

May 18, 1926.

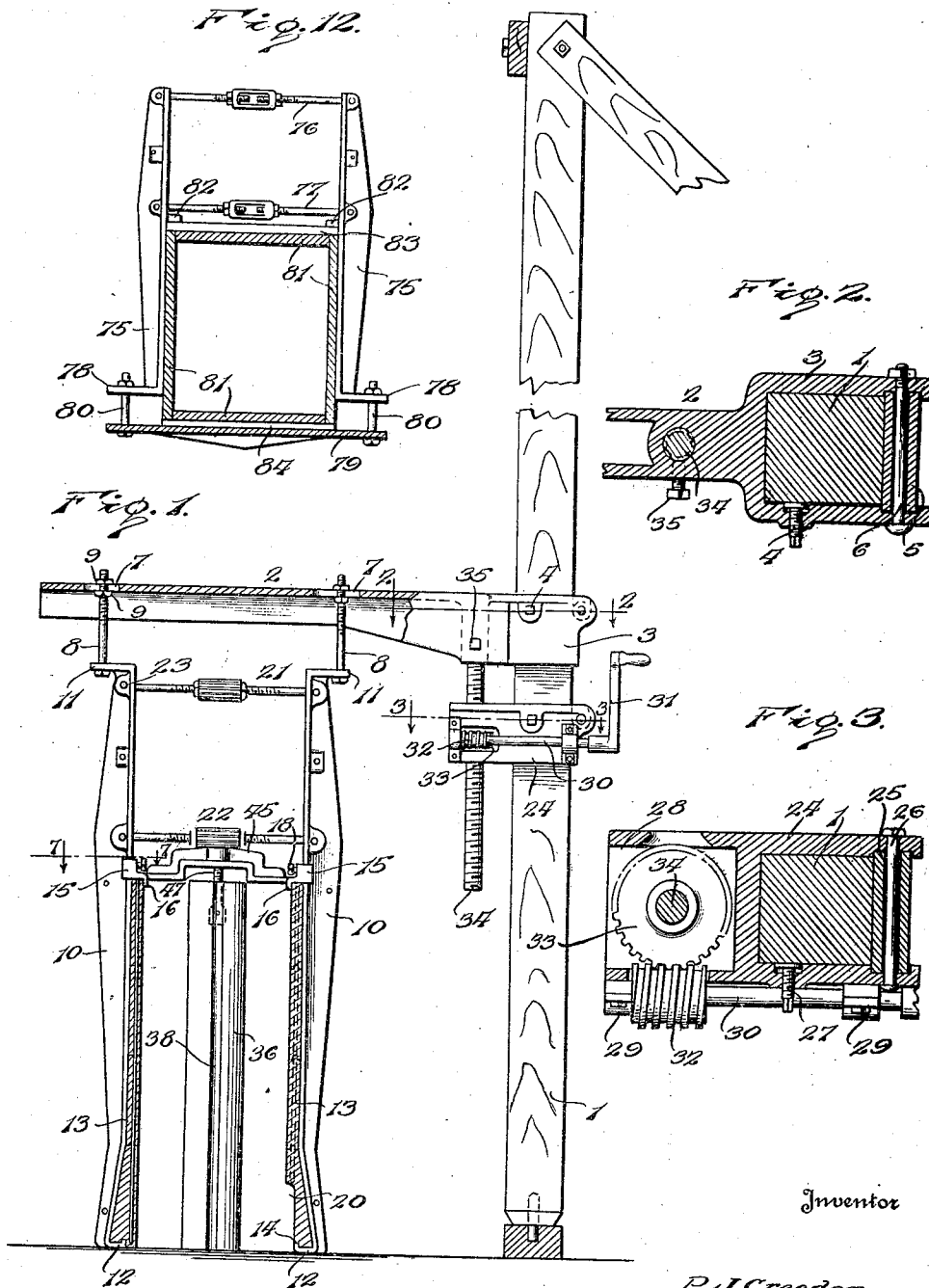
P. J. CREEDON

1,585,083

APPARATUS FOR USE IN ERECTING CONCRETE STRUCTURES

Filed June 16, 1925

3 Sheets-Sheet 1



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Fig. 4.

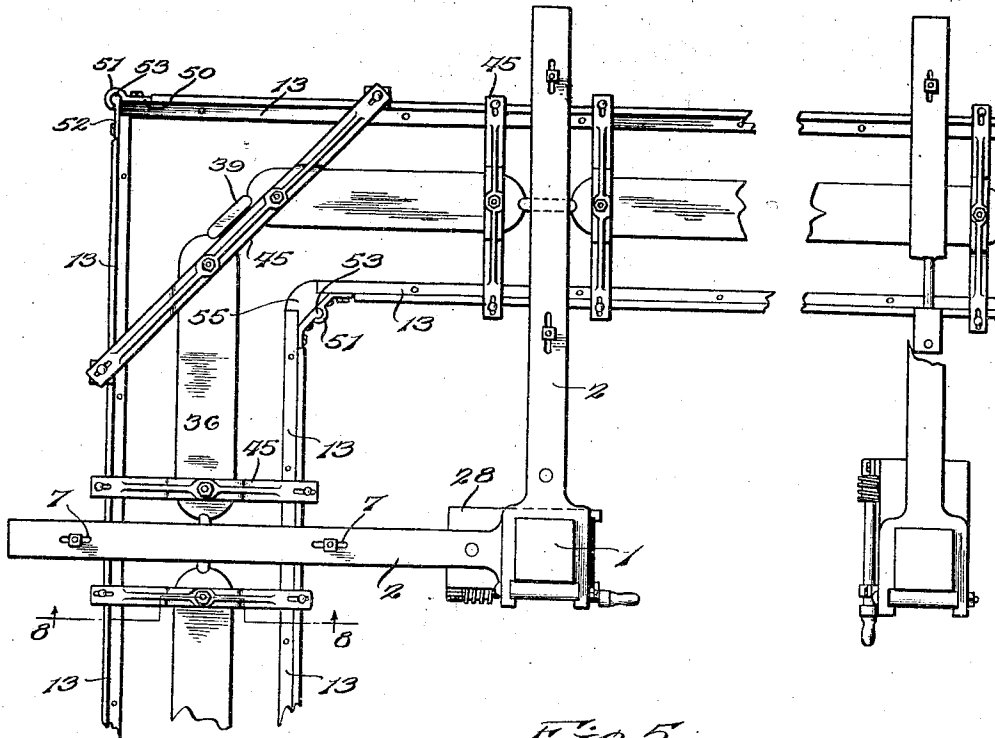


Fig. 5.

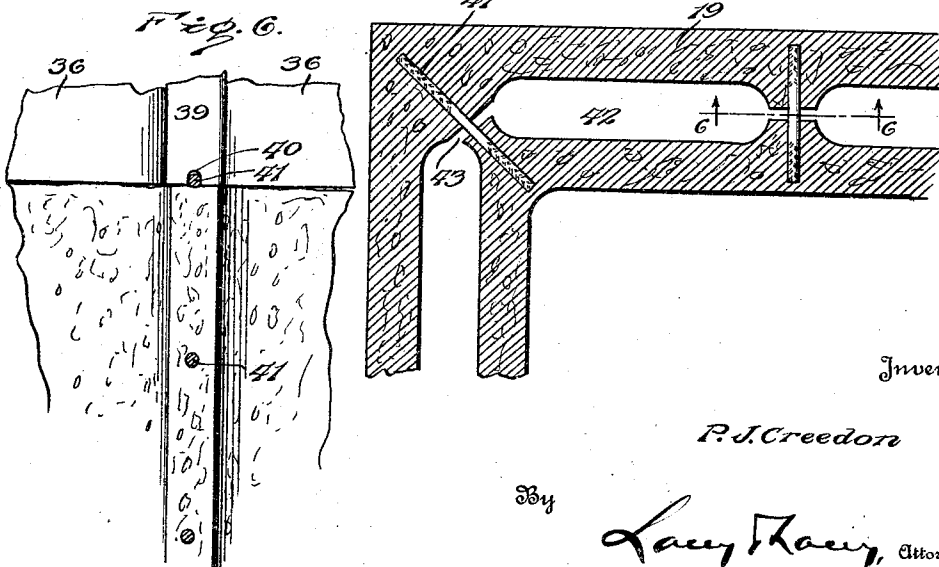
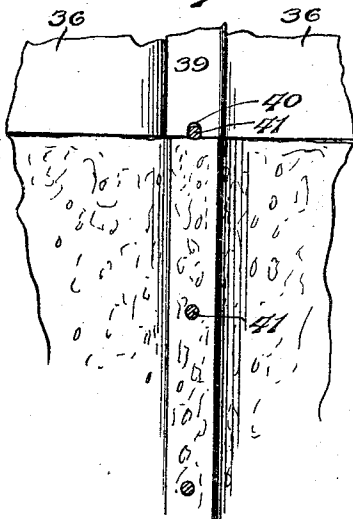


Fig. 6.



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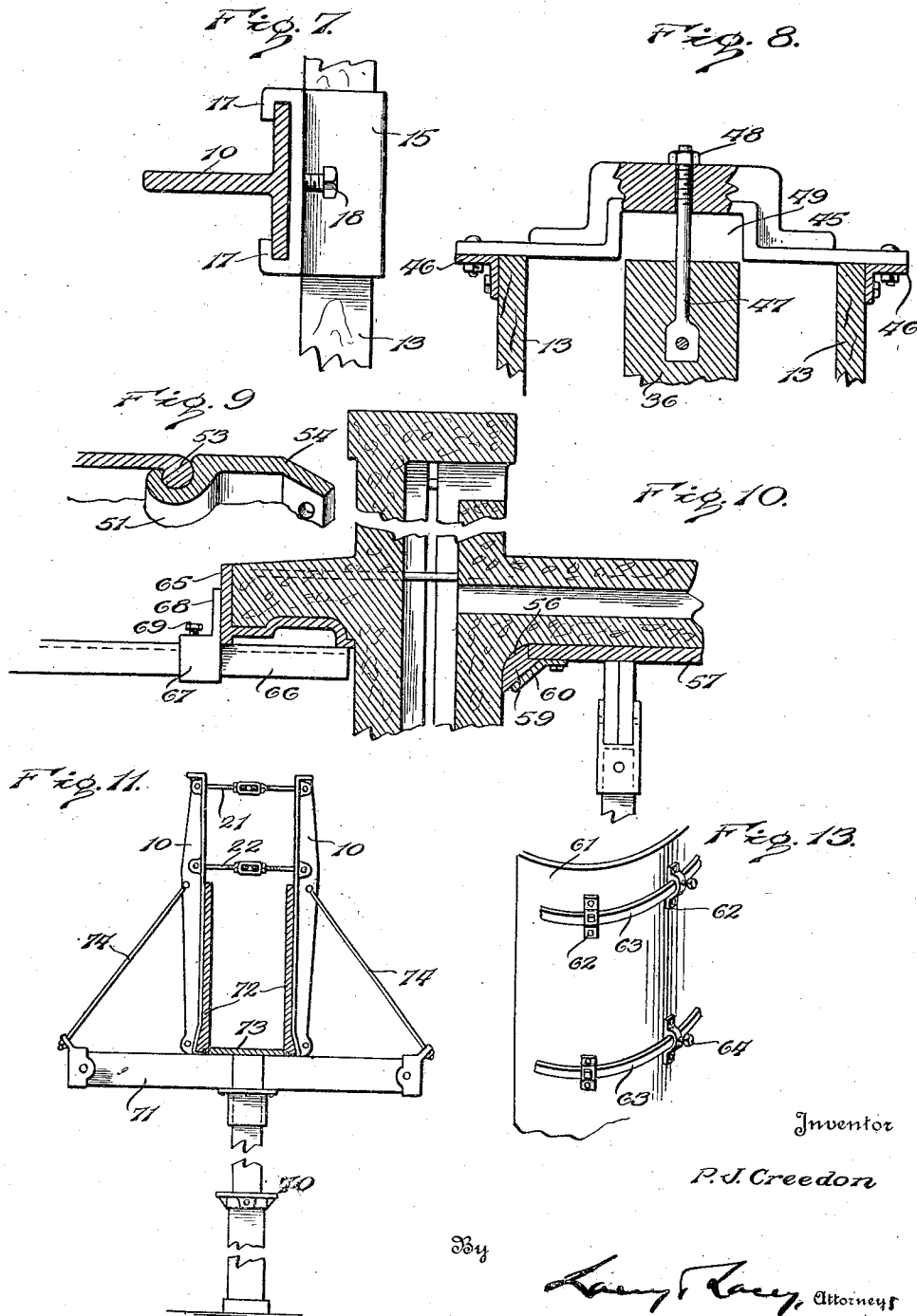
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UNITED STATES PATENT OFFICE.

PATRICK J. CREEDON, OF OMAHA, NEBRASKA.

APPARATUS FOR USE IN ERECTING CONCRETE STRUCTURES.

Application filed June 16, 1925. Serial No. 37,510.

My invention seeks to provide mold forms for use in erecting concrete structures which may be easily assembled, which will impart to the concrete the desired configuration and which may be very readily raised as the walls of a building or other concrete structure increases in height. A primary object of the invention is to provide mold forms of such a type that a wall produced by the use of the same will have a dead-air space throughout its entire extent, and another object of the invention is to provide means whereby corners in a wall or other structure may be easily formed and the mold members readily removed from the corners without disrupting the surface of the concrete body. These several stated objects, and other objects which will incidentally appear, are attained in the use of such an apparatus as is illustrated in the accompanying drawings, and the invention resides in certain novel features which will be particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a sectional elevation of mold forms embodying my invention arranged for use in forming a wall;

Fig. 2 is an enlarged detail horizontal section on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged horizontal section on the line 3—3 of Fig. 1;

Fig. 4 is a plan view showing my improved apparatus arranged to form two meeting walls and illustrating the method of forming corners;

Fig. 5 is a horizontal section of a wall constructed by the use of my apparatus;

Fig. 6 is a vertical sectional view on the line 6—6 of Fig. 5;

Fig. 7 is an enlarged detail section on the line 7—7 of Fig. 1;

Fig. 8 is an enlarged sectional elevation on the line 8—8 of Fig. 4;

Fig. 9 is an enlarged horizontal section of a part of the means for forming an inside corner;

Fig. 10 is an enlarged vertical section illustrating the manner of forming a cornice and also the manner of forming a corner between a side wall and a ceiling;

Fig. 11 is a view showing the mold members arranged to form a beam or girder;

Fig. 12 is a view, partly in horizontal section and partly in plan, of means for shaping a column, and

Fig. 13 is a detail view showing means employed in forming a round corner or projection.

In the practice of the invention, posts 1 are set up at intervals along the line of a contemplated wall, and upon these posts are mounted jacks which are adapted to support the mold members or forms and effect lifting of the same as the formed wall increases in height. Each jack consists of an arm 2 provided at one end with a yoke or stirrup member 3 adapted to span the post 1 and held firmly to the post at the proper height by a set clamping bolt 4 mounted in one side of the yoke and arranged to bear against the post, as shown clearly in Fig. 2. The yoke fits closely to the post and a roller 5 is mounted between the ends of the side members of the yoke to ride upon the post when the jack is being raised or lowered. This roller is shown clearly in Fig. 2, and it will be noted that it is of a hollow form and held in place by a bolt 6 inserted through the sides of the yoke, the roller being thus held to the post so that it aids in maintaining the jack arm in proper position upon the post and also reduces the frictional wear upon the post when the jack is being moved vertically. The arm 2 is preferably of channel formation, and in its upper web are formed longitudinal slots 7 receiving the upper ends of hanger bolts or threaded rods 8 which are held in the arm by clamping nuts 9 mounted upon the respective hanger bolts above and below the cross web of the arm and turned home against the same, as will be understood upon reference to Fig. 1. Carried by the lower ends of these hanger members and supported by the heads of the same are mold board carriers 10 which are preferably of the T-shape cross section illustrated in Fig. 7. The upper ends of these mold carriers are provided with outstanding lugs or flanges 11 which are fitted upon the lower ends of the hangers whereby the carriers are suspended from the jack arm 2, as clearly shown in Fig. 1. The mold members, which are preferably boards, are mounted upon the inner sides of the carriers, and, in order that the mold members may be firmly supported, the carriers are provided at their lower ends with inwardly projecting feet 12 adapted to engage under the lower edges of the mold members 13 so as to support the same. Preferably, the

inner ends of the feet 12 are provided with upstanding toes 14 seating in corresponding notches or grooves in the mold members so that the latter will be held against inward lateral movement away from the carriers. The upper edges of the mold members are held to the carriers by brackets 15 slidably fitted upon the side flanges of the carriers and provided at their lower ends with overhanging lips 16 adapted to engage over the upper edges of the mold members, as shown clearly in Fig. 1, whereby the latter will be held close to the carriers. The brackets are provided with re-entrant side flanges 17 engaging the sides of the respective carriers, as shown clearly in Fig. 7, and a set bolt 18 is mounted in the upstanding portion of the bracket to be turned home against the carrier and thereby secure the bracket in place. It will be understood that after the mold members are placed against the carriers the brackets are slid downwardly to engage the upper edges of the mold members and the set bolts are then turned home so that the brackets will be rigidly secured.

The inner opposed faces of the mold members are generally flat and smooth in order that they will properly shape the surfaces of the wall which is shown at 19 in Fig. 5. It is frequently desirable to have the base projection on an interior wall formed integral with the wall, and to this end the lower portions of the mold member 13, which are at the inner side of the apparatus when set up for use, may be provided with a recess 20 shown in Fig. 1 so that, when the concrete is poured into the mold and tamped a portion of the same will spread laterally into the said recess and thereby produce the desired base.

It will be understood that the longitudinal slots 7 in the jack arm 2 provide for adjustment of the carriers 10 toward and from each other so that they may be set to produce walls of any desired thickness. In order that the mold carriers may be maintained at the set distance apart, I provide turn-buckles 21 and 22 which extend between the upper portions of the carriers and each of which has its ends pivotally connected to the carriers, as indicated at 23. These turnbuckles may obviously be easily adjusted so that the carriers will be at the desired distance apart, and if the upper turnbuckle be shortened while the lower turnbuckle is left undisturbed, the upper ends of the carriers will be caused to swing toward each other sufficiently to loosen the mold members from the set concrete so that the mold may be raised without marring the surface of the wall. Of course, by properly adjusting both turnbuckles, the carrier arms may be moved toward or from each other so that the mold members may be moved laterally from the wall before being raised, and

this adaptability of the device will permit it to be employed when projections or ornamental designs are to be formed in the surfaces of the walls. It will, of course, be understood that the lugs 11 at the upper ends of the carrier arms are slotted or have the openings therethrough large enough to accommodate the relative movement of the carriers upon the hangers so that, while the carriers will be firmly supported in use, they will not bend the hangers when adjustment of the carriers is necessary.

Below the yoke 3 a similar yoke 24 is fitted to the post 1, and this yoke is equipped at its rear end with a roller 25 and bolts 26 corresponding in all respect to the roller 5 and bolt 6. A set bolt 27 is also mounted in the side of the yoke 24 and corresponds in all respects to the bolt 4 so that the yoke 24 may be firmly secured to the post or upright 1. The outer side of the yoke 24 is formed into or carries a box 28 and upon one side of the yoke is secured bearings 29 in which is journaled a shaft 30 equipped at its inner end with a crank handle 31 and carrying near its outer end a worm 32 meshing with a worm gear 33 which is housed within the box 28. The worm gear 33 has an internally threaded hub which is engaged with a threaded rod 34 depending from the jack arm 2, the upper end of the said rod being firmly secured in the jack arm in any efficient manner, as by the use of a set bolt 35 mounted in the side of the arm and turned home against the upper end of the rod. It will be understood that, if the set clamping bolt 4 be loosened while the bolt 27 is secured, rotation of the shaft 30 will effect rotation of the worm gear 33 which will thereupon tend to ride along the rod 34, but inasmuch as the gear is housed within the box 28 and is held against movement from the box by the top and bottom walls of the same, the rod 34 will be caused to move axially through the gear and the jack arm with the mold carriers and the molds suspended therefrom will be moved vertically and caused to ride upwardly upon the supporting post 1. When the jack arm has been raised to the limit of the rod 34, which is usually equal in length to the height of one course of the wall, the set bolt 4 is turned home so as to clamp the post 1 and the set bolt 27 is loosened, whereupon, if the rotation of the shaft 30 be continued, the gear 33 and the box and yoke carrying the same will be caused to travel upwardly so as to adapt the device for another operation. Of course, after the yoke 24 has been moved upwardly close to the yoke 3, the set bolt 27 is again turned home.

In order to produce the dead-air space in the finished wall, I provide a plurality of cores, such as are shown at 36. These cores may be of any suitable material and are

preferably constructed of wood having convex ends, as shown at 37, and having vertical grooves 38 extending the full height of their end surfaces. Intermediate plates 39 are provided between adjacent cores, and these plates are relatively narrow and thin and have their edges adapted to seat in the grooves 38, as will be readily understood upon reference to Fig. 4. In the lower ends of the intermediate plates 39 are formed notches 40 whereby the said plates may fit over transverse reinforcements and tie rods 41 which are disposed upon the concrete at intervals as it is poured, it being understood that it is desired in the finished wall to have air spaces 42 connected by narrow spaces 43 throughout the extent of the wall, the inner and outer members of the wall being entirely independent of each other, except for the tie bars 41 which are disposed at intervals across the narrow spaces 43, as shown clearly in Fig. 5. The intermediate plates or strips 39 will frictionally engage within the grooves 38 so that, when adjacent cores are raised, the intermediate plate will also be raised, but the plates may be raised independently of the cores and to that end a hook or eye, indicated at 44, may be provided at the upper end of each of the intermediate plates. As the pouring of the concrete proceeds, a tie bar 41 is placed in position and the strip 39 is pushed downwardly until the notch 40 fits over the said tie bar. The pouring then proceeds in the usual manner until it reaches the level at which another tie bar is desired, whereupon the strip is raised to permit the placing of such tie bar and the process then proceeds as before. The cores are supported from the upper edges of the mold members 13 and for this purpose I provide at intervals the yoke or bridge bars 45, the ends of which rest upon and extend laterally beyond the upper edges of the mold members. Brackets or angle bars 46 are provided along the upper edges of the mold members at the upper sides thereof and the ends of the bars 45 are secured to these brackets, as shown clearly in Fig. 8. Secured in the upper end of the cores in any convenient manner are hanger bolts 47 which project upwardly through the cores and have their upper ends extended through the centers of the bars 45 and secured therein by nuts 48, as will be understood upon reference to Fig. 8. The central portions of the bridge or yoke bars 45 are stepped upwardly defining an arch 49 immediately above the core to accommodate relative upward movement of the core. It is sometimes desirable to loosen the core from the concrete before attempting to raise the molds, and for this purpose the nut 48 may be turned home so that the top of the core will be drawn into the arch 49 of the bridge bar, thereby releasing the core from the concrete so that it may then be raised to the desired height without disrupting the concrete which will generally need further setting at this time. It will be understood, of course, that, as shown in Fig. 4, a bridge or yoke bar 45 will be provided to support each end of each core and at the corner of a wall, or the meeting point of two walls, a longer bar will be provided so that it may extend across the angle or corner and be connected with the adjacent ends of the meeting cores. It will also be convenient to provide two jack arms 2 upon the post 1 at the corner of a wall, the upper jack arm resting at its yoke or inner end upon the lower jack arm so that, when the jack shaft 30 is rotated, both arms will be raised. It will be understood that the concrete is poured until it reaches the level of the upper edges of the mold members, whereupon the jacks are manipulated to raise the mold members to such height as will permit the pouring of another course of concrete. Inasmuch as the core-carrying bars 45 rest at their ends upon the upper edges of the mold members and are secured to brackets or bars which, in turn, are secured to said mold members, the cores will be raised with the outer mold members so that the entire apparatus will be set for a second pouring. It may be noted at this point that the members 46 serve as reinforcements to brace the upper edges of the outer form boards or mold members 13 and enable them to withstand the strain imposed thereon by the pouring and the tamping of the concrete. It will, of course, be understood that metallic reinforcements are set in place so as to extend vertically and horizontally through the concrete wall as the pouring progresses.

External square corners may be formed and the mold members withdrawn from such corners without disrupting the surface of the concrete but it is sometimes desirable to raise the form board or mold member at one side of a corner before raising the form board at the other side of the corner inasmuch as the pouring and setting may proceed in such manner that one side of the corner will be finished before the other side is finished. I, therefore, provide a connection between the forms at the corner which will permit such relative movement. Referring particularly to Figs. 4 and 9, it will be noted that a plate or bracket 50 is secured upon the outer face of one form board or mold member 13 and projects beyond the end edge of said member, the projecting portion being formed into a hook or grooved extension 51. A plate 52 is secured to the outer face of the meeting mold member 13, and this plate is provided along its outer vertical edge with a bead 53 which fits closely within the grooved or hook member 51 so that, while manual separation of these parts will

be prevented and they will be held together under the normal strains, they may be shifted vertically relative to each other without becoming separated. At the inner corner I provide the same construction, except that the side edges of the respective plates are bent or turned angularly, as shown most clearly at 54 in Fig. 9, thereby accommodating the inner angle of the meeting plates so that the interengaged portions of the connecting plates will extend diagonally across the corner. This is advantageous because it permits the employment of a form block 55 having dovetailed edges which will fit to the adjacent edges of the inner mold members 13 and permit the utilization of the connecting plates to support this block 55 in place and prevent its falling away from the concrete as the latter is poured and formed. In order that this form block may be easily shifted without disrupting the corner, I form the working face of the same upon a convex arc and, consequently, the corner produced will be concave. I have found that if a round inside corner be produced the form may be easily removed therefrom without marring the surface of the corner but it is difficult to remove the forms from a square inside corner without marring the surface. For this reason, I generally form a round corner, as shown at 56 in Fig. 10, between a side wall and a ceiling. In providing for the corner between a side wall and a ceiling, it is, of course, not necessary to provide for relative vertical movement between the mold members forming the corner inasmuch as the ceiling forms, indicated at 57, are not to be shifted vertically. They may conveniently be held in position by fixed uprights, indicated at 58. The corner mold 59 is, therefore, merely held in place by angle brackets 60 which are secured to the adjacent mold member 57 and bear against the mold block 59.

In forming round projections exterior to a wall, such as a bay window, I may employ the forms, such as indicated in Fig. 13, consisting of a flexible sheet metal plate 61 of proper dimensions provided at intervals upon one face with brackets 62. Flexible rods or straps 63 are inserted through the brackets 62 and set screws 64 are mounted in the brackets to bear against the strips or rods. The metal plate is easily bent to the desired curvature and the strips 63 are, of course, given the same curvature after which the set screws are turned home against the strips or rods and will hold the form in the shape given it. The form or mold plate 61 at the outer side of the projection will, of course, present its concave face to the work and the shape-retaining strips or rods will be upon its convex face while the converse arrangement will be employed at the inner side of the projection.

In Fig. 10, I have shown a method whereby cornices may be formed upon a wall. The cornice mold 65 is supported against the wall by an arm 66 which may conveniently be one of the jack arms 2, the mold resting upon the inner end of the arm, as shown. A stop bracket 67 having an upstanding finger 68 is adjustably secured upon the arm 66 by a set screw 69 with the finger 68 bearing against the outer side of the mold so that the mold will be firmly held in its proper position.

If a beam or girder is to be formed, a telescopic post 70 is provided and a cross-head or bar 71 is secured upon the upper end of this post. A box consisting of the side members 72 and a bottom 73 is arranged along the line of the contemplated beam or girder with the bottom 73 resting on the several crossheads 71, and the arms 10 are then placed against the side members 72 and engaged therewith just as they are engaged with the mold members 13 in Fig. 1. The turnbuckles 21 and 22 are adjusted to clamp the members of the box in proper position and brace rods 74 are extended between the said arms and the ends of the crossheads 71 so as to impart the desired rigidity to the structure. Of course, the jack will be unnecessary in this adaptation of the invention.

When it is desired to form a column, I employ the form-retaining arms 75 which are of the same type as the carrier arms 10, being connected by the turnbuckles 76 and 77, as shown. The ends of these arms remote from the turnbuckles are provided with outstanding lugs 78 and a clamp 79 is provided and connected with said lugs by bolts 80 in an obvious manner. A box of the proper dimensions for the column is formed about the site of the column and consists of plates or mold boards 81, two of which rest against the inner sides of the arms 75 which, in this instance, of course, are arranged in a horizontal position, the meeting mold boards 81 extending transversely between the arms and the first boards with their vertical edges against the inner sides of the latter. Lugs 82 are formed upon the arms, a presser bar 83 being preferably interposed between the lugs and the transverse form board, as shown. At the opposite side of the box, a presser board 84 is inserted between the mold board 81 and the clamping plate 79 so that, when the nuts upon the bolts 80 are turned home, the several form boards will be firmly clamped together and will maintain their set relation while the concrete is being poured and is setting.

From the foregoing description, taken in connection with the accompanying drawings, it will be seen that I have provided a simple, compact and easily manipulated apparatus whereby concrete structures may be

readily and rapidly erected and the molds or forms adjusted to new positions as the work progresses.

Having thus described the invention, I claim:

1. In apparatus for the purpose set forth, the combination of a main supporting member, a jack arm fitted directly upon said member, means on the supporting member for shifting said arm vertically along the member, and mold members carried by the jack arm.

2. In an apparatus for the purpose set forth, the combination of an upright support, a jack arm fitted at one end about the said upright support and projecting laterally therefrom, mold members supported from said arm, means mounted in said arm for securing it in a set position to the upright support, and means mounted on the upright support below the jack arm for effecting vertical movement of the arm along the support.

3. In an apparatus for the purpose set forth, the combination of an upright, a jack arm fitted to the upright and projecting laterally therefrom, mold members suspended from the arm, means for securing the arm in a set position upon the upright, a threaded rod depending from the arm, a box mounted upon the upright below the arm, a jack shaft mounted upon the said box, a worm on said shaft, and a worm gear fitted within the box and meshing with said worm and having an internally threaded hub engaging the said threaded rod.

4. In an apparatus for the purpose set forth, the combination of a pair of mold carriers, means for suspending said carriers and adjusting the same vertically, mold members fitted to the inner faces of said carriers, feet at the lower ends of the carriers supporting said mold members, brackets slidably fitted upon the carriers to engage over the upper ends of the mold members, and extensible connections between the carriers above the brackets and the mold members.

5. In an apparatus for the purpose set forth, the combination of a pair of mold carriers, means for suspending the carriers, mold members supported by the carriers on the inner faces of the same, core carriers extending across and resting upon the mold members, cores suspended from said core carriers, and intermediate strips engaged with the opposed ends of adjacent cores.

6. In an apparatus for the purpose set forth, the combination of mold members,

means for supporting the mold members, core carriers resting upon and extending across the mold members, and free of the supporting means, cores disposed between the mold members, and hangers fitted in the core carriers and connected to the cores and movable vertically through the core carriers whereby to lift the cores from the work.

7. In an apparatus for the purpose set forth, the combination of mold members, means for supporting the mold members, a core-carrying bar extending across and resting upon the mold members and having a central arched portion, a core disposed between the mold members in vertical alignment with the arched portion of the core carrier, and a hanger secured on the top of the core and extending through and supported by the core carrier and movable vertically therethrough whereby to draw the core into the arched portion of the carrier.

8. In an apparatus for the purpose set forth, the combination of mold members, means for supporting the mold members, cores disposed between the mold members and in spaced relation thereto, means for raising the mold members and the cores, and intermediate plates slidably engaged with the opposed ends of adjacent cores.

9. In an apparatus for the purpose set forth, the combination of mold members, means for supporting the mold members, cores disposed between the mold members and spaced therefrom and provided with vertical grooves in their ends, and intermediate strips slidably engaged in said grooves and provided with notches in their lower ends.

10. In an apparatus for the purpose set forth, the combination of form boards disposed in angular relation, and connecting plates secured to the outer faces of meeting form boards, one of said plates having a longitudinally extending bead at its free edge and the other of said plates having a grooved extension slidably receiving the bead.

11. In an apparatus for the purpose set forth, the combination of form boards disposed in angular relation, a form block having dovetailed side edges engaging the meeting ends of said form boards, and connecting plates secured to the form boards and bearing against said form block and having sliding engagement with each other.

In testimony whereof I affix my signature.

PATRICK J. CREEDON. [L. s.]