

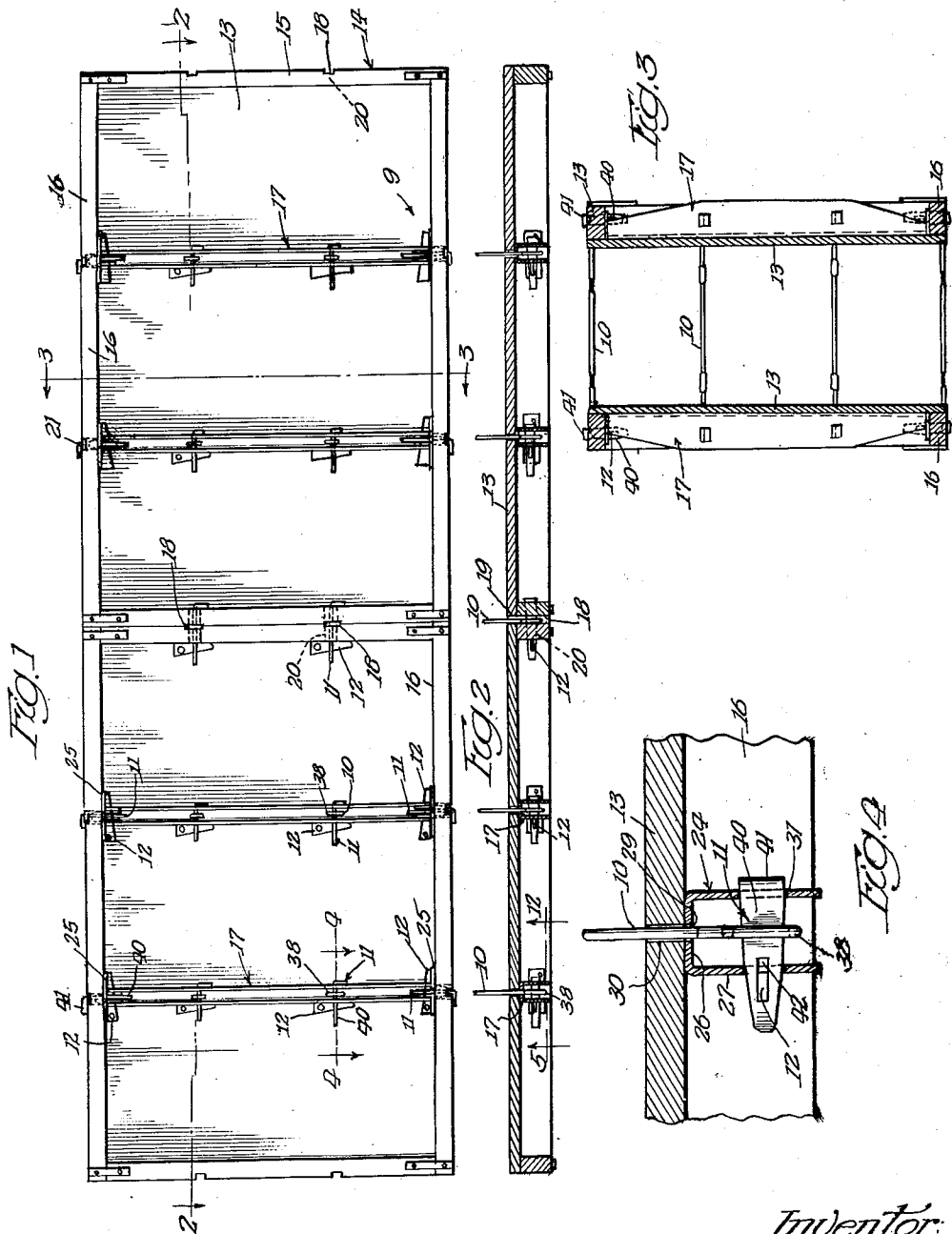
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CONCRETE WALL FORM

2,816,345

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2 Sheets-Sheet 1



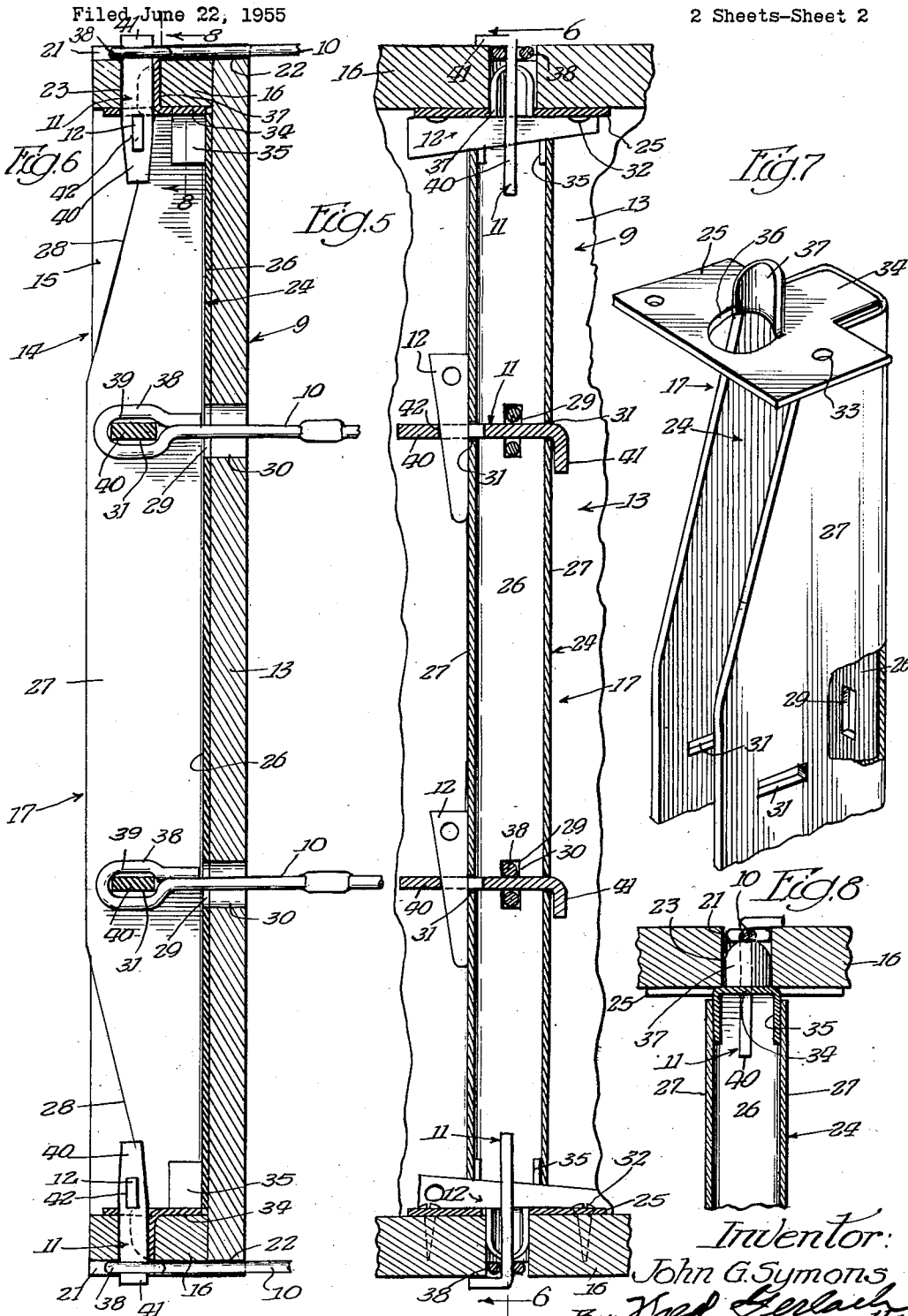
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**CONCRETE WALL FORM**

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**Application June 22, 1955, Serial No. 517,254**

**6 Claims. (Cl. 25—131)**

The present invention relates generally to wall forms. More particularly, the invention relates to that type of wall form which is adapted for use in the formation of a concrete wall and comprises: (1) a series of upstanding edge to edge panels in the form of rectangular facings and rectangular reinforcing frames on the marginal portions of the outer surfaces of the facings; (2) a second series of similar upstanding panels in opposed and spaced apart relation with the panels of the first series; (3) horizontally positioned combined tie and spreader members which extend between the two series of panels and have apertured ends that fit in horizontal notches in the outer side surfaces of the vertical and horizontal pieces of the reinforcing frames; (4) head and shank variety bolts which extend through the apertured ends of the combined tie and spreader members and registering holes in the notched portions of the vertical and horizontal pieces of the frames of the panels and have longitudinal slots in the free ends of their shanks; and (5) wedges which extend through the slots in the free ends of the bolt shanks and, when driven tightly into place, coact with the bolts to connect the panels to the ends of the combined tie and spreader members.

As evidenced by United States Patent No. 2,702,422, granted on February 22, 1955, and entitled "Concrete Wall Form," it has heretofore been proposed in connection with a concrete wall form of the aforementioned type to provide the reinforcing frames of the panels with crossbars which are in the form of metallic channel bars, extend between the notched and hole-equipped portions of certain oppositely disposed pieces of the reinforcing frames, are arranged so that the webs thereof are spaced outwards of the outer faces of the facings of the panels and the side flanges project in the direction of and abut against the outer faces of the facings, and embody at the ends thereof outwardly extending metallic plates which fit against the inner side surfaces of the certain oppositely disposed pieces of the reinforcing frames and have centrally disposed openings in registry with the inner ends of the shank-receiving holes in said certain pieces of the frames. In practice it has been found that a concrete wall form, the panel reinforcing frames of which have metallic channel bar variety crossbars of the aforementioned character, although efficient in operation, is subject to the objection that, due to the particular arrangement and design of the crossbars, the apertured ends of the combined tie and spreader members can only be connected to the marginal portions of the panels, i. e., the vertical and horizontal pieces of the reinforcing frames, and hence if the panels are to resist outward bulging or deflection during a concrete pouring operation, they must by necessity be made of comparatively small size. If the panels are of comparatively small size, it is necessary to use many panels in a large sized concrete wall form and the labor incident to installation is accordingly quite involved and expensive.

One object of this invention is to provide a concrete wall form which is an improvement upon, and obviates

the aforesaid objection to, previously designed wall forms and is characterized by the fact that the channel bar variety crossbars of the reinforcing frames of the panels are so designed and constructed that the apertured ends of the combined tie and spreader members may be connected to them at points inwards of their ends. By making it possible to connect the apertured ends of certain of the combined tie and spreader members to the intermediate portions of the crossbars as well as to connect the apertured ends of other of the combined tie and spreader members to the vertical and horizontal pieces of the panel reinforcing frames, the panels when in their operative or assembled position are tied together by the members not only marginally but also centrally and hence they may be made of comparatively large size without any likelihood of them bulging or deflecting outwards during a concrete pouring operation. By being able to employ panels of comparatively large size but fewer panels need be employed in connection with assembly of the form as a whole and the labor or work incident to assembling the form is thereby materially reduced.

Another object of the invention is to provide a concrete wall form of the type and character under consideration in which the channel bar variety crossbars of the panel reinforcing frames are arranged so that the webs thereof abut against the panel facings and their flanges project outwards away from the facings, embody in the webs thereof longitudinally extending slots which register with corresponding slots in the panels and permit the apertured ends of certain of the combined tie and spreader members to be inserted into the spaces between the outwardly projecting flanges, and also embody in the flanges oppositely disposed pairs of transversely extending slots which are located directly opposite to the longitudinal notches in the webs and are adapted to receive the shanks of the bolts that are used to anchor or connect the apertured ends of said certain combined tie and spreader members to the intermediate portions of the crossbars.

A further object of the invention is to provide a concrete wall form of the type and character under consideration in which the ends of the channel bar variety crossbars of the panel reinforcing frames have associated therewith separately formed outwardly extending metallic plates which are of novel construction and are connected to the ends of the channel bars in a particular and improved manner.

A still further object of the invention is to provide a concrete wall form which is generally of new and improved construction, may be fabricated or manufactured at a comparatively low cost, effectively and efficiently fulfills its intended purpose and, due to the particular design, construction and arrangement of the crossbars of its panel reinforcing frames, possesses extremely long life.

Other objects of the invention and the various advantages and characteristics of the present wall form will be apparent from a consideration of the following detailed description.

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

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote the corresponding parts throughout the several views:

Figure 1 is a side elevation of a concrete wall form embodying the invention;

Figure 2 is a fragmentary horizontal section taken on the line 2—2 of Figure 1 and illustrating in detail the manner in which the edge to edge panels of one of the series are clamped together;

Figure 3 is a vertical transverse section taken on the line 3—3 of Figure 1;

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Figure 4 is an enlarged horizontal section taken on the line 4—4 of Figure 1 and illustrating the manner in which the apertured ends of certain of the combined tie and spreader members are connected to the intermediate portions of the channel bar variety crossbars of the panel reinforcing frames;

Figure 5 is an enlarged vertical section taken on the line 5—5 of Figure 2 and showing in detail the manner in which the apertured ends of certain of the members are connected to the intermediate portions of the metallic crossbars;

Figure 6 is a vertical section taken on the line 6—6 of Figure 5 and illustrating the construction and design of the crossbars;

Figure 7 is a fragmentary perspective view of one end of one of the metallic channel bar variety crossbars; and

Figure 8 is a vertical section taken on the line 8—8 of Figure 6 and showing in detail the manner in which the separately formed plates at the ends of the crossbars are connected to the ends of the channel bars.

The wall form which is shown in the drawings constitutes the preferred form or embodiment of the invention. It is adapted for use in the formation of a concrete wall (not shown) and comprises two similar series of up-standing edge to edge siding panels 9, combined tie and spreader members 10 for holding the two series of siding panels against relative lateral displacement, and bolts 11 and wedges 12 for connecting the panels to the ends of the combined tie and spreader members. The two series of panels are spaced apart a distance corresponding to the desired thickness of the concrete wall to be formed therebetween and are adapted to have concrete in unset or plastic form poured between them for wall forming purposes. After setting or hardening of the concrete and removal of the wedges 12 and the bolts 11, the panels 9 are removed from the sides of the wall and the projecting ends of the combined tie and spreader members 10 are severed or broken adjacent to the sides of the concrete wall, as well understood in the art.

The panels 9 of the form are exactly the same in size, design and construction and each consists of a rectangular facing 13 and a rectangular reinforcing frame 14. Although the drawings illustrate the panels as being horizontally aligned, it is to be understood that the panels may be arranged in vertical alignment. The facings 13 of the panels 9 are preferably formed of plywood, although, if desired, plain or regular wood may be employed. They are of uniform thickness throughout their entire areas and have truly flat inner and outer faces. The rectangular frames 14 of the panels 9 serve to reinforce or strengthen the plywood facings 13. They are located directly outwards of the facings and consist of vertically extending pieces 15, horizontally extending pieces 16, and vertically extending crossbars 17. The vertically extending pieces 15 of the panel frames 14 are formed of wooden beams of rectangular cross section and fit against the end marginal portions of the outer surfaces of the panel facings 13. They are fixedly secured in place by screws, nails or other attaching devices (not shown) and are so positioned and arranged that their outer side surfaces are flush with the end edges of the facings. As shown in Figure 1 of the drawings, the outer side portions of the vertically extending pieces 15 of the frames 14 are provided with horizontal full width notches 18 for receiving and accommodating the ends of certain of the combined tie and spreader members 10. Although there may be any desired number of notches 18 in each of the vertically extending pieces 15, but two of such notches are shown and they are located equal distances from the ends of each vertically extending piece 15. The end margins of the panel facings 13 are provided with notches 19 which are aligned and in communication with the inner ends of the notches 18 and serve to accommodate the portions of said certain combined tie and spreader members that are directly inwards of the ends of such members. The ver-

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tically extending pieces 15 of the panel frames 14 are provided with horizontally disposed transversely extending open ended circular holes 20 which communicate with the central portions of the notches 18 and are adapted to receive the shanks of certain of the bolts 11 as described hereafter. The horizontally extending pieces 16 of the panel frames 14 are in the form of wooden beams and are the same in cross sectional size as the vertically extending pieces 15. They fit against, and are suitably fixedly secured to, the top and bottom marginal portions of the outer faces of the plywood facings 13 and are arranged so that the outer side faces thereof are flush with the top and bottom margins of the facings and their ends are in abutment with the ends of the vertically extending pieces 15. The outer side portions of the horizontally extending pieces 16 of the reinforcing frames are provided with horizontally disposed transversely extending full width notches 21 for receiving and accommodating the ends of other combined tie and spreader members 10. Although any number of notches 21 may be provided in each horizontally extending piece 16, but two are shown and they are located equal distances from the ends of each horizontally extending piece 16. The top and bottom margins of the panel facings 13 are provided with notches 22 which are aligned and in communication with the inner ends of the notches 21 and serve to accommodate the portions of said other combined tie and spreader members that are directly inwards of the ends of such members. The horizontally extending pieces 16 of the frames 14 are provided with vertically disposed transversely extending open ended circular holes 23 which, as best shown in Figures 5 and 6, communicate with the central portions of the notches 21 and are adapted to receive the shanks of other bolts 11 as hereinafter described. The crossbars 17 of the reinforcing frames 14 extend vertically and constitute the essential novel feature of the form. They reinforce the plywood facings 13 against outward bulging or deflection during use of the form for wall forming purposes and consist of metallic channel bars 24 and separately formed metallic plates 25 at the ends of the channel bars. Each panel 19 is illustrated as being provided with two vertically extending crossbars 17 although it is to be understood that a greater or lesser number of crossbars may be employed if desired. As shown in the drawings, the crossbars 17 are in vertical alignment with the notches 21 and the open ended holes 23 in the horizontally extending pieces 16 of the reinforcing frames 14. The metallic channel bars 24 that constitute parts of the crossbars 17 consist of vertically extending intermediate webs 26 and outwardly and vertically extending integral side flanges 27 along the side margins of the webs. The length of the channel bars 24 is such that they substantially bridge the distance between the inner side surfaces of the horizontally extending pieces 16 of the reinforcing frames 14. The webs 26 of the channel bars fit flatly against the outer faces of the panel facings 13 and are fixedly secured in place by way of rivets, screws or other attaching devices (not shown). The side flanges 27 extend at right angles to the webs 26 and project away from the facings 13. The outer corner portions of the side flanges 27 are cut away as at 28 in order that the depth of the ends of the side flanges is less than half that of the horizontally extending pieces 16 of the reinforcing frames 14. As best shown in Figure 6 the vertically extending open ended holes 23 are disposed outwards of the ends of the side flanges 27. The intermediate web 26 of each channel bar 24 is provided inwards of its ends and midway between the side edges thereof with vertically extending slots 29. Preferably, the slots 29 in each web correspond in number to the notches 18 in each vertically extending piece 15 and are horizontally aligned with the notches 18 as shown in Figure 1. The panel facings 13 are provided with vertically extending slots 30 which register and communicate with the slots 29 in the webs of the crossbars 24. The slots 29 and 30 permit the ends

of other combined tie and spreader members 10 to be inserted in the spaces between the side flanges 27 of the channel bars as best shown in Figure 6. The side flanges 27 of the channel bars are provided with pairs of horizontally extending slots 31 which are horizontally aligned with the central portions of the slots 29 and are adapted to receive the shanks of other bolts 11 as described hereafter. The metallic plates 25 of the crossbars 17 are flat and abut against the inner side surfaces of the horizontally extending pieces 16 of the reinforcing frames 14. They extend horizontally and project outwards beyond the ends of the channel bar side flanges 27. Screws 32 extend through holes 33 in the end portions of the plates 25 and into the horizontally extending pieces 16 of the frames 14 and serve fixedly to connect or secure the plates 25 to the horizontally extending pieces 16. The inner central portions of the plates 25 are provided with flat integral extensions 34 which fit within, and are shaped conformably to, the ends of the channel bars 24 and embody at the sides thereof integral right angle tongues 35. The latter project away from the horizontally extending pieces 16 of the reinforcing frames 14 and fit against, and are welded to, the end portions of the inner surfaces of the side flanges 27. The central portions of the plates 25 are provided with holes 36 which are in registry with the inner ends of the open ended holes 23 in the horizontally extending pieces 16 of the frames 14 and are adapted to receive the shanks of the bolts 11 that pass or extend through the holes 23. The plates 25 are provided on the central portions thereof with integral parts 37 which project at right angles to the plates and away from the metallic channel bars 24, are arcuate in cross section, fit within the inner side portions of the holes 23, and are adapted slidably to receive the inner side portion of the shanks of the bolts that pass through the holes 23. The plates 25 are preferably in the form of stampings. The parts 37 are joined to the portions of the plates that define the inner portions of the holes 36 and are formed of the metallic stock which is punched or stamped from the plates 25 in connection with formation of the holes 36. They coact with the screws 32 in holding the crossbars 17 in place.

The combined tie and spreader members 10 extend horizontally between the two opposed spaced apart series of panels 9. They are in the form of steel rods and have at the ends thereof horizontally elongated closed loops 38 which define apertures 39. In connection with assembly of the wall form certain of the combined tie and spreader members are manipulated so that the apertured ends thereof fit within the notches 18 and register with the horizontally extending open ended holes 20 in the vertically extending pieces 15 of the frames 14; other combined tie and spreader members are manipulated so that the apertured ends thereof fit within the notches 21 and register with the vertically extending holes 23 in the horizontally extending pieces 16 of the reinforcing frames 14; and the remaining combined tie and spreader members are manipulated so that the apertured ends thereof project through the slots 29 and 30 into the spaces between the side flanges 27 of the channel bars 24 and register with the pairs of transversely extending slots 31 in the side flanges 27.

The bolts 11 are preferably in the form of metallic stampings and embody flat tapered shanks 40 and integral right angle heads 41 at the large ends of the shanks. The shanks of the bolts are adapted to extend through the apertures 39 in the closed loops 38 at the ends of the combined tie and spreader members 10. The small or free ends of the shanks of the bolts 11 are provided with longitudinally extending slots 42 (see Figures 4 and 5). The bolt shanks that extend through the apertured ends of the combined tie and spreader members that fit in the notches 18 are adapted also to extend through the horizontal holes 20 in the vertically extending pieces 15 of the reinforcing frames 14 as shown in Figure 1. The

bolt shanks that extend through the apertured ends of the combined tie and spreader members that fit in the notches 21 are adapted also to extend through the vertically extending holes 23 in the horizontally extending frame pieces 16 as shown in Figures 1, 5 and 6. The bolt shanks that extend through the apertured ends of the combined tie and spreader members that project through the slots 29 and 30 into the spaces between the side flanges 27 of the channel bars 24 are adapted also to extend through the pairs of slots 31 in the channel bar side flanges as best shown in Figure 5.

The wedges 12 of the concrete wall form are formed of comparatively heavy stamped metal and are adapted to extend through the longitudinally extending slots 42 in the small ends of the shanks of the bolts 11. When driven into place the wedges 12 coact with the heads 41 to hold the bolts 11 against longitudinal displacement in either direction. The wedges which are used in connection with the bolts that extend through the horizontal holes 20 in the vertically extending pieces 15 of the reinforcing frames 14 fit slidably against the inner side surfaces of certain of the vertically extending pieces 15 and coact with said bolts to clamp the panels 9 in edge to edge relation. The wedges which are used in connection with the bolts that extend through the vertically extending holes 23 in the horizontally extending pieces 16 of the frames 14 extend horizontally and fit slidably against the exposed side surfaces of the plates 25 as shown in Figures 5 and 6. The wedges that are used in connection with the bolts that extend through the pairs of slots 31 in the side flanges 27 of the channel bars 24 extend vertically and fit slidably against the outer side surfaces of certain of the side flanges as best shown in Figure 5.

In assembling the form, the panels 9 are positioned in two opposed spaced apart series. Thereafter, the combined tie and spreader members 10 are positioned horizontally and are then manipulated as hereinbefore described. After proper manipulation of the combined tie and spreader members, the bolts 11 are inserted into place and then the wedges 12 are driven through the slots 42 in the small ends of the tapered shanks 40 of the bolts. As soon as the form is assembled, concrete in unset or plastic condition is poured into the space between the two series of panels. Upon hardening or solidifying of the concrete, the panels are dismantled by removing the wedges 12 and then sliding the bolts 11 lengthwise in the direction of their heads 41 until the shanks are withdrawn from the apertures 39 in the ends of the combined tie and spreader members 10. As soon as the wedges and bolts are removed, the panels are free and hence may be removed by shifting them away from the sides of the wall. After removal of the panels from the sides of the wall, the projecting loop-equipped ends of the combined tie and spreader members 10 are severed or broken adjacent to the sides of the wall.

The herein described concrete wall form effectively and efficiently fulfills its intended purpose and is characterized by the fact that the crossbars 17 are so designed and constructed that it is possible to cross-connect the central portions of the panels as well as the marginal portions of the panels by way of the combined tie and spreader members to the end that the panels are not likely to bulge or deflect outwards in connection with a heavy concrete load and hence may be made of comparatively large size. The crossbars 17 serve effectively to reinforce the central portions of the plywood facings 13 and impart long life to the panels. The flat outwardly extending right angle plates 25 at the ends of the crossbars 17 serve, because they include the tongue-equipped extensions 34, to prevent inward bending or distortion of the side flanges 27 of the channel bars 24. In view of the particular design and construction of the frame crossbars 17, the form as a whole may be produced at a comparatively low cost.

The invention is not to be understood to be restricted to the details set forth since they may be modified within

the scope of the appended claims without departing from the spirit and scope of the invention.

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

1. In a concrete wall form, the combination with a composite panel adapted to be placed in an upstanding position and edge-to-edge relation with like panels and including a flat rectangular facing having extending therearound and secured to one face thereof a marginal rectangular frame in the form of a pair of vertical oppositely disposed side members and a pair of horizontal oppositely disposed side members, and a channel bar extending between and substantially bridging one pair of side members of the frame, fitting against the facing, and arranged so that its side flanges extend at right angles to said facing, of a pair of metal stampings associated with the ends of the channel bar respectively and comprising flat metal plates fitting against and secured to the adjacent portions of the inner faces of said one pair of opposed side members, said plates being provided in the planes thereof with lateral extensions extending across and serving to close the ends of the channel bar, each of said lateral extensions being provided with a pair of oppositely disposed tongues which fit against, are welded to, and are in interlocked relation with the side flanges of the channel bar, said tongues extending at right angles to the extensions.

2. In a concrete wall form, the combination with a composite panel adapted to be placed in an upstanding position and edge-to-edge relation with like panels and including a flat rectangular facing having extending therearound and secured to one face thereof a marginal rectangular frame including a pair of oppositely disposed side members with transversely extending open-ended bolt-receiving holes intermediate their ends, and a channel bar extending between and substantially bridging said side members of the frame, fitting against the facing, and arranged so that its side flanges extend at right angles to said facing and its ends are in alignment with the bolt-receiving holes, of a pair of metal stampings associated with the ends of the channel bar respectively and comprising flat metal plates fitting against and secured to the adjacent portions of the inner faces of said oppositely disposed side members and having holes in registry with said bolt-receiving holes, said plates being provided in the planes thereof with lateral extensions extending across and serving to close the ends of the channel bar, each of said lateral extensions being provided with a pair of oppositely disposed tongues which fit against and are in interlocked relation with the side flanges of the channel bar.

3. In a concrete wall form, the combination with a composite panel adapted to be placed in an upstanding position and edge-to-edge relation with like panels and including a flat rectangular facing having extending therearound and secured to one face thereof a marginal rectangular frame in the form of a pair of vertical oppositely disposed side members and a pair of horizontal oppositely disposed side members, and a channel bar substantially bridging the distance between one pair of opposed side members of the frame and arranged so that

its web portion abuts against the said one face of the facing and its side flanges project outwardly therefrom, said one pair of side members being formed with holes that are aligned with the ends of the channel bar and are adapted to receive therethrough tie rod-retaining members which cooperate with transverse wedges for clamping purposes, the ends of the channel bar being of reduced extent to afford clearances for said wedges, of a pair of metal stampings associated with the ends of the channel bar respectively and comprising flat metal plates secured to the inner faces of said one pair of opposed side members and fitting thereagainst, said plates being formed with holes in alignment with the holes in the adjacent side members, arcuate flanges projecting laterally out of the planes of said plates and extending into the holes in said one pair of side members, lateral extensions formed on said plates in the planes thereof and serving to close the ends of the channel bars, and a pair of laterally extending tongues formed on each extension and fitting against and welded to the side flanges of the channel bar adjacent an end of the latter to lock the plate and channel bar against relative lateral displacement.

4. In a concrete wall form, the combination with a composite panel adapted to be placed in an upstanding position and in edge-to-edge relation with like panels and including a flat rectangular facing having extending therearound and secured to one face thereof a marginal rectangular reinforcing frame including a pair of oppositely disposed side members with transversely extending open-ended bolt-receiving holes intermediate their ends, and a channel bar extending between and substantially bridging said side members and positioned so that the ends thereof are in alignment with said bolt-receiving holes, of a pair of separately formed substantially flat plates associated with the ends of the channel bar respectively, fitting against the adjacent portions of the inner faces of said side members, and having holes in registry with the bolt-receiving holes in said side members, each of said plates being provided with a pair of spaced apart substantially parallel tongues arranged in such lapped relation with the side flanges of the channel bar as to lock the plate and channel bar against relative lateral displacement.

5. In a wall form, the combination set forth in claim 4 wherein the tongues on each plate are formed integrally with the plate and extend away from the latter.

6. In a concrete wall form, the combination set forth in claim 4 wherein the tongues on each plate are formed integrally with the plate and extend at right angles to the plane of the plate.

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