July 27, 1948. A. E. TROIEL 2,445,894

FORM FOR MOLDING CONCRETE PILES

Original Filed Aug. 13, 1941

Fig. 1.

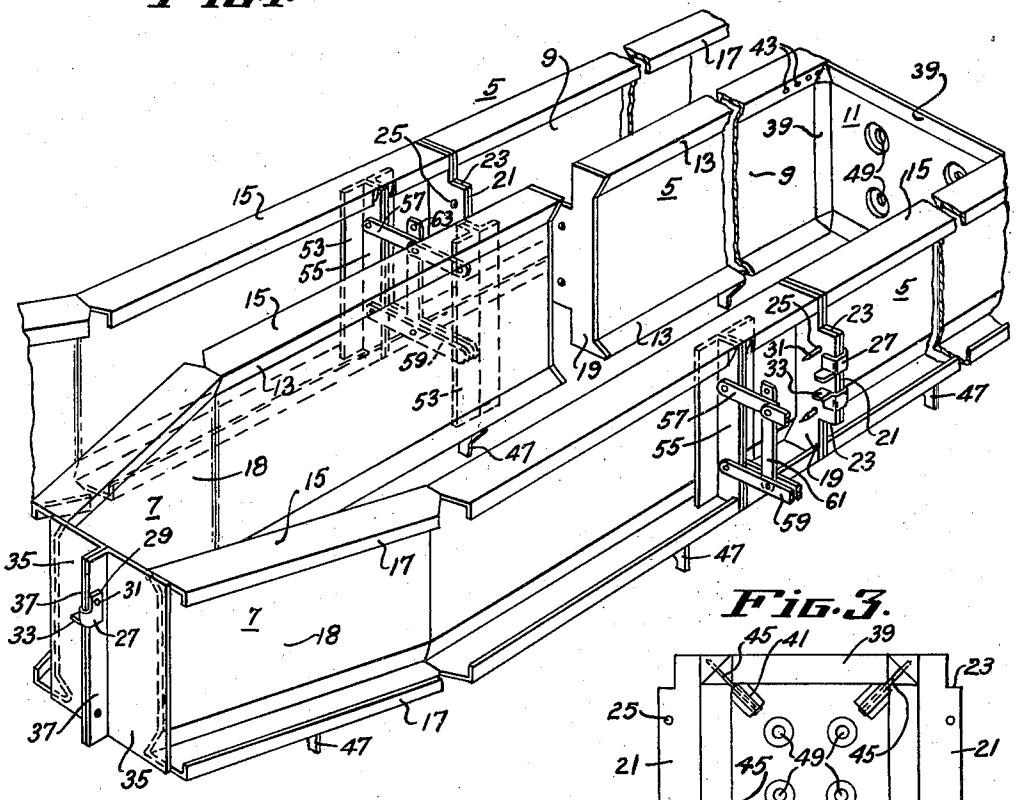


Fig. 3.

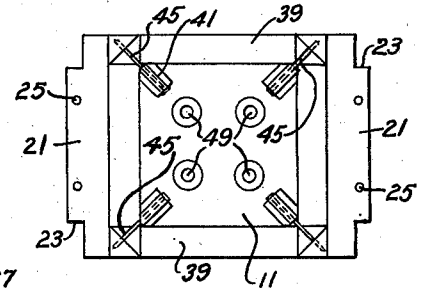
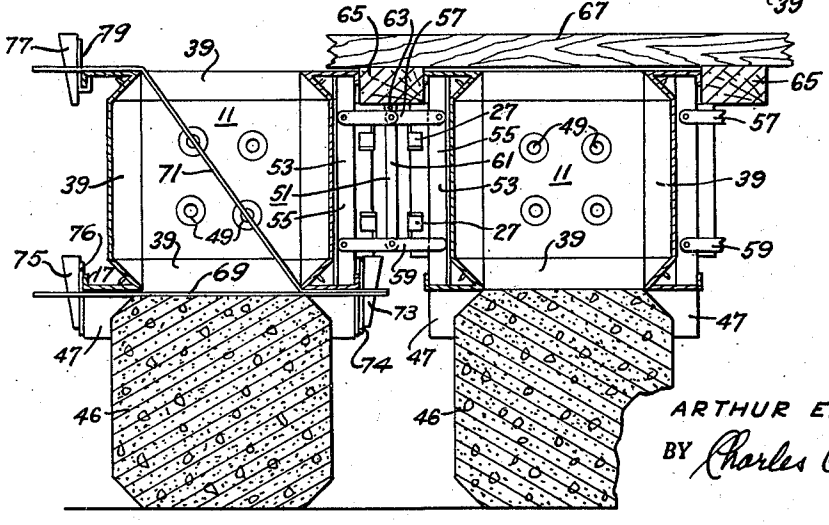


Fig. 2.



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FORM FOR MOLDING CONCRETE PILES

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11 Claims. (Cl. 25—121)

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My invention relates to forms, and more particularly to forms for the production of reinforced concrete piles.

This application is a continuation of my application Serial No. 406,609, filed August 13, 1941, now abandoned.

Among the objects of my invention are to provide a novel and improved pile form—

(1) Which is constructed from components that are portable and readily assembled and disassembled in use,

(2) Which is adapted to be ganged for the forming of a plurality of piles at one time,

(3) Which is adapted for mounting on previously formed piles, whereby subsequent piles may be cast in a neatly stacked arrangement upon the others,

(4) Which, when employed in a gang, will upon removal from the finished piles, leave the individual piles sufficiently spaced from the neighboring piles as to permit ready access thereto with lifting hooks,

(5) Which may be increased to a desired length merely by the insertion of side wall sections adapted for the purpose,

(6) Which will produce a pile with a tapered end and one having beveled or chamfered edges both around the top as well as along the longitudinal corners,

(7) Which, when assembled as a gang form, leaves the space above the form free of obstructions, so as to permit freedom of operation of bucket cranes and buggies customarily employed in the pouring of concrete into the forms.

Additional objects of my invention will be brought out in the following description of the same taken in conjunction with the accompanying drawings wherein—

Figure 1 is a view in perspective, partly broken away, disclosing a preferred form of my invention,

Figure 2 is a view in section, partly broken away, of a gang form embodying my invention, and illustrating the manner of mounting the same upon previously formed piles,

Figure 3 is a rear view in elevation, of a cap or closure for that end of a form which determines the upper end of a pile.

With reference to the aforementioned drawings, the individual form comprises a pair of parallel side walls 5 terminating in side wall extensions 7 which are angularly disposed toward each other to form a tapered end of a pile. The side walls may be formed of one or more side wall sections 9 which are adapted to be clamped together in

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alignment, whereby the form may be extended to produce a pile of any desired length. The end of the form which represents the top of the pile, is closed by a suitable closure 11.

Each side wall section is formed from a rectangular sheet, the upper and lower longitudinal regions thereof being bent to provide an inwardly directed 45° angle chamfer strip 13, a horizontal strip section 15 along the edge of the chamfer strip, and a short vertical flange 17 along the free edge of the horizontal strip section, thus leaving an intermediate portion or web 18. Affixed to each end of a side wall section, is an end wall 19 which conforms in contour with the contour of the sheet as bent to provide the chamfer strips, horizontal strip sections, etc. Each of these end walls is formed with an outwardly extending portion 21, providing an upper and lower shoulder 23, and is provided with a pair of perforations 25 therethrough to receive a clamp 27 for holding two side wall sections together in alignment.

This clamp is of U-shape, having a spacing between the leg portions thereof, approximately equal to the thickness of two end walls. One of the legs is provided with an integral tab 29 in the plane thereof, such tab having a pivot 31 riveted thereto. Laterally extending from the opposite leg of the clamp is a tab 33. In employing the clamp to hold two side wall sections in alignment, the side wall sections are placed with the end wall of one of them against the end wall of the other side wall section, and with the perforations in alignment, the pivot 31 of the clamp is passed through two of the aligned perforations and the U-shaped portion is then swung into clamping position, straddling the outer edges of the adjacent end walls. The laterally extending tab 33 is useful in hammering the clamp home and, further, in releasing the same when it is desired to disassemble the form. A pair of clamps will suffice in holding two of the side wall sections in properly aligned position.

In the embodiment under consideration, each side wall extension 7 is formed from a side wall section, by notching through the upper and lower chamfer strips 13 and adjacent portions of the horizontal strip sections 15, leaving only the web 18 uncut. This permits the side wall extension to be flexed in either direction, and in making up a form, the opposed side wall extensions are bent toward each other and rigidly maintained in such position by suitable holding means extending across the free edges of the side wall extensions. Such holding means in the embodiment illus-

trated by me, comprises a plate **35** attached to the web of the extension and terminating in a lateral flange **37**. The dimensions of the plates are such that by bringing the two side wall extensions toward each other until the flanges **37** contact one another, a proper taper will result. In this position, the flanges are clamped, through the use of a U-shaped clamp **27** similar to that described in connection with clamping the ends of adjacent side wall sections together, the flanges being suitably perforated for the purpose.

At the far end of the form, which is to determine the upper end of a pile, the form is closed by the cap or closure **11**. This cap is substantially rectangular in shape, with corners removed so that the cap may be fitted into the open end of the form between the side walls. The edges of the cap are turned inwardly on an angle of approximate 45° to form a border of chamfer strips **39** around the cap, these chamfer strips serving to impart a beveled or chamfered edge around the top end of the finished pile.

The cap is retained in position during the pouring of a form, by suitable holding means at each corner of the cap, which are adapted to engage the chamfer strips of the side walls. One form which such holding means may take, may comprise a suitable nail guide **41** preferably welded to the cap, adjacent each corner thereof and directed toward the nearest side wall chamfer strip **13**. The chamfer strip in this region is perforated with a string of small holes **43** to receive a nail **45** or corresponding element which is inserted through the nail guide and directed toward one of the perforations. The presence of a series of perforations permits of adjustment of the cap in the form.

In employing a form, it is customary to provide a bottom surface between the side walls, and this determines one wall of the finished pile. After a pile has once been formed, it might itself then provide the surface upon which another pile may be formed. In order to readily support the form upon a previously finished pile **46**, each of the side wall sections, as well as the side wall extensions, has affixed thereto, a series of short legs **47** shaped to provide a 45° shoulder and so positioned as to afford a complementary fit with the chamfered edges of the pile upon which the form is to rest. In lieu of spaced legs **47** as illustrated, a leg extending the entire length of each side wall section may be employed, in which case, contact will be made throughout the entire length of the pile upon which the form is mounted.

Before pouring concrete into a form, it is desirable to spread a sheet of paper or equivalent material upon that surface on which the form is supported. This will not only preclude possibility of adhesion of the two piles, but offers a smooth surface upon which the concrete is poured, thereby giving a smooth finished effect to the pile under construction.

In the manufacture of piles, particularly those of the concrete type, it is customary to reinforce the same with a reinforcing network of steel. Such reinforcing network might include longitudinally disposed rods or bars extending practically the full length of the pile. At spaced intervals, such network may be suspended from cross-bars straddling the side walls, with the longitudinally disposed rods preferably protruding through the cap **11**. For this purpose, the cap is provided with the desired number of openings or holes **49** to receive the ends of the rods. When this procedure is followed, the cap is preferably countersunk around each of the holes to receive a felt washer or the like for the purpose of precluding leakage of freshly poured concrete, through the cap openings around the rods which extend therethrough. Following the setting of a pile and the removal of the form, the protruding ends of the reinforcing rods are preferably bent over to provide anchoring means for any concrete components of a superstructure which may subsequently be added.

To enhance the economy in the use of my improved form, as well as to facilitate the assembling of the same, I prefer to so construct the components that the forms may be ganged for simultaneonus use, whereby a plurality of piles may be cast at one time. To this end, the side wall sections **9** are joined together in pairs by means of toggle connections **51** located at spaced intervals, these joined side wall sections then forming elements of the adjacent side walls of adjacent individual forms.

The toggle connection which joins such side wall sections, comprises a pair of side members **53** of angle iron, of a length equal to the height of a side wall section, and having an intermediate lateral web **55** extending the full length thereof. These side members are connected by upper and lower toggle links **57** and **59** respectively. The lower links are two in number, extending between the side wall sections, one on either side of the plane of the webs **55**. One of these links is pivoted at one end to one web, while the other is pivoted to the other web. This leaves the free end of each link in position to slide against one of the webs when such link is shifted about its pivot connection. With the links so pivoted to the respective webs, they are also pivotally secured at their mid-points to each other, and to the lower end of an operating handle **61** which extends upwardly between the side members. Adjacent the upper end of the operating handle, there is pivotally anchored, one end of each of the upper links, each of which is also pivotally secured at its other end to the web of one of the side members. A hole **63** through the upper end of the operating handle, adapts it for the reception of a lifting hook or the like.

In assembling the toggle connection to the two side wall sections to be joined, each side member **53** is disposed between the horizontal strip sections **15** of a side wall section and against the web **18** of such side wall section. A portion of the upper and lower flanges **17** of the side wall section, at points to either side of the side member web **55**, is slit and then crimped under and against the web, thereby securely fastening the toggle connection to that side wall section.

In use, the gang form is assembled by spreading the toggle connections and then aligning and joining the number of side wall sections necessary to give the desired length of pile. To one end of the assembled sections is similarly affixed, a side wall section having a side wall extension adapted for the formation of the taper in the form as previously described.

To guard against possible distortion of the wall structure, due to the side wall thrusts of the concrete being poured into the forms, the forms are so designed and dimensioned as to receive a two-by-four or equivalent beam **65** (Figure 2) between the side walls, and these are adapted to rest upon the upper shoulders **23** of the end walls **19** of the side wall sections, and present an upper surface either flush with or slightly above the horizontal strip sections **15** of the side walls, thereby en-

abling the application of bridging members 67 across the various forms. Such bridging members are preferably formed of wooden beams which may be nailed to the two-by-four beams previously discussed. Certain of these may be used in suspending a reinforcing network in the form prior to pouring of the concrete, while others may be employed as part of a walk for buggies which are sometimes employed in lieu of bucket cranes for conveying and pouring concrete into the molds. In this connection, my improved forms permit freedom of movement due to the complete absence of any obstructions above the upper level of the forms.

After the concrete has been poured and the piles have had an opportunity to solidify and set, the forms may be disassembled by opening the same at each end, leaving the side walls in a position to be withdrawn from engagement with the piles, and such withdrawal is readily effected by lifting up on the toggle control handles. Such operation of the toggle connections draws the side walls toward each other a distance away from the piles, sufficient to permit the side walls or the side wall sections to be lifted away from the finished piles, for subsequent use. This leaves the individual piles spaced from each other a distance which provides sufficient room between the piles for the introduction of hooks for removal of the piles to a conveyor or carrier for hauling to the point of use.

Facilities are preferably provided for bracing the end walls of each gang of forms. For this purpose, I include a series of bracing strips 69 and 71 at spaced intervals in the outside forms of the gang. Both have one end inserted beneath the side wall preceding the end wall and retained against displacement by a wedge 73 fitted into aligned slots in these members adjacent this side wall and bearing against an intermediate element 74 which contacts both the lower edge of the wall and a leg 47 to give support to the wedge.

The bracing strip 69 extends horizontally beyond the outer wall and this end is similarly slotted to receive a wedge 75 and supporting element 76 in pressure engagement against the lower flange 17 of the outer wall.

The strip 71 passes diagonally across the form and over the upper surface of the outer wall and, like the strip 69, is anchored by a wedge 77 and a supporting element 79, this supporting element being of L-shape, thus enabling it to be hooked under the flange 17 so as to provide proper support for the wedge.

My invention is susceptible to changes and improvements, without departing from the principles involved. I accordingly do not desire to be limited in my protection to the detail disclosure of my preferred form as set forth above, except as may be necessitated by the appended claims.

I claim:

1. A self-sustaining side wall component for a pile form, comprising a substantially rectangular web having inwardly directed chamfer strips along the upper and lower edges thereof, and including a relatively thin end wall at one end of said web, shaped to conform to the end contour offered by said web and chamfer strips, and having a lateral offset in substantially the plane of said end wall to provide an offset shoulder below the upper edge of said side wall component.

2. A self-sustaining side wall component for a pile form, comprising a substantially rectangular web having inwardly directed chamfer strips along the upper and lower edges thereof, a horizontal strip section having an edge in common with an edge of the upper of said chamfer strips, a horizontal strip section having an edge in common with an edge of the lower of said chamfer strips, and a relatively thin end wall at one end of said web, shaped to conform to the end contour offered by said web, chamfer strips and horizontal strip sections, and having a lateral offset in substantially the plane of said end wall to provide an offset shoulder below the upper edge of said side wall component.

3. Adjacent side wall components for a gang form comprising; a pair of side wall sections, each providing a side for a different form of the gang, each said wall section including a substantially rectangular web having outwardly directed chamfer strips along the upper and lower edges thereof and an end wall at one end of said web, shaped to conform to the end contour offered by said web and chamfer strips and having a lateral offset providing an offset shoulder; and means joining said sections into a unit assembly, said means being adjustable to vary the spacing between said sections, and disposed below the plane of said offset shoulders.

4. Adjacent side wall components for a gang form comprising; a pair of side wall sections, each providing a side for a different form of the gang, said wall including a substantially rectangular web having outwardly directed chamfer strips along the upper and lower edges thereof and an end wall at one end of said web, shaped to conform to the end contour offered by said web and chamfer strips and having a lateral offset providing an offset shoulder; and means joining said sections at spaced intervals into a unit assembly, said means being adjustable to vary the spacing between said sections, and disposed below the plane of said offset shoulders.

5. A side wall component for a pile form comprising a plurality of substantially rectangular web sections of sheet material of uniform width, each bent to provide chamfer strips along the upper and lower edges thereof, a relatively thin end wall disposed at the end of each adjacent web section, each shaped to conform to the end contour of its associated web section and having a lateral offset providing an offset shoulder, and means securing the end walls of adjacent web sections together with the web sections in matched end-to-end relationship.

6. Adjacent side wall components for a gang form comprising; a pair of side wall sections, each providing a side for a different form of the gang, each of said side wall sections including an end wall having an offset slightly below the upper edge of said side wall section and extending laterally in the direction of the other side wall section to provide between said side wall sections a pair of shoulders below the plane of the upper edges thereof for the support of a beam.

7. Adjacent side wall components for a gang form comprising; a pair of side wall sections, each providing a side for a different form of the gang, each of said side wall sections including an end wall having an offset slightly below the upper edge of said side wall section and extending laterally in the direction of the other side wall section to provide between said side wall sections a pair of shoulders below the plane of the upper edges thereof for the support of a beam; and means interconnecting said side wall sections into a unit assembly capable of being moved about

as such, said means being disposed below the level of said shoulders.

8. Adjacent side wall components for a gang form comprising; a pair of side wall sections, each providing a side for a different form of the gang, each of said side wall sections including an end wall having an offset slightly below the upper edge of said side wall section and extending laterally in the direction of the other side wall section to provide between said side wall sections a pair of shoulders below the plane of the upper edges thereof for the support of a beam; and a plurality of toggle means interconnecting said side wall sections into a unit assembly capable of being moved about as such and enabling said side wall sections to be adjustably spaced from each other, each of said toggle means including an operating handle extending upwardly but terminating below the level of said shoulders.

9. Adjacent side wall components for a gang form comprising, a pair of independent side wall sections, each providing a side for a different form of the gang; and means joining said sections into a unit assembly capable of being moved about as such and associated with other similar assemblies to constitute a gang form, said means constituting a plurality of toggle connections, each including upper and lower toggle links pivotally anchored at one end to each of said side wall sections, an operating handle intermediate said side wall sections and terminating below the plane of the upper edges of said side wall sections, and means pivotally securing said links to said operating handle.

10. Adjacent side wall components for a gang form comprising, a pair of independent side wall sections, each providing a side for a different form of the gang; and means joining said sections into a unit assembly capable of being moved about as such and associated with other similar assemblies to constitute a gang form, said means constituting a plurality of toggle connections, each including a short vertically disposed beam affixed to each of said side sections and having a web

extending laterally toward the other, upper and lower toggle links pivotally anchored at one end to said laterally extending webs, an operating handle intermediate said side wall sections and terminating below the plane of the upper edges of said side wall sections, and means pivotally securing said links to said operating handle.

11. Adjacent side wall components for a gang form comprising, a pair of independent side wall sections, each providing a side for a different form of the gang; and means joining said sections into a unit assembly capable of being moved about as such and associated with other similar assemblies to constitute a gang form, said means constituting a plurality of toggle connections, each including a short vertically disposed beam affixed to each of said side sections and having a web extending laterally toward the other, a lower toggle link pivotally anchored at one end to one side of one of said laterally extending webs and terminating alongside the corresponding side of said other web, a second lower toggle link pivotally anchored to the other side of said other web and terminating alongside the other side of said first web, upper toggle links pivotally anchored to said webs, an operating handle intermediate said side wall sections and terminating below the plane of the upper edges of said side wall sections, and means pivotally securing all of said links to said operating handle.

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