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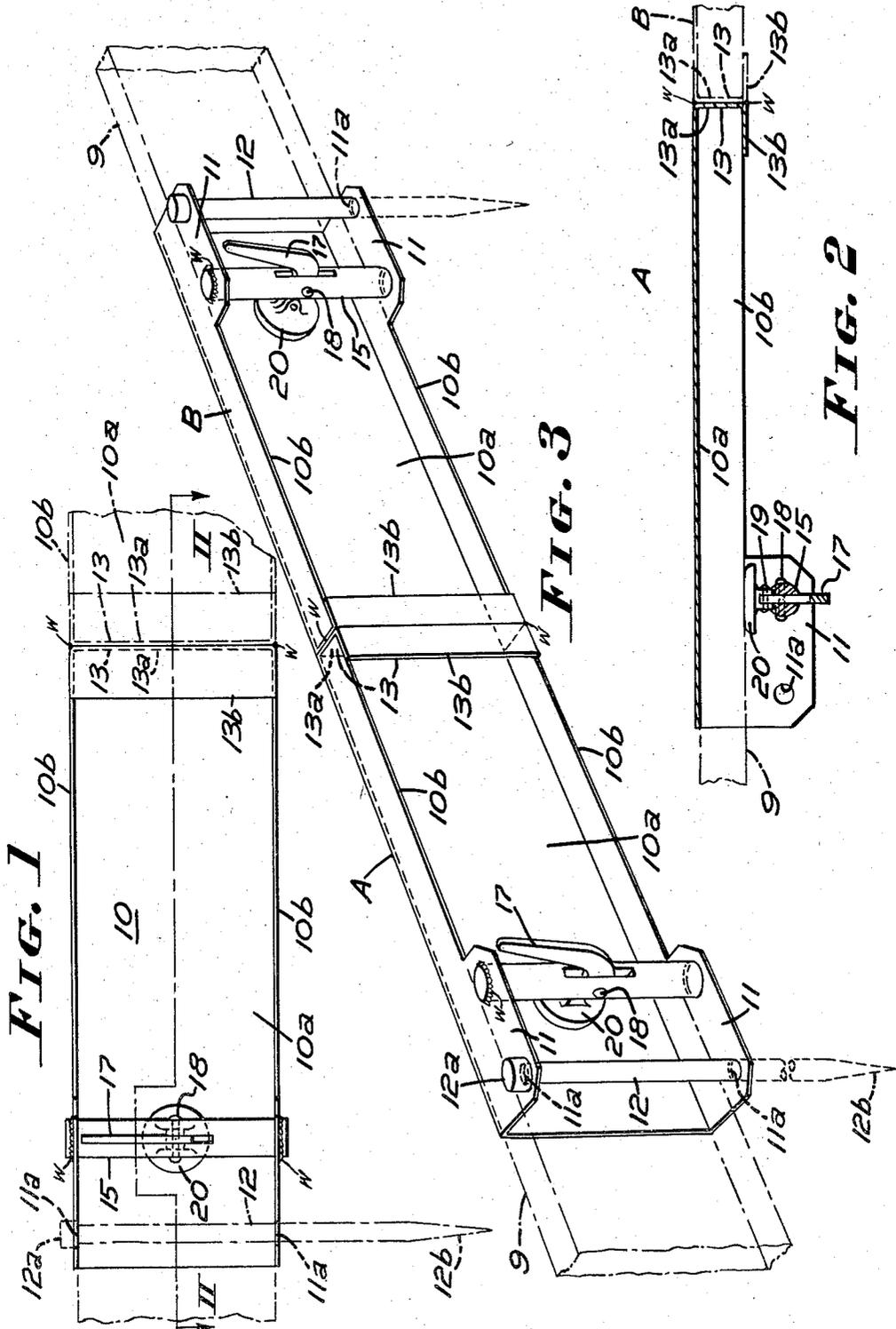
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CONCRETE FORM CONSTRUCTION

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**CONCRETE FORM CONSTRUCTION**

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9 Claims. (Cl. 25—118)

This invention relates to the installation and use of molds or forms such as for concrete or cement.

One phase of my invention relates to the provision of a mold course or form construction which will facilitate casting or molding shapes, particularly in the building construction field.

Previous to my invention, it has been the more or less generally accepted practice to use wood members in constructing forms, molds, or shapes for use in holding concrete and cement in position during pouring, for shaping it while in position, and for holding it in position while it is given an opportunity to properly dry out or set.

My investigations in this field have indicated that there have been many attempts to provide improved form structures for special purpose employment and to provide them with means to facilitate their assembly and disassembly or knock-down. Metal members have been used with wood members and metal members have been used alone, but all of the systems previously known or in use have had common faults, namely, the high cost of their installation, and their lack of full adaptability for various conditions that may be met in the field. However, a factor which I found to be of great importance is that of time consumption, both in the initial installation of the forms as well as in their disassembly.

My experience has been that for an average building in the nature of a home, for example in the \$10,000 to \$25,000 range, and for which footer courses are to be built, it takes two men about two to two and one half days to build and assemble the necessary forms for the pouring operation. Then, too, I have found that there is a waste of costly lumber in such an installation.

It has thus been an object of my invention to provide a form construction that will permit the use of wood footer or form members, but in such a manner that they will be subjected to a minimum of wear and tear and need no longer be nailed in position;

Another object of my invention has been to devise a solution to the current problem as to time and expense involved in the preliminary step of assembling or constructing concrete forms and in the final step of removing them;

A further object of my invention has been to devise an adaptor unit for a form construction that is flexible enough in its utilization and adaptation to meet all requirements as to various types of casting installations, that will make possible the employment of connecting or principal lengths or heights of footer, form, wall board or side members of wood construction, and that will properly support and quickly lock and unlock connecting members;

A still further object of my invention has been to provide a form member unit which will serve in a practical manner both as an anchoring and a connecting unit and, as to the latter, may be securely or pivotally

2

connected to adjacent units to provide a side or end connector construction, corner joints, as well as vertical risers and adaptors for horizontal and vertical projections of the form assembly;

5 These and other objects of my invention will appear to those skilled in the art from illustrations and descriptions thereof as hereinafter set forth.

10 In the drawings, Figure 1 is a vertical side view in elevation, taken from an outer or exposed side of a basic unit or member constructed in accordance with my invention; dot and dash lines indicate how an adjacent unit or member may be positioned with respect thereto, how a footer member may be carried thereby, and how the unit may be anchored in position to the ground;

15 Figure 2 is a horizontal section taken along the line II—II of Figure 1 and on the same scale as such figure;

20 Figure 3 is a perspective view in elevation along a pair of connected units of my invention that are employed to provide a side or end connector construction for a form assembly or construction; this figure is on the same scale as Figures 1 and 2;

25 Figure 4 is a perspective view looking downwardly towards one corner of a form construction or assembly that utilizes spaced-apart and opposed forms or supports that are constructed and utilized in accordance with my invention; this view is on a slightly smaller scale than Figures 1 to 3;

30 Figure 5 is a top plan view of the structure of Figure 4, on the same scale as such figure, but illustrating the structure in a partially folded and end-disconnected relationship as to its unit parts C and D;

35 Figure 6 is a side perspective on the same scale as Figure 1 and illustrating a riser assembly or construction of my invention;

40 Figure 7 is an enlarged end section, see Figure 3, to illustrate a clamping or securing means of my invention employed for releasably-holding or clamping a footer member in position;

45 Figure 8 is a view similar to Figure 7, but illustrating a modified form of clamping or releasable holding means;

50 And, Figure 9 is a reduced top plan fragment showing opposed form members that are assembled or constructed in accordance with my invention; this view illustrates how the forms may be employed in molding or casting concrete.

55 I discovered that it is advantageous to make maximum possible use of wood members or footers in concrete construction form work, but that the members should be utilized in such a manner that they are not damaged by driving in and pulling out nails. I have found it is necessary to hold such members securely in position, but that such holding action should be accomplished with a minimum of effort as well as released with minimum of effort, and without damage to the footer members.

60 Since the forms are to be secured to the ground, I found it to be advantageous to provide a master or basic form of adaptor or connector unit that acts both as a connector and as an anchor for members of the form construction. Without disturbing its functions in this connection, I additionally constructed the unit, so that it may be employed with other units to form a hinge type of joint, a riser assembly, as well as a side and end connector for end-to-end positioned longitudinal lengths of connecting members, such as wood footers. A further factor of importance is that the unit construction and its parts have been so devised as to minimize any danger of jamming, damage or distortion; at the same time, I keep the functions as simple as possible and provide a full effectiveness and positiveness of utilization.

70 Particularly referring to Figures 1 to 3 of the draw-

ings, a basic form of connector or adaptor unit is shown as employing a structural metal member 10, such as a steel channel-shaped member. The unit 10 has an upright web wall or portion 10a and a pair of top and bottom side-edge flange or rim portions 10b. As shown particularly in Figures 2 and 9, the web portion 10a has a smooth, uninterrupted side or inner face which is adapted to abut upon or face material 8 (such as concrete) which is being formed. The other side or face of the web portion 10a has the top and bottom ledges or edge flanges 10b that project outwardly or forwardly to define top and bottom guide, side or positioning rails or portions for longitudinal form, moldboard or footer lengths or members 9. End portions of the footer lengths 9 (see Figures 3 and 9) are slid endwise into and out of position with respect to the units 10 to be securely and non-pivotally carried in position therewithin and therealong.

An end stop, cross-over piece or hold-down member 13 may be provided for each unit, is of angle shape, and may be secured in position against inner end portions or edges of the web wall 10a and flanges 10b. A back, end or cross flange portion 13a is employed to close off spacing between the flanges or rims 10b, and serves as an abutment stop for the end portion of a footer or form member 9. An outer or front flange 13b is adapted (as shown in Figure 3) to rest upon side edges of the top and bottom flanges 10b, and to form a lap-over retainer or hold-down for the end portion of the form member 9 which is to be held in position. Thus, the end stop member or piece 13 serves not only as a limit stop, but also as a hold-down and pivot-preventing member, to effectively support the footer member 9 along the structural member 10, and to hold it in place in cooperation with clamping means 20 or 20'.

At its other end, the structural member 10 is provided with a positioning means made up of clamping and anchoring means. A pair of top and bottom, opposed ear or tab portions 11 project inwardly on the same planes as or as projections of the flanges 10b, but for an additional distance to support an anchor or drive pin or member 12 for the anchoring means, and a mounting bar or rod, support standard or cross member 15 for the clamping means. As shown, the tabs 11 have opposed open portions or holes 11a therethrough adjacent outer ends of the unit structure to guide and support the drive pin 12. Pointed end 12b of the pin 12 is driven into the ground as an anchor by striking its head 12a. Since the drive pin 15 projects between flanges 10b and between and through upper and lower flanges or tabs 11 of the structural member 10, and since it is located closely adjacent to the clamping structure, it provides a maximum effectiveness of anchoring with a guided, maximum stability of its mounted relationship.

The clamping means, as shown in Figure 7, comprises a cross or upright bar, rod, support member or standard 15 which extends through the tabs 11, opposite to the ends thereof through which the drive pin 12 projects. The support standard 15 is secured as an integral part of the unit by weld metal w. The support standard 15 has a centrally-located mount or bearing part 16 which, as shown in Figure 7, is reinforced and is bifurcated to operatively carry a throw arm 17 by means of a pivot pin assembly 18.

The throw arm 17 has a front arm or handle portion 17a and a back cam, latch or clamp arm portion 17b which is disposed in an angular relationship with respect to the handle portion 17a (see Figure 7). A clamping means, pressure or abutment plate 20 is pivotally mounted on or carried by the outer end of the arm portion 17b to be moved, as shown from an unlatched or unclamped position (see the dotted position of Figure 7) to a secure holding, clamping and abutting position (see the full line position of Figure 7).

In the clamping position, the clamping means or pres-

sure plate 20 is tightly held or clamped against an outer side of an end portion of the form member, mold board or footer member 9. The pressure exerted between the web 10a of the structural member and the cross member 15 by the arm 17, and between the pivot mounting 18, end pivot connection 19 (of portion 17b to mount lug portion of the plate 20), and the pressure plate 20, maintains the clamping relationship. At this time, the operating arm portion 17a may be in an upwardly-inclined relationship (see Figure 7). To release the arm 17, manual force is applied downwardly to the handle portion 17a to raise the portion 17b about pivot mount 18. At this time, the pressure plate 20 is released from tight abutment with the form member 9 and is free to swing about its pivot pin connection 19.

As shown, the handle 17a of the throw arm 17 is manually moved to an "up" position (Figure 7) to apply, clamp or lock pressure plate 20 in a pressing or clamping position against an outer side of the end portion of the form member 9. In this manner, the flat sides of the member 9 are clamped between web portion 10a and pressure member 20. To release the member 9 for its slide-out removal, it is only necessary to manually move the handle 17a of the throw arm to its "down" position.

In the modified construction of Figure 8 of the drawings, the support standard or cross member 15 has a centrally-located, rotatable, mounting sleeve or collar part 22. A clamp bar or operating swing arm 21 is secured by weld metal w to form an integral part with the sleeve 22. The bar or arm 21 has a wedge shoulder, clamping or pressure plate portion 21a, a laterally-offset, intermediate connecting portion 21b, and an operating handle portion 21c. The clamping portion 21a has a beveled end 21d to facilitate a horizontal swing of the arm 21 between an inner position in which it is in clamping and holding engagement with footer 9 (as shown by the inner or dot and dash position) and an outer position in which it releases the footer 9 (as shown by the outer or right-angular position of the full lines of Figure 8).

The arm 21 may be of somewhat flexible steel bar or strap material. When used as shown in Figure 8, it tends to "snap" into and out of its final holding position where the portion 21a lies substantially flat upon or parallel to the side of the footer 9. Since the full length of the arm 21 lies substantially parallel along the footer 9 and within the metal member 10 when the footer is being clamped, the arm is out-of-the-way from the standpoint of striking and accidentally releasing it.

As shown in Figures 1 to 3 of the drawings, the basic connector unit 10 of my construction may be employed with another similar unit, so as to provide two, adjacent in-line, end-to-end positioned units A and B that together define a unitary connector and ground anchor unit construction. That is, by welding the units A and B together along their opposed and abutting back flange portions 13a, an integral connector construction is provided that, as shown in Figure 1, may be employed as a unit to join, hold, and support or anchor a pair of timber form members 9 in an end-to-end assembled position with each other. This provides an especially stable and practical construction, since it is anchored by drive pins 12 at its opposite outer ends and clamps the form members 9 adjacent to the anchoring.

The upper and lower or side edge flanges 10b and the end flange 13a form or define a three-sided guide limit edge enclosure which is only open at one end or towards the inner or back end portions of the unit. In addition, the forward end portion of each form member 9 is held down by flange 13b in cooperation with clamping means, pressure plate or face portion 20 or 20', so that no tilting action is permitted, either vertically or horizontally of the assembly.

In Figures 4 and 5, I have illustrated how two basic units C and D of my construction may be employed to define or form a corner or joint construction. All

that is necessary is to provide aligned holes 25 through the upper and lower flanges 10b of each structural member 10 of channel form. These holes 25, as shown in Figure 4, serve as pivot points or hinge portions for the two members C and D when their slots 25 are aligned and headed anchor pin 26 is pushed therethrough. The pin has a point 26b that may be driven into the ground by striking its head 26a.

To reinforce the hinge connection between the structural members 10 of units C and D, and to provide for locking the members in a desired angular relationship with respect to each other, see Figure 4, I have provided a pair of scissor-like fold arms or hinge members 27. The arms 27 are, at their inner ends, pivotally secured by bolt and nut assemblies 28 to the members 10 at their upper flanges 10b. The inner ends of the arms 27 are pivotally connected together by nut and bolt assembly 29.

It will be noted that the pivot assemblies 28 are intermediate the length of the units C and D of Figure 5, behind but somewhat adjacent to the connection joint provided by the cooperating action of the holes 25 and pin 26. As shown particularly in Figure 4, the arms 27 may be of metal angle-piece construction and the flange portion of one of them (the lefthand arm of Figure 4) may be cut away to permit the pivot action.

It may be noted, as indicated both in Figures 4 and 9, that the units of the form assembly on both sides of the material or concrete 8 that is being poured, formed, and set are of the same construction. It will be noted, however, that the smooth or form sides or faces of each assembly face each other and towards the material 8. No cross braces or connectors between the opposed form assemblies is shown or needed, and the space between the form assemblies is maintained substantially clear for overhead pouring, inspection, and work.

I have previously shown how a basic connector unit A, comprising a structural member 10, may be employed as a side or end connector by assembling two of them (A and B) in an end-to-end relationship. I have also shown how the basic members 10 (C and D) may be pivotally connected in an angular or hinge swing relationship with each other to provide a corner or joint for a form construction or assembly. I will now show how a basic member 10 and its basic unit construction may be utilized to provide risers, as well as offsets for the form assembly or construction. As to the latter, see particularly Figure 6 of the drawings.

I employ a basic unit E in an angularly-positioned and secured relationship with respect to an adjacent basic unit F. In this arrangement, top or side flange 10b of the unit F is welded or secured to the back end member or piece 13 of the unit E. The unit F may be connected in an end-to-end relationship with an adjacent riser unit F in the manner indicated by the members A and B of Figure 3, or the unit F may be employed to clamp or secure a connecting form member or footer 9 therebetween. If the latter is done, I prefer to eliminate inner end pieces 13 as to the units F and to secure or weld-on outer end limit pieces or cross members 14 which are shown by dot and dash lines in Figure 6.

Also if desired (see the upper portion of Figure 6), a unit E may be secured at its outer end at right angles to the bottom unit F in a similar manner to the mounting and securing of the two lower units E and F. The particular method of connecting the upper and lower unit assemblies will depend upon a number of considerations, such as the desired riser height to be attained, whether or not any wood or connecting, major length form members 9 are to be employed in the riser section, etc. In any event, it is apparent that my basic unit utilizes the structural member 10 as well as the forward, end-positioned, anchoring and clamping part. The unit is thus readily adaptable to meet any type of require-

ment which may be met in the field. It will also be apparent that the length portions of the members 10 may be bent to conform to any desired contour of assembly.

What I claim is:

1. A connector unit construction for a material-forming assembly that includes a form member, a longitudinally-projecting structural member having a web portion provided with a substantially smooth inner face to abut material being formed, said member having forwardly-extending longitudinal side edge flange portions along said web portion to guide an end portion of a form member along the structural member, opposed forwardly-extending mounting tab portions, ground anchor means carried by said tab portions, a quick-release clamping means operatively carried by said tab portions adjacent to said anchor means and adapted to clamp the form member against said web portion and between said opposed flange portions of the structural member; said quick-release clamping means comprising, a cross member mounted on said tab portions, a throw arm pivotally mounted on said cross member, a pressure clamping means, and pivot connections between said pressure clamping means and said arm to move said pressure clamping means into and out of pressure abutment with the form member when said throw arm is actuated.

2. A connector construction for a material-forming assembly that includes a longitudinal form member, at least one structural member; said structural member having a web wall to, on its one side, abut the material being formed and to, on its other side, abut a side of an end portion of the form member; a pair of transversely spaced-apart and forwardly-extending flanges along side edges of said web wall to cooperate with said web wall and guide the end portion of the form member therebetween along said web wall of the structural member, a positioning means on said structural member to anchor the structural member in position and clamp the form member in position with respect to said web wall and flanges, said positioning means having a pressure means to clamp the end portion of the form member against said web wall, said positioning means having a pair of spaced-apart tabs, a drive pin projecting through and carried by said tabs to anchor the structural member, said positioning means having a support and reinforcement member secured to and extending between said tabs, said pressure means being operatively carried by said support member and having a clamping portion, and said pressure means having means to move said clamping portion to and from said web wall and into and out of clamping abutment with the end portion of the form member.

3. A connector construction for a material-forming assembly that includes a longitudinal form member, at least one structural member; said structural member having a web wall to, on its one side, abut the material being formed and to, on its other side, abut a side of an end portion of the form member; a pair of transversely spaced-apart and forwardly-extending flanges along side edges of said web wall to cooperate with said web wall and guide the end portion of the form member therebetween along said web wall of the structural member, a positioning means on said structural member to anchor the structural member in position and clamp the form member in position with respect to said web wall and flanges, said positioning means having a pressure means to clamp the end portion of the form member against said web wall, said positioning means having a pair of spaced-apart tabs, a drive pin projecting through and carried by said tabs to anchor the structural member; said pressure means having a throw arm operatively mounted on the structural member, and having a pressure face portion carried by said throw arm, and said throw arm having means to clamp said face portion in position between the end portion of the form member and the structural member.

4. A connector construction for a material-forming assembly that includes a longitudinal form member, at least one structural member; said structural member having a web wall to, on its one side, abut the material being formed and to, on its other side, abut a side of an end portion of the form member; a pair of transversely spaced-apart and forwardly-extending flanges along side edges of said web wall to cooperate with said web wall and guide the end portion of the form member endwise therebetween along said web wall of the structural member, a positioning means on said structural means to anchor the structural member in position and clamp the form member in position with respect to said web wall and flanges, said positioning means having a pressure means to clamp the end portion of the form member against said web wall; said pressure means having a throw arm operatively mounted on the structural member, having a pressure plate portion carried by said throw arm, and said throw arm having means to clamp said pressure plate portion in position between the end portion of the form member and the structural member; said positioning means having a support mounting in a spaced relation with said web wall, and said throw arm being adjustably carried by said support mounting.

5. A connector construction as defined in claim 4 wherein, said pressure plate portion has a pressure face for clamping engagement against the form member to hold it in position with respect to said web wall, said pressure plate portion is secured to an inner end portion of said throw arm, said means to clamp said pressure plate portion has a collar turnably carried by said support mounting, and the inner end portion of said throw arm is offset and secured to said collar means for adjustable movement between an outer position in which said pressure face is out of clamping engagement with the form member and an inner substantially parallel position with respect to said web wall in which said pressure face is in clamping engagement against the form member.

6. In a connector unit construction for a material-forming assembly that includes a longitudinal form member, at least one structural member; said structural member having a web wall to, on one side, abut the material being formed and to, on its opposite side, abut an end portion of the form member; a pair of transversely spaced-apart and forwardly-extending flange portions along side edges of said web wall to cooperate with said web wall and guide the end portion of the form member endwise therebetween along said web wall of the structural member; a positioning means at an end portion of the structural member, having means to anchor the structural member in position, and having means to clamp the end portion of the form member in position relative to said web wall and flanges; said clamp means having a pressure plate portion to hold a side of the end portion of the form member against said web wall; an end member positioned across an opposite end portion of the structural member and having flanges to limit maximum insertion of the end portion of the form member with respect to the structural member and to hold the end portion of the form member down against tilting action with respect to said positioning means, a pair of spaced-apart tabs carried by said flanges, said anchor means having a drive pin extending through said tabs, a mounting member secured between said tabs, said mounting member having a central mounting portion; said clamp means having a lever arm pivotally positioned on said central mounting portion, and having a manual throw portion projecting forwardly of said central mounting portion; said lever arm having an offset cam-acting clamping portion projecting backwardly therefrom, and said pressure plate portion being pivotally carried on an end portion of said clamping portion for movement into and out of clamping abutment with the end portion of the form member.

7. In a connector unit construction for a material-

forming assembly that includes a longitudinal form member, at least one structural member; said structural member having a web wall to, on one side, abut the material being formed and to, on its opposite side, abut an end portion of the form member; a pair of transversely spaced-apart and forwardly-extending flange portions along side edges of said web wall to cooperate with said web wall and guide the end portion of the form member therebetween along said web wall of the structural member; a positioning means at an end portion of the structural member, having means to anchor the structural means in position, and having means to clamp the end portion of the form member in position relative to said web wall and flange portions; an end member positioned across an opposite end portion of the structural member and having flanges to limit maximum insertion of the end portion of the form member with respect to the structural member and to hold the form member down against tilting action with respect to said positioning means; said positioning means comprising a cross member between said flange portions, and means adjustably mounted with respect to said cross member; said adjustably-mounted means comprising, a collar portion for turning movement on said cross member, a clamping arm mounted on said collar for operating movement with respect to said cross member, said arm having an inner clamping portion to be moved into and out of abutment with the side of the end portion of the form member, a handle portion, an offset connecting portion between said clamping and handle portions, and said handle portion being positioned to swing said collar on said cross member and move said clamping portion into and out of an aligned abutting relation with respect to the form member.

8. A connector unit construction for a material-forming assembly that includes longitudinal form members, at least a pair of structural members; each said structural member having a web wall and flanges along sides of said web wall to guidably support one of the form members along said web wall and flanges, said flanges being top and bottom flanges positioned along top and bottom sides of each said structural member; positioning means at an end portion of each said structural member, having means to anchor said structural member in position, and having clamping means to hold the form member in position with respect to said structural member; each said structural member at an opposite end thereof having aligned hole portions through said top and bottom flanges, a headed anchor pin removably-projecting through the hole portions of both of said structural members to pivotally connect them together and anchor them in position with respect to each other, said headed anchor pin being pointed at its projecting end for driving it into the ground to anchor the structural members, a pair of swing arms having a common pivot means connecting them together at their back end portions, means pivotally connecting the forward end portion of one of said pair of swing arms to a flange of one structural member, means pivotally connecting the forward end portion of the other swing arm to an opposed flange of the other structural member; and said swing arms being operatively connected to move from a folded relationship with respect to each other when said structural members are pivoted about said anchor pin towards each other, to a straight-line position with respect to each other when said structural members are moved about said anchor pin to a spread-apart relationship with respect to each other.

9. A form assembly for making a concrete construction which comprises, a series of basic unit connectors of metal construction including connectors defining a joint and connectors defining a riser for the assembly, a series of timber form members to be assembled between said unit connectors, means carried by each said unit connector to positively guide in and non-pivotally mount

end portions of the form members, means to anchor the form members at said unit connectors, means carried by said unit connectors to quickly and effectively clamp one side of the form members against said unit connectors to provide an assembly of and to quickly release the clamping action to provide a disassembly of the construction; said clamp means comprising, a cross member secured to each said unit connector in a forwardly-spaced transverse relationship therewith, a throw arm, a pressure face portion secured to an inner end portion of said throw arm, and means swingably mounting said throw arm on said cross member to move said pressure face portion into and out of clamping abutment with the form member that is assembled with respect to each said unit connector.

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