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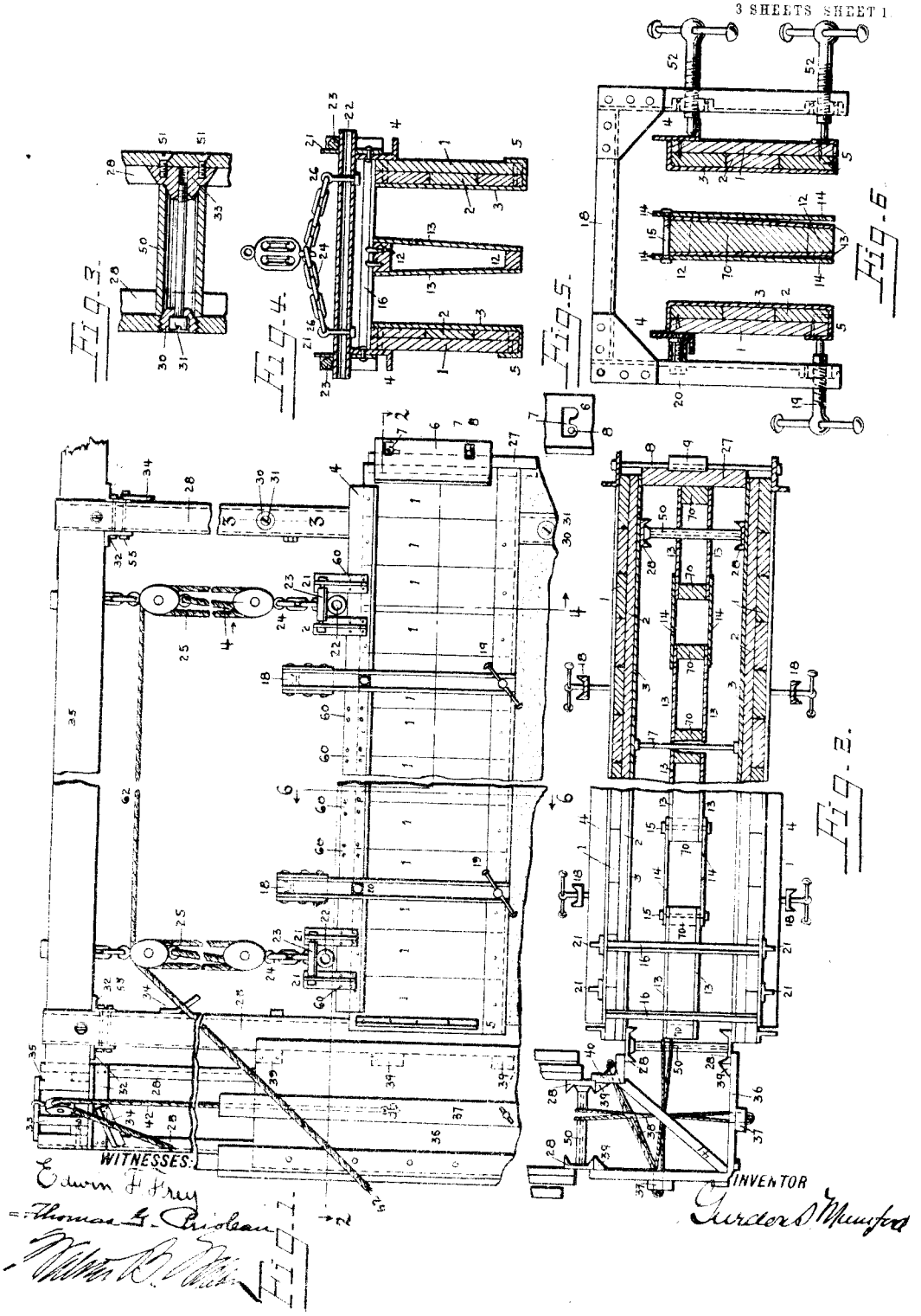
APPARATUS FOR CASTING CONCRETE WALLS.

APPLICATION FILED APR. 23, 1913.

1,122,982.

Patented Dec. 29, 1914.

3 SHEETS SHEET 1.



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3 SHEETS—SHEET 2.

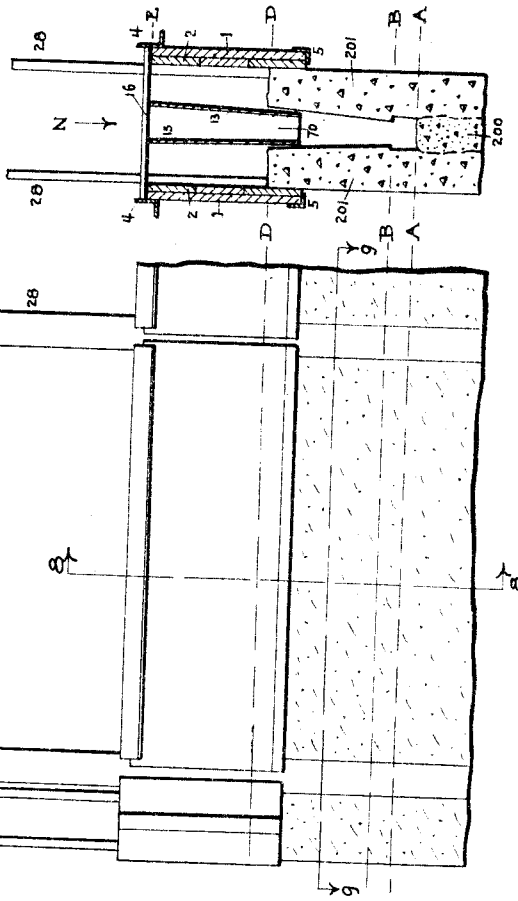


Fig. 8.

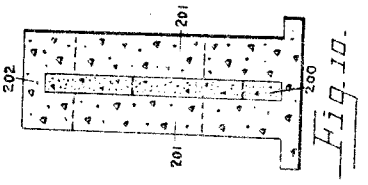


Fig. 10.

Fig. 7.

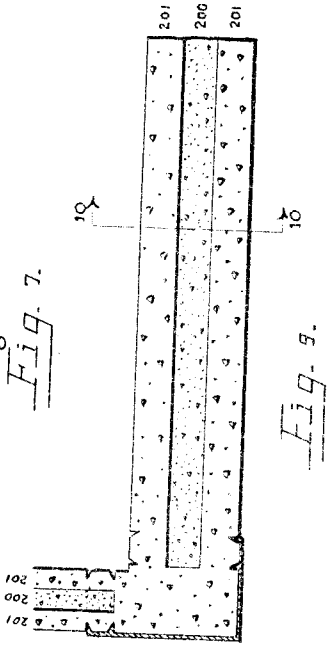


Fig. 9.

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3 SHEETS—SHEET 3

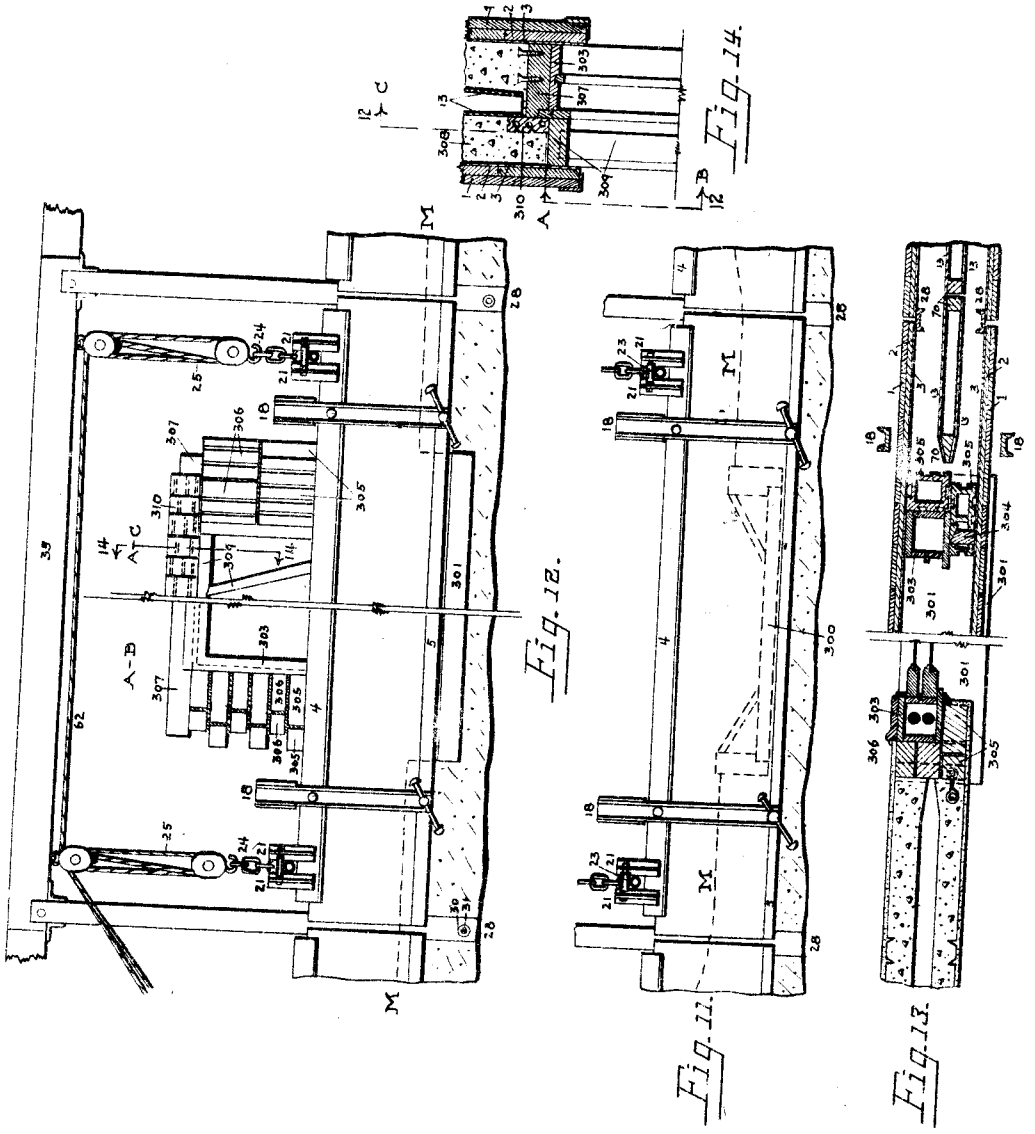


Fig. 14.

Fig. 12.

Fig. 11.

Fig. 13.

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APPARATUS FOR CASTING CONCRETE WALLS.

1,122,982. Specification of Letters Patent. Patented Dec. 29, 1914.

Application filed April 23, 1913. Serial No. 763,081.

To all whom it may concern:

Be it known that I, GURDON S. MUMFORD, a citizen of the United States, and resident of Garden City Estates, in the county of Nassau, Long Island, State of New York, have invented a certain new and useful Method and Apparatus for Casting Concrete Walls, of which the following is a specification.

This invention relates to an apparatus for constructing concrete walls, and with regard to certain more specific features thereof, to the construction of concrete walls of houses, factories and the like.

One of the objects of the present invention is to provide a simple and practical apparatus which will permit of the same forms or molds being used over and over again and dispense with the use of skilled labor in handling the apparatus.

A further object is to provide an apparatus which will insure automatic plumb and alinement while the walls are being constructed.

A further object is to provide an apparatus which will make it possible to build a double or hollow concrete wall by means of non collapsible concrete core molds which may be withdrawn from the wall during construction without aid of any special manipulation such as collapsing, etc.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the several steps and the relation and order of one or more of such steps with relation to each of the others thereof, and in the features of construction, combinations of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the application of each of which will be indicated in the following claims.

In the accompanying drawings wherein is shown one of the various possible embodiments of this invention, Figure 1 is a detailed elevation of a portion of the molding apparatus showing a wall in the course of construction; Fig. 2 is a plan view, partially in section of the apparatus shown in Fig. 1; Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1, showing details of the framed guide members; Figs. 4 and 6 are sectional views taken on the lines 4—4 and 6—6, Fig. 1, looking to the right and left respectively; Fig. 5 is an elevational view of the end connections of the mold showing arrangement of holes at top in the end plates #6, in Fig. 1; Fig. 7 is an elevational view largely diagrammatic showing a water-proof and temperature-proof wall in the course of erection, hoisting and other apparatus details being omitted; Fig. 8 is a sectional view taken along line 8—8 of Fig. 7; Fig. 9 is a plan view in section line 9—9 of Fig. 7 showing finished wall; Fig. 10 is a typical sectional view of a water-proof, temperature-proof wall showing water cut off joints and temperature protection; Fig. 11 is an elevational view showing preparation of wall to receive masonry sill on which the window or door frame and its protecting jamb is built; Fig. 12 is an elevational view showing method of inserting window frame and its protecting masonry jamb; Fig. 13 is a plan view partly in section of Fig. 12 and shows the bond obtained with the concrete wall; Fig. 14 is a sectional view taken along line 14—14 and shows the bond with the wall and method of building, bonding, and protecting the head or top of the window frame.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to the drawings and more particularly to Fig. 1; on the footing or foundation course, framed guides 28 are erected at convenient intervals, preferably sixteen to twenty feet apart, two sets being placed adjacent at each corner, see Fig. 2. These guide frames consist of two steel channel members 28 united at proper intervals with a device, see Fig. 3, consisting of a pipe or sleeve 50 through which runs a threaded round headed bolt 31 slotted for a screw driver; the head of this bolt seats in a beveled threaded member 30, and the threaded end of 31 screws into a lug 32 which is held by screws 51 to the opposite channel member 28. This lug has beveled sides and is cupped at the entrance to the receiving thread.

The object of this device is to permit the bolt 31 to be withdrawn on completion of the wall, the pipe or sleeve 50 remaining in the wall, permanently, and being mortared up. The member 30 is also unscrewed and withdrawn, allowing a round steel or wood bar equal to the full, inside diameter of the

sleeve to be inserted and used to dislodge the lug channel member (33, 28) from the wall, there being some adhesion of concrete to the inprojecting flanges of the channels 28, notwithstanding the application of oil or grease to the channels. The member 30 is then screwed in its place in the guides 28 so that by the same method, working from the opposite side, this guide (30, 28) may be forced from the wall. The cupping of the lug 33 prevents injury to the thread and the bevel on the threaded washer 30 and lug 33 gives a tight joint and permits of a shorter and heavier pipe sleeve 50 being used as may be desirable if these cross members are to be used temporarily to support scaffold or runway planks. At the top of these channels 28 are cross connecting angle members 32, bolted to channels by bolts 55 and supporting and fastened to two, transverse members 35 from which the mold is suspended by rope or chain pulley blocks 25. The framed guides 28 are braced by bolted cross steel angles or flats 34 to a pre-erected scaffold, or to stakes driven in the ground, or by sway bracing for considerable heights. The framed guides (28, 33, 30, 31, 51, 32) are previously assembled, erected as a unit, and when braced as described and in connection with the transverse member, afford an absolutely automatic plumb and alinement for the mold members and wall.

The flanges of the channel members 28 of the framed guide project into the wall and are heavily greased to prevent adhesion, but the support of the concrete at the sides of the flanges of the members 28 gives great stiffness particularly in the line of the strain caused by the weight of the mold members, permitting a comparatively light section to be used. The small groove left on their withdrawal is mortared up, when above the grade, or used as a natural termination for tar water-proofing, when below the grade at the corners, as hereinafter described.

A molding device such as is shown in Figs. 1, 2, 4, 6, 7, 8, 11, 12, 13, 14 is applied to the opposite sides of the framed guides. This molding device consists of two flat members or sides made up of two sets of planks, 1, 1, etc. which are short, narrow members etc., positioned vertically, and longitudinal members 2, 2, etc., running the whole length of the side mold; the grain of each set of members being at right angles to the other set. These sets 1 and 2, are securely bolted, nailed or screwed together, and at top and bottom have heavy stiffening angles 4 and 5 to which they are rigidly attached by screws or bolts. These side members range from ten to twenty feet in length and are from two to four feet in depth, such lengths or depths being stock sizes and used as conditions require. The inner faces of these side molds are lined with sheet metal 3, preferably zinc. This arrangement of the wood strips 1 and 2 acts to prevent shrinkage and expansion as the direction of movement of swelling or shrinkage for each set opposes that of the other. Longitudinal stiffness is obtained by the heavy steel angles 4 and 5, and great resistance to warping, deflections, etc., is obtained, as the short pieces 1 span from angle to angle and are held rigidly at those points.

The upper angle members 4 have sets of holes in them 60, to receive bolts by which members 21 of T-cross section are secured. The projecting legs of these T members act as a bearing for a roller member 23 which is secured from sliding movement by threads and nuts at its extremities. Under each pair of these rollers passes a yoke member consisting of a round bar 22, preferably hollow, through which two eyebolts 26 pass, a chain member 24 connecting these eyebolts 26 to the pulley member 25. A number of sets of holes 60 in the angle member 4 permit of the position of the T members 21 and rollers 23 and yoke and pulley members being shifted to facilitate construction of windows or other openings in the wall. The function of the roller members 23 is to allow easy, frictionless movement of the heavy outside mold members (1, 2) away from and toward the wall, thus preventing slipping, jarring, or vibration against the green wall during the process of disengagement and resetting. The peculiar function of the yoke member is to afford a single central application of power in hoisting, and a connecting means of support by which the side molds are kept on the same vertical level during hoisting, and readily adjusted in relation thereto.

Hoisting ropes 62 are rigged through pulleys hung from the supporting member 35, passing also through pulleys 25 fastened to the hoisting yokes (22, 26, 24) finally connecting with the drum of some hoisting device of any desired style.

At the ends of the side members are angle members 6 with holes at the top (see Figs. 1, 2, 5) and bottom 7, through which run iron rods 8 which support and brace an end, closing member 27 for use where the side members are not continuous, end to end, abutting with a small clearance interval on the guide-frame members. These end pieces 27 have a short angle piece 9 secured in the center at or near the top. To disengage, when a section of wall has been cast, the bolt 8 is wedged up and into the adjoining part of the hole 7 in the side angles 6. The lower bolt 8 is then pulled out, allowing the end member 27 to swing clear at bottom, being supported on the rod 8 by angle 9.

In order to prevent the spreading of the side molds while constructing the wall,

clamping devices as shown in Fig. 6 are provided at two or more points intermediate to the ends of the mold. These clamping devices comprise an inverted U-shaped frame member 18 constructed in a substantial manner to resist strains exerted thereon, and having on one side one fixed stop member 20, and one threaded member with operating handle 19, while directly opposite are threaded members 52 with operating handles whereby the side molds may be forced relatively toward each other, the weight of the clamp being supported at all times by the upper angle members 4. In order to properly adjust the clamp it is at times necessary to operate the threaded member 19 but after this setting has been obtained, the clamp can be operated entirely from one side by members 52.

The positioning of the threaded members (19, 52) and stop 20 of the clamps is such that they act directly against the angle members 4 and 5 of the side molds. This greatly lessens the strain on the side molds, minimizes their tendency to warp or twist out of line and applies the power to hold the side molds true to line at the points most necessary, viz., top and bottom, thus obtaining a fair and true joining of the successive casts.

In constructing concrete walls above grade it has been found desirable to provide an interior continuous air space, dividing the wall into inner and outer shells. Below the grade for purposes of water-proofing, it is desirable to construct the solid wall of two kinds of concrete, (see Figs. 7, 8, 9, 10), that is to say, outer walls of a semi-dry, porous mixture and a thin inner layer or core of a wet, dense, relatively-rich-in-cement mixture. This thin layer breaks horizontal joints with the porous, outer walls and is poured after these outer walls are cast. For instance, referring to Fig. 8, the joint in the outer wall, if it may be considered such, is indicated by the line B B, while the joint in the intermediate wall will be indicated at the line A A. Thus these joints break as the wall is constructed, as is also indicated by the dotted lines in Fig. 10. This air space or double wall construction is made by using a rectangular, slightly tapered, sheet metal core 13 nailed to side and top skeleton frame pieces 12 and supported by angle, spanner-members 16 secured to these frames and resting upon the tops of the side molds and abutting against the top angle-members 4 when the side molds are clamped to the required position for pouring the wall, the spanner 16 thus acting as a gage for the side molds.

In constructing a wall with openings of any kind it is desirable to have some means of joining the gap between the separate, inside, core molds in a long form, that is bound to occur for clearance reasons, and to obviate the necessity of building a new set of core molds to fit each individual case. To accomplish this, sheet metal pieces 14 are suspended from the ends of the core molds (12, 13) by means of bolts 15 which pass through holes in the tops of sheet metal members 14, being secured at the ends by nuts and rest upon the tops of the core members (12, 13). These sheet metal sides 14 close the gap between the cores, lapping by the sides of the core members (12, 13), and are forced flat against the interior core by the pressure of the concrete when cast. By notching the tops and bottoms of these closer members 14, the double wall can be cast around the pipe sleeve 50, Fig. 5. For greater security in keeping the wall gage a double headed bolt 17 is laid across a [illegible] bottom of the side molds from side to side and between the cores.

In constructing a corner, see Figs. 1 and 2, a special mold form (36, 40) is used consisting of planking preferably lined with sheet metal, and having at its edges short, wedge shaped block members 39 (Figs. 1, 2) which coacting against the guides 28 hold the molds in place. To disengage the outside corner members from the wall it is necessary to wedge them outward, severing any adhesion of concrete with block members 39. On the outer mold, heavy wood stiffening braces 37 are bolted; wires 38 running through holes in these braces 37 to the pipe-sleeve members 50 of the guides, securely bind the corner molds in position, the molds being drawn up tight against the guides by inserting a lever between wires 43 and twisting. These corner mold members preferably extend much higher than the longitudinal molds so as to require little shifting and are hoisted to new position by a rope and block member 42, Fig. 1. For greater stiffness, a temporary spreader member 41, Fig. 2, is inserted near the top and is withdrawn before the concrete reaches its level. The twisted wires 38 remain in the concrete and are cut as in usual practice. This method of lacing the wires 38 around the permanent pipe sleeves 50, in connection with the guide angle members 39, insures great stiffness at the corners. A true angle is thus obtained with a minimum of bracing, and material. It is not considered desirable to extend the air space around the corner in constructing concrete walls, it being deemed preferable to obtain insulation above the grade by other methods such as inserting hollow tile or hollow brick, etc., and for water-proofing purposes below the grade, to coat the corners with tar or other adhesive membranous washes, the small grooves left by the withdrawal of the guide members 28 affording a perfect water-tight stop for this protective covering.

The method of operation of the above described apparatus is substantially as follows:—After laying the footing course, the vertical pre-assembled guide frames 28 are erected thereon, in the manner shown. Figs. 1 and 2, it being understood that sufficient of these frames are erected to girdle the floor plan area or any suitable division thereof. The side and corner molds are then applied to the opposite sides of the framed guides 28. These side molds may abut with a working clearance, end to end, against the guide frames or they may lap by as shown in Fig. 1; in the latter case it is necessary to start one section in advance of the other and use the end device 27, Fig. 1 and Fig. 2; the outside section molds that follow extend by against the wall section already cast. If an ordinary, solid, foundation wall is desired, the core form members are omitted and suitable spreader members similar to 16 are laid on the top of the side molds abutting against angle members 4, Fig. 2, to aid in preserving the wall thickness. The clamp members 18 are then adjusted and screwed up tightly holding the side molds firmly against the guide frames 28: concrete is then poured, and, after a sufficient interval of time for gaining strength, the clamps are then loosened sufficiently and the side molds slightly forced from the surface of the wall. The side molds are then hoisted by means of the hoisting device and tackle 25 and yoke member (22, 24, 26), a sufficient lap at the bottom being allowed, the clamps are then screwed up tight again and the operation repeated.

It is thus seen that in carrying out this invention after the guide frames are once erected the use of skilled labor of any kind is eliminated, for the apparatus and the finished wall cannot deviate from their original setting, nor can the apparatus injure the green wall in any way. It is also seen that this invention provides a simple and practical apparatus for constructing reinforced concrete walls, accomplishing, among others, all of the objects and advantages above set forth.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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

1. In an apparatus of the character described, in combination, vertically disposed guide ways, a mold coacting with the outer surfaces of said guideways comprising inside and outside longitudinal members, each of said molds having angle irons at the top and bottom, the upper angle irons projecting outwardly, and a clamping member adapted to rest and be supported on said angle irons.

2. In an apparatus of the character described, in combination, vertically disposed guideways, a mold coacting with the outer surfaces of said guideways comprising inside and outside longitudinal members, said mold members having upper angle irons projecting above the tops of the molds and outwardly from the sides thereof, means co-acting with the outwardly projecting parts for clamping the molds together, and means coacting with the upwardly projecting parts for spacing the molds apart.

3. In an apparatus of the character described, in combination, vertically disposed guideways, a mold coacting therewith comprising inside and outside longitudinal members, said mold members having upper angle irons projecting above the tops of the molds and outwardly from the sides thereof, means co-acting with the outwardly projecting parts for clamping the molds together, means co-acting with the upwardly projecting parts for spacing the molds apart, and a core supported from said last mentioned means.

4. In an apparatus of the character described, in combination, vertically disposed guideways, a mold adapted to co-act with the outer surface of said guideways and be progressively raised thereon comprising inside and outside longitudinal members, said mold members having upper and lower angle members, and a U-shaped clamping member with threaded pressure members engaging the top and bottom angle members, said threaded pressure members at the top of said clamps resting upon the horizontal leg of said top angle members and supporting said clamping means.

5. In an apparatus for molding concrete walls, in combination with vertically disposed guide members, and molds adapted to be guided by said guide members when moving in a vertical direction, of a hoisting device consisting of roller supports secured to the molds under which passes a transverse bar upon which the rollers move freely so as to allow a free swinging movement of the molds, said bar being supported by a flexible member fastened near the ends of the bar and forming a triangle with an apex

central as regards the wall thickness, and a pulley attached to said apex.

6. In an apparatus for molding concrete walls, a hoisting device consisting of a transverse bar, roller supports adjustable toward and from each other on said bar whereby said roller supports may move freely so as to allow a free swinging movement thereof, a flexible member fastened near the ends of said bar for supporting the bar and forming a triangle with an apex central as regards the wall thickness, and a pulley member attached to said apex.

Signed at New York city in the county of New York and State of New York this nineteenth day of April A. D. 1913.

GURDON S. MUMFORD.

Witnesses:
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