Sept. 25, 1934. O. ROBERG 1,974,752

CONCRETE MOLD CONSTRUCTION

Filed Aug. 17, 1933 2 Sheets-Sheet 1

Fig. 1.

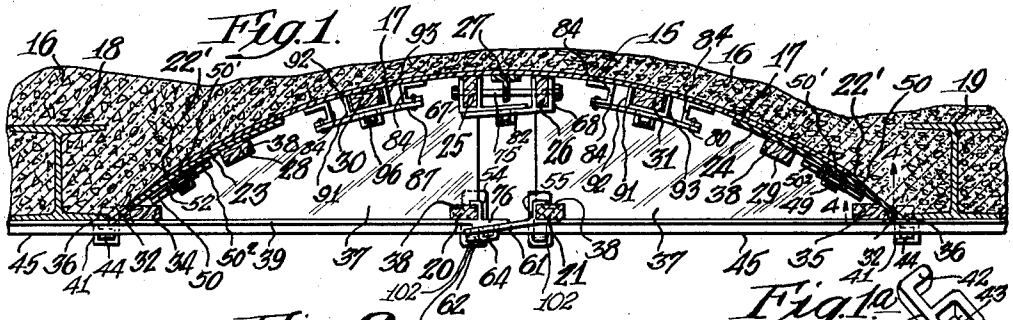


Fig. 1a.

Fig. 2.

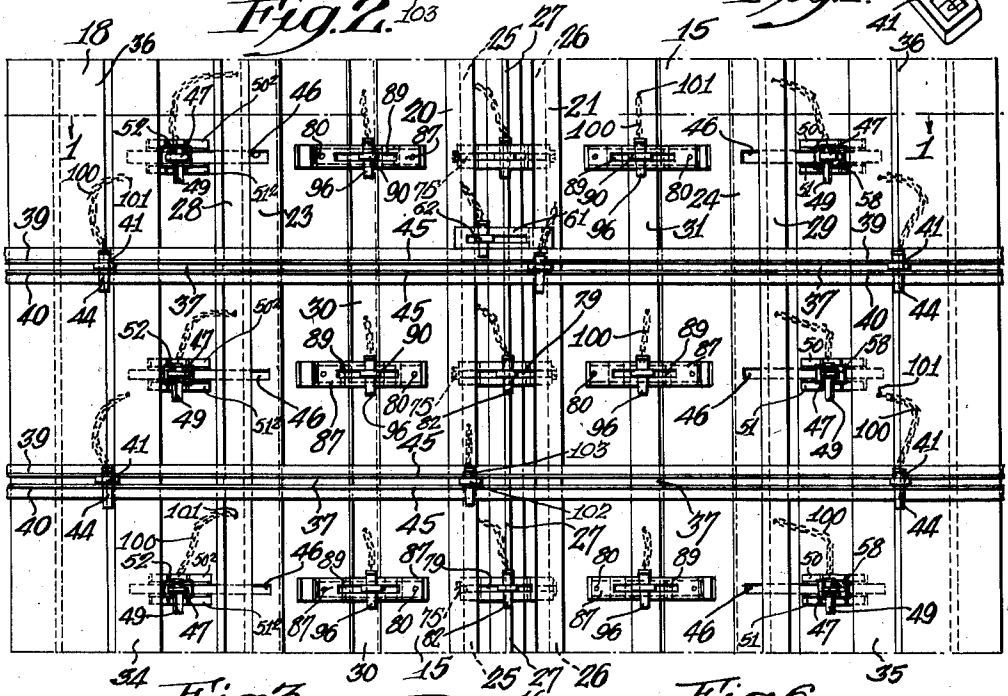


Fig. 3.

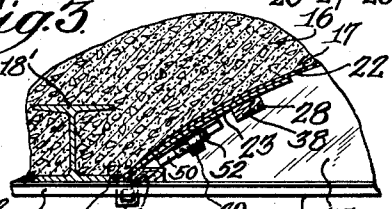


Fig. 4.

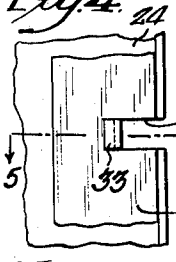


Fig. 5.

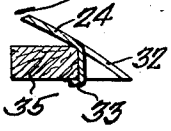
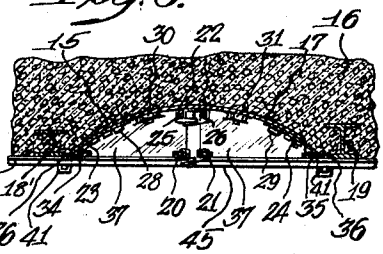


Fig. 6.



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CONCRETE MOLD CONSTRUCTION

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Fig. 7.

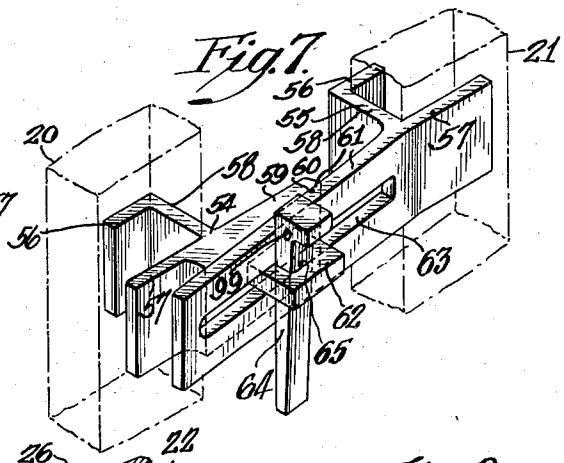


Fig. 7a.

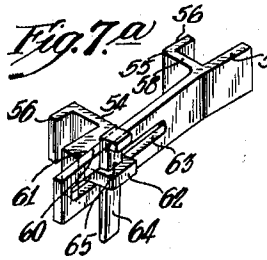


Fig. 8.

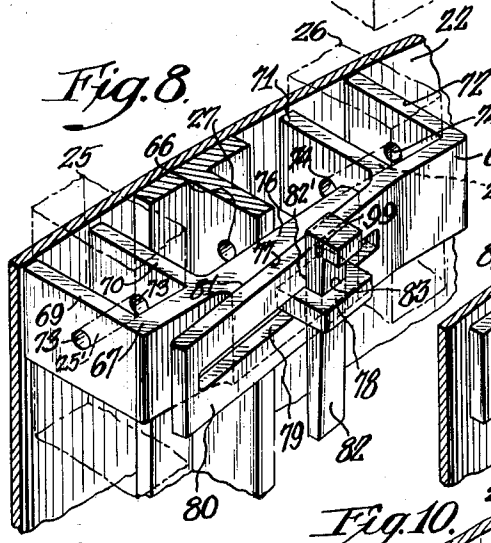


Fig. 9.

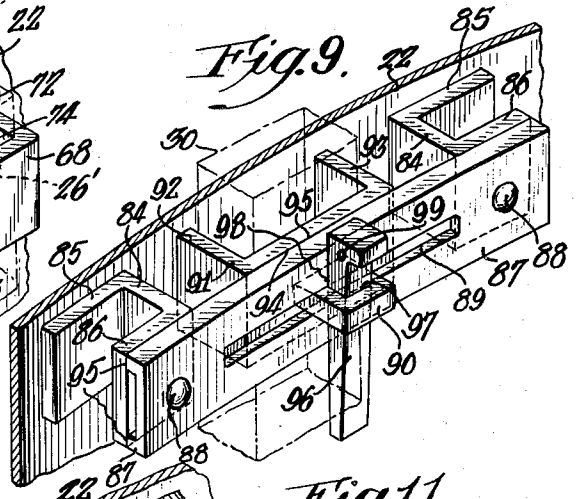


Fig. 8a.

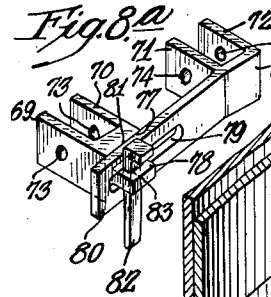


Fig. 10.

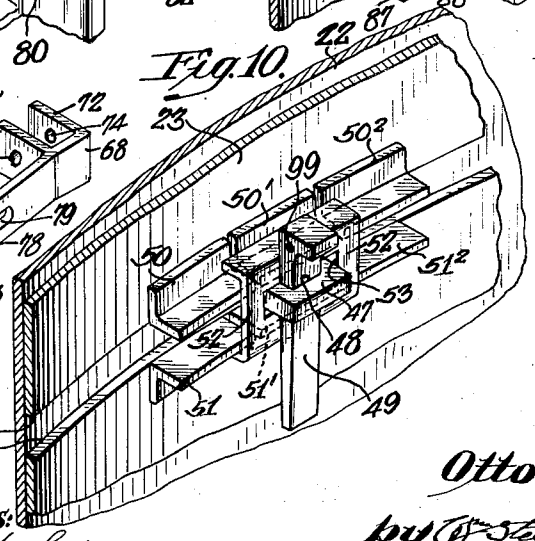
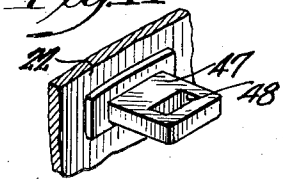


Fig. 11



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UNITED STATES PATENT OFFICE

1,974,752

CONCRETE MOLD CONSTRUCTION

Otto Roberg, Philadelphia, Pa.

Application August 17, 1933, Serial No. 685,599

6 Claims. (Cl. 25—131.5)

My invention relates to detachable forms for use in concrete wall construction.

A purpose of my invention is to construct an adjustable and detachable mold or form for use in building concrete walls in which the parts of the mold structure are fastened together by wedges.

A further purpose is to provide an adjustable bay form for concrete construction in which the bay former portion is overlapped at its sides in order that the form can be applied to different sizes of stationary structure.

A further purpose is to secure overlapping sides of arch or bay forming sheets in a desired position with respect to a stationary structure by the use of wedges.

A further purpose is to provide outer and inner bay forming sheets, supported against longitudinally disposed battens by means of angles and angle irons, using wedges to hold the sheets and irons together to construct a mold.

A further purpose is to provide an apertured projection from a bay sheet that will extend through a slot in a cooperating bay sheet, and to insert a wedge through the aperture in the projection to hold the parts together to construct a mold.

A further purpose is to provide a central support for concrete molds which includes a T shaped iron attached to a bay sheet, U shaped irons placed about longitudinally disposed battens, wedge extensions on the U shaped irons that cooperate with one another, an apertured lug from one extension that is inserted through an opening in the adjacent extension and a wedge inserted into the aperture of the lug to hold the parts together along with a bolt inserted through the U shaped irons and longitudinal battens.

A further purpose is to provide an adjustable mold construction that can be fastened to a permanent structure of a building operation in which heavier permanent structure is used at one point of fastening of the mold and lighter permanent structure is used at the other point of fastening of the mold.

A further purpose is to make the bay sheet or plate of a mold adjustable at its sides and to make the ribs, which determine the curvature of the bay sheet, adjustable between the sides and preferably at the middle, so that adjustment of the ribs will have a minimum influence on the curvature of the bay sheet.

In building concrete walls it is necessary on some operations to provide longitudinal spaced metal I-beams secured to end or side walls or to upper and lower floor structure. A form is fastened adjacent these I-beams and concrete is poured into the space adjacent the mold and about the I-beams. After proper drying the form is removed and the concrete becomes set.

I have found in constructing walls and particularly walls for subway construction, that different sizes of I-beams are needed, due of course to the different stresses occurring at various places along the length of the subway operation. For instance, if the distance between the ground and the street surface is greater in one place than it is in another, added strength in the form of a larger I-beam must be provided, to take care of the added stress occurring at this place. Again, if the subway is under a cross street where stresses are greater, it is also necessary to provide heavier I-beams.

In some locations, thicker walls are formed about the heavier I-beams, according to the conditions present at the particular place where the walls are to be built.

For instance, in building the South Broad Street subway in Philadelphia, Pa., construction of which has continued for twenty-five city blocks, many different conditions were present, such for example as soft and hard earth, rock or damp earth, and in many places water was present.

Where water and soft earth are present it is necessary to form a thicker wall and it is in these places that larger I-beams are used, in order to avoid the possibility of caving in of the ground about the structure.

If the earth be hard or rocky, it is not necessary to use the larger or heavier I-beams, as firmness of the ground due to the hardness of the earth will support the wall.

With the above condition in mind, my invention is intended to provide a mold form that can be used for application to different sizes of I-beams, such as 6, 8, 10, 12 or 14 inches.

By adjusting it, my mold can be applied to a small (6") I-beam on its one side and large (12") I-beam on its other side.

I make the adjustment of my mold possible by the use of curved or bay sheets of metal that are placed between the longitudinal I-beams.

In the drawings:

Figure 1 is a sectional top plan view of my improved mold construction in place against I-beams of a permanent structure, the view being taken on the line 1—1 of Figure 2.

Figure 1a is a perspective view of a hook used in the construction seen in Figure 1.

Figure 2 is a fragmentary elevation of structure seen in Figure 1.

Figure 3 is a fragmentary view, similar to a portion of Figure 1, but showing a smaller I-beam, with my mold adjusted for use against the I-beam.

Figure 4 is an enlarged fragmentary sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a fragmentary sectional top plan view taken on the line 5—5 of Figure 4.

Figure 6 is a reduced scale sectional top plan view similar to Figure 1, but illustrating a smaller I-beam at one side than at the opposite side.

Figure 7 is an enlarged fragmentary perspective view illustrating adjustable means for holding parts of the superstructure of my mold at the front of the mold.

Figure 7*a* is a perspective view showing a modified detail of structure of Figure 7.

Figure 8 is an enlarged fragmentary perspective view illustrating adjustable means for holding parts of the superstructure of my mold at the center of the rear portion of the mold.

Figure 8*a* is a view similar to Figure 8, but showing a modification and on a reduced scale.

Figure 9 is an enlarged fragmentary perspective view illustrating adjustable means for holding parts of the superstructure of my mold at the rear of the mold and between the center of the mold and the sides thereof.

Figure 10 is an enlarged fragmentary perspective view illustrating adjustable means for clamping inner and outer shells of my mold structure together near the sides of the mold.

Figure 11 is a detail perspective view showing parts of Figure 10 more clearly.

While my structure might be used in horizontal position, I much prefer to use it in vertical position, and have particularly adapted it for this intended use.

In Figures 1 and 2, I have preferred to illustrate my mold construction 15 as applied to a concrete wall 16 having a bay formation 17 located between I-beams 18 and 19. The I-beams 18 and 19 in Figures 1 and 2 are large size I-beams and I have preferred to illustrate in these figures I-beams of the same size on each side of the bay portion.

In placing my form 15 in the position of use, I find it desirable to employ vertically positioned battens 20 and 21 at the front of the wall and flush with the facing surfaces of the I-beams 18 and 19. The battens 20 and 21 are spaced from one another and extend upwardly between the ground or floor adjacent the wall upwardly to the under surface of the street or ceiling structure. I have not illustrated the floor or ceiling, as it is not pertinent to my invention.

The form 15 is made of a central curved bay plate 22 and side bay plates 23 and 24. The ends of the central bay plate 22 overlap the side plates 23 and 24 and are tapered at 22'. The side plates 23 and 24 are slidingly adjustable with respect to the central bay plate 22 as hereinafter described.

Located in the center of the bay plate 22 and spaced from one another are longitudinal battens 25 and 26. These battens 25 and 26, like the battens 20 and 21, extend from the floor to the ceiling to act as vertical supports for the central portion of the bay plate 22. Intermediate the battens 25 and 26 and welded to the bay plate 22, is a T-member 27. This T-member extends the full length of the bay plate to strengthen the bay plate.

Intermediate the central strengthening structure and the side plates 23 and 24, are vertical battens 28, 29, 30 and 31. The battens 28 and 29 act as vertical supports for the inner extensions of the side plates 23 and 24. The battens 30 and 31 are used to add additional strength along the vertical line of the bay plate 22 and, like the other battens, extend from the floor to the ceiling.

At the front ends of the form adjacent the I-beams 18 and 19, the side bay plates 23 and 24 are flush with the facing surface of the I-beams excepting at intervals where the bay plate sides are notched at 32 and the metal ears 33 from the notched portions are bent about vertical battens 34 and 35. The battens 34 and 35 have their outer surfaces flush with the outer surfaces of the I-beams and the battens 20 and 21. The battens 34 and 35 are positioned to engage one side of the side bay plates 23 and 24 and the other side of the side bay plates will engage the flanges 36 of the I-beams.

Any number of reinforcing ribs 37 are arranged in vertical tiers between the floor and ceiling. The reinforcing ribs 37 are notched at 38 to fit about the numerous battens employed in my mold construction.

Angle irons 39 and 40 are spaced at intervals above and below each of the reinforcing ribs. Between the angle irons 39 and 40, I insert a hook clamp 41 that has a hook end 42 and is apertured at 43. The hook end 42 is inserted into one of the notches formed at 32 in the side bay plates 23 and 24 to engage about the flange 36 of the I-beam. When the ends of the hooks 42 are in place behind the flanges 36 of the I-beams, wedges 44 are driven into the apertures 43 against the flanges 45 of the horizontal angle irons to secure the angle irons in place against the outer faces of the I-beams and in contact with the battens 20, 21, 34 and 35.

At the inner ends of the bay between the battens 34 and 28, and 35 and 29, respectively, I provide slots 46 in the side bay plates 23 and 24.

Fastened by welding to the central bay plate 22 are wedge-receiving lugs 47 apertured at 48 to receive wedges 49.

Angle irons 50 and 51, 50' and 51', 50^2 and 51^2 are secured by welding to the side bay plates 23 and 24, with the horizontally extending flanges arranged flush with the slot in the side bay plates 23 and 24. A channel member 52 has its flange ends inserted above and below flanges of the angle irons 50 and 51, 50' and 51' and 50^2 and 51^2. The channel member 52 is apertured at 53 to pass about the wedge-receiving lug 47 and the wedge 49 is then placed in the aperture 48 to hold the inner and outer bay plates in any desired position.

By the construction described above, it will be noted that the lug 47, being fastened to the bay plate 22, will permit the passage of the side bay plate 23 or 24 about the lug 47, to bring the side bay plates into different positions at the sides of the bay structure to accommodate my mold to different sizes of I-beams of a permanent structure.

After the side bay plates have been moved to any desired position with relation to the bay plate 22, the wedges 49 are then driven into the apertures 48 in the lugs 47 to engage the channels 52 which in turn engage the flanges of the angle irons that are fastened to the side bay plates.

There are side bay plates on each side of the mold structure, and with the exception of identifying them as side bay plates 23 and 24, I have

given them the identical reference characters, as the construction of one side of the mold is the same as that of the other side.

It will be evident that the above described construction provides a convenient means of fastening the side bay plates to the central bay plate and one that allows sufficient resiliency and bending of the metal of the side bay plates, because of the use of three sets of short angle irons 50 and 51, 50′ and 51′ and 50^2 and 51^2, which will permit bending at two points across the length spanned by the three sets of angle irons. If a single angle iron of a length equivalent to the three angle irons were used, bending of the side bay plate 23 would cause the plate 23 to impinge against a portion of the central bay plate 22 and cause distortion of the bay former. Another objection to a full length angle iron is that the bay plate 23 would bind against the central bay plate 22, thereby causing difficulty in moving the side bay plates with respect to the central bay plate 22.

At the center of the mold adjacent the front thereof and partly surrounding the battens 20 and 21 are cooperating wedge members 54 and 55. The members 54 and 55 engage the battens 20 and 21 at the sides 56 and 57 and at the end 58 of each batten. The wedge member 54 has an inwardly extending arm 59 with a wedge surface 60 that engages a cooperating surface 61 extending laterally from the wedge member 55.

Projecting from the wedge extension 59 is a lug 62 which passes through a slot 63 of the arm 61. A wedge 64 is driven into an aperture 65 in the lug 62 to hold the cooperating wedge members in place with respect to one another, and thereby position the battens 20 and 21 at the desired spaced relation with respect to the mold.

It will be noted that the use of my cooperating wedge members provides an efficient and sure spacing arrangement for the battens and at the same time a convenient way of locking the battens in any desired vertical position. The battens 20 and 21, as stated before, have their ends secured to a permanent structure at the base of the mold and to a permanent structure at the top of the mold. The ribs 37 also act as spacers to keep the battens in a desired position with respect to the cooperating wedge members 54 and 55.

In Figure 7*a*, I have illustrated a modification in which the inner extension 59 of one of the cooperating lug members 54 has been omitted. I find this construction to be desirable when it is not necessary to space the supporting battens at such a great distance. The form of Figure 7*a* will be used when a short spacing is desired between the battens 20 and 21. The form of Figure 7, however, will be employed when greater spacing of the battens is required.

The form of Figure 7*a* is otherwise identical to the structure of Figure 7 with the exception that the lateral extension 59 has been omitted. I have accordingly given the parts of this figure the same reference characters as those of Figure 7, with the extension 59 omitted.

The location of the cooperating wedge members 54 and 55 is immaterial and will be determined by the number of such wedge members used, as they may be at any desired location throughout the length of the mold structure. I have preferred to show in Figure 2 one set of these cooperating wedges located directly above the flange 45 of one of the angle irons 39.

At the center of the bay, I have welded a T-bar 27 which provides additional strength to the central bay plate.

Distributed through the length of the mold structure and preferably located intermediate each set of angle irons, are cooperating wedge members 67 and 68 having rearwardly projecting ends 69, 70, 71 and 72. A recess is provided in the extended arms 69 and 70 which project rearwardly to fit about longitudinally disposed battens 25. The recess provided in the extensions 71 and 72 adapts the wedge member 68 to placement about the longitudinal batten 26. Apertures 73 and 74 are provided in the wedge members, an aperture 66 in the flange of the T-bar, an aperture 25′ in the longitudinal batten 25 and an aperture 26′ in the longitudinal batten 26. When the above described apertures are in line they will receive a bolt 75, which bolt will firmly hold the wedges and battens in connection with the T-bar.

As clearly shown in Figure 3, one of the wedge members 67 has an inwardly directed portion 76 provided with a wedge face 77. At the center of the wedge face 77 and projecting therefrom I provide a lug 78. The lug 78 projects outwardly and through a slot 79 in an extending arm 80 whose face 81 makes wedge engagement with the wedge face 77 of the arm 76 of the cooperating wedge member 67.

After the lug 78 has been extended through the slot 79 in the arm 80, an individual wedge 82 is driven into an aperture 83 in the lug 78. The slot 79 will allow adjustment of the lug 78 and wedge face 77 with respect to the face 81 of the arm 80 and thereby allow for the centering of the battens 25 and 26. After the battens 25 and 26 have been properly centered, the wedge 82 will be driven into the slot 83 and the face 82′ of the wedge will engage the sides 80′ of the arm 80 to bind the surfaces 77 and 81 together and thereby hold the adjustable wedge members in whatever position may be desired.

It will be noted that the form of Figure 8 provides a desirable centering arrangement of the battens 25 and 26 with respect to the central bay plate 22 and at the same time provides additional support to the battens to hold them in a desired position and to space them from one another.

In Figure 8*a* I have illustrated a modification of the structure of Figure 8 in which I have omitted the extending wedge face 77. In this figure the wedge engaging faces are contained in the space represented by the width of the batten engaging arms 69 and 70.

The form of Figures 8*a* has been found preferable when it is desired to space the battens 25 and 26 closer together than those represented in Figure 8. In all other respects the construction of Figure 8*a* is identical with that of Figure 8 and I have therefore given it the same reference characters as those of Figure 8.

The construction of Figure 8 is intended to be applied to a curved concrete surface in which a bay plate is used and in which the supporting battens such as those represented at 25 and 26 are in spaced relation at considerable distance from one another.

In Figure 9, I have shown an enlarged view to illustrate an arrangement by which the central bay plate 22 may be adjusted with respect to the batten 30.

The central bay plate 22 carries U-brackets 84 which have their ends 85 welded to the bay plate.

The opposite ends 86 of the U-brackets are fastened to a channel iron 87 by bolts 88 that project through the channel iron and through the ends 86 of the U-brackets.

The longitudinal channel iron 87 extends from one U-bracket to the other and is provided with a slot 89 through which projects a lug 90 fastened to a channel 91 which has its ends 92 and 93 embracing the batten 30. The face 94 of the channel 91 engages flanges 95 of the channel 87. An individual wedge member 96 is inserted into an aperture 97 in the lug 90 and the face 98 of the wedge 96 engages against the channel iron 87 to hold the channel 91 firmly in contact with the batten 30. I have preferred to aperture the individual wedges at 99 for the reception of chains 100 which may conveniently be attached to any one of the batten members at 101 in order that the individual wedges will not become separated from the mold proper.

The lateral adjustment of the battens 30 corrects for any lack of straightness of the wooden battens.

I ordinarily find it preferable to assemble the battens for the right or the left side of one bay against the ribs 37, as for example by nails or screws through the battens into the ribs. I then attach the metal parts to the battens and apply the central bay plate 22 and the side bay plates 23 and 24. The left hand side of the bay form then comprises one unitary structure and the right hand side comprises another unitary structure, adjustable with respect to the left hand side. The battens and ribs of the left hand side are ordinarily rigid, and the same is true of the battens and ribs of the right hand side.

In case of adjustment of the form to fit a different spacing between the centers of the I-beams of the permanent structure or to fit different sizes of I-beams, the ribs and battens of the left hand side will be adjusted relatively to the ribs and battens of the right hand side by loosening the wedges 49, 64, 82 and 96, moving the battens to the left hand side toward or away from those of the right hand side, and resetting the wedges. While the wedges 49 are loosened, the side bay plates will also be adjusted with respect to the central bay plate.

The erection of the bay form after the adjustment of the side bay plates and of the left and right hand sets of battens has been accomplished, is a relatively simple matter. The form is merely placed in the desired position, the hooks 41 are inserted through the recess 32, the angle irons 39 and 40 are erected and the wedges 44 are driven home to engage the hooks against the angle irons. It will be understood that the angle irons 39 and 40 will extend for several bays, frequently for three or four bays.

When the bay form is set in place between the I-beams, the form may be fastened to the battens 20 and 21 at any desirable place along the length of the battens by apertured hooks 102 into which wedges 103 are driven thereby holding the bay form in position against the permanent structure.

I believe that I am the first to provide an adjustable bay plate structure by which an arcuate surface can be molded in connection with a permanent structure at its ends in which one permanent structure is of smaller size than the other.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain part or all of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a bay form, a central curved bay plate, a side bay plate overlapping the central bay plate, wedge means for adjustably securing the side bay plate to the central bay plate, a plurality of battens extending longitudinally of the bay plates and bracing them, means for securing the battens to the bay plates, means for adjusting the battens with respect to the bay plates and means for securing the form to permanent structure.

2. In a bay form, a curved bay plate made up of a plurality of units, means for adjusting the arcuate length of the bay plate, supporting structure extending longitudinally of the form for the left hand side of the bay plate, supporting structure extending longitudinally of the mold for the right hand structure of the bay plate, means for adjustably securing the supporting structure for the right and left portions of the bay plate to the bay plate and means for laterally adjusting the distance of the supporting structure for the right hand portion of the bay plate from the supporting structure for the left hand portion of the bay plate.

3. In a bay form, a central curved bay plate, a pair of side bay plates, one overlapping the central bay plate on each side, wedge means for adjustably securing the side bay plates to the central bay plate, a plurality of battens following the inner contour of the bay plates, wedge means for adjustably securing the battens to the bay plates, means for laterally supporting the battens from one another, members running laterally across the bay between adjoining parts of permanent structure, hooks engaging the permanent structure and wedge means securing the hooks to the lateral extending members.

4. In a bay form, a bay plate, an angle welded to the bay plate, a pair of battens, one on either side of the angle, a pair of cooperating members secured to the battens and overlapping one another, there being a slot in one of said members, a lug on the other of said members projecting through the slot and having an opening, a wedge passing through the opening to lock the two members together at a chosen position and a bolt extending through the battens and through the angle.

5. In a bay form, a pair of spaced battens, cooperating members, one secured to each batten and having overlapping portions, one of which has a tapered engaging face, walls forming a slot in one of the overlapping portions, a lug secured to the other overlapping portion and extending through the slot, there being an opening in the lug, and a wedge passing through the opening, whereby the members may be positioned to hold the battens at any spacing to one another by virtue of the taper of said overlapping portion.

6. In a bay form, a bay plate, a plurality of spaced brackets secured to the inside of the bay plate, a slotted bay bar extending between and secured to the brackets, a batten, a lug secured to the batten extending through the slot and provided with an opening and a wedge passing through the opening in the lug, whereby the batten is adjustably secured with respect to the bay plate.

OTTO ROBERG.