

Sept. 8, 1959

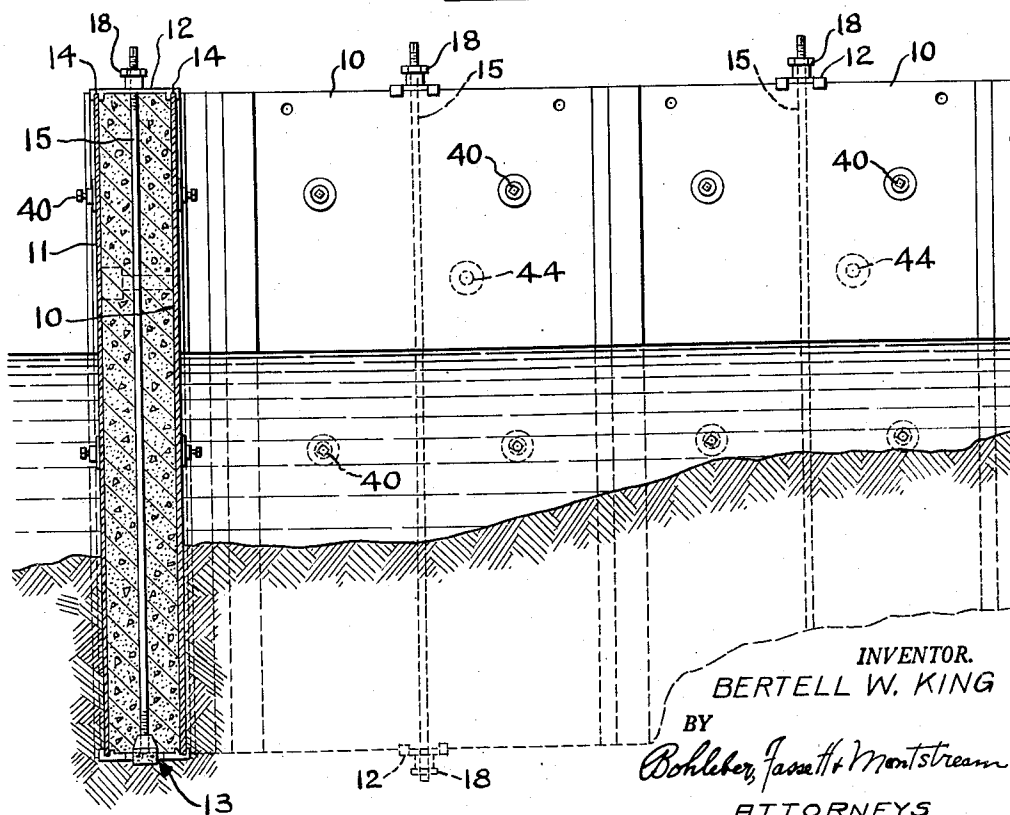
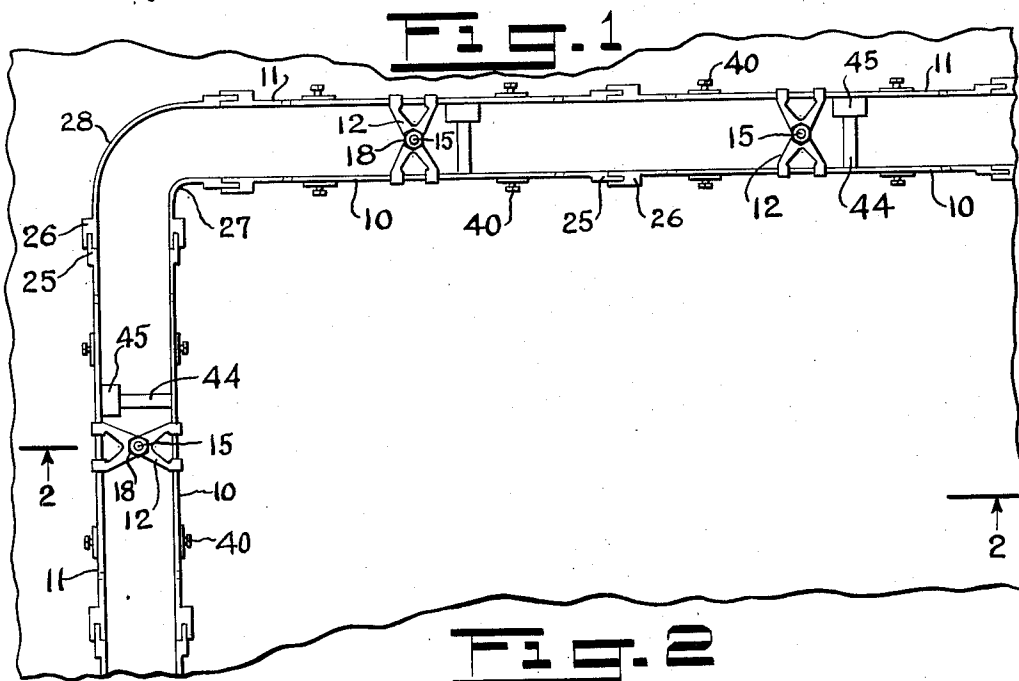
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2,902,743

CONCRETE BULKHEAD, JETTY OR PILE FORM

Filed July 27, 1953

4 Sheets-Sheet 1



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CONCRETE BULKHEAD, JETTY OR PILE FORM

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Fig. 4

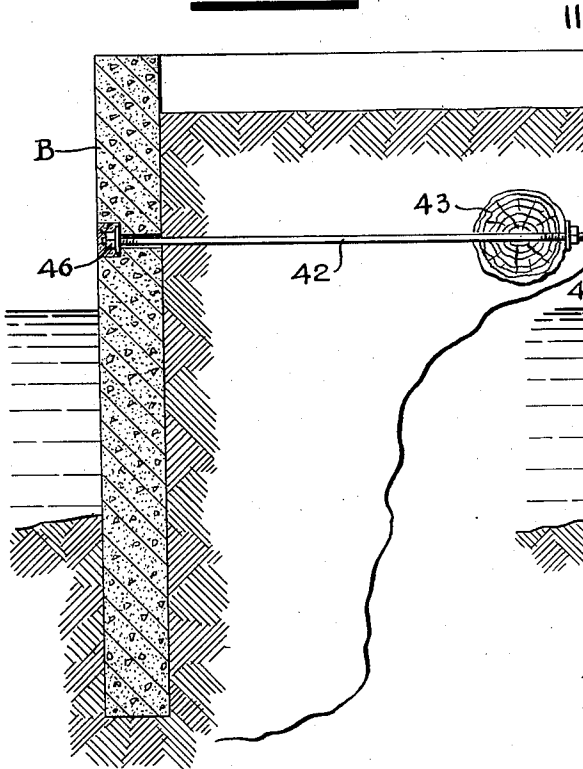


Fig. 5

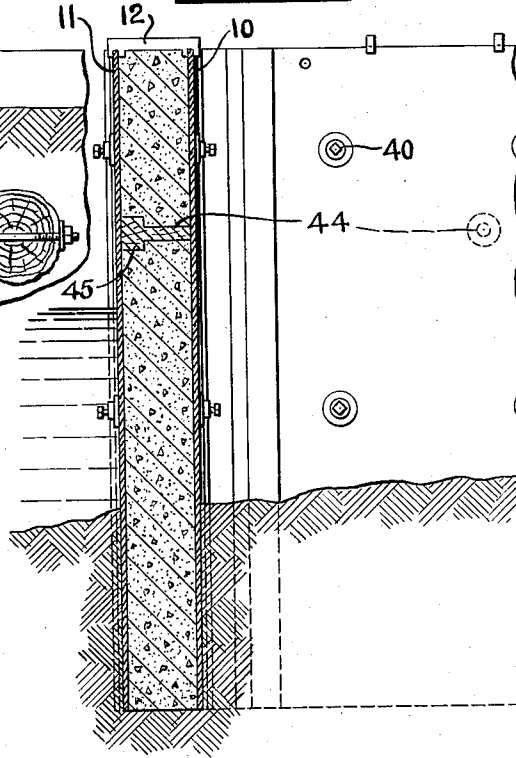


Fig. 6

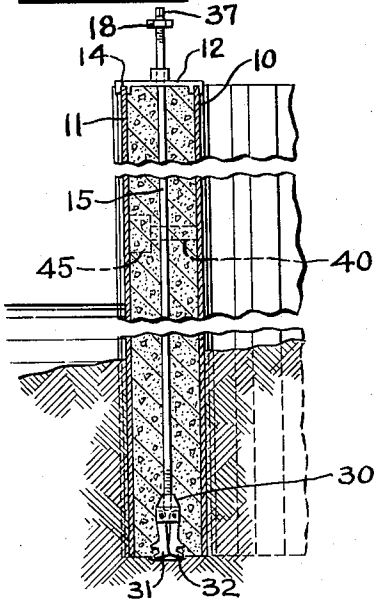
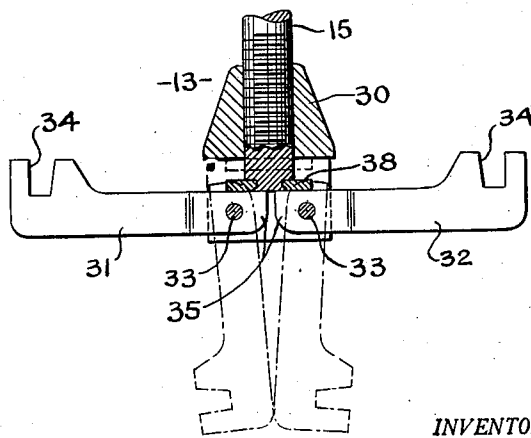


Fig. 7



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Fig. 7

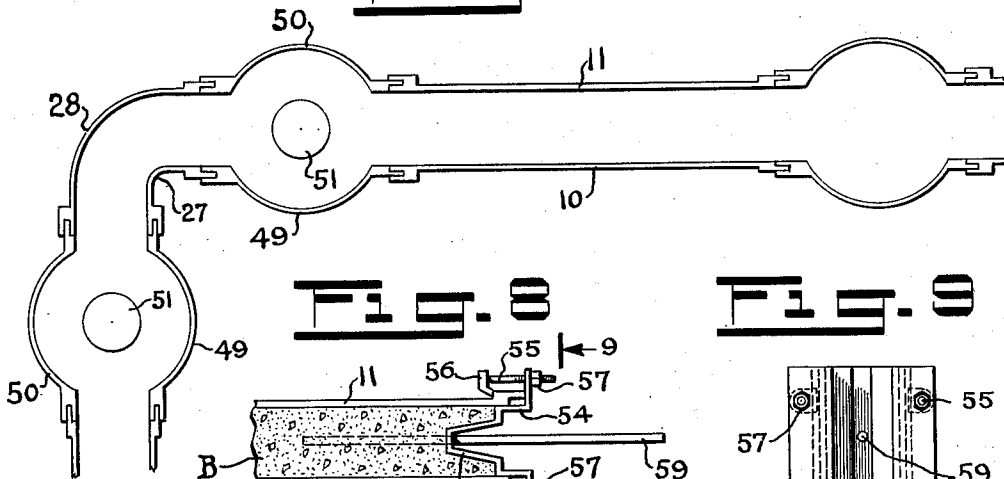


Fig. 8

Fig. 9

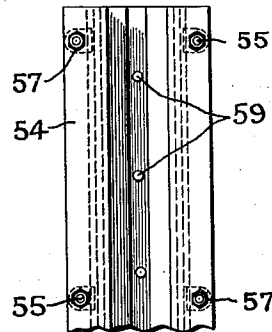
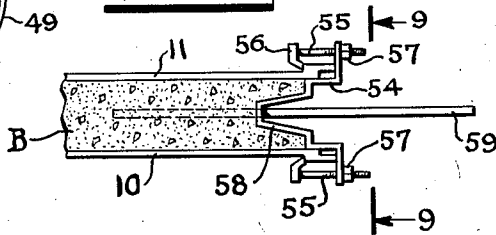


Fig. 10

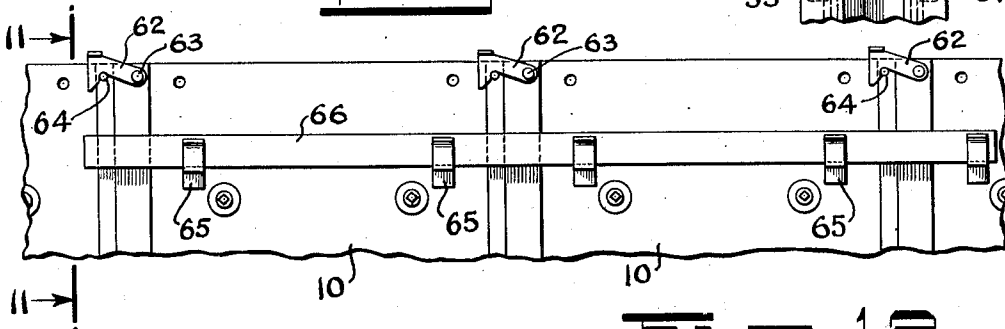


Fig. 12

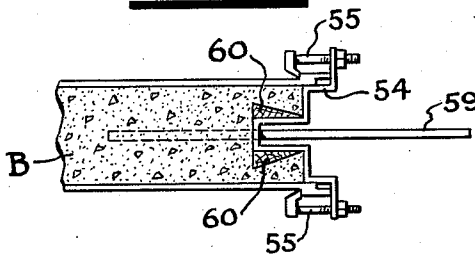
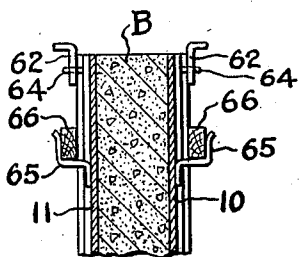


Fig. 11



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Fig. 15

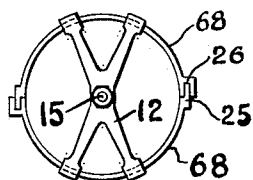


Fig. 13



Fig. 14

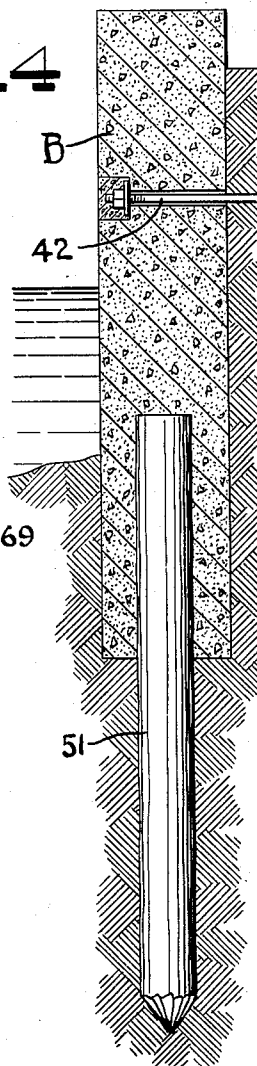


Fig. 16

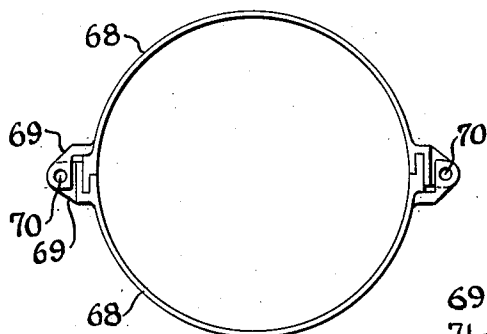


Fig. 17

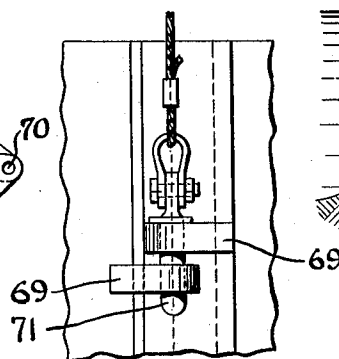


Fig. 18

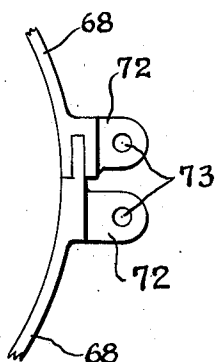
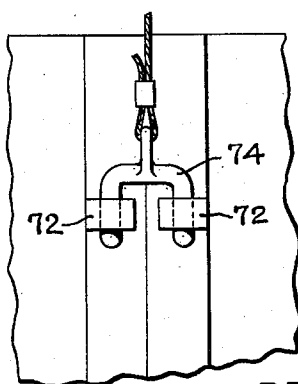


Fig. 19



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CONCRETE BULKHEAD, JETTY OR PILE FORM

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Application July 27, 1953, Serial No. 370,440

14 Claims. (Cl. 25—131)

The invention relates to a form by means of which a concrete bulkhead, jetty, pile and the like may be simply and easily poured and the forms removed for reuse. The form is preferably made of sheet material such as metal plates which are held or clamped in spaced apart relation at top and bottom so that the lower portion may be driven into the soil, the soil between the plates removed and concrete may be poured therebetween and not spread the form. A clamp bar passes down between the plates which is removed while the concrete is still soft. After the concrete has hardened the plates may be removed for reuse in making other concrete bulkheads, jetties or piles.

It is an object of the invention to construct a form for bulkheads, jetties and piles of simple construction which is reclaimable.

Another object of the invention is to construct a form of sheet metal plates which are held spaced apart by a bottom clamp and an upper clamp in which the bottom clamp is collapsible so that it may be removed and reused.

A still further object of the invention is to provide a construction of concrete form such that a hole may be readily provided in the hardened concrete bulkhead to receive a supporting dead-man bar.

Other objects of the invention will be more apparent from the following description when taken in connection with the accompanying drawings illustrating some preferred embodiments of the invention in which:

Figure 1 is a top view of interengaging forms showing the vertical edges of a series of form plates and a corner or angle form so that a form of any desired length may be constructed;

Figure 2 is a vertical section taken on line 2—2 of Figure 1 through a form filled with a concrete to form a bulkhead and the like;

Figure 3 is a sectional view through a form with the concrete poured and a removable plug in the concrete;

Figure 4 is a sectional view of a completed wall with the dead-man supporting bar therethrough;

Figure 5 is a sectional view of the form using removable or collapsible lower or bottom clamp which is collapsed and ready for removal through the soft concrete;

Figure 6 is an enlarged view of a collapsible lower clamp;

Figure 7 is a top view of a form of circular shape in intermediate positions for a pile anchorage;

Figure 8 is a horizontal section through an end of a bulkhead having an end plate for interlocking adjacent bulkhead sections;

Figure 9 is an end view of the bulkhead of Figure 8;

Figure 10 is a side view of interlocking latches;

Figure 11 is a section taken on line 11—11 of Figure 10;

Figure 12 is a horizontal section through a bulkhead showing an end plate for a dovetail interlock between adjacent bulkhead sections;

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Figure 13 is an enlarged view of a bottom edge for the form plates;

Figure 14 is a vertical section through a bulkhead with a pile anchorage;

5 Figure 15 is a top view of a circular pile form;

Figure 16 is a top view of a circular form having pin interlock between forms;

Figure 17 is a side view of the pin interlock of Figure 16;

10 Figure 18 is a top view of a U pin interlock; and

Figure 19 is a side view of the U pin interlock.

The form is constructed of a pair of form plates of desired shape having interengaging means along the vertical edges thereof to prevent at least lateral displacement of the plates. Any suitable form of interengaging means may be used, the simpler form to construct being one which prevents lateral displacement of the edges only. Clamping means is used to retain the upper and lower edges of the form plates in spaced relation, which means includes a clamp bar passing down between the plates, until the concrete is poured whereupon the clamping bar and if a collapsible lower clamp is used, is removed while the concrete is still soft. The concrete and soil retain the lower edges of the form plates in position and the upper clamp may remain to prevent the upper edges of the form plates from spreading.

The form for a straight bulkhead B or straight sided pile and the like, is constructed of a pair of straight form plates 10 and 11 which are held in spaced relation by clamping means including a top clamp 12 and a bottom clamp 13 which may be like clamp 12. The clamps may have angularly extending arms for better support. Each clamp may have spaced grooves 14 for receiving the edges of the form plates. A clamp bar 15 passes down between the form plates and clamps the top clamp and bottom or lower clamp against the upper and lower edges of the plates respectively and thereby holds the latter in spaced relation. The clamp bar is threadedly received in the bottom clamp 13 and the top clamp has a hole therethrough for freely passing the clamp bar. The threads provide a connecting means between the clamp bar and the bottom clamp to separate the clamp bar by turning of the latter at the top of the clamp bar.

A nut 18 is threaded onto the clamp bar at the upper end which engages the clamp 12 and when tightened forces or draws the two clamps together to clamp the form plates in spaced relation. The clamp bar may be long so that it is suitable for use with different lengths of plates 10 and 11. Any form of securing means is suitable for drawing the clamps together to secure the form plates in spaced relation.

Any suitable interengaging means may be used for interlocking the vertical edges of adjacent plates forming a complete form. The interengaging means particularly shown includes a tongue 25 at the edge of one plate. The tongue is received in a groove 26 carried by the vertical edge of the adjacent plate. The tongue and groove may be formed in any way, the construction shown being built up by welding narrow bands of metal to the plates. Any length of form may be constructed by interengaging a plurality of forms or vertical sections of spaced plates. Figure 1 illustrates an angular section or corner form for forming corners made up of an inner corner plate 27 and an outer corner plate 28 which can also be used to make hollow generally square piles or with one or more plates 10 and 11 hollow rectangular piles. The clamping means described secures the corner form in spaced relation although when serving as corners in a straight line run of forms it may be dispensed with.

In building a bulkhead, jetty or pile, a section is assembled together with one or more clamping means for each form or section including the upper clamp 12 and

lower clamp 13 clamped on the upper and lower edges of the plates whereupon the section is sunk into the soil or sand or mud such as by driving etc. to the desired depth. The forms or sections are assembled together in side-by-side relation with the interengaging means at the adjacent vertical edges engaged until a multiple form of the desired length has been secured. The soil is then removed from between the plates and concrete is poured thereinto. After the concrete has been poured the nut 18 is removed from the clamp bar after which the clamp bar 15 is unscrewed from the bottom clamp 13 if it is a fixed clamp like clamp 12 with separable means such as a threaded hole, and the clamp bar pulled out through the soft concrete. The upper clamp 12 may remain upon the top of the plates in order to assure that there will be no spreading of the tops of the plates and may be removed after the concrete has hardened. The lower clamp plate 13 remains at the bottom.

If it should be desired to remove the lower clamp and reuse the same, a collapsible form of lower clamp may be used a form of which is shown in Figures 5 and 6. In this construction a base 30 is provided having a threaded hole therethrough to receive the clamp bar 15. The base carries a pair of arms 31 and 32 at least one of which is and preferably both of which are pivotally mounted on the base in any suitable manner such as by the hinge pins 33. In the form illustrated both arms are pivotally mounted. Each arm carries a groove 34 to receive the edge of its respective plate. Suitable connecting means is provided to keep the arms from pivoting from horizontal position or in the construction particularly shown from pivoting downwardly. The means particularly shown is the end of each pivotal arm which has an inwardly projecting extension 35. The inner arm ends or extensions engage or abut the end of the bar 15 when the arms are projecting horizontally and permit the arms to hinge downwardly when the clamp bar is turned or unscrewed upwardly such as by turning the same with a wrench on the flats 37. The form of collapsible clamp particularly illustrated may take many forms, the essential construction of which is that engagement of the pivoted arms with the clamp bar holds the arms horizontally against collapsing when clamping pressure is applied thereto and upon turning the clamp bar relatively to the arms or unscrewing the clamp bar vertically somewhat from the clamp, the arms are rendered collapsible. Preferably the clamp bar 15 has a washer 38 secured to the end thereof which engages the base 30 so that the clamp bar cannot be unscrewed from the base 30. The washer also provides a greater area of engagement between the clamp bar and the collapsible arms.

The collapsible bottom clamp of Figures 5 and 6 is used in the same way that a bottom clamp such as 12 is used, the arms being retained horizontally by the bar engaging the same. After the concrete has been poured into the form, the nut 19 is removed and the clamp bar 15 is rotated to remove the end of the clamp bar from engagement with the arms so that they can pivot downwardly to collapsed position when the bar is pulled upwardly to release the arms or grooves from the lower edges of their respective plates and to collapse the arms inwardly so that the clamp will pass between the form plates. With the lower clamp collapsed, the clamp bar 15 is pulled up through the soft concrete with the lower clamp still carried thereby and clamp and bar may be reused.

After the concrete has hardened the plates also may be removed and reused. Any means may be used for this purpose. In order to aid in the removal of the form plates from the concrete, the plates may have bolts or set screws 40 threaded therein. Turning the bolts into the plates forces separation of the plate from the concrete after which the metal or form plates 10 and 11 are withdrawn for reuse.

It is desirable too at times to provide a tie-rod or dead-

man 42 between the bulkhead and an anchor such as a pile 43. This may be accomplished by securing in any manner, a plug 44 such as of wood between the form plates and holding it in position such as by wedging or in any other manner. After the concrete has set the plates 10 and 11 are removed and the plug driven out to form a hole through the bulkhead whereupon the tie-rod 42 may be projected through the hole left by the wooden plug and thereby tie the concrete bulkhead to the anchor 43. Preferably the plug has a head 45 so that an enlarged or countersunk hole is provided to receive a washer and nut 46 which may be covered with cement, pitch or other material.

Figure 7 illustrates an assembled or combination form using form plates 49 and 50 which extend outwardly, such as arcuately, from the interengaging means and used between a straight form 10 and 11 or between a corner form 27, 28. These curved form plates may be held in spaced relation with the same form of clamping means described herein. They have the same interengaging means at their vertical edges. An anchoring pile 51 may be driven into the soil below the lower edge of the form plates, the upper portion of the pile extending between the form plates 49 and 50. The upper end of the anchoring pile is embedded in the concrete of the bulkhead as shown in Figure 14.

If it should be desired to form a bulkhead B or the like of a same length and there are not enough forms or form plates to provide this length, or for any other reason, the open ends of the form may be closed by an end plate 54. Means are provided to secure the end plate to the end of the form or the form plates 10 and 11, that shown in Figure 12 being a bolt 55 having a hook 56 on its end which engages behind the shoulder formed by a tongue or a groove. Each bolt passes through a hole in the end plate and is clamped in place by a nut 57. To provide an interlock between the ends of end-to-end bulkheads, the end plate carries an extension 58 which forms a groove in the end of the bulkhead. The joint between bulkhead ends may be reinforced by providing holes in the end plate through which reinforcing bars extend, the ends of which become anchored in the bulkhead. A dovetail form of groove in the end of a bulkhead may be provided as in Figure 12 by using wedge shaped fillers 60 such as of wood. When the end plate 54 is removed, the fillers may be removed to leave an interlocking dovetail groove in the end of one of the bulkheads which when filled with concrete when the adjacent bulkhead is poured forms a dovetailed interlock therebetween.

It may be desirable to lock the adjacent plates of a form together after they have been projected into the soil so that they will not separate. Any means may be used for this purpose that shown in Figure 10 including a hooked lever 62 carried on a pivot 63 secured to one plate and the hook engaging a pin 64 carried by the adjacent plate. Angle irons 65 may also be secured to the plate forms in which a wooden stud 66 may be placed to further assure that the form plates 10 will not bulge.

The invention may be used to construct circular piers or piles as shown in Figures 15 through 19. The form plates 68 are in the same shape of a semicylinder with interengaging tongue and groove vertical edges. The clamps 12 and 13 may be used as well as the clamp bar 15. The grooves in the clamps are in circular form to conform to the circular shape of the form plates. A form of locking means may be used for such circular forms as shown in Figures 16 through 19 or they may be used in conjunction with the clamping means shown in Figure 15. Brackets 69 may be welded adjacent the edges of the form plates having aligned holes 70 therethrough to receive a removable locking pin 71. The brackets 72 may be spaced as in Figures 18 and 19, each bracket having a hole 73 to receive a removable U-shaped locking

pin 74. These removable locking means of Figures 16 through 19 may also be used to secure together straight forms, end plates and corner forms of Figures 1 through 9 in substitution for or in conjunction with the hooked lever means 62 of Figure 10. The bottom edge of all plate forms may have a jagged or serrated edge 76, as shown in Figure 13 to render it easier to drive the form plates into the soil.

This invention is presented to fill a need for improvements in a concrete bulkhead, jetty or pile form. It is understood that various modifications in structure, as well as changes in mode of operation, assembly, and manner of use, may and often do occur to those skilled in the art, especially after benefiting from the teachings of an invention. Hence, it will be understood that this disclosure is illustrative of preferred means of embodying the invention in useful form by explaining the construction, operation and advantages thereof.

What is claimed is:

1. A bulkhead, jetty or pile form comprising a pair of relatively thin and spaced form plates of substantial width having bottom, top and vertical edges, means carried by each plate at their vertical edges and extending the full length of the vertical edge for vertical interengagement with the vertical edge of another adjacent plate, and at least one clamping means for the form including a narrow bottom clamp having spaced grooves a width approximately the thickness of the form plate engaging the bottom edge of each plate to secure the bottoms of the plates in spaced apart relation, the bottom clamp exposing practically the entire lower edge of the form plates, a top clamp having spaced means engaging the top edge of each plate to secure the tops of the plates in spaced apart relation, and a clamp bar located between the form plates and secured to the bottom clamp and the top clamp and carrying means to draw the clamps together to clamp them to the edges of the form plates.

2. A bulkhead, jetty or pile form as in claim 1 in which the bottom clamp is rigid, and connecting means between the clamp bar and the bottom clamp to separate the bottom clamp from the clamp bar upon turning of the clamp bar at the top thereof.

3. A bulkhead, jetty or pile form as in claim 1 in which the bottom clamp includes a base and at least one hinged arm carried by the base for collapsing the clamp for its removal, and connecting means between the bottom of the clamp bar and the base for vertical movement of the clamp bar relatively to the arms to release the latter.

4. A bulkhead, jetty or pile form as in claim 3 in which the bottom clamp has two hinged arms and the inner end of each hinged arm is adjacent to the clamp bar to be engaged thereby and retain each hinged arm in horizontal relation.

5. A bulkhead, jetty or pile form as in claim 1 in which the bottom clamp includes a base and a pair of hingedly mounted arms carried on the base for pivotally collapsing the arms.

6. A bulkhead, jetty or pile form as in claim 5 including the inner ends of each arm from the pivot being adjacent to the clamp bar to engage the same and retain the arms in horizontal position, and connecting means between the bottom of the clamp bar and the base for vertical movement of the clamp bar relatively to the arms to release the latter.

7. A bulkhead, jetty or pile form as in claim 5 including inwardly projecting extensions carried by the inner end of each arm and in abutting relation with the end of the clamp bar when the arms are in horizontal position, and connecting means between the bottom of the

clamp bar and the base for vertical movement of the clamp bar relatively to the arms to release the latter.

8. A bulkhead, jetty or pile form as in claim 7 in which the lower end of the clamp bar threadedly engages the bottom clamp, and a washer carried by the lower end of the clamp bar to abut the pivotal arms and retain them in horizontal position and prevent the clamp bar from being separated from the lower clamp.

9. A bulkhead, jetty or pile form as in claim 1 in which the form plates extend outwardly from and parallel with the vertical interengaging means.

10. A bulkhead, jetty or pile form as in claim 1 including means carried by the form plates for securing adjacent forms together against separation.

11. A bulkhead, jetty or pile form as in claim 1 in which the form plates extend laterally from and parallel with the vertical interengaging means.

12. A pile form comprising a pair of spaced form plates of circular shape, means carried by each plate at their vertical edges for interengagement with the vertical edge of the other form plate, and at least one clamping means for the form including a relatively narrow bottom clamp having means conforming to the edge of the form plates and engaging the bottom edge of each plate to secure the bottoms of the plates in spaced assembled relation, the bottom clamp exposing practically the entire lower edge of the form plates, a top clamp having spaced means conforming to the edge of the form plates and engaging the top edge of each plate to secure the tops of the plates in assembled relation, and a clamp bar located between the form plates and extending between the bottom clamp and the top clamp and having means to draw the clamps together to clamp them to the edges of the form plates.

13. A pile form as in claim 12 in which the bottom clamp is rigid, and separable means to secure the bottom clamp to the clamp bar.

14. A pile form as in claim 12 in which the bottom clamp includes a base having a threaded hole to receive the clamp bar, and a pair of arms pivotally mounted on the base and engaging the clamp bar to hold the arms in horizontal position, and connecting means between the bottom of the clamp bar and the base for vertical movement of the clamp bar relatively to the arms to release the latter.

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