United States Patent [19]

Franklin

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[54] **SPACER ELEMENTS FOR CORNER FORMING SYSTEM**

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Related U.S. Application Data

[63] Continuation of Ser. No. 841,630, July 14, 1969, abandoned.

[52] **U.S. Cl.** **249/194,** 249/210

[51] **Int. Cl.** **E04g 9/00**

[58] **Field of Search** 249/33, 35, 48, 188, 189, 249/192, 193, 194, 5, 6, 9, 205, 207, 208; 52/394, 395, 396, 402, 403

[56] **References Cited**

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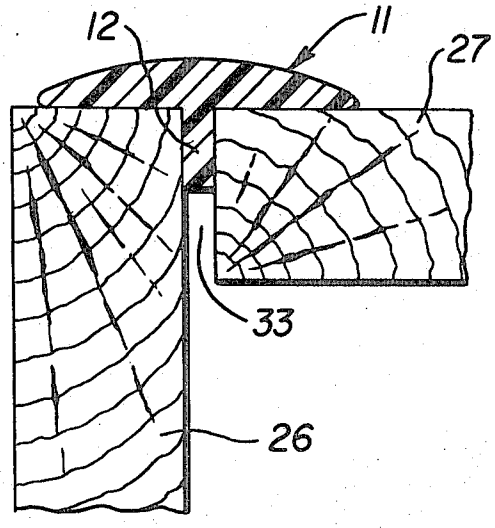
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[57] **ABSTRACT**

A forming system and accessories therefor in which sheet components are held together in operative relationship to provide mold elements for the formation of inside corners in concrete structures and in which at least a portion of the molded shape is derived from the placement of a spacer element having a lip member or extension engaged between adjacent sheet components for holding said sheet components slightly spaced apart to facilitate the stripping of the forms after use. The mold shape body of said spacer further serves to prevent the escape of poured concrete and-/or provides decorative or functional indentations in the final concrete surface. The spacer elements may be used with support brackets that incorporate similar spacer tabs or in substitution therefor.

6 Claims, 9 Drawing Figures



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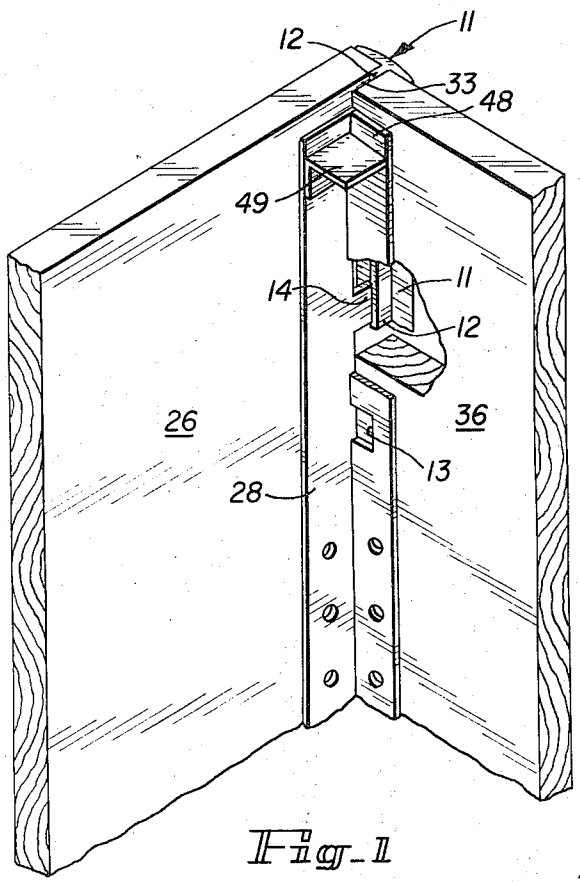


Fig_1

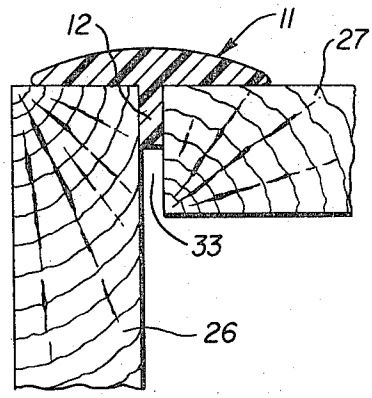


Fig_2

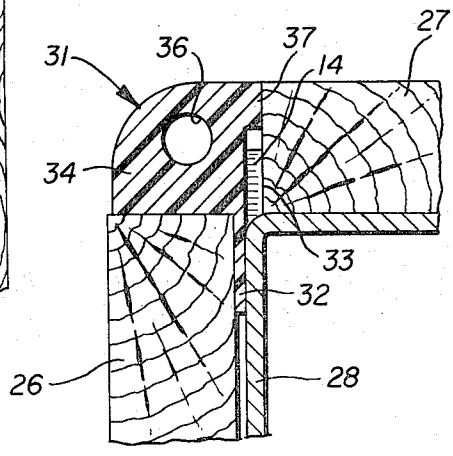


Fig_3

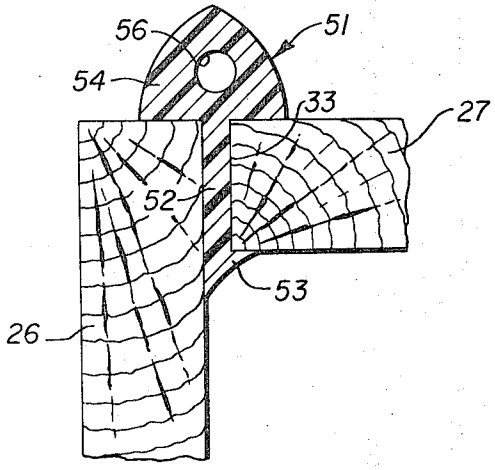


Fig_5

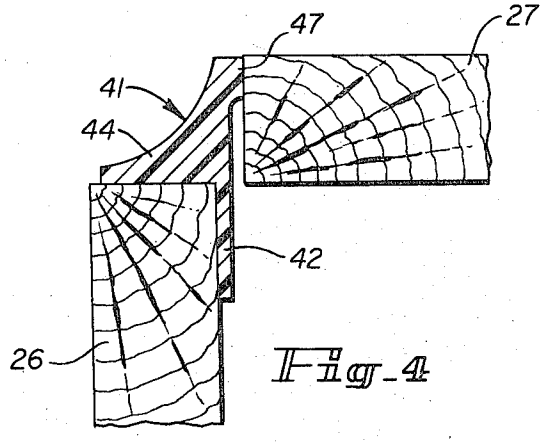


Fig_4

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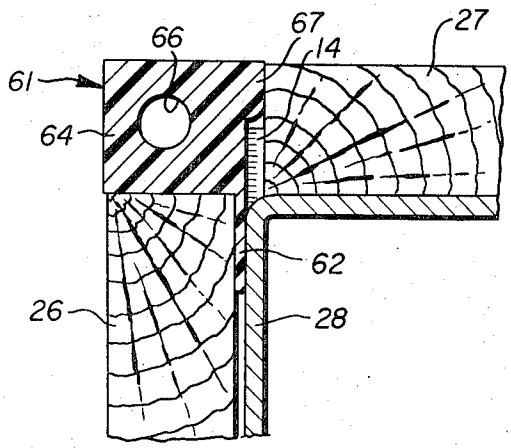


Fig_6

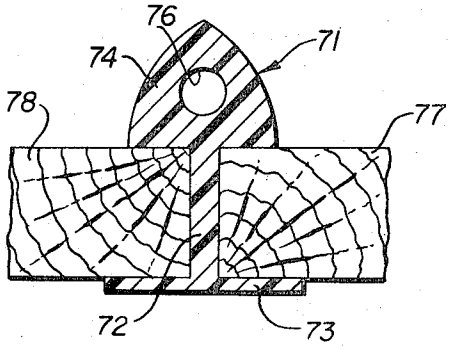


Fig_7

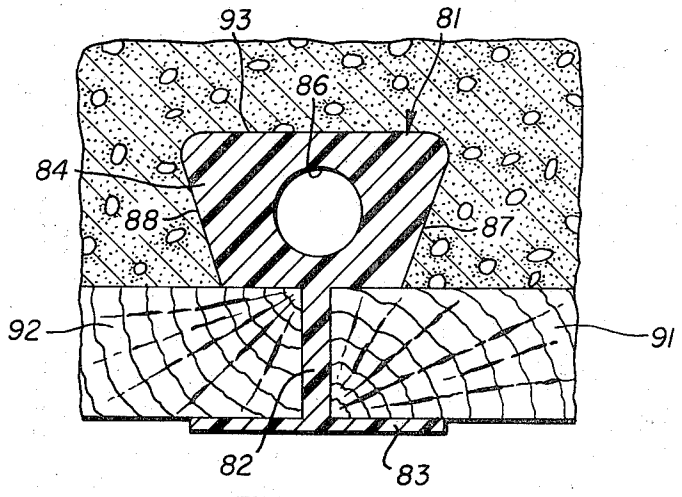


Fig_8

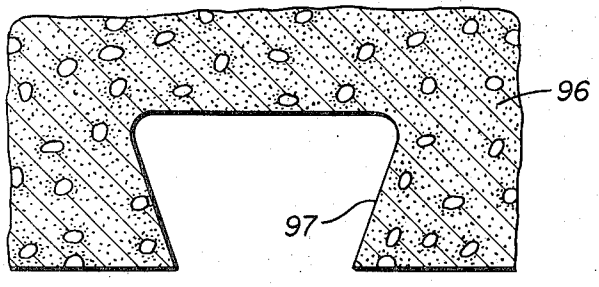


Fig_9

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SPACER ELEMENTS FOR CORNER FORMING SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of application No. 841,630 filed July 14, 1969 and now abandoned.

BACKGROUND OF THE INVENTION

The subject of this application finds use in such systems as described in U.S. Pat. No. 3,582,035.

As set forth in the previous applications, other inventors and engineers have previously recognized the advantage of providing pan forming systems for localized reduction in the thickness of the cross-section for concrete floors. Such pan systems have been derived to provide longer span concrete floors without the substantial increase in cost factors and dead weight associated with long span slab floors. Previous pan systems have been provided to leave joist like elements extending in one or more directions across the total span of the floor system being poured. A "one-way" system would provide a plurality of parallel joist structures, while a "two-way" system would provide intersecting joists to give the underneath side of the poured floor a grid or a waffle like appearance. Over a long period of years different pan forming systems have been derived to meet user requirements. Metal, wood and cardboard pan form elements have been used to obtain desirable floor systems. At the present time greater spans between vertical supports have become desirable for purposes of economy of construction as well as for convenience of building use. These factors give new impetus to the use of variable cross-section pan floor systems and make it worthwhile to provide a pan form system of greater utility for use in long span construction.

The utility of any pan forming system is determined by several factors: the cost of pan elements; the ease and cost of placement and support; the suitability of pan elements for reuse; the adaptability of the pan elements for providing floor systems having pan voids of varying depth, width or length; the ease with which the pans may be removed and whether the pan forming system components may be removed before the main support or shoring elements are removed; the detail, finish or decorative pattern provided by the pan form elements; the suitability of the pan form elements as a support or an aid in the placement and fastening of reinforcing elements or utility components that are to be embedded in the floor system; and the ability of the pan forming system to withstand loads imposed by poured concrete and personnel or the equipment used during construction operations.

No previously used single pan forming system has provided the best possible answer to all requirements, and, accordingly, different systems have been extensively used in connection with different types of construction. Metal and fiberglass pan forms are expensive, and the single size and shape characteristic tends to limit design possibilities in use. Previous wood systems have entailed an excessive labor cost for placement and removal, and it is difficult to efficiently reuse wood elements that have been nailed in conventional manner. Further, wood forms have previously been difficult to strip without incurring some damage to form elements or to the poured concrete. Cardboard form

systems have recently attained more widespread useage, since they are relatively easy to install, the core elements are directly reuseable, and design variations are possible without excessive cost. Limitations include an inadequate depth of pan for long span and high load installations, inadequate anchors for utility placements, and the necessity for form and shore removal before the pans are freed for reuse.

The system shown and described in the mentioned related patent was designed to obviate many previous shortcomings. Present acceptance in the construction industry is at least indicative of an improved capability to satisfy some of the requirements set forth above.

In such previous applications a bracket support is provided which engages a plurality of otherwise mating sheet elements to hold such elements in operative position. The bracket includes extension or tab elements which extend between adjacent form sheet materials to provide and maintain a gap therebetween. The gap makes it easier to remove the forms after the concrete has been poured and cured. In the previous system escape of poured concrete through such gap was prevented by the application of tape to the concrete contacting face of the assembled forms to cover the gap.

SUMMARY OF THE INVENTION

In keeping with the present system a spacer element that may be formed of resilient material is applied to form components at the time of erection. The body of the spacer is usually disposed at the concrete contacting face of the form system, and an extension or lip element formed integrally with the body is positioned between adjacent panel or sheet forming components to hold such panels and components slightly spaced apart one from the other. The derived spacing is filled or at least partially filled by said lip or extension element. Accordingly, with the present system the lip member or spacer extension serves to provide the desirable gap between form elements while the main body operates to prevent the escape of poured concrete from the form system. The body may be utilized as a mold form element so that rounded or chamfered corners may be obtained or so that decorative indentations may be provided on later exposed surfaces of the concrete structure. Similarly, such body may be used to provide functional indentations that will facilitate the installation and mounting of storage, utility or decorative features to the completed concrete structure.

The spacer elements provided herein may be used cooperatively with form support brackets of the type disclosed in the mentioned prior applications. Accordingly, the present system has all of the user benefits described in the previous applications inclusive of ease of erection and removal of the forms whether such forms are used in an open deck or closed floor support system or not. To such earlier benefits are added improved decorative and utility features provided by the reuseable poured concrete excluding element, and an operational advantage, since the spacers may be repeatedly reused. For some operations the spacer element can even be directly applied to a single panel element for conjoint handling and reuse therewith.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating use of a spacer element together with tab providing support brackets,

FIG. 2 is a cross-sectional elevation showing installation of a first type of spacer element,

FIG. 3 is a cross-section showing a rounded corner spacer element adapted for use with tab providing support brackets,

FIG. 4 is a cross-section showing a cove spacer element,

FIG. 5 is a cross-section illustrating a modified embodiment of the invention for providing decorative indentations for a poured concrete structure,

FIG. 6 is a cross-section illustrating an angle corner embodiment,

FIG. 7 is a decorative indentation spacer element for use between aligned panels,

FIG. 8 is a cross-section showing a channel-lock spacer, and

FIG. 9 is a cross-sectional view illustrating the concrete surface derived from use of the spacer element of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Separate embodiments of the invention are shown in FIGS. 1–9. The type of spacer element shown in FIGS. 1 and 2 is intended for use in the type of construction system set forth and described in the mentioned previous applications. This spacer strip 11 is to be placed on pan forms as illustrated, and it will at time of use serve to prevent the escape of poured concrete through the gap or space 33 separating form boards, such as the upright forms 26 and 36, and the top panels 27. This spacer element 11 is, accordingly, used in place of the tab provided in the previous applications. In order to hold the spacer 11 in desired position and, in fact, to help maintain the gap 33, spacer element 11 has a lip or extension 12 that is inserted in such gap. Where the spacer 11 is of resilient material, the resilience of the body and extension 12 will itself tend to hold the spacer in its engaged position. For other uses it may be necessary or advantageous to fasten the extension 12 to one of the intersecting form boards. With the strip permanently applied to one form board element the forms can be assembled, removed and handled with the spacer attached.

Some details of the type of forming system disclosed in the mentioned prior applications is revealed in FIG. 1, where the support bracket 28 is shown to include flanges disposed at right angles each to each with openings 13 punched in one flange to provide a tab 14 which extends between the upright form boards 26 and 36 to provide the gap 33. The extension 12 of the spacer 11 is engaged in this same gap as illustrated. Adjacent its top the bracket 28 provides a deck support 49 in position to preserve lips or extensions 48 that similarly maintain a gap 33 between a top form board 27 and the upright forms 26 and 36. In the practice of the invention these gaps will similarly be preserved and occluded by the spacer elements 11.

An alternate form for a spacer for similar purpose is shown in FIG. 5. Here spacer 51 is provided to fit in the gap 33 between a top form board 27 and an upright form 26. The lip extension 52 for this embodiment of the invention extends completely through the gap, and a foot lock 53 is provided to hold the spacer 51 in position. The longitudinal extent of the lip extension 52 may be interrupted at spaced positions to provide clearance for tabs 14 or extension elements 48 of brackets 28 as previously described. The spacer element 51 has a different form for the gap covering component. As shown in FIG. 5, body segment 54 has an arch shape. This shape will provide an indentation in the poured and cured concrete of interesting architectural appearance. Such arch shape has a further advantage inasmuch as the body 54 will be easily stripped from the concrete after a floor, column or wall has been poured thereabout. This ease of stripping is further facilitated by the provision of a central opening or hole 56 in the body 54. Where the spacer is of resilient material, this central opening permits additional flexure of the spacer to facilitate clean removal.

FIGS. 3, 4 and 6 show alternate types of spacer elements that are specifically designed to provide distinctive corner contours for inside corners of poured construction. The basic construction of all these embodiments of the invention is similar except for the detailed configuration of the body component itself. In FIG. 3 spacer 31 has a body 34 of exterior rounded shape so that use of the spacer will provide a corner having a round transition between the surfaces formed by the form boards 26 and 27. In FIG. 4 spacer 41 is provided with an external concave shape for the body 44, and in FIG. 6 spacer 61 completes a rectangular or square shape for the form elements 26 and 27. The FIGS. 3 and 6 embodiments are each provided with central openings 36 and 66, respectively, to facilitate flexure in stripping operations. The particular spacer elements shown in FIGS. 3, 4 and 6 have a lip member or extension 32, 42 and 62 of near identical construction. This extension is thinner than the extension 12 and 52 previously described, since it does not completely fill the entire gap between the form boards 26 and 27. The spacers 31, 41 and 61 are, in fact, intended for use with support brackets 28, and they are adapted to directly accommodate the tabs 14 of such brackets. (See FIGS. 3 and 6.) To maintain a space for the tabs 14 and to still completely close off the area between the form boards 26 and 27, a nose piece 37, 47 and 67 is provided for engagement against the edge of form boards 27. Where the spacers are formed of resilient materials, and especially where the central openings 36 and 66 are provided, the nose and body are deformable to an extent assuring a tight concrete excluding seal between all of the form components.

The embodiment of the invention shown in FIG. 7 is in part similar to that of FIG. 5, but the useage is different. Spacer 71 having a central opening 76 has the arch shape of the spacer 51 and a full depth extension 72. The foot piece 73 is different, however, so the spacer strip may be applied to form boards 77 and 78 disposed in otherwise abutting relationship. This type of spacer can be used in connection with floor construction where a plurality of panels are used to complete a form system. In general, however, this type spacer will have most extensive useage in connection with poured concrete walls, since the body 74 can be disposed in horizontal or vertical patterns to provide a poured wall having decorative indentations.

The spacer 81 of FIG. 8 has a distinctive body 84 enclosing an enlarged central opening 86. The side walls

87 and 88 of the body 84 are angularly disposed so that the body is narrower at its surface of contact with the form boards 91 and 92 than it is along its terminal face 93. The lip extension 82 passes completely through the form boards 91 and 92, and the spacer 81 is held in position with respect to the form board by a foot element 83. When concrete is poured about this spacer, the spacer would ordinarily be trapped in the concrete. The spacer 81, however, is made of resilient material, and a large opening 86 is provided through the complete extent thereof. The opening 86 and the flexible nature of the spacer permits the body 84 to be withdrawn so that the completed wall 96, as shown in FIG. 9, will have a channel indent 97 therein. The channel-lock indentation 97 so provided may be used for decorative purposes, or, due to its distinctive shape, it may be used to facilitate the mounting of additional structural or decorative components for a building structure. Where such channel-lock is provided in an overhead ceiling, wedge components may be inserted so that utilities or decoration may be conveniently suspended therefrom. When a lock channel is disposed on upright walls or columns, spandrels, windows or wall finish materials may be conveniently applied.

For all embodiments of the invention at least two purposes are served. The body of the spacer or channel elements prevents escape of poured concrete from the forming system. Lip elements or extensions are at the same time engaged between otherwise contacting form elements to preserve a spacing therebetween. When the spacers are of resilient or flexible material, this preserved spacing serves to facilitate removal of the forms after the wall has been poured and cured. All embodiments of the invention further provide a decorative or improved finished appearance for the poured components. Such decorative and/or utility conveniences are provided without substantial cost, and the cost of placing and removing the forms is not substantial especially where the spacers are applied to and moved with one of the associated form components. The spacers may be used with support brackets, such as the brackets 28, and their associated tabs, or these spacers may be used with other types of support elements for the form boards. In instances where brackets or supports are used that do not provide a tab or lip extension, the extensions on the spacers will of themselves provide a gap preserving element. Accordingly, forming systems of more conventional type can be benefited by use of channel elements made in accordance with the present invention.

I claim:

1. A concrete forming system which utilizes a plurality of panel form members disposed in intersecting planar positions to confine and mold concrete being poured to provide an inside corner comprising a spacer-mold element formed integrally of resilient material and having a body component disposed for contact with the poured concrete and accordingly determining a portion of the mold form shape of said corner, a lip element formed with said body and disposed for extension away therefrom and away from the concrete being poured, a form support for said concrete forming system, and an element on said support for extension with said lip element to a position between said panel form members for conjointly holding said form members apart in manner providing a gap therebetween with said gap being occluded and preserved by said lip element and body whereby escape of poured concrete is avoided and whereby removal of said panel form members is facilitated after the concrete has set.

2. The forming system as set forth in claim 1 wherein said body component provides a corner transition shape between the mold form surfaces defined by said panel forms.

3. A forming system for use in the construction of poured concrete structures at inside corners thereof comprising a plurality of panel form members having terminal end edges at normal disposition with respect to mold surfaces thereof, said panel form members being disposed in intersecting planar positions at the intended inside corners of said structure to confine and mold the concrete being poured, a spacer-mold unit for use at said inside corner disposed in contact with the end edges of adjacent form panels, said spacer-mold unit being integrally formed of resilient deformable material to include a body component disposed for contact with the poured concrete and accordingly determining a portion of the mold form shape at said inside corner, and a lip component formed with said body and disposed for extension away therefrom and away from the concrete being poured on a line parallel to and spaced apart from a concrete contacting mold form surface of one adjacent panel, the body component for said spacer-mold unit having at least one edge that defines said body disposed in contact with an end edge of one of said panel form members with said body component edge being of height corresponding to the thickness for said panel form members, said lip component at the time of use being operative to hold said panel form members apart in manner providing a gap therebetween with said gap being occluded and preserved by said lip and body components whereby escape of poured concrete is avoided and wherein the removal of said panel form members from a poured inside corner after the concrete has set is facilitated by the deformable resilience of said spacer-mold unit.

4. The forming system as set forth in claim 3 wherein said panel form members are disposed in otherwise conterminous relation with said lip element positioned therebetween.

5. The forming system as set forth in claim 3 wherein said panel form members are disposed to provide a lap joint corner with said lip element positioned therebetween.

6. The forming system as set forth in claim 3 wherein said panel members are disposed to form paired inside corners with at least one panel form member itself extending between said corners and accordingly being subjected to longitudinal compressive stress exerted by poured concrete with said longitudinal compressive stress being transmitted to and by an end of an intersecting panel.

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