Apr. 24, 1923. 1,452,628

D. E. TINGLEY

CONCRETE FORM

Filed Feb. 4, 1922 4 Sheets-Sheet 1

Fig. 1.

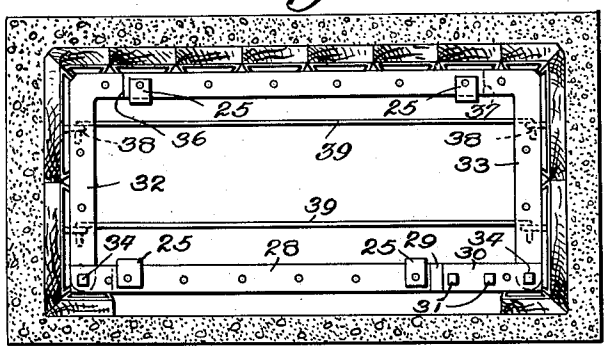


Fig. 2.

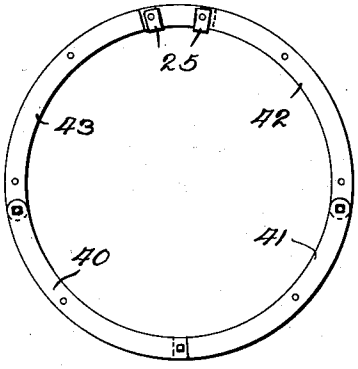


Fig. 3.

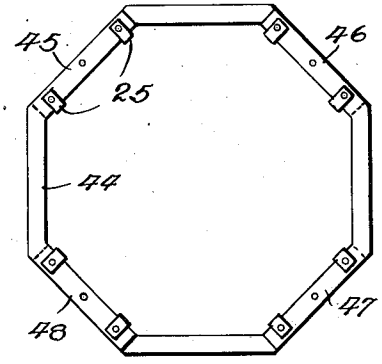


Fig. 4.

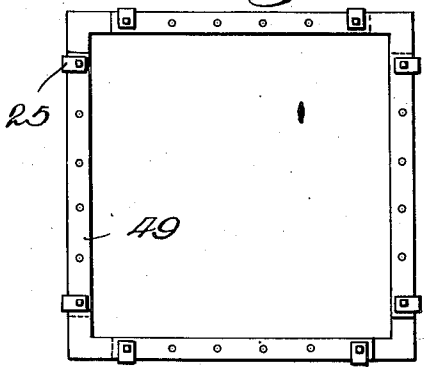
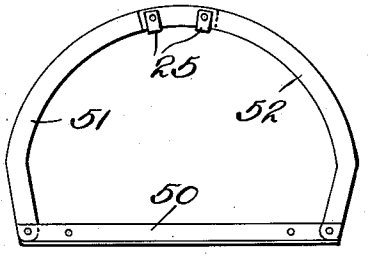


Fig. 5.



Inventor.

David E. Tingley

By Brown & Phelps

Attorneys

Apr. 24, 1923. 1,452,628

D. E. TINGLEY

CONCRETE FORM

Filed Feb. 4, 1922 4 Sheets-Sheet 2

Fig. 6.

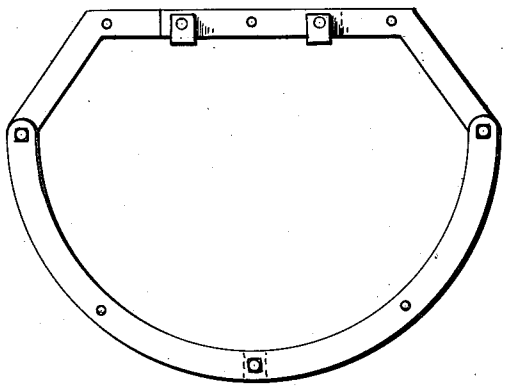


Fig. 7.

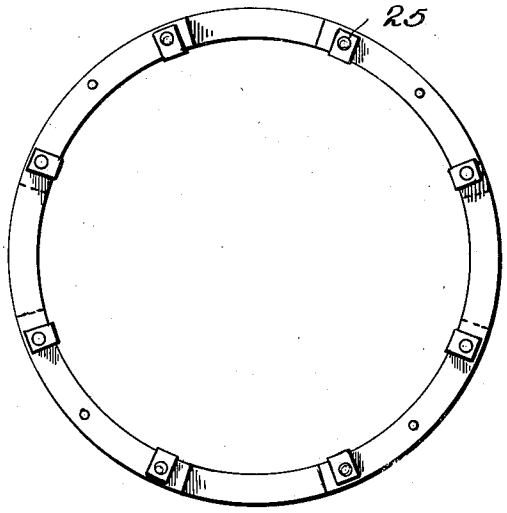


Fig. 8.

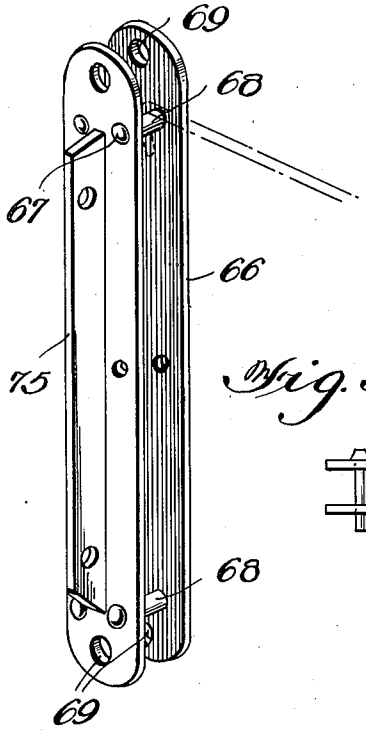


Fig. 9

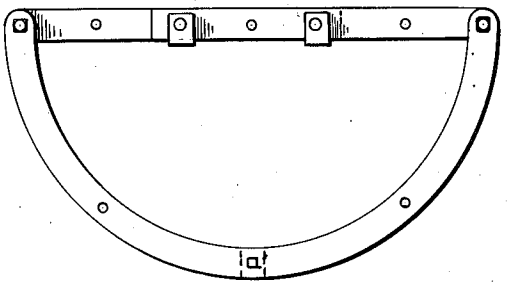
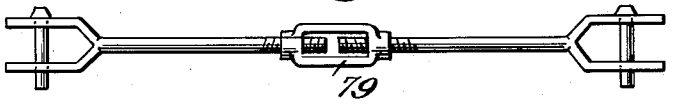


Fig. 10.



Inventor

David E. Tingley

By Browne & Phelps

Attorneys

Apr. 24, 1923. 1,452,628

D. E. TINGLEY

CONCRETE FORM

Filed Feb. 4, 1922 4 Sheets-Sheet 3

Fig. 11.

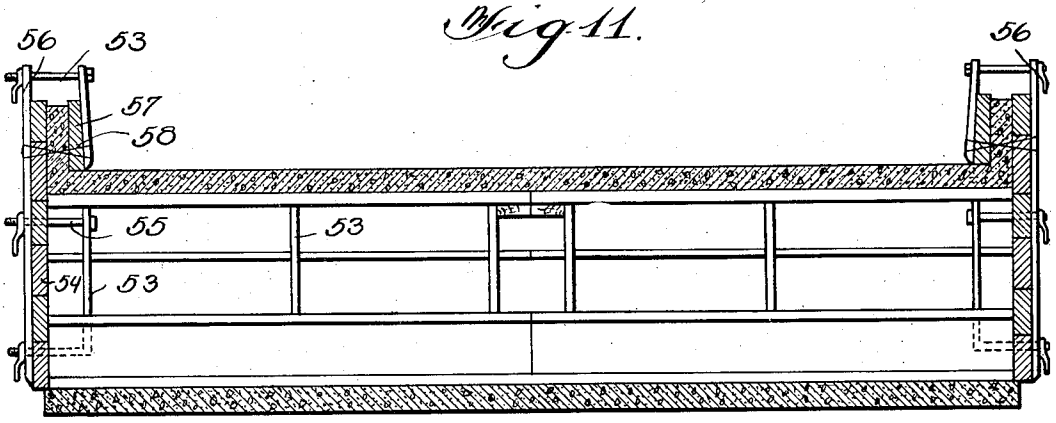


Fig. 24

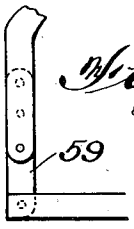


Fig. 12.

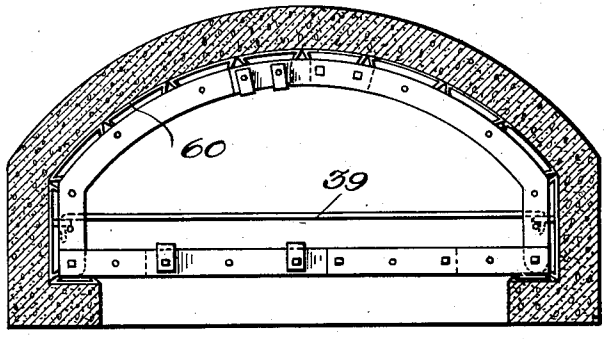


Fig. 14.

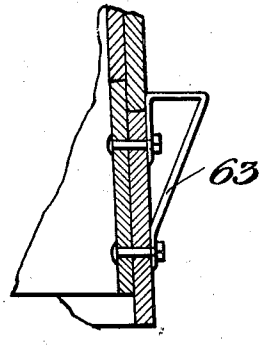
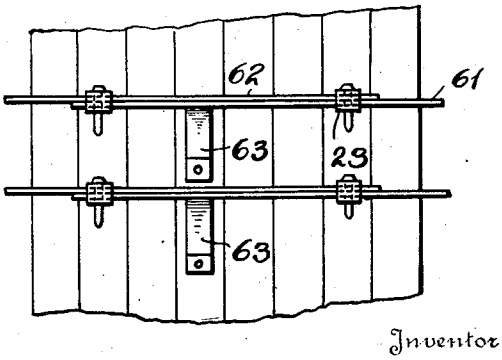


Fig. 13.



Inventor

David E. Tingley

By Browne & Phelps

Attorneys

Apr. 24, 1923. 1,452,628

D. E. TINGLEY

CONCRETE FORM

Filed Feb. 4, 1922. 4 Sheets-Sheet 4

Fig. 15.

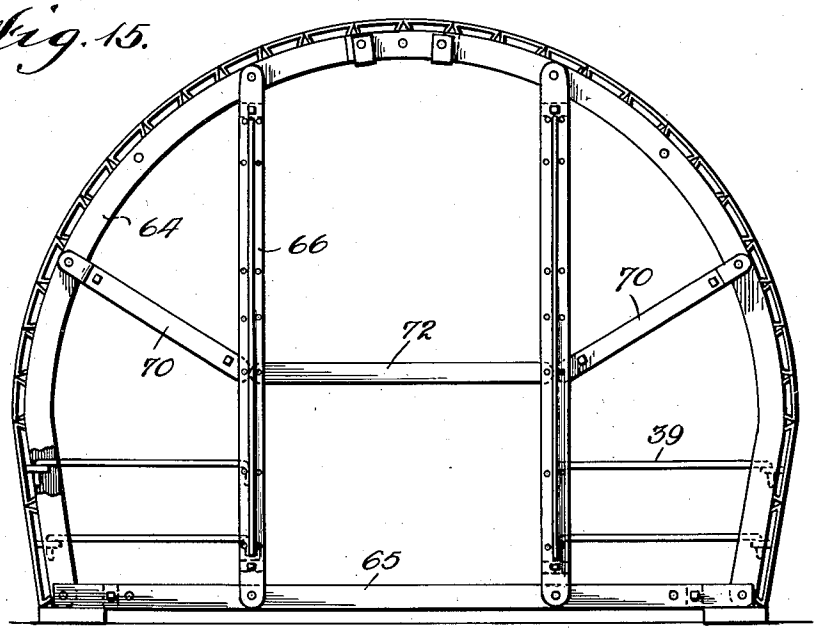


Fig. 16.

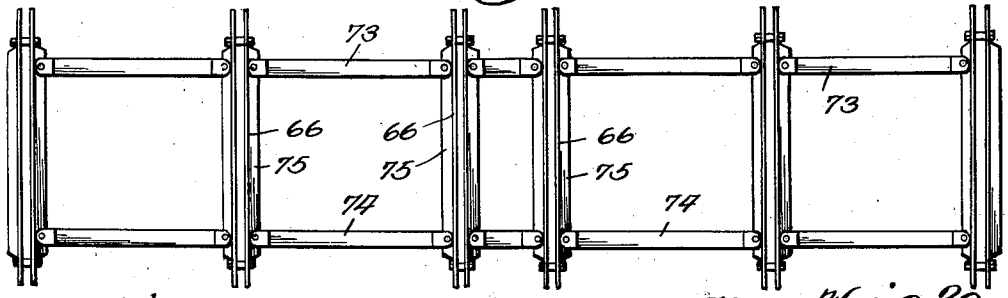


Fig. 17. Fig. 18. Fig. 19.

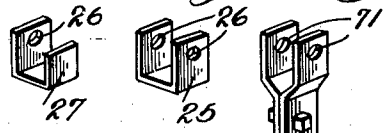


Fig. 20.



Fig. 21.

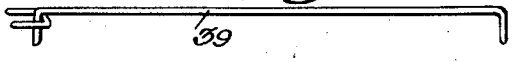
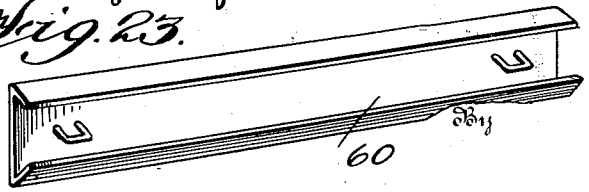


Fig. 22.



Fig. 23.



Inventor

David E. Tingley

Brownr & Phelps

Attorneys

Patented Apr. 24, 1923. 1,452,628

UNITED STATES PATENT OFFICE.

DAVID E. TINGLEY, OF MARSHALL, ILLINOIS.

CONCRETE FORM.

Application filed February 4, 1922. Serial No. 534,658.

To all whom it may concern:

Be it known that I, DAVID E. TINGLEY, a citizen of the United States, residing at Marshall, in the county of Clark and State of Illinois, have invented certain new and useful Improvements in Concrete Forms, of which the following is a specification.

The invention relates to concrete forms which may be utilized for different sizes of structures with a minimum of parts, in which the supports may be internal or external. A further object of the invention is the provision of a locking device which makes it possible to use the forms either internally or externally.

A further object of the invention is the provision of convenient means for supporting the form supporting devices while the concrete is being applied.

Illustrative embodiments are shown in the accompanying drawings, in which

Fig. 1 is a vertical transverse section of a culvert showing the forms in place;

Figs. 2, 3, 4, 5, 6, 7 and 8 are elevations of different forms of form supporting devices;

Fig. 9 is a perspective view of an interior brace for a centering of large dimensions;

Fig. 10 is a side view of a brace;

Fig. 11 is a longitudinal vertical section of a culvert;

Fig. 12 is a vertical transverse section of a culvert showing forms in place;

Fig. 13 is a detail elevation of the form externally applied as to a column or smoke stack;

Fig. 14 is a detail sectional view showing means for supporting the form supporting means of Fig. 13;

Fig. 15 is a vertical transverse section of a form of centering for a tunnel;

Fig. 16 is a side view of a series of braces such as shown in Fig. 15;

Figs. 17 to 22 inclusive are perspective views of elements utilized for securing the forms together,

Fig. 23 is a perspective view of a form board which may be made of metal; and

Fig. 24 is a detail side view of a modification of the form support shown in Fig. 12.

The form supporting means shown in the different figures are, to a large extent, formed of flat bars, and are joined in such a manner as to be readily separable by means of the devices shown in Figs. 17 to 22 inclusive. In these figures 25 illustrates a U-shaped clip which may be lapped over a pair of overlapping flat bars and having registering perforations, and a pin may then be passed through the perforations and through the holes 26 in the side member. If desirable one branch of the U may be shortened, as shown at 27, Fig. 17, and the pin referred to will pass the registering openings in the overlapped bars and through the single opening 26 to retain the clip in place. The form support of Fig. 1 comprises a lower member formed of flat bars 28, 29 and 30. The bars 29 and 30 may be firmly secured together by means of bolts 31, and the bars 28 and 29 may be secured together by means of clips 25, so as to be readily separable. The member may therefore be extended with the greatest of facility by removing the clips 25 and sliding the bars 28—29 upon each other so as to bring other holes therein in register.

The sides of the form shown in Fig. 1 comprise flat bars 32—33 secured at their lower ends to the ends of the bars of the bottom member by means of bolts 34. The upper end of the side members 32—33 are turned at an angle and extend into overlapping relation providing the upper member of the form, the side member 33 terminating at 36 and the side member 32 at 37. Without removal of the bolts 34 the extension of the bottom member by sliding plates 28 and 29 upon each other will also extend the upper member, the clips 25 thereof being replaced in a different pair of perforations. The clips 25 may be readily removed to disassemble the form for removal from the completed concrete conduit. To hold the form boards upon the supports until the concrete is placed they are preferably provided with staples 38 for the reception of the hook end rods 39.

The form of Fig. 2 comprises a circular form having partially connected members 40, 41, 42 and 43, the latter two members being removably joined together by means of clips 25.

The form of Fig. 3 provides an octagon formed of four members 44—45, which are alike, and have their ends overlapped upon

the sides 45—46 and 47 and 48 of the figure and connected by means of the clips 25. The sides of the figure provided by the overlapped ends of the member 44 may be extended by bringing other holes in register, thus producing a hexagonal of two sizes of side.

The form of Fig. 4 provides a square by utilizing four angular members 49 which are alike and which are overlapped as shown and connected by means of the clips 25. The square may be expanded, retaining its characteristics, the assembly shown in Fig. 4 being its minimum size. This expansion would be accomplished in an obvious manner by bringing other holes in register. Moreover this form of the device may be caused to provide a rectangle by expanding two opposite sides only. The form of the device shown in Fig. 5 provides a support for such a structure as a culvert, and comprises a bottom member 50 of an angle bar having members 51—52 pivotally connected to its ends and overlapping at their upper portion where they are secured together by means of clips 25. The form of Figs. 6 and 8 is substantially similar to that of Fig. 2, with the exception that the upper portion is angular or flat instead of round, and the form of Fig. 7 is similar to the form of Fig. 4, but provides a round figure instead of the angular figure of Fig. 4.

Fig. 11 illustrates a complete form for a culvert having earth-retaining flanges at its ends. In this form of the device the flat bar supports 53 may be those shown in any of the preceding figures, and the hooked rods 39 may be utilized to hold the lateral form boards in place. The end form boards 54 are shown as secured by means of clamp bolts 55 passing through holes in the adjacent support 53 and acting against vertical bars 56 which pass across the end form boards. Interior form boards 57 to form the flange may be supported by means of a clamp 53 and by means of wires 58.

If it is desired to increase the dimensions of the sides of the form shown in Fig. 1, or 12, a bar such as shown at 59 in Fig. 24, may be interposed between the side member, and the bottom member, thus utilizing the same angular side member which would be used for the smaller structure. The structure of Fig. 12 represents a culvert utilizing a curved upper portion but being otherwise similar to Fig. 1, and illustrating the use of metal form boards such as are shown in perspective in Fig. 23. The hooked rods 39 are utilized to hold the side form boards in place. In Figs. 13 and 14 the means for utilizing any of the heretofore described supports upon the exterior of the form are shown. In this case the flat bars 61—62 may be those providing a round or angular outline, closed figure, the clips 25 being placed from the exterior so as to leave the inner edges of the plate free to contact with the form boards. To support the bars 61—62 certain of the form boards are provided with brackets 63 which will occur upon the upper edge of the form board. As shown in Fig. 14, the form boards may be formed of two thicknesses, providing a rebate at each edge, the bracket projecting past the rebate so as to grasp the edge of the succeeding board, after the placing of which the bars 61—62 may be laid upon the bracket 63 to support the outward pressure of concrete to be placed.

The centering shown in Fig. 15 for use in large structures comprises supports 64, which may be formed of flat bars, and a brace 65, which may be formed of flat bars or of reversely joined angle bars. A series of vertical supports 66 which may be formed of T bars and may be fashioned as shown in Fig. 9 with the opposed bars joined by bolts 67 and spaced apart by bushings 68 placed over the bolts between the bars. The thus spaced apart bars are adapted to overlap the support 64 and be secured thereto by means of pins placed through the holes 69. The lower end of the supports may be secured to the brace member 65 in a like manner. The center of the upright 66 may be prevented from springing by means of braces 70 secured to bolts or pins extending between the bars 66 and made in the form shown in Fig. 19 so as to overlap the supports 64 and to be secured thereto by means of pins passed through holes in the support 64. Also additional support for the center of the uprights 66 may be provided in the form of bars 72 which may be placed at such a height that men, teams, or trucks may pass underneath, or the brace 72 may be removed after the load has been placed on the centering and has begun to receive its initial set to provide a clear passageway through the center of the form. The upright 66 may be connected longitudinally, as shown in Fig. 16, by means of braces 73—74, which have their ends preferably formed in the manner illustrated in Fig. 19, and which may be secured to the flange 75 of the uprights by means of pins. The hooked rods 39 may be utilized to hold the lower form boards upon the center of Fig. 15, one end of the rod being hooked over bushings 68, or over bolts or pins passed through the upright 66. If desired the hooked rods may be made in the form of a turn buckle, as illustrated at 76 in Fig. 20.

To provide a ready lengthening of the hook rods 39 either in the form shown at 39, or when formed as a turn buckle 77, in Fig. 22, lengtheners 78 having an eye at one end and a hook at the other end may be utilized.

The braces 73—74 may, if desired, be produced in the form shown in Fig. 10, at 79,

so as to be readily adjusted as to length and to pull members in the form should they be sprung by added weight.

Minor changes may be made in the physical embodiment of the invention without departing from its spirit.

What I claim is:

1. A concrete form comprising supporting means and a base member connecting the lower ends thereof, vertical supports comprising T bars having their flanges outwardly directed and their bases spaced apart overlapping said supporting means and said base members and pinned thereto, transverse brace members bolted between the bases of said T members, and longitudinal brace members secured to the oppositely directed flanges of said T members.

2. A concrete form comprising a form board, flanges upon said board inwardly directed at less than a right angle thereto whereby said board may be used upon a curved surface and provide a tight joint with adjacent boards, loops secured to said board for coaction with retaining means.

3. A concrete form comprising, in combination, a closed figure formed of flat bars each having a plurality of holes therein some of which are adapted to be brought into registry, readily removable connecting means spanning said bars and having perforations, a pin passing through said means and registering openings whereby the size of the figure may be modified by bringing chosen holes in said bars into registry, form boards supported by said closed figure, flanges upon said boards, each flange forming an acute angle with the plane of the board whereby the boards may be used for internal or external forms, loops secured to certain of said boards, and rods having hooks engaging said loops to retain said boards in place.

DAVID E. TINGLEY.