March 7, 1939. M. WINANDY 2,149,653

FORM FOR CONCRETE STRUCTURES

Filed Feb. 1, 1937 4 Sheets-Sheet 1

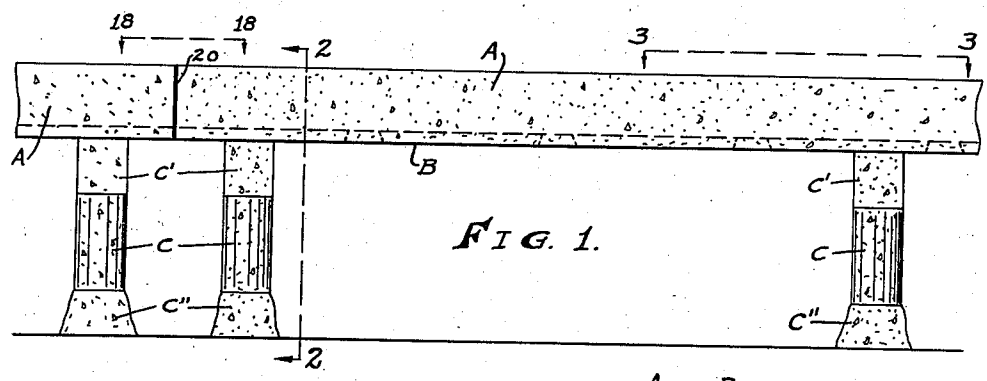


FIG. 1.

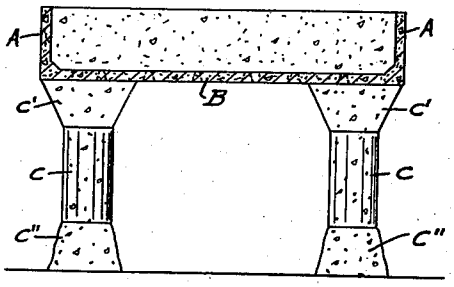


FIG. 2.

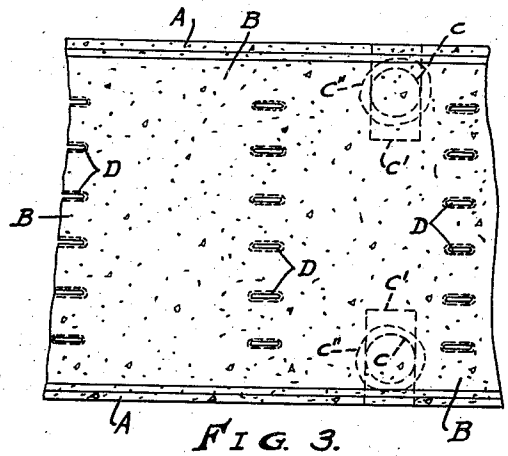


FIG. 3.

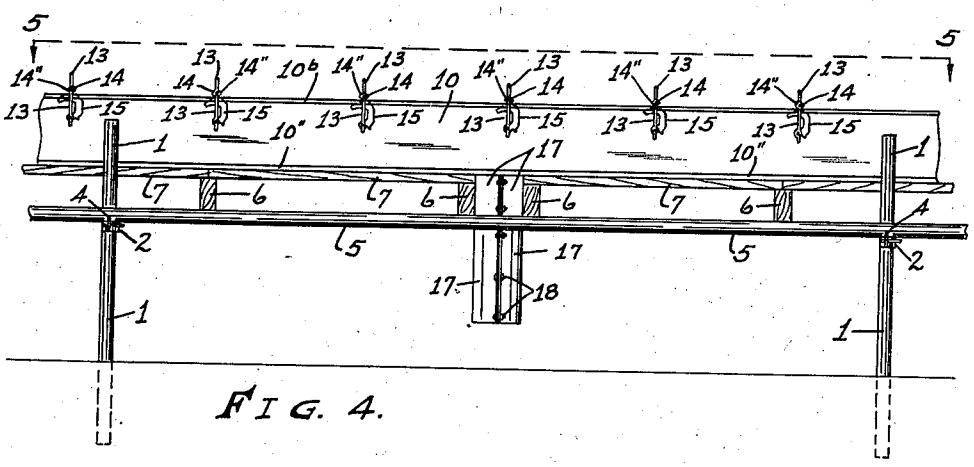


FIG. 4.

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FORM FOR CONCRETE STRUCTURES

Filed Feb. 1, 1937 4 Sheets-Sheet 2

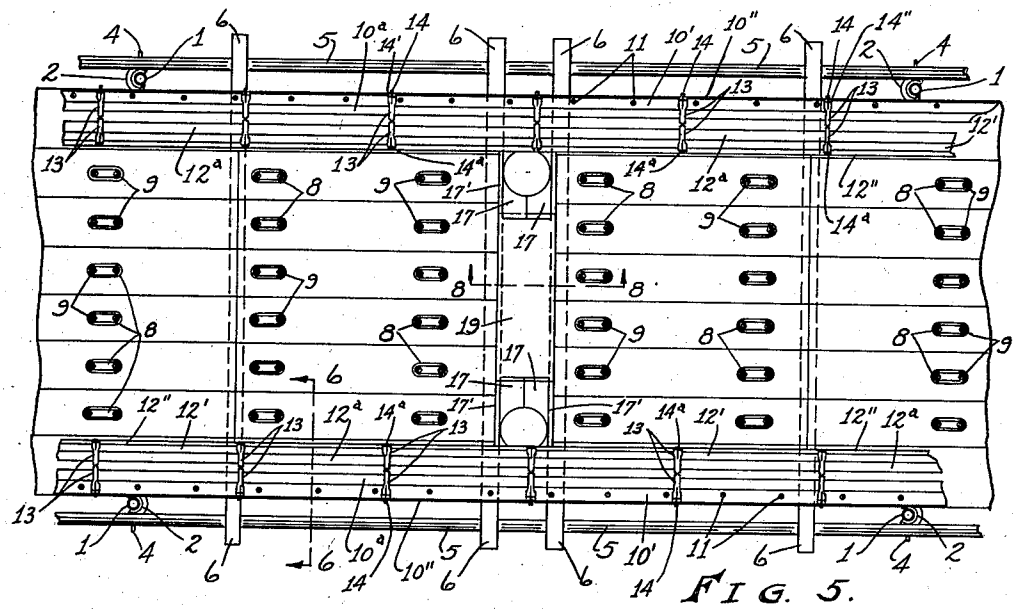


FIG. 5.

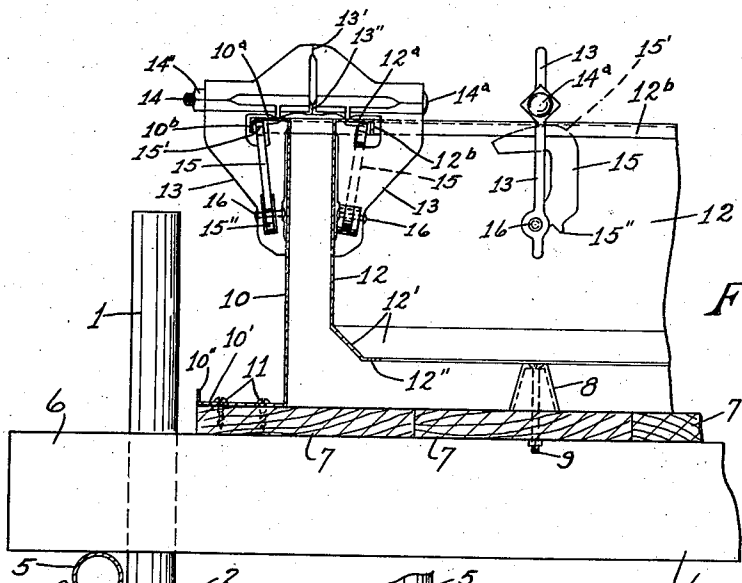


FIG. 6.

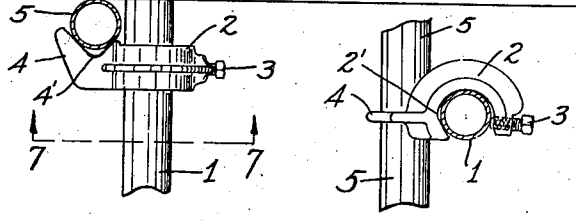


FIG. 7.

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FORM FOR CONCRETE STRUCTURES

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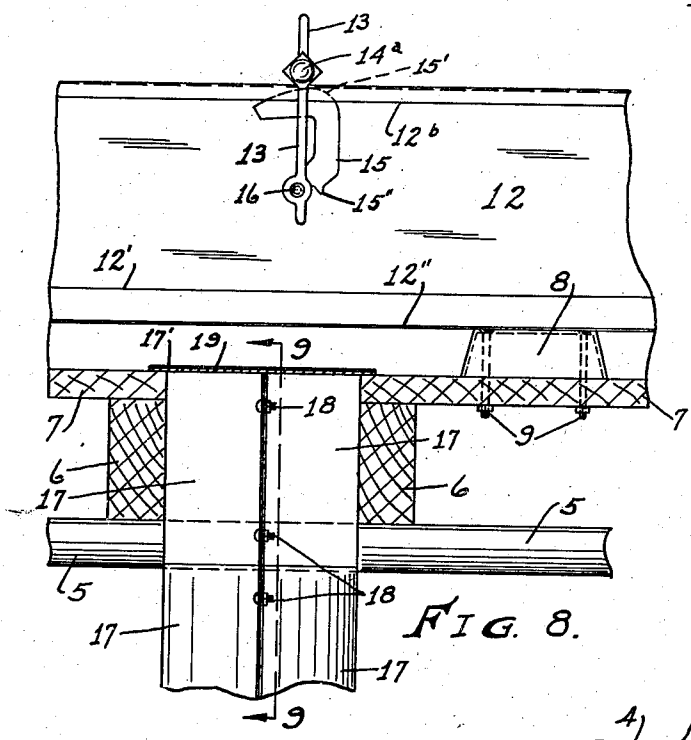


FIG. 8.

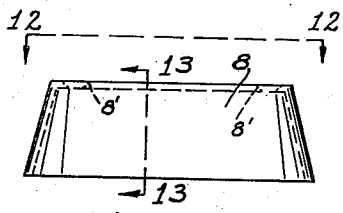


FIG. 11.

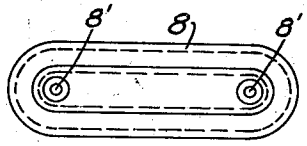


FIG. 12.

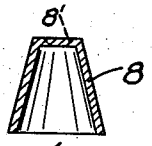
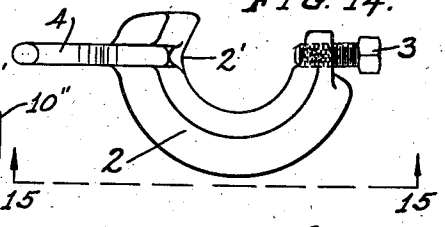


FIG. 13.

FIG. 14.



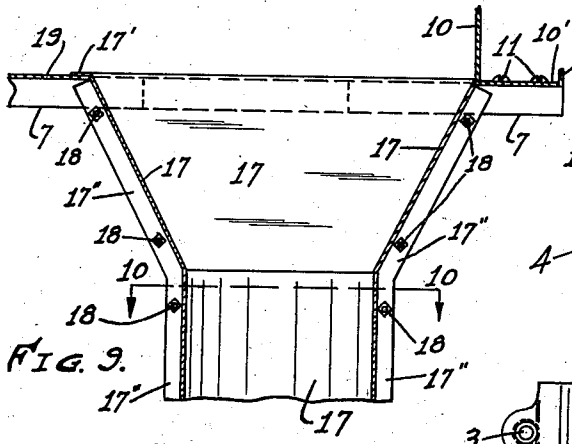


FIG. 9.

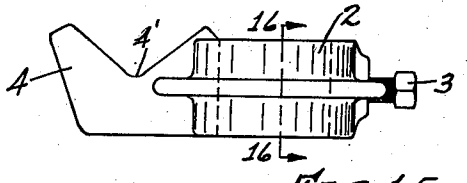


FIG. 15.

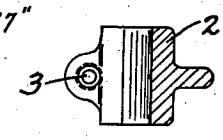


FIG. 16.

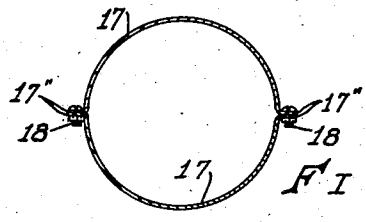


FIG. 10.

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FORM FOR CONCRETE STRUCTURES

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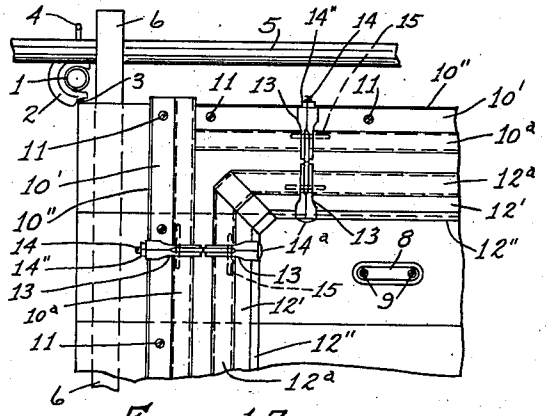


FIG. 17.

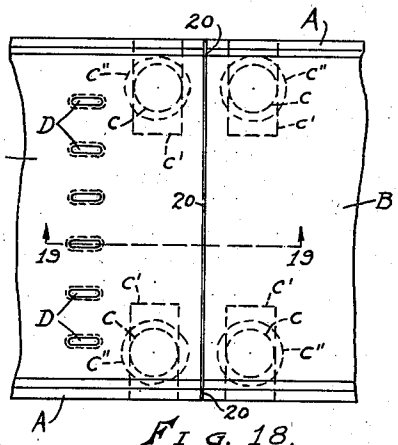


FIG. 18.

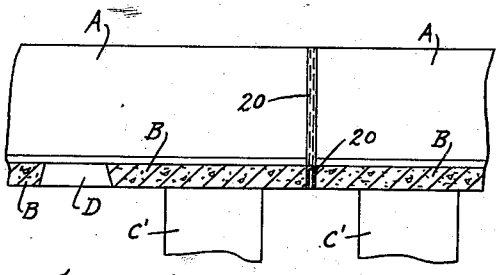


FIG. 19.

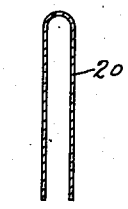


FIG. 20.

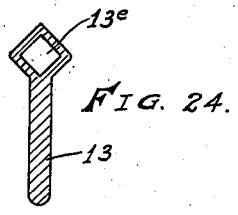


FIG. 24.

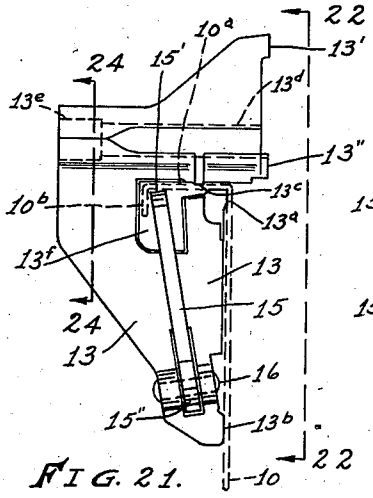


FIG. 21.

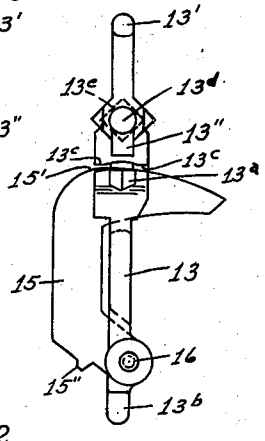


FIG. 22.

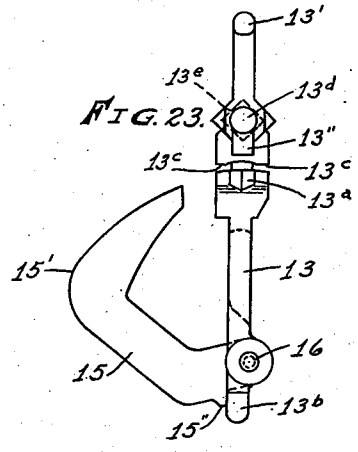


FIG. 23.

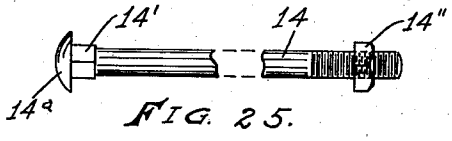


FIG. 25.

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Patented Mar. 7, 1939 2,149,653

UNITED STATES PATENT OFFICE

2,149,653

FORM FOR CONCRETE STRUCTURES

Mike Winandy, Richmond, Ind.

Application February 1, 1937, Serial No. 123,422

3 Claims. (Cl. 25—118)

This invention relates to forms for monolithic concrete structures, and more especially to forms used in the construction of concrete benches for use in greenhouses and the like.

The principal object of the invention is the provision of a combination of parts which will expedite the assembly of the necessary forms required to efficiently and economically construct the benches.

Another object of the invention is the provision of members which are simple of construction, economical to manufacture, and which, when assembled, are rigid and substantial.

Another object of the invention is the provision of means for supporting the forms without the necessity of providing expensive equipment.

Still another object is the provision of form members which are extremely light in weight, and which thereby, minimizes the cost of transportation from one location to another.

A still further object of the invention is the provision of clamping members which rigidly maintain the side members of the forms in fixed relation with each other when assembled.

Other objects and advantages of the invention will suggest themselves in the course of the following description, and that which is new will be pointed out in the appended claims.

The most satisfactory and preferred manner of carrying out the principles of the invention in a practical, economical, and efficient manner is shown in the accompanying four sheets of drawings, in which;

Figure 1 is a partial side elevation of a completed greenhouse bench which has been constructed by means of the herein shown and described form members.

Figure 2 is a detail cross section through the completed bench, taken on line 2—2 of Figure 1.

Figure 3 is a partial plan view of the completed bench, taken from line 3—3 of Figure 1.

Figure 4 is a partial side elevation of the assembled form members.

Figure 5 is a partial plan view of the assembled form members, taken from line 5—5 of Figure 4.

Figure 6 is a detail cross section through the assembled form members, taken on line 6—6 of Figure 5.

Figure 7 is a detail section, taken on line 7—7 of Figure 6, showing an under side view of one of the supporting members.

Figure 8 is a detail section through the form members, taken on line 8—8 of Figure 5.

Figure 9 is a detail vertical section through the post-forming mould members, taken on line 9—9 of Figure 8.

Figure 10 is a detail section through the post-forming mould members, taken on line 10—10 of Figure 9.

Figure 11 is a detail side elevation of one of the drainage aperture form members.

Figure 12 is a top plan view of the aperture form member, taken from line 12—12 of Figure 11.

Figure 13 is a detail cross section through the drainage aperture form member, taken on line 13—13 of Figure 11.

Figure 14 is a detail elevation of one of the supporting clamp members.

Figure 15 is a detail side elevation of the supporting clamp member, taken from line 15—15 of Figure 14.

Figure 16 is a detail cross section through the supporting clamp member, taken on line 16—16 of Figure 15.

Figure 17 is a partial detail plan view of the assembled form members, showing the method of assembling the end members with relation to the side members.

Figure 18 is a partial plan view of the completed bench, taken from line 18—18 of Figure 1, and showing an expansion joint therein.

Figure 19 is a detail section through the expansion joint, taken on line 19—19 of Figure 18.

Figure 20 is a detail section through the expansion joint-forming member.

Figure 21 is an elevation of one of the spacing-clamp members.

Figure 22 is an edge elevation of the spacing-clamp member, taken from line 22—22 of Figure 21, and showing the pivoted wedge thereof in clamping position.

Figure 23 is an edge elevation of the spacing-clamp member, the same being similar to Figure 22 except the pivoted wedge thereof is shown in disengaged position.

Figure 24 is a detail vertical section through the spacing-clamp member, taken on line 24—24 of Figure 21.

Figure 25 is a detail elevation of the bolt which is used for rigidly securing two of the spacing-clamp members together.

Like characters designate like parts throughout the several views.

In order that the construction and advantages of the invention may be more fully understood and appreciated, I will now take up a detailed description thereof, in which the same will be more fully set forth.

In the drawings, A designates the vertically extending sides of the completed bench, B designates the floor portion, C designates the post members, with C' and C'' designating the upper and lower portions respectively of the post members, all of which are formed of monolithic construction. D designates drainage apertures formed vertically through the floor of the completed bench.

Now referring to the form members and the construction in detail, 1 designates vertically positioned supporting members with each being comprised of a length of pipe which is driven into the earth with the upper end thereof projecting above the earth. The members 1 are arranged in rows, with each of the members being positioned in substantial alignment with other like members of the same row. Two rows of the members 1 are required to support the form members, with each of the rows being arranged in parallel relation with the other.

2 designates the supporting clamp members, the same being positioned on the vertically positioned supporting members, and being rigidly secured thereon by means of the threaded set screws 3. The clamp members 2 are formed substantially circular in shape with a portion thereof being omitted, and forming a space thereby for the purpose of positioning the clamps 2 on their respective supporting members 1, all as shown in Figures 7 and 14. A lug 4 is formed integrally with the clamp member 2, and projects outwardly therefrom. On the side opposite the lug 4 is a threaded aperture formed through the body of the clamp member for the reception of the threaded set screw 3. Opposite the set screw 3, and adjacent the lug 4, an indenture 2' is formed for the purpose of allowing the respective supporting pipes 1 to contact the inner surface of the clamp 2 at two places or points, with the set screw 3 bearing against the opposite side of the supporting pipe, and thereby maintaining the clamp member 2 in rigid relation to the supporting pipe 1, as shown in Figure 7.

The comparatively long pipes 5 are positioned longitudinally with relation to the proposed benches, with the same resting in the concave portion 4' of the lugs 4, as shown in Figure 6. The pipes 5 provide supports for the end portions of the transverse supporting members 6.

The transversely positioned members 6 are placed on and supported by each of the pipes 5 with the end portions of the members 6 extending outwardly beyond the pipes 5, as shown in Figures 5, 6 and 17.

Floor members 7 are arranged longitudinally between the transverse members 6 with the end portions of the floor members 7 meeting each other and resting on the members 6. Drainage aperture forms 8 are provided and secured through the floor members 7 by means of the bolts 9, and are arranged thereon at intervals to provide the most efficient drainage of the moisture which accumulates within the finished benches when the same are in practical use.

The outer side members 10, of the forms, are formed of comparatively light gauge sheet metal, with the lower portions 10' thereof being turned outwardly at right angles to the vertical portions thereof. The outer edges 10'' of the portion 10' are turned upwardly with relation to the respective portions 10', and provide stiffness thereto. The upper portions 10^a of the member 10 are also turned outwardly in a similar manner to the portions 10', and are provided with the turned-down portions 10^b which provide stiffness thereto. The members 10 are rigidly secured to the floor members through the portions 10' by means of the threaded screws 11, as shown more clearly in Figures 6 and 17.

The inner form members 12 are formed of sheet metal similar to the outer side members 10, and have inwardly extending portions 12^a formed at the upper edges thereof, with the downwardly extending flanges 12^b being formed along the inner edges of the portions 12^a. The angular inwardly extending portions 12' are formed at the lower edges of the members 12, with the inwardly extending portions 12'' being formed at the lower edges of the portions 12' and at right angles with relation to the vertically disposed portions 12. It will be noted that the members 12 do not extend as far downwardly as the members 10, and thereby providing a gauge for the thickness of the floors of the completed benches. It will also be apparent that the upper surfaces of the drainage aperture forming members 8 are on the same approximate level as the under surfaces of the portions 12'' of the members 12, with the upper surfaces of the members 8 also forming a gauge for the upper surfaces of the floors of the completed benches. Each of the members 8 has countersunk apertures 8' formed through their upper surfaces for the reception of the heads of the bolts 9, and thereby present an unobstructed top surface for the members 8, all of which is clearly shown in Figure 6.

Clamps are provided for spacing the inner members 12 in fixed relation to the outer members 10, with each of the clamps comprising two members 13 held rigidly together by means of a bolt 14. Each of the clamp members 13 is identical with each other, and the description of one of the members will suffice for the other. The clamp member 13 has the projecting portions 13' and 13'' which serve as spacers, and definitely fix one of the members 13 in spaced relation to the companion member 13 when assembled and secured together by means of the threaded bolt 14. The members 13 have an aperture 13^d formed therethrough for the reception of the bolts 14, with the outermost end portion 13^e of the aperture being formed square in cross section, as shown in Figure 24, for the reception of the square shoulder 14' of the bolt 14, the same being for the purpose of preventing the bolt from turning as the threaded nut 14'' is tightened thereon. Each of the clamp members 13 has the upper and lower lugs 13^a and 13^b formed thereon, with these lugs being adapted to bear against the respective side form members 10 and 12. A downwardly projecting lug 13^c is formed on each side of the member 13 with the same being adapted to bear against the upper portions 10^a and 12^a of the members 10 and 12 respectively, and with the respective portions 10^b and 12^b extending downwardly in the apertures 13^f of the members 13.

Pivotal wedge members 15 are provided to rigidly maintain the members 10 and 12 in fixed relation with each other, and with the respective members 13. The wedge members 15 are pivotly secured, through their lower portions, to the members 13 by means of rivets 16, and have the cam-shaped surfaces 15' formed at the upper portions thereof, with the surfaces 15' being adapted to bear against the under side of the respective portions 10^a and 12^a. A projecting lug 15'' is formed on the member 15, near the lower end portion thereof, and provides a stop for the member 15 when the same is in disengaged position, as

shown in Figure 23. When the wedge members 15 are in wedged position against the under sides of the portions 10a and 12a, the action thereof causes the upper surfaces of the portions 10a and 12a to be pressed tightly against the under surfaces of the downwardly projecting lugs 13c, and thereby securely clamping the members 10 and 12 in their respective members 13. It will also be apparent that one of the side portions of the wedge members 15 bears laterally against the downwardly extending portions 10b and 12b, with the action thereof causing the vertical portions 10 and 12 respectively to be maintained in contact with the lugs 13a and 13b of the members 13. It will be noted that the lugs 13' and 13'' provide fixed spacing of the members 13 without the necessity of providing any other gauging means, and with these means, the form members 10 and 12 are automatically maintained in spaced relation with each other.

The post members C of the completed benches are formed by means of the members 17, two of which are used for each post member. Each of the members 17 has an outwardly-turned flange 17' formed at the upper edges thereof, with the flanges 17' being adapted to rest on the end portions of the adjacent floor members 7. The vertical edges of the members 17 are each provided with outwardly extending flanges 17'', with the same having apertures formed therethrough for the reception of the bolts 18 which secure the members 17 together at the outer edges thereof. It will be noted that the members 17 are not secured to the members 7, but are suspended therefrom by means of the flanges 17' extending over the adjacent edges of the members 7. The spaces between each pair of the post-forming members are filled by means of the filler members 19 which also lap over the end portions of the adjacent end portions of the members 7, as shown in Figures 8 and 9. The post-forming members 17 and the filler members 19 are formed of comparatively light gauge sheet metal.

It will be apparent from Figures 1, 2 and 4 that the lower end portions of the members 17 do not extend downwardly to the surface of the earth. When the forms are being filled with concrete, the same is allowed to pass downwardly through the members 17, and to form piles of concrete from the surface of the earth upwardly to the lower end portions of the members 17, and thereby forming bases C'' for the posts C.

It is necessary to provide expansion joints in the benches at approximately intervals of twenty-five or thirty feet in order to allow for longitudinal expansion and contraction of the benches, and the expansion joint members 20 are provided for this purpose. The members 20 are formed U-shaped, as shown in Figures 19 and 20, and are formed of light gauge sheet metal which will provide for compression when expansion of the benches occur. The members 20 are left in the benches after the same are built.

The assembly and the utilization of the several form members herein shown and described, is substantially as follows:

The pipes 1 are driven into the earth with their upper end portions projecting vertically therefrom, and with the pipes being arranged in two parallel rows. The clamp members 2 are secured at the desired heights on the respective pipes 1 by means of the set screws 3, after which the longitudinally extending pipes 5 are placed on the outwardly projecting lugs 4 of the clamp members 2. The transverse members 6 are then placed across the pipes 5 with their outer end portions projecting therebeyond. The floor members 7 are laid from one of the members 6 to the next adjacent member 6 with each end of each member 7 resting on a transverse member 6, with the drainage aperture forming members 8 having been previously secured through the members 7 by means of the respective bolts 9. The outer members 7 only are rigidly secured to the members 6 by means of nails or other suitable means. The outer side members 10 are rigidly secured to the outermost members 7 through the portions 10' by means of the threaded screws 11. The outer clamp members 13 are arranged along the upper edges of the members 10 at the desired intervals, after which the inner side members 12 are provided with their respective clamp members 13, and are placed into position with relation to the outer member 10, after which the bolts 14 are extended through the apertures 13d of both halves of the clamp members and the respective nuts 14'' are threaded onto the threaded end portions of the bolts 14 and tightened against the respective members 13. When the clamp members 13 are tightly drawn together by means of the bolts 14 and the threaded nuts 14'', it is apparent that the projecting lugs 13' and 13'' provide predetermined spacing means for the members 10 and 12. After the two members 13 have been secured together, the pivoted wedge members 15 are swung upwardly with the surfaces 15' contacting the under surfaces of the respective portions 10a and 12a, and thereby tightly securing the portions 10a and 12a against the under sides of the lugs 13c.

After the forms have been filled with concrete, and the same has set the required length of time, and with the forms being ready to be taken therefrom, the bolts 14 are removed from the clamps 13 and the inner form members, together with the respective clamp members 13, are removed. The threaded screws 11, by which the members 10 are secured to the respective floor members 7, are removed, and the members 10 together with the respective clamp members 13 are removed from the floor members 7. The set screws 3 are loosened, and the clamps 2 are removed from their respective vertical pipe members 1, allowing the members 5, 6 and 7 together with the drainage aperture forming members 8 to drop downwardly from the completed bench, after which the parts of the forms are disassembled. After the forms have been removed, the bolts 18 are removed from the flanges 17'' of the members 17, and the halves of the members 17 are then removed from the completed posts C.

I desire that it be understood that the concrete may be reinforced with rods or wires in the conventional manner, or the benches may be formed without the usual reinforcements.

I also desire that it be understood that minor changes may be made in the several details, and in the arrangement of the parts herein shown and described, insofar as the changes may fall within the scope of the appended claims.

Having now fully shown and described the invention, what I claim, and desire to secure by Letters Patent of the United States, is:

1. In forms for concrete structures, a vertically disposed outer side member having an outwardly turned flange formed on the lower portion thereof with the flange being secured to floor members and with the upper portion of the outer side member turned in a horizontal position and at right angles to the vertically disposed portion

and with the outer edge of the upper horizontal portion being turned downwardly, a clamp member removably secured on the upper portion of said side member, a wedge member forming a part of said clamp member and pivotly secured thereon and adapted to wedge against the under side of the upper portion and rigidly securing the same thereto, and with the clamping member supporting and positioning an inner side member in predetermined spaced relation with the outer side member.

2. In a form for concrete structures, an outer side member and an inner side member, with the lower portion of the outer side member being rigidly secured to floor members, clamping members, with each being comprised of two identical halves secured together by means of a threaded bolt passing through both halves thereof, a wedge member pivotly secured in each half of each clamp member with a portion of each of said wedge members being adapted to wedge against a portion of a respective side member and to maintain one of said side members in predetermined spaced relation with the opposite of said side members.

3. In forms for concrete greenhouse benches, the combination of vertically extending members having clamping members removably secured thereto, outwardly extending lug members formed integrally with the clamping members, longitudinally positioned members resting on said lug members, transverse members extending between and resting on said longitudinally positioned members, floor members arranged on said transverse members, outer side members rigidly secured to said floor members and extending upwardly therefrom, inner side members supported from said outer side members, and means for supporting said inner side members in predetermined fixed relation to said outer side members.

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