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Sels et al.

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[54] **COLUMN FORM AND CLAMP ASSEMBLY**

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[21] Appl. No.: **145,333**

[52] **U.S. Cl.**.....**249/48,** 249/219 R, 269/115

[51] **Int. Cl.**.....**E04g 13/02**

[58] **Field of Search**....249/48, 175, 219 R, 194, 205, 249/207; 269/111, 112, 115, 116, 117, 121, 122, 123, 124, 125

[56] **References Cited**

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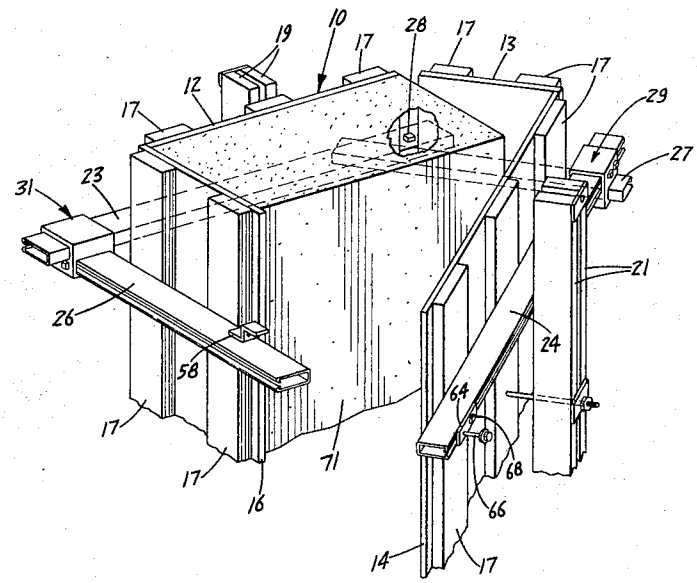
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[57] **ABSTRACT**

A form usable to construct a concrete column is held in a closed position by a number of clamp assemblies surrounding the form. Each clamp assembly has two pairs of channel bars held in adjustable right angle relationship with a corner bracket unit. A single pivot joins one bar of each pair of bars together. A quick release connector holds the other bars of each pair of bars together.

17 Claims, 7 Drawing Figures



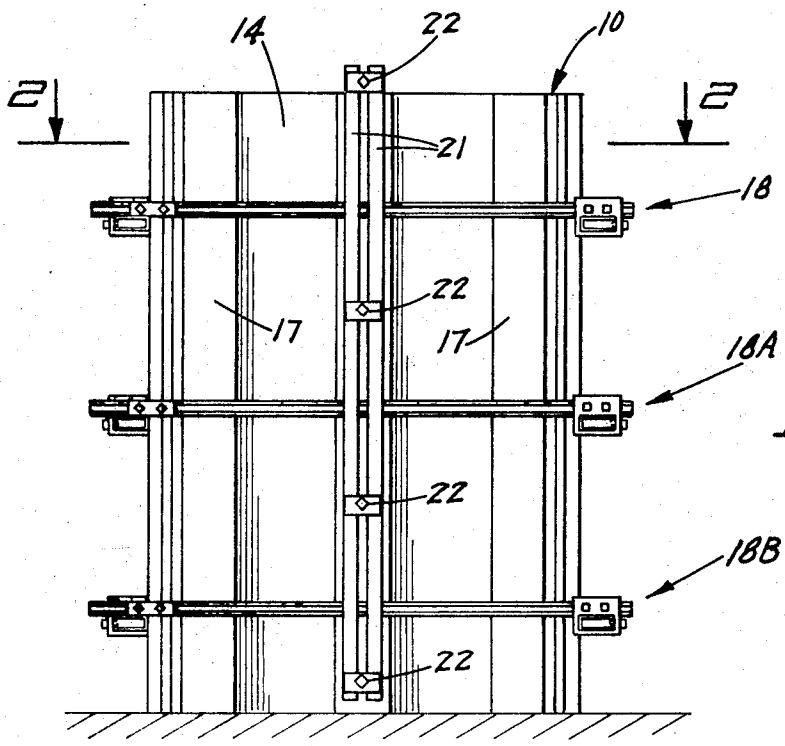


FIG. 1

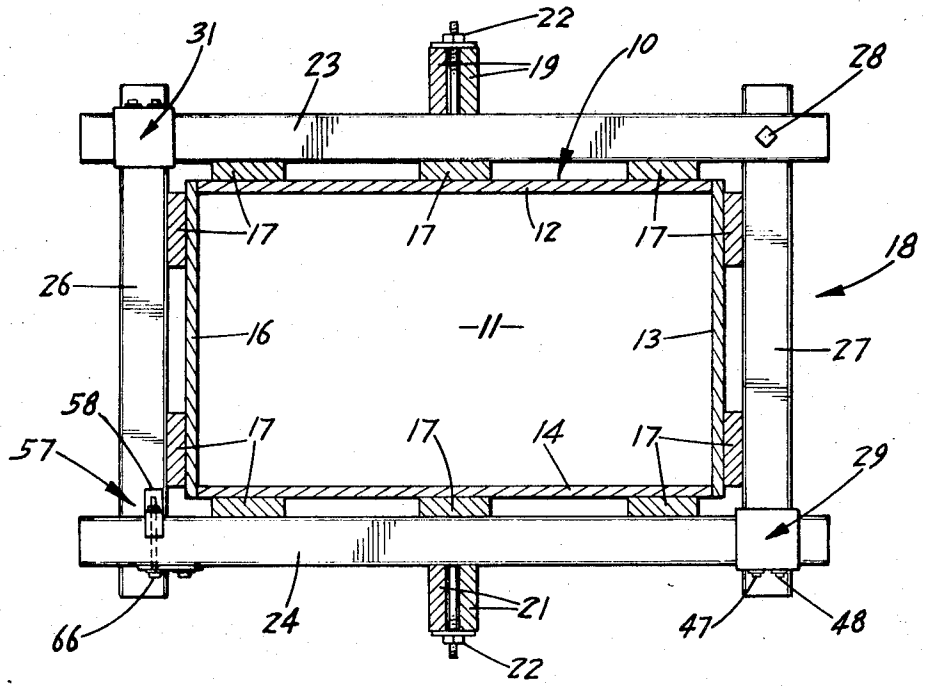


FIG. 2

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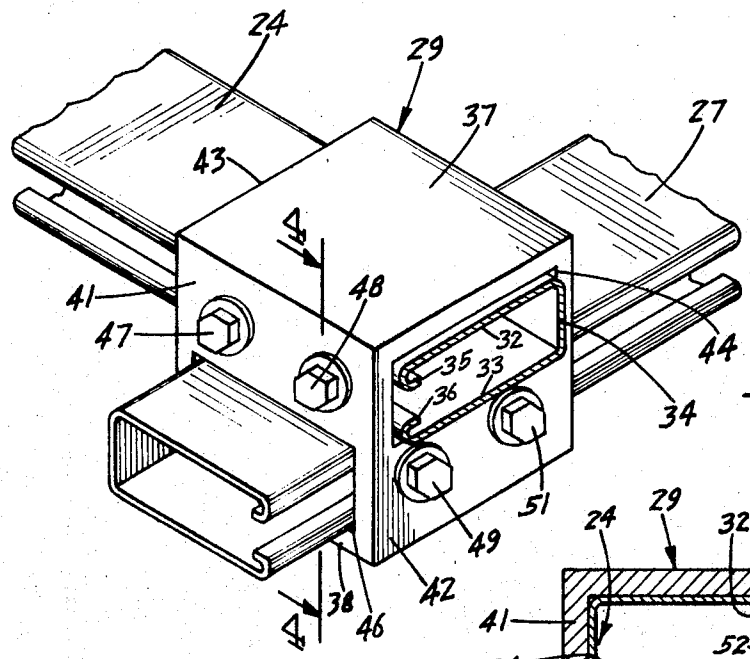


FIG. 3

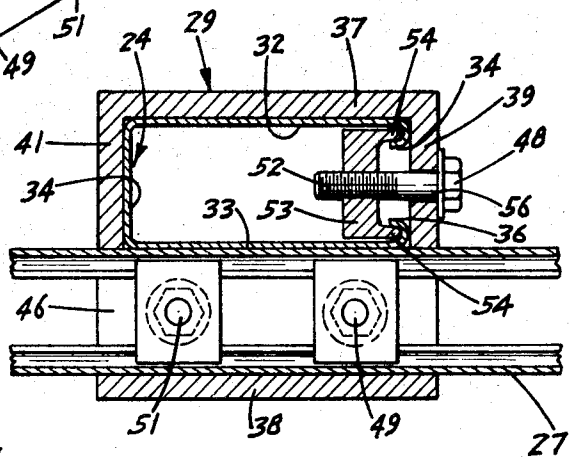


FIG. 4

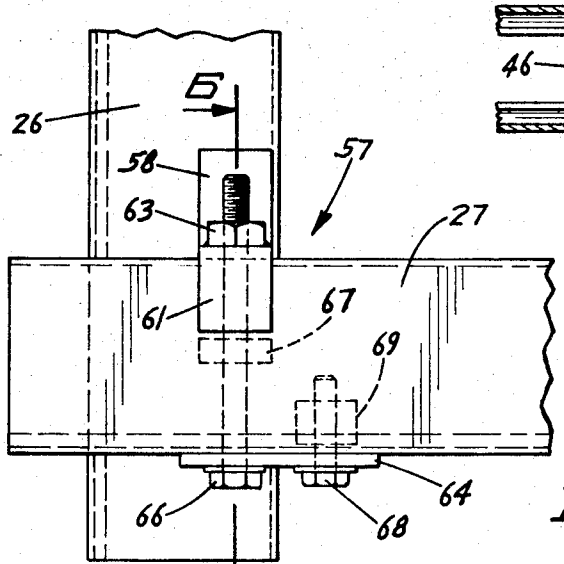


FIG. 5

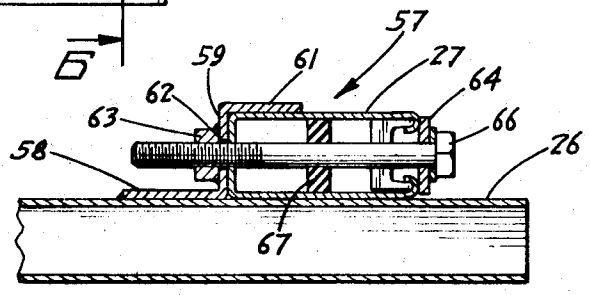


FIG. 6

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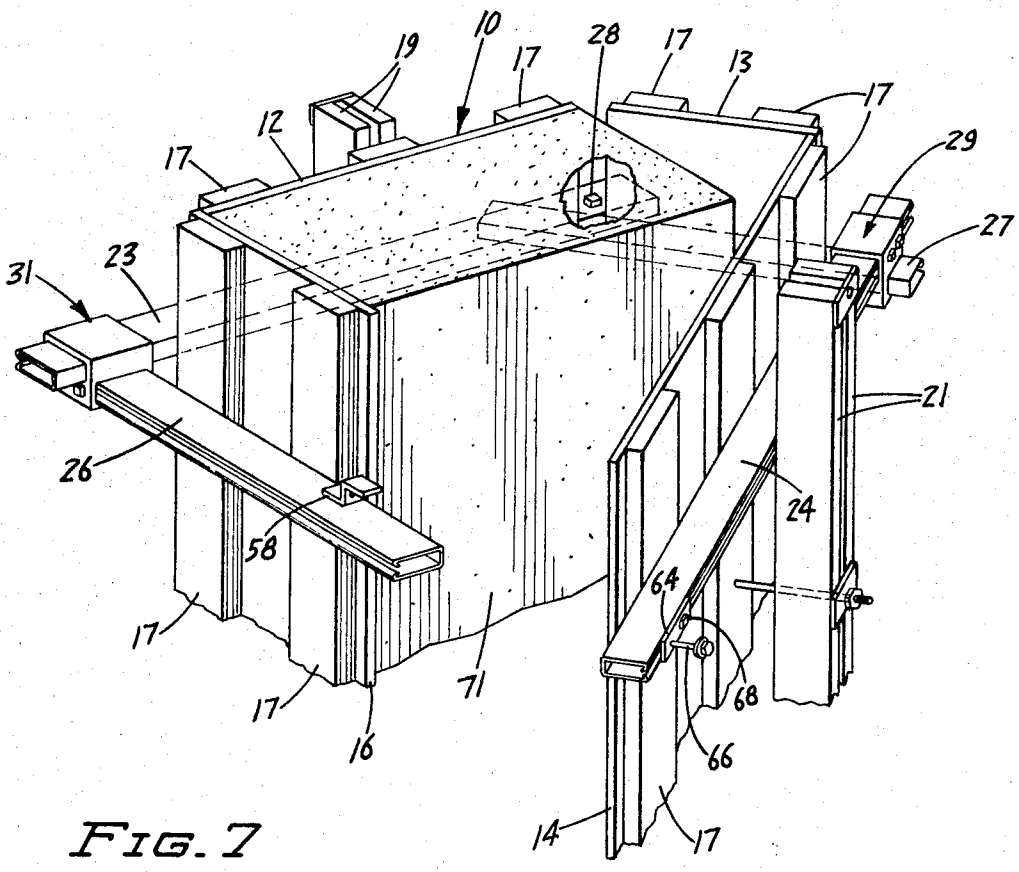


FIG. 7

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COLUMN FORM AND CLAMP ASSEMBLY

BACKGROUND OF INVENTION

Numerous types of clamping devices have been developed for use with concrete forms. Healy, in U.S. Pat. No. 907,496, discloses a clamp for mold forms used in concrete columns. This clamp consists of rigid bars provided with apertures. Bolts fasten the bars to one another around the mold forms to hold the mold forms in generally rectangular relationship. This same general design was carried forward in U.S. Pat. Nos. 1,566,377, 1,634,111, 1,683,929 and 1,704,307. Each of these patents shows a clamping device having rigid bars pivotally joined to each other. The bars extend around a generally rectangular concrete form. Special locking structures are used to hold the bars in general rectangular relationship around the forms. These clamping devices have numerous separate members which are necessary for securing them in place. Also, the clamps do not provide a positive means for maintaining the square relationship of the forms. Knorr, in U.S. Pat. No. 3,475,017, discloses a clamp having mating pairs of angle irons with the flange of one angle iron of each clamp being notched for receiving the notched angle iron of a companion clamp. These members must be disassembled to remove the clamp from the board. They do not provide pivoting and release structures which permit opening of the form after the concrete column has been poured.

SUMMARY OF INVENTION

The invention is broadly related to a clamp assembly for holding a structure in a predetermined position. The clamp assembly functions in combination with a concrete column form used in making a concrete column. The form has two relatively movable sections that are attached to the clamp assembly. The clamp assembly comprises two right angle units that are pivotally attached to each other at one end and are releasably connected at the other end to form a generally rectangular clamp that is disposed about the form. The clamp assembly can be disassembled to permit the forms to move to an open position, whereby the form and clamp assembly can be removed as a unit from the concrete column. Each unit has a corner bracket means to connect separate bar means of the unit in a fixed right angle relationship relative to each other. The bracket means comprises a box-like structure having a first passage for receiving one of the bars of the clamp and a second passage disposed normally to the first passage for receiving the other bar of the unit. Nut and bolt assemblies are used to releasably attach the bracket to both of the bars. The bars of each unit are generally U-shaped in cross section and are generally U-shaped or channel members having inwardly directed flanges linearally along the open ends of the members.

IN THE DRAWINGS

FIG. 1 is a side elevational view of a concrete column form and clamp assembly of the invention;

FIG. 2 is an enlarged sectional view taken along the line 2—2 of FIG. 1;

FIG. 3 is a perspective view of the rigid right angle corner bracket of the clamp assembly;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is a top plan view of the releasable locking structure of the clamp assembly;

FIG. 6 is a sectional view taken along the line 6—6 of FIG. 5; and

FIG. 7 is a fragmentary perspective view showing the open clamp assembly and the stripping of the form from a concrete column.

Referring to the drawing, there is shown in FIGS. 1 and 2 a generally upright concrete column form indicated generally at 10 surrounding a space 11 having a generally rectangular horizontal area. The space 11 is adapted to receive concrete and reinforcing bars to provide a generally upright concrete column. The form 10 comprises four panels or sheathings 12, 13, 14 and 16 secured to a plurality of upright supports 17, as wood 2×6's or the like. The form 10 is attached with fasteners (not shown) to a plurality of vertically spaced clamp assemblies indicated generally at 18, 18A and 18B which function to hold the form in its closed position as shown in FIG. 2. The panels are mounted on the clamp assemblies in pairs so that each form has two sections or parts that can move relative to each other. The side members of the clamp assemblies 18, 18A and 18B are reinforced with first generally upright pair of beams 19 and second pair of upright beams 21. Fasteners 22 are used to connect the beams to the adjacent supports 17 of the form. Some of the fasteners 22, as the top fastener, can be elongated bolts or rods that extend through or over the column, thereby functioning as clamps forcing the beams 19 and 21 toward each other. Additional reinforcing beams can be used with the opposite portions of the collars. Also, additional reinforcing beams can be used on the same portions of the clamp assemblies.

The following description is limited to clamp assembly 18. Clamp assemblies 18A and 18B are identical with the clamp assembly 18. Additional clamp assemblies can be used with form 10. In general, as the length of the form increases, the number of clamp assemblies used on the form increases.

As shown in FIG. 2, clamp assembly 18 comprises a pair of side bars 23 and 24 connected with end bars 26 and 27. The adjacent ends of bars 23 and 27 are pivotally connected with a generally upright pivot member 28, as a bolt or pin. Bars 24 and 27 are held in a fixed right angle relationship with a corner member 29. In a similar manner, bars 23 and 26 are held in fixed right angular relationship by a corner member 31. Corner members 29 and 31 permit longitudinal adjustment to both of the bars relative to their respective corner members. This allows the clamp assembly to be used with various column sizes. The corner members 29 and 31 are identical in structure. The following description is limited to corner member 29, shown in detail in FIGS. 3 and 4.

As shown in FIGS. 3 and 4, the bar 24 has a generally U-shaped configuration having parallel sides 32 and 33 joined together with a back 34. The open side of the bar has inwardly directed lips or flanges 35 and 36. This structure is generally known as a Unistrut bar. Bars 23, 26 and 27 are of identical shape.

Corner member 29 has a generally flat top 37 and flat bottom 38. The edges of the top and bottom are

joined with generally flat sides 39, 41, 42 and 43. This structure forms a generally box- or cube-shaped unit having normally disposed walls. Corner member 29 has a first passage or opening 44 extended through the walls 39 and 41 to accommodate with a close sliding fit the side bar 24. A second opening 46 positioned at right angles with respect to the first opening extends through the walls 39 and 41. The openings 44 and 46 are of a size and shape to receive a bar with a close sliding fit so that the inner walls of the corner member hold the bars in normal relationship to each other.

A first pair of fasteners 47 and 48 function to releasably hold corner member 29 in a fixed assembled relation with the bar 24. A second pair of fasteners 49 and 51 function to hold the bar 27 in assembled relation with corner member 29. FIG. 4 shows fastener 48 as comprising a bolt 52 threaded into a nut 53 located within the channel of bar 24. The nut 53 has lateral ribs 54 which fit under the flanges or lips 34 and 36, thereby holding the nut from turning. The bolt 52 extends through a hole 56 in the wall 39 so that the bolt 52 functions to clamp the bar 24 to corner member 29. Fasteners 47, 49 and 51 are identical in structure and function as the fastener 48.

As shown in FIGS. 5 and 6, bars 24 and 26 are releasably joined with a quick release or lock mechanism indicated generally at 57. The mechanism 57 is at the corner of the clamp assembly that is located diagonally from pivot member 28. Lock mechanism 57 comprises an offset bracket 58 secured by means of a weld to the top of bar 26. Bracket 58 has a generally upright back 59 and a forwardly directed top flange 61. As shown in FIG. 6, when the bar 27 is in assembled relation with respect to bracket 58, the top flange 61 is located over and in close proximity to the top of bar 27. The back 59 of the bracket 58 has a hole 62 axially aligned with a nut 63 welded to the back.

Disposed along the open side of the bar 57 is a plate 64 having a hole for a fastening bolt 66. Bolt 66, extended through a hole in the base of bar 27, is threaded into the nut 63 to clamp bar 27 to bracket 58. The bolt 66 extends through a friction or resilient washer 67. The washer 67 is rectangular in shape and is located in frictional engagement with the sides of bar 27 to prevent the bolt 66 from falling out of the bar 27 when it is detached from nut 63.

Plate 64 is adjustably mounted on bar 27 with fastener 68. Fastener 68 comprises a bolt that extends through a suitable hole in plate 64 into the space between the sides of bar 27. The bolt is threaded into a nut 69 that is prevented from turning by the lips of the bar. The nut 69 is identical in shape and structure to nut 53.

The form 10 is constructed of a size and length as required by the specification of the concrete column. The length as well as the width of each clamp assembly are readily adjusted by releasing the fasteners 47, 48, 49 and 51, as shown in FIGS. 3 and 4. This permits the bars to be moved relative to the corner members. The releasable lock mechanism 57 is adjusted relative to bar 24 by releasing fastening member 68. The plate 64 is moved to a position wherein bolt 66 is aligned with a hole in the base of bar 24 so that bolt 66 can be moved through the base and into the nut mounted on bracket 58. The well adjusted clamp assemblies 18, 18A and 18B are then placed around the form and secured to the form panels with fasteners (not shown) as nuts, bolts, screws and the like, at spaced intervals to provide the necessary reinforcement for the panels. The reinforcing beams, as beams 19 and 21, are then mounted on the clamp assemblies and panels to provide additional reinforcement, if required. The form is closed and held in the closed position with locking mechanism 57 on each clamp assembly. Bolt 66 is threaded into nut 63 to firmly hold the clamp assembly about the form.

After the concrete has been poured into the space 11 of form 10 and the concrete is set, form 10 can be removed from the column 71, as shown in FIG. 7, without disassembling the form or removing the clamp assemblies from the panels. The releasable locking mechanisms 57 are disengaged by merely removing a single bolt 66 from its associated nut 63. The resilient friction washer 67 holds the bolt in assembled relation with the bar 27. With the locking mechanisms 57 released, the form and clamp assemblies can be swung open away from the concrete column. The form is then cleaned and oiled, making it ready for use with another column. The form is closed by merely swinging the form along with the clamp assemblies back to its closed position. The form is locked in the closed position by attaching bolt 66 to nut 63.

While there has been shown and described a preferred embodiment of the invention, it is understood that various changes and substitutions can be made by one skilled in the art without departing from the spirit of the invention. The invention is defined in the following claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A column form and clamp means having generally upright form means defining a space for accommodating a concrete column, said form means having at least two sections movable from a form position to an open position relative to each other to remove the form means from the concrete column, at least one clamp means surrounding said form means to hold the form means in the form position and to permit movement of the form means to the open position, said clamp means including: first bar means and a second bar means, first corner means attachable to the first bar means and second bar means to fix said first and second bar means in a general right angle relationship relative to each other, third bar means and fourth bar means, second corner means attachable to the third and fourth bar means to fix said third and fourth bar means in a right angle relationship relative to each other, the first and second corner means each comprising a unit having a first side wall with a first enclosed passage through the first side wall accommodating one bar means and a second side wall disposed at an angle relative to the first side wall, said second side wall having a second enclosed passage through the second side wall accommodating another bar means, first clamp means securing the one bar means to the unit, second clamp means securing the other bar means to the unit, said first and second clamp means each having means to release the bar means whereby the position of the unit on the bar means can be changed making the clamp means usea-

ble with different column sizes, pivot means connecting the second bar means with the fourth bar means, and releasable fastening means connecting the first bar means with the third bar means.

2. The structure of claim 1 wherein: each corner means comprises a cube shaped unit having a first passage for receiving one bar means and a second passage disposed normal to the first passage for receiving the other bar means, and said first and second clamp means securing the unit to both bar means to fix the right angle relationship between the bar means.

3. The combination of claim 1 wherein: each of said bar means is an elongated, generally U-shaped member having inwardly turned lips along the open sides thereof.

4. The structure of claim 1 wherein: said releasable fastening means comprises a bracket secured to the third bar means, and a means attachable to the bracket to hold the first bar means in assembled relation with the bracket.

5. The structure of claim 4 wherein: said means attachable to the bracket is a bolt adapted to be threaded into a nut secured to the bracket.

6. The structure of claim 1 wherein: said first clamp means and second clamp means each comprise nut and bolt assemblies having nut disposed within a bar means and cooperating with said bar means to prevent rotation of the nuts, and bolts cooperating with the unit and threaded into the nuts to hold the bar means and unit in a selected adjusted position.

7. The structure of claim 1 wherein: each corner means comprises a cube-shaped unit having a first passage for receiving one bar means and a second passage disposed at an angle relative to the first passage for receiving the other bar means.

8. The structure of claim 1 wherein: said first and second clamp means comprise nut and bolt assemblies having nuts disposed within the bar means and bolts cooperating with the clamp means and threaded into the nuts to hold the bar means and corner means in a selected adjusted position.

9. The structure of claim 1 wherein: each of said bar means is an elongated generally U-shaped member having inwardly turned lips along the open sides thereof, said first and second clamp means each comprising releasable separate nut and bolt assemblies operable to adjust the position of the corner means relative to the bar means associated with the corner means, each nut and bolt assembly having a nut disposed within a generally U-shaped member and having ribs which cooperate with the inwardly turned lips to prevent rotation of the nut and bolt threaded into the nut to hold the corner member in assembled relation with the U-shaped members associated with the corner member.

10. The structure of claim 1 wherein: each of said corner means is a cube-shaped unit having a top wall and a bottom wall joined to the first side wall and the second side wall.

11. The structure of claim 1 wherein: said first side wall and second second side wall are normally disposed relative to each other.

12. The structure of claim 1 wherein: said first clamp means and second clamp means each comprise releasable separate nut and bolt assemblies operable to adjust the position of the corner means relative to the bar means associated with the corner means so that the clamp means can be used with different column sizes by changing the position of the corner means relative to said bar means, each nut and bolt assembly having a nut disposed within a bar means and cooperating with the bar means to prevent rotation of the nut, and a bolt engageable with the corner means and threaded into the nut to hold the corner means in a selected adjusted position relative to the bar means.

13. A column form and clamp means having generally upright form means defining a space for accommodating a concrete column, said form means having at least two sections movable from a form position to an open position relative to each other to remove the form means from the concrete column, at least one clamp means surrounding said form means to hold the form means in the form position and to permit movement of the form means to the open position, said clamp means including: first bar means and a second bar means, first corner means attachable to the first bar means and second bar means to fix said first and second bar means in a general right angle relationship relative to each other, third bar means and fourth bar means, second corner means attachable to the third and fourth bar means to fix said third and fourth bar means in a right angle relationship relative to each other, said first and second corner means each comprising a cube-shaped unit having a first passage for receiving one bar means and a second passage disposed at an angle relative to the first passage for receiving the other bar means and clamp means releasably securing the unit to both bar means, said clamp means securing the unit to both bar means being adjustable whereby the position of the corner means on the first and second bar means can be changed making the clamp means useable with different column sizes, said clamp means having nut and bolt assemblies with nuts disposed within the bar means and cooperating with said bar means to prevent rotation of the nuts, and bolts cooperating with the clamp means and threaded into the nuts to hold the bar means and corner means in a selected adjusted position, pivot means connecting the second bar means with the fourth bar means, and releasable fastening means connecting the first bar means with the third bar means.

14. The structure of claim 13 wherein: each corner means comprises a cube-shaped unit having a first passage for receiving one bar means and a second passage disposed normal to the first passage for receiving the other bar means, and means securing the unit to both bar means to fix the right angle relationship between the bar means.

15. The structure of claim 13 wherein: each of said bar means is an elongated, generally U-shaped member having inwardly turned lips along the open sides thereof.

16. The structure of claim 13 wherein: said releasable fastening means comprises a bracket secured to the third bar means, and a means attachable to the bracket to hold the first bar means in assembled relation with the bracket.

17. The structure of claim 16 wherein: said means attachable to the bracket is a bolt adapted to be threaded into a nut secured to the bracket.

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