May 20, 1969 W. D. WILLIAMS 3,445,084

STRINGER-SUPPORTING BRACKET FOR A CONCRETE FLOOR SLAB FORM STRUCTURE

Filed June 8, 1967 Sheet 1 of 2

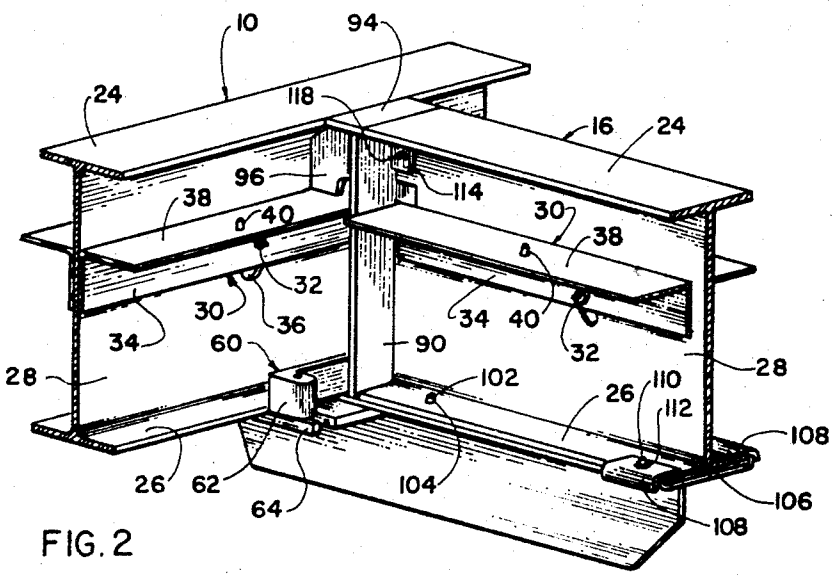


FIG. 2

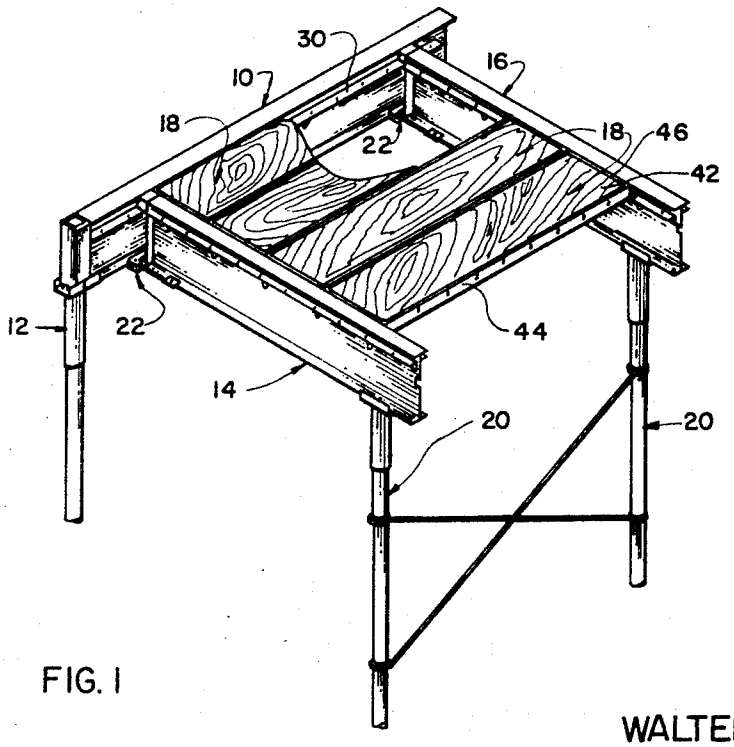


FIG. 1

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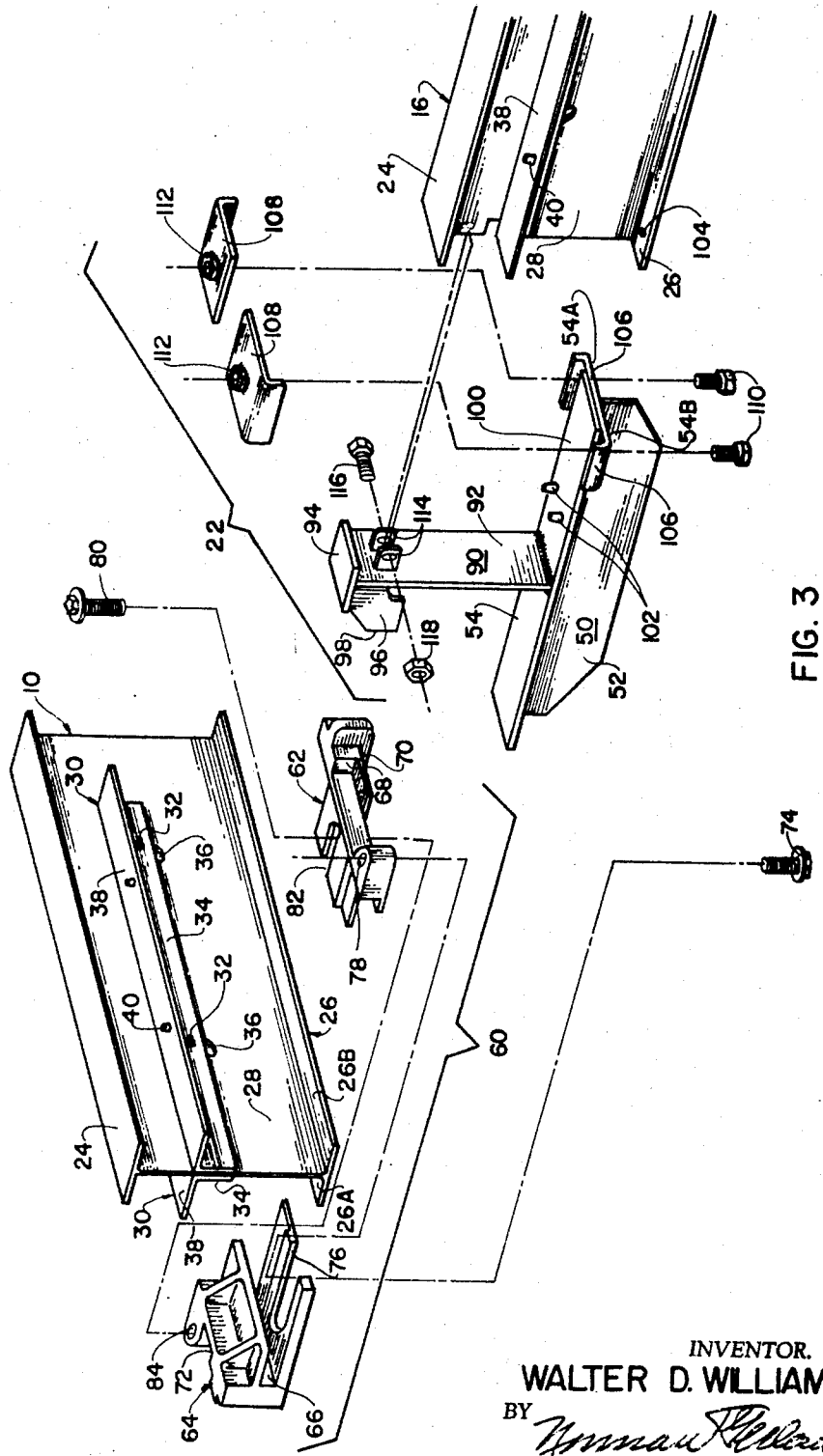


FIG. 3

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United States Patent Office 3,445,084 Patented May 20, 1969

3,445,084

STRINGER-SUPPORTING BRACKET FOR A CONCRETE FLOOR SLAB FORM STRUCTURE

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Filed June 8, 1967, Ser. No. 644,532
Int. Cl. E04g 11/50, 11/48
U.S. Cl. 249—192 6 Claims

ABSTRACT OF THE DISCLOSURE

A supporting bracket designed specifically for use in a concrete floor slab form structure and connecting one end of a panel-supporting stringer to a medial side region of another panel-supporting stringer, the stringers being specifically of the type disclosed in United States Patent No. 3,052,008, dated Sept. 4, 1962 and entitled "Panel-Supporting Stringer Assembly for a Concrete Floor Slab."

The present invention relates generally to a supporting bracket which is designed specifically for connecting one end of a horizontal panel-supporting stringer to a medial side region of another horizontal panel-supporting stringer in a concrete floor slab form. The invention is specifically designed for use in connection with the erection of a concrete building by way of a concrete form structure like that of United States Patent No. 3,130,470, granted on Apr. 28, 1964 and entitled "Concrete Wall Form Installation," the panel-supporting stringers of such concrete form structure being specifically of the type that is illustrated and described in United States Patent No. 3,052,008, granted on Sept. 4, 1962 and entitled "Panel-Supporting Stringer Assembly for a Concrete Floor Slab." The concrete form structure of the first mentioned patent and the panel-supporting stringer of the second mentioned patent are both predicated upon the use of concrete form panels which are commonly known as "Steel-Ply" panels and are manufactured and sold by Symons Mfg. Company of Des Plaines, Ill.

A "Steel-Ply" concrete form panel consists essentially of a shallow tray-like structure in the form of a flat rectangular plywood facing, the margins or edges of which are completely encased in a rectangular metallic reinforcing frame including longitudinal and transverse members. Such a panel, when used in a horizontal floor slab form installation, is adapted to be arranged in edge-to-edge relationship with similar panels and in such a manner that all of the plywood facings lie in a common horizontal plane in order that wet concrete may be poured on the continuous unbroken upwardly presented slab-supporting surface that is offered by the plywood facings. "Steel-Ply" panels are manufactured in sizes which vary both as to length and width, the sizes, however, being standardized and in certain multiples of one foot. The panels are supported at their ends on vertically movable supporting rails which are associated with horizontally extending stringers, the latter, in turn, being supported on vertically extending shores of the adjustable height type. After the wet concrete has been poured on the upper surfaces of the plywood facings of the panels in order to produce the desired floor slab and after the concrete has become sufficiently set as to be self supporting, the supporting rails which are associated with and form parts of the horizontal panel-supporting stringers are lowered and, thereafter, the panels are removed so that they may be immediately reused in the formation of floor slabs at other levels in the same concrete building. By such a procedure it is not necessary to complete curing or setting of the concrete before panel-removal operations as had heretofore been considered necessary. Such a method of building construction is commonly known as the "Symons Slab-Shore" system of building erection.

It frequently happens in connection with a "Symons Slab-Shore" system of building erection that a cantilever structure is to be formed on the outside of a rectangular form structure, the width of such cantilever structure being equal to the length of a panel of regular size, or to a multiple of a panel length. Moreover, the placement of the cantilever structure may be such that it adjoins one of the regular panel-supporting stringers of the concrete form structure and falls within the longitudinal dimension of the latter. Alternatively, the cantilever structure may be positioned to overlap adjacent panel-supporting stringers or even to overlap two or more of such stringers. In such an instance, it is necessary, in order to provide a foundation support for such a cantilever structure, to utilize two or more regular panel-supporting stringers (hereinafter referred to as "cantilever stringers") and to position these stringers in supported relationship alongside certain of the regular form stringers and cause them to extend at a right angle thereto with the outer ends of the cantilever stringers being supported by adjustable shores. The panels for the cantilever structure may then be caused to span the distance between adjacent cantilever stringers in the usual manner of panel support.

The present invention is specifically concerned with a novel supporting bracket by means of which the inner end of each cantilever stringer may be attached to and supported from the outer side of a regular form stringer at any desired longitudinal location along the last mentioned stringer. Since, in the "Symons Slab-Shore" system of building erection, the regular panel-supporting stringers are generally in the form of I-beams, and since the top flanges of such stringers lie in the general horizontal plane of the plywood facings of the stringers lie in the general horizontal plane of the plywood facings of the stringer-supported panels as clearly disclosed in aforementioned Patents Nos. 3,130,470 and 3,052,008, it is necessary, in designing such a stringer-to-stringer supporting bracket, that pains be taken to insure continuity of horizontal top stringer and bracket surfaces for smooth underneath or bottom surface slab formation. The problem is further complicated in that it is necessary to provide a reaction support for each cantilever stringer against both lateral and longitudinal tilting movement, as well as to avoid interference between the stationary part of each cantilever stringer and the moving parts adjacent to the regular form stringer. These considerations have been borne in mind in the production and development of the present stringer-supporting bracket and the latter, therefore, constitutes an effective adjunct to the present "Symons Slab-Shore" system and serves to extend the usefulness of such system.

The provision of a stringer-supporting bracket of the character briefly outlined above constitutes the principal object of the present invention. Numerous other objects and advantages of the invention, not at this time enumerated, will become readily apparent as the nature of the invention is better understood from a consideration of the following detailed description.

In the accompanying two sheets of drawings forming a part of this specification, one illustrative embodiment of the invention is shown.

In these drawings:

FIG. 1 is a fragmentary perspective view of a cantilever form structure employing two of the stringer-supporting brackets of the present invention;

FIG. 2 is an enlarged fragmentary perspective view of a portion of the cantilever structure of FIG. 1, the form panels being omitted and the view illustrating the manner

in which the present bracket serves to maintain end-to-side contiguity between one of the cantilever stringers and an adjacent regular form stringer; and

FIG. 3 is an enlarged exploded perspective view of the structure that is shown in FIG. 2.

Referring now to the drawings in detail and in particular to FIG. 1, one of the longitudinally extending, horizontally disposed stringers **10** of a concrete floor slab form structure is shown as being supported at one end by an adjustable height shore **12** and to this stringer there are attached in end-to-side relationship two horizontally disposed cantilever stringers **14** and **16** which, in turn, serve to support therebetween a rectilinear series of horizontal slab-supporting panels **18** on the upper surface of which the concrete of the cantilever form structure is adapted to be poured, it being understood that the two cantilever stringers and the panels **18** constitute said cantilever form structure. The stringers **14** and **16** likewise are supported, in part, by vertically adjustable shores **20**.

It will be understood that the various stringers, shores and panels constitute elements of a concrete floor slab form structure of the type that is shown and described in aforementioned Patent No. 3,130,470 as modified by the addition of the cantilever form parts. The end-to-side connection between each of the stringers **14** and **16** and the stringer **10** is effected by means of two of the supporting brackets **22** of the present invention.

For a full understanding of the stringer-supporting bracket of the present invention a general understanding of the nature of the various stringers **10**, **14** and **16** is essential. Reference may be had to aforementioned Patent No. 3,052,008 for a full understanding of the nature or design of these stringers, but for purposes of description herein, it is sufficient to state that each stringer includes a main body portion in the form of an I-beam (see FIG. 2) having a horizontal top flange **24**, a horizontal bottom flange **26**, and a vertical connecting web **28**. Vertically shiftable supporting rails **30** of angle piece construction extend horizontally along the opposite sides of the web **28** and are capable of being shifted between raised and lowered positions and of being secured in their raised positions by means of nut and bolt assemblies **32** which extend through holes in the vertical flanges **34** of the rails and also through arcuate slots **36** in the web **28**. The horizontal flanges **38** of the rails **30** are provided with small protuberances **40** at spaced regions therealong near the outer edges thereof for panel-retaining purposes as will be described presently.

It is also deemed necessary for a full understanding of the present stringer-supporting bracket that a general understanding of the nature of the panels **18** be had. These panels are of the "Steel-Ply" type and are fully disclosed and described in both of the above-mentioned patents. Briefly, however, each panel is of shallow tray-like design and includes a plywood facing **42** which is bounded by studding in the form of a rectangular steel frame including side members **44** and end members **46**. The end regions of the panels **18** are adapted to be supported on the horizontal flanges **38** of the rails **30** and the small protuberances **40** project upwardly into the confines of the shallow tray-like panels and cooperate with the end members **46** in preventing the ends of the panels from slipping from the rails during panel installation and removal operations. It will be understood that on the side of the regular panel-supporting stringer **10** that is remote from the panels **18** of the cantilever form structure, main form panels (not shown) will extend away from said stringer **10** in a direction normal to the direction of the panels **18**. It will also be understood that, in accordance with the principles of a conventional "Slab-Shore" system of building erection, after the entire form structure including the main floor slab-supporting panels and the cantilever slab-supporting panels **18** are in position, the upper faces of the various top flanges **24** and of the plywood facings **42** of the various panels lie in a common horizontal plane and, in combination with portions of the brackets **22**, present a smooth unbroken slab-supporting surface upon which wet concrete may be poured in order to provide or form the main floor and its cantilever extension of the concrete building which is being built by way of the "Slab-Shore" system and the hereinbefore described cantilever form structure.

Referring now, additionally, to FIG. 3, each of the stringer-supporting brackets **22** involves in its general organization a horizontally elongated platform part **50** which is T-shaped in transverse or cross section and embodies a vertical web **52** and a horizontal stringer-supporting upper flange **54**. But one bracket **22** will be described in detail and its platform part **50** is adapted transversely to underlie and to be attached to the bottom flange **26** of the regular panel-supporting stringer **10**. In addition, it is adapted longitudinally to underlie and support the adjacent end of the cantilever stringer **14** or **16** as the case may be.

The platform part **50** of each bracket **22** may be suspended from the bottom flange **26** of the regular panel-supporting stringer **10** by various means, as, for example, by bolting the same to such flange or by the use of a number of C-clamps if desired. However, an extremely effective connection between the platform part **50** and the stringer **10** may be attained by the use of a separable two-part connecting device such as is designated in its entirety by the reference numeral **60**, such device being of the type that is shown and described in United States Patent No. 3,144,105, granted on August 11, 1964 and entitled "Separable Two-Part I-Beam Connector." Reference may be had to such patent for a full understanding of this connecting device **60** and, for purposes of disclosure herein, the entire disclosure of such patent insofar as it is consistent with the present disclosure. is hereby incorporated and made a part of this patent application by reference thereto. Having thus embodied the disclosure of United States Patent No. 3,144,105 in the present application, it is deemed sufficient for purposes of discussion herein to state that the connecting device **60** includes a pair of counterpart sections **62** and **64**, which, as shown in FIG. 3, are shown as being in exploded relationship on opposite sides of the stringer **10**, and when assembled upon each other in operative connecting relationship with respect to the regular panel-supporting stringer **10** and the platform part **50**, fit closely together and serve to maintain said platform part **50** in an underslung position and so that it extends transversely of said stringer as clearly shown in FIG. 2. When in this nested and connecting relationship, the section **64** presents a channel void **66** which embraces the side of the bottom flange **26** that is labelled **26***a* while the section **62** presents a shoulder **68** which abuts against the outer edge of the bottom flange **26** that is labelled **26***b*. Similarly, the section **62** of the connecting device **60** presents a channel void **70** which embraces the side of the upper flange **54** that is labelled **54***a* while the section **64** presents a shoulder **72** which abuts against the outer edge of the side of the upper flange **54** that is labelled **54***b*. A vertical bolt **74** projects upwardly through a notch **76** in the section **64** and is received in a threaded hole or socket **78** in the section **62**. Similarly, a vertical bolt **80** projects downwardly through a notch **82** in the section **62** and is received in a threaded hole **84** in the section **64**. When the two bolts **74** and **80** are tightened, the sections **62** and **64** are drawn together and the platform part **50** of the bracket **22** is securely clamped to the regular panel-supporting stringer **10** in the predetermined desired relationship in which the various parts are illustrated in FIG. 2.

The platform part **50** is provided with an upstanding post structure **90** in the form of a flat strip of sheet steel which may have its lower end welded as at **92** to the upper flange **54** medially of the ends of the latter. The upper end of the post structure **90** has welded to it a

horizontally disposed filler plate **94** of rectangular configuration. This filler plate assumes a coplanar relationship with respect to the top flange **24** of the regular panel-supporting stringer **10** and abuts against the latter in edge-to-edge relationship when the bracket **22** is assembled upon or applied to said stringer **10**. A vertical flat stabilizing web **96** overlies the adjacent panel-supporting rail **30** of the stringer **10**, rests on the horizontal flange **38** of said adjacent panel-supporting rail, and underlies the top flange **24** of such stringer. The outer edge **98** of said stabilizing web **98** abuts against the adjacent side of the connecting web **28** of the regular stringer **10**.

The top flange **54** of the platform part **50** presents an upwardly facing platform surface **100** which is adapted to receive and support the adjacent end of the associated cantilever stringer **14** or **16** as the case may be, the stringer **16** being selected for illustration in FIG. 3. When in its supported position on the platform surface, the bottom flange **26** of the stringer **16** rests squarely upon the platform surface and is fixedly located thereon by means of two upstanding rivet-like locking protuberances **102** which project upwardly through small holes **104** which are formed in the bottom flange **26** and are located or disposed on opposite sides of the vertical web **28** by the cantilever stringer **16**. In order securely to clamp the stringer **16** on the platform surface **100**, a base anchor plate **106** underlies an overhanging end region of the upper flange **54** of the platform part **50** and cooperates with two clamping plates **108** which overlie the opposite side portions of the bottom flange **26** of the stringer **16**. Vertical bolts **110** pass upwardly through holes (not shown) in the end portions of the anchor plate **106** and vertically aligned holes in the clamping plates **108** and cooperate with nuts **112** in drawing the latter plates toward the base anchor plate **106** thereby clamping the contiguous or overlapping flanges **26** and **54** together as clearly shown in FIG. 2. In order to restrain the stringer **16** against lateral tilting movement, the upper portion of the adjacent end edge region of the stringer web **28** projects between a pair of spaced apart retaining ears **114** on the upper end of the post structure **90**. A horizontal bolt **116** passes laterally through registering holes in said upper portion of the adjacent end edge region of the web **28** and the two ears **116** and cooperates with a nut **118** in retaining the upper portion of the adjacent end region of the stringer **16** thus anchored to the post **90**.

In the application of the present stringer-supporting brackets **22** to a concrete floor slab form structure for the purpose of erecting on such form structure an outrigger cantilever form structure, the number of cantilever panel-supporting stringers required will, of course, first be ascertained and, thereafter, these stringers will be attached to one or more of the main or regular floor slab form stringers **10** at preselected locations. Assuming for purposes of discussion herein that only two of the cantilever stringers such as have been shown in FIG. 1 at **14** and **16** are required, these stringers will be applied to the main or regular stringer **10** so that they extend at an angle of 90° to such stringer and then applying the two sections **62** and **64** of the two-part connecting device **60** in position in the manner previously described and as more fully described in aforementioned United States Patent No. 3,144,105. After the bolts **74** and **80** have been tightened, the platform part **50** of the bracket **22** will be securely and firmly positioned on the stringer **10** so that the filler plate **94** abuts against the top flange **24** of the stringer **10** as shown in FIG. 2, with the post structure **90** extending vertically upwardly alongside the stringer **10** and with the platform surface **100** extending outwardly in a plane slightly below the general horizontal plane of the bottom flange **26** of the stringer **10**. The stabilizing web **96** will then abut against the vertical web **28** of the stringer **10**. The proximate or inner end of the cantilever stringer is then set upon the platform surface **100** by resting the inner end portion of the bottom flange **26** of this stringer on such surface and causing the two rivet-like protuberances **102** to pass upwardly through the holes **104** in the bottom flange **26** of the cantilever stringer. The web **28** of said cantilever stringer is then caused to enter between the two spaced apart ears **114** on the upper end of the vertical post structure **90** and the bolt **116** is thereafter applied to the ears and said web. The base anchor plate **106** and the two overlying clamping plates **108** are then secured in position so as to clamp the upper flange **54** of the platform part **50** to the bottom flange **26** of the cantilever stringer. Thereafter, the nut and bolt assemblies **100** and **112** are tightened, thus completing the attachment of the cantilever stringer to the stringer **10** in its proper 90° positional relationship.

When both of the cantilever stringers **14** and **16** have been applied to the main or regular stringer **10** in the manner set forth above, the various "Steel-Ply" panels **18** are installed upon the parallel stringers **14** and **16** in the manner set forth in aforementioned Patent No. 3,130,-470. Briefly, the application is made by loosening the nut and bolt assemblies **32** and allowing the panel-supporting rails **30** to assume their lowered positions. Lowering of the rails **30** affords the necessary clearance for insertion of the panel ends into the space which exists between the rails and the top flanges **25** of the two cantilever stringers **14** and **16**. After the ends of the panels have been inserted into place, the panels **10** are centered between the two top flanges **24** of the cantilever stringers **14** and **16** and the rails **30** are raised to lift the panels bodily so that their plywood facings **42** move into the general horizontal plane of these top flanges, as well as that of the top flange **24** of the regular stringer **10**. The nut and bolt assemblies **32** are then tightened and the cantilever floor slab form structure is complete and ready for concrete pouring operations.

It is to be noted that after assembly operations as described above have been completed, a substantially smooth unbroken planar surface is provided completely across all portions of the main or regular floor slab form structure and the cantilever floor slab form structure and concrete may be poured onto such planar surface. The horizontal filler plates **94** of the brackets **22** establish contiguity of concrete-supporting surface between the top flanges **24** of all of the stringers involved in the form structure, while the webs **96** and the ears **114** steady the post structures **90** and the stringers **14** and **16** so that there will be no shifting or creeping of the stringers or panels under the influence of the pressure that is exerted by the weight of the poured concrete.

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 attachment of the platform parts **50** of the brackets **22** has been described herein as being effected by means of the special I-beam connector **60** of U. S. Patent No. 3,144,105, other forms of connectors may be employed for effecting the attachment. 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 I claim as new and desire to secured by Letters Patent is:

1. In a concrete floor slab form structure adapted for use with a floor slab form for producing a main floor slab portion, an auxiliary slab form for producing a coplanar cantilever floor slab portion including, in combination, a horizontally disposed I-beam type panel supporting stringer associated with the main floor slab portion and a second and similar horizontally disposed cantilever stringer positioned in end-to-side contiguity and at an angle of 90° with repect to the first mentioned stringer, said stringers having coplanar top and bottom flanges respectively and interconnecting web portions, and an elon-

gated supporting bracket supporting the second mentioned stringer from the first mentioned stringer and preserving its positional relationship with respect thereto, said bracket having a flat upwardly presented surface which is coextensive with the bracket, a vertical post structure projecting upwardly from the central region of said surface and dividing the latter into a clamping surface on one side of the post and a platform surface on the other side thereof, means fixedly clamping said bracket to the first mentioned stringer so that said clamping surface underlies the bottom flange of the latter stringer with the post structure projecting upwardly alongside the first mentioned stringer and with the platform surface overhanging the outer side of the bottom flange of said first mentioned stringer, said second mentioned stringer having its bottom flange supported on said platform surface, a flat filler plate carried at the upper end of said post structure and interposed in coplanar relationship between the top flange of the first mentioned stringer and the top flange of the second mentioned stringer, and means fixedly clamping the bottom flange of the second mentioned stringer to the platform surface of the bracket, the top flanges of the first and second mentioned stringers and the filler plate presenting a substantially continuous unbroken horizontal concrete receiving surface.

2. In a concrete floor slab form structure, the combination set forth in claim **1**, wherein said supporting bracket is generally of T-shape in cross section and includes an upper horizontal flange and a depending vertical web, the transverse dimension of said upper flange being substantially equal to the transverse dimension of the bottom flange of the second mentioned stringer which rests thereon, and wherein said means for fixedly clamping the bottom flange of the second mentioned stringer to the platform surface of the bracket comprises an anchor plate beneath such bottom flange and overhanging the side of the bottom flange, a pair of clamping plates above said bottom flange, and nut and bolt assemblies extending between the clamping plates and anchor plate drawing the same toward each other and against said bottom flange.

3. In a concrete floor slab form structure, the combination set forth in claim **1** and including, additionally, a stabilizing web on said post structure adjacent to the upper end thereof and beneath said filler plate, said web bearing against the vertical web of the first mentioned stringer.

4. In a concrete floor slab form structure, the combination set forth in claim **3** and including, additionally, a pair of spaced apart ears on the post structure adjacent the upper end thereof and on the side of the post remote from the stabilizing web, said ears straddling the vertical web of the second mentioned stringer and serving to prevent lateral tilting of the latter stringer.

5. In a concrete floor slab form structure, the combination set forth in claim **3** and including, additionally, a pair of locking protuberances projecting upwardly from said platform surface on opposite sides of the longitudinal axis of the bracket, said second mentioned stringer being provided in the bottom flange thereof with small holes through which said locking protuberances project upwardly.

6. In a concrete floor slab form structure, the combination set forth in claim **5** and including additionally, a through bolt projecting through said spaced apart ears and the web of the second mentioned stringer.

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U.S. Cl. X.R.

249—18, 219; 287—189.35