closure for a liner; and

FIG. 12 is a fragmentary horizontal sectional view of a cylindrical concrete column form having applied thereto liners embodying the present invention.

Referring now to the drawings in detail and in particular to FIG. 1, for environmental purposes, a conventional concrete wall form consisting of an upstanding front side 10 and an upstanding rear side 12 is made up of individual rectangular concrete wall form panels 14 which are joined together in edge-to-edge relationship by fastening devices 16 (T-bolt and wedge assemblies) with the two sides of the form being maintained in their spaced apart relationship by horizontal tie rods 18. As shown in FIG. 1, the T-bolts of the fastening devices 16 extend through elongated apertures in the ends of the tie rods 18. The panels on each side of the concrete wall form present a continuous and unbroken planar inside pouring surface which confines the wet concrete which is poured between the two form sides 10 and 12 and, in the absence of the liners of the present invention, would ordinarily result in the provision of a concrete wall having

planar or smooth outer side surfaces. However, as will be described in detail presently, when the liners of the present invention are operatively applied to either of such inside pouring surfaces, the production of a concrete wall having a ribbed side surface will result.

The specific type of wall form panels and the nature or design of the tie rods and fastening devices constitute no part of the present invention but, purely for illustrative purposes, conventional "Steel-Ply" panels of the type which are manufactured and sold by Symons Mfg. Company of Des Plaines, Ill. have been selected. It is, of course, to be understood that the particular liners constituting the present invention are adapted for use with concrete wall form panels other than "Steel-Ply" panels. A "Steel-Ply" panel consists essentially of a shallow tray-like structure consisting of a rectangular plywood facing 20 which is bounded by a marginal steel reinforcing frame including vertical members 22 and horizontal top and bottom members 24 and 26. The medial regions of the plywood facing are reinforced by transverse horizontal crossbars 28 while the vertical frame members 22 are notched as indicated at 30 for selective reception of the adjacent ends of the tie rods 18, the latter being of cylindrical tie rod stock and having looped end regions 32 through which the shanks of the T-bolts of the fastening devices 16 project. The fastening devices 16 serve to anchor the ends of the tie rods 18 to the form sides 10 and 12 and also to draw the abutting side edges of the adjacent panels hard against each other. The arrangement of the constituent parts of the concrete wall form thus far described constitutes no part of the present invention and no claim is made herein to any novelty therewith, the novelty of the present invention residing rather in the shape characteristics of the various liners which are applied to the inside surfaces of the plywood facings 20 of the panels 14, and particularly in the manner in which adjacent liners are interlocked together. For a more detailed description of the concrete wall form panels 14, the tie rods 18 and the fastening devices 16 and the manner in which they cooperate to produce a concrete wall form, reference may be had to United States Pat. No. 2,640,249, granted on June 2, 1953 and entitled "Wall Form Panel." Although in the present instance a concrete wall form utilizing "Steel-Ply" panels is shown and described, it will be distinctly understood that the particular liners of the present invention are capable of being applied to the pouring surfaces of a wide variety of concrete forms regardless of whether the panels be of the "Steel-Ply" type or otherwise and also regardless of whether the forms be wall forms, ceiling forms, slab forms, column forms or the like. Irrespective, however, of the particular use to which the present invention may be put, the essential features thereof remain at all times the same.

Still referring to FIG. 1, the inside pouring surface of the rear side 12 of the concrete wall form is completely covered by a series of the installed liners, each liner being designated in its entirety by the reference numeral 40. Each liner is in the form of an extruded sheet of plastic material which, as best illustrated in FIGS. 2 and 3, is generally of sinuous configuration in that it is provided with a series of hollow trapezoidal ribs 42 which are separated by intervening valleys or troughs 44. Each rib is formed with a flat crest portion 45 (see FIGS. 2, 3 and 4) and each trough is provided with a flat trough bottom wall 46. The liner side walls 48 which form between them the ribs 42 and the troughs 44 are of sloping design.

In the manufacture of the liners 40, the width of the liners 40 is a function of the effective width of the extrusion die aperture or slot and a wide variety of widths are contemplated. The length of the extrusions is limited only by facility in handling the extruded liners. Since the illustrated liners 40 are specifically designed for use in connection with "Steel-Ply" panels which, invariably, are two feet wide, it is convenient for practical considerations that the width of the liners be approximately one foot so that

two of the liners placed side by side and interlocked together in a novel manner according to the present invention will suffice to cover the plywood facing of a given panel insofar as transverse or lateral coverage is concerned. Since the liners may be extruded to any desired length and, since the sheet material of the liners is readily susceptible to a sawing or shearing operation, a given extrusion may be cut and fitted to a concrete-receiving surface which is two or more panels high. Odd or excess dimensions may be filled in by the use of filler blocks of special configuration as will be described in detail presently.

It is to be distinctly understood that although the exemplary disclosure of FIG. 1 shows the rear side 12 of the concrete wall form as consisting of two panels 14 and covered by a plurality of full height form liners 40, liner application may be accomplished by other placements of liners over the pouring surface to be covered. Fitting of the various liners together in piecemeal fashion to effect full coverage of any given plywood facing area may be effected according to the dictates of the operator, the only requisite being that secure interlocks be effected along such vertical seam areas as may be present and that mortar tight seam lines be effected along the horizontal regions of juncture, all in a manner that will now be described in detail.

The manner in which vertical seam areas are established is clearly shown in FIGS. 2 to 5, inclusive wherein it is to be noted that each liner 40 is provided at its opposite side edges with lateral interlock flanges which are complementary and include a male base interlock flange 50 and a female base interlock flange 52. Except for the provision of these two flanges, the thickness of the plastic material of each liner 40 is uniform throughout, the male and female interlock flanges 50 and 52 being of half-thickness so that when the male base interlock flange 50 of the liner is disposed in its interlocked and overlapping relationship with respect to the female base interlock flange 52 of an adjacent liner, a bottom wall for the trough 44 which exists between the adjacent side walls 48 of the two liners results and this bottom wall is of the same thickness as the rated over-all thickness of the various liners.

Each male interlock flange 50 projects from the base line of one of the sloping side walls 48 and it lies in the general plane of the various bottom walls 46. The underneath side of the flange 50 is formed with a small, longitudinally extending V-shaped groove 54 therealong, the function of which will be made clear presently.

Each female interlock flange 52 also projects from the base line of one of the sloping side walls 48 and it also lies in the general plane of the various bottom walls 46. This flange 52 is joined to the adjacent side wall 48 by a reentrant bend 56 (see FIGS. 4 and 5) which establishes a relatively deep laterally extending pocket 58. The latter extends the full length of the liner 40 and its associated female interlock flange 52. This pocket is adapted to receive therein the distal edge region of the male interlock flange of the adjacent liner 40 and, when such male interlock flange is thus received, an upwardly projecting raised rib 60 on the portion of the female interlock flange that is adjacent to the open mouth of the pocket 58 extends into the groove 54 and fills the same as clearly shown in FIG. 4 with the two interlock flanges 50 and 52 being disposed in superimposed relationship and face-to-face contact.

The distal edge of the female interlock flange 54 is formed with an upturned edge flange 62 (see FIG. 5) which encompasses the juncture region between the sloping side wall 48 and male interlock flange 50 of the adjacent liner and lies flat against a thickened heel portion 64 which is formed at such juncture region.

It will be observed that when the interlock is effected between the male and female interlock flanges 50 and 52, three fluid-tight sealing areas are established to pre-

vent moisture from seeping past the mating interlock flanges. First of all, there is a sealing area or line at the region where the lower edge of the sloping wall 48 bears against the upper face of the male flange as seen in FIG. 4 immediately above the rib 60. The height of this rib is slightly greater than the depth of the cooperating groove 54 so that the rib presses the material of the male interlock flange 50 upwardly against the wall 48 and establishes a concrete-tight seal. Secondly, the rib 60 and the mating groove 54 establish a seal which is concrete-tight and, thirdly, the heel portion 64 and the upturned edge flange 62 provide an additional concrete tight seal.

One manner in which the interlock between the adjacent side edges of two liners 40 may be effected is shown in FIG. 5, the union being accomplished by the simple expedient of forcing the distal edge of the male interlock flange 50 sidewise into the pocket 58 that is established by the reentrant bend 56 of the female interlock flange 52 until the two interlock flanges snap into the position shown in FIG. 4. Where two liners 40 are of relatively short longitudinal extent, this snap-in method of assembly may be carried out by a simple square push-in procedure wherein both liners are maintained in parallelism. Where the liners are of great length, the union may be made in an askew fashion where one form liner is maintained at a slight oblique angle with respect to the other form liner and, starting at one end of the juncture region, the liners are pushed toward each other in a scissors-closing manner until the final snap-in where the distal edge region of the male interlock flange 50 is completely received in the pocket that is provided for it in the female interlock flange 52. Under certain circumstances, it may be found expedient to slide the two liners into their interlocked condition by a telescopic action of the two interlock flanges 50 and 52.

The upturned rib 62 performs an additional function in that it holds the male interlock flange 50 bodily against lateral shifting movement on the underlying female interlock flange 52 and prevents the distal edge region of the male interlock flange from creeping outwardly from the pocket 58. The mating rib 60 and groove 54 also assist in performing this function.

From the above description, it will be apparent that any desired horizontal extent of concrete wall form panel facing may be covered by a series of liners 40 which are placed in edge-to-edge relationship without interrupting or disturbing the uniformity of rib-and-trough design. In the exemplary illustration of FIG. 1, because the standard "Steel-Ply" concrete wall form panels 14 are of standard width, namely, two feet, while the form liners 40 are one foot in width, two such liners which are interlocked in the manner described above are adequate completely to cover the plywood facing 20 of a panel. In such an instance, the seam areas between adjacent form liners will lie on the vertical frame members 22 of the panel reinforcing frames and, if desired, the female interlock flanges of the liners may be adhered to the adjacent vertical frame members by the application of a suitable adhesive. Such an installation is shown in FIG. 10 where it may be considered that the illustrated female flange 52 is adhesively applied to the two abutting vertical frame members 22. Further stability may be given to the adjacent liner ribs 42 by passing long nails, staples or other fastening elements 70 through the flat crest portions 45 of such liner ribs, thereby securing them to the plywood facings 20 on the opposed sides of the vertical frame members. This use of long fastening elements is resorted to especially in areas where filler blocks are installed behind the horizontal juncture region between adjacent form liners 40 as will be set forth presently.

In instances where a seam area lies directly on the plywood facing 20 of a given concrete wall form panel or panels as shown in FIG. 9, short nails 72 may be driven through the female interlock flange 52 before the male interlock flange 50 of an adjacent liner is put in place.

Otherwise, the various form liners may be applied to the plywood facing by passing short nails or other fastening elements 74 through the trough bottom walls 46 of the liners as shown additionally in FIGS. 3, 8 and 11.

As previously stated, the form liners 40 are extruded in continuous lengths within practical limits. Under certain circumstances therefore it may be found necessary or desirable to position the liners in end-to-end relationship as, for example, when a given concrete wall which is to be formed is extremely high. To accomplish this, the liners are placed in their end-to-end relationship and are held in proper alignment by means of filler blocks which function to align respective liner ribs with each other and also to provide a seal at the resulting seam line. One such filler block is shown on FIG. 6 and designated by the reference numeral 80. Preferably the filler block 80 is formed of a material such as a rubber which is to be distinguished from sponge rubber in that it is provided with occluded openings and is therefore impervious to moisture except for a limited amount of surface moisture inclusion. Solid rubber and certain resilient plastic materials also are suitable for use as filler blocks. These filler blocks are trapezoidal in transverse section to conform to the rib-and-trough contour of the form liners 40 and they are capable of use either as bridging filler pieces for aligning adjacent form liners as shown in FIG. 3, or as end closure pieces as shown in FIG. 11. As previously stated, when such filler blocks function as bridging filler pieces, it is advisable to pass long nails 70 through them as shown in FIG. 10. Nailing thereof also is advisable when they are used as end closure pieces for the otherwise open ends of the ribs 42 of a given liner 40.

Preferably the cross sectional area of the filler blocks 80 is slightly greater than that of the inside voids that are established by the various form liner ribs 42 so that when the liners are nailed or adhered in position on the plywood facing 20 of a concrete wall form panel the filler blocks will completely fill the voids in which they are disposed and exist under slight compression. As shown in FIG. 10, these filler blocks will conform to the voids which exist in the vicinity of each seam area, the reentrant bend 56 serving to displace the material of the adjacent block, as does also the heel portion 64.

If desired, the filler blocks 80 may be molded or otherwise fashioned in gang form as shown in FIG. 7, wherein a series of the spaced apart blocks 82 are connected together along their bases by thin web-like connecting strips 84 which, in any given concrete form installation, underlie the troughs 44 of the form liner with which the gang of filler blocks is associated.

It is further contemplated according to the present invention that the filler blocks 80 may be made of wood or other solid, non-resilient materials such as a suitable plastic. Wooden blocks are shown in FIG. 8 of the drawings and one of them is designated by the reference numeral 90. Such blocks are trapezoidal in transverse cross section to conform to rib curvature in the form liner 40 but where solid blocks are used in the vicinity of the seam areas it is necessary on one side of the area to use a block 92 which has one relieved corner region 94 for accommodating the adjacent reentrant bend 56, and on the other side of the area to use a block 96 having a relieved corner region 98 to accommodate the adjacent heel portion 64 and its associated upturned flange 62.

An important feature of the present invention resides in the ability of the form liners 40 to conform to concrete pouring surfaces of non-planar configuration. In FIG. 12 a concrete column form in which a series of the present form liners have been installed is disclosed. For exemplary purposes, the particular column form illustrated is of the type which is shown and described in United States Pat. No. 3,291,437, granted on Dec. 13, 1966 and entitled "Flexible Panel With Abutting Reaction Shoulders Under Compression." Reference may be had to such patent for a full understanding of the nature of the column form but,

for purposes of description herein, it is deemed necessary only to point out that the form is made up of flexible rectangular sheet metal panel sections **100** having interlocking tongues **102** and grooves **104** along their vertical edges so that the panel sections may be bent to arcuate form and interlocked to provide a cylindrical internal concrete pouring surface **106**. The effective arcuate extent of each panel section **100** is substantially equal to the width of a standard "Steel-Ply" concrete wall form panel such as those shown in FIG. 1 and, therefore, each panel **100** is "lined" so to speak with two of the interlocked form liners **40**, the seam areas extending vertically and the application of the liners being made by a suitable adhesive. In FIG. 12 the curvature of the concrete pouring surface to which the liners **40** is applied is uniform throughout, as well as being of a concave nature. It will be apparent, however, that the form liners of the present invention may be applied to non-uniform curved surfaces whether the same be of a concave or a convex nature.

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 details of construction may be resorted to without departing from the spirit or scope of the invention. For example, whereas in the exemplary form of the invention disclosed herein the various ribs **42** and troughs **44** are shown as being of generally trapezoidal configuration, other rib and trough shapes are contemplated as, for example, ribs having arcuate, polygonal or peaked crown portions. The only requisite in the design of the form liners is that the bottom walls of the troughs **44** be planar for nailing or adhesive purposes, and that the male and female overlap interlock areas embody the interlock principles herein set forth. Therefore, only insofar as the invention is particularly 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. In a concrete wall form installation presenting a concrete pouring surface, in combination, a pair of adjacent identical form liners each of which is in the form of an extruded rectangular sheet of flexible plastic material of generally corrugated configuration and presents alternately arranged longitudinally extending upstanding hollow ribs with intervening troughs having planar bottom walls positioned upon and secured to said pouring surface in side-by-side relationship, one outermost rib on one of said liners being provided with a male interlock base flange and one outermost rib on the other liner being provided with a female interlock base flange, said female flange being formed with a reentrant bend adjacent to its juncture region with its associated rib and defining a laterally extending pocket, said male flange overlying said female flange in substantial coextensive face-to-face contact there-

with and with the distal edge thereof projecting into said pocket and filling the same, and an upturned distal edge flange on said female flange bearing against the juncture region between the male flange and its associated rib, said edge flange and the bottom wall of the pocket serving to prevent lateral shifting of the interlock flanges with respect to each other, a raised rib on said female flange and positioned adjacent to the mouth of said pocket and disposed exteriorly of the pocket, said male flange being formed with a groove therein and into which the upper edge region of said raised rib projects, the bottom walls of said troughs being of predetermined uniform thickness, and the male and female flanges have a combined thickness equal to the thickness of said bottom walls of the troughs, said raised rib bearing upwardly against the male flange within said groove and serving to force the male flange into sealing engagement with the juncture region between the female flange and its associated hollow rib.

2. In a concrete wall form installation, the combination set forth in claim 1 and including, additionally, a second pair of form liners identical with the first pair of liners and disposed endwise of said first pair in contiguous relationship with respect thereto and with their ribs and troughs in end-to-end alignment with the ribs and troughs of the first pair of liners, and an integral gang of filler blocks underlying the first and second pair of form liners, said gang of filler blocks comprising individual filler blocks which are conformable in shape to the shape of the hollow ribs and which are disposed within such ribs, and web-like connecting strips between adjacent filler blocks which underlie said troughs, said gang of filler blocks bridging the juncture region between said first and second pair of form liners.

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U.S. Cl. X.R.

25—131 P; 249—35, 47, 189, 192