M. D. MORRILL.

SECTIONAL MOLD FOR CONCRETE WALL CONSTRUCTION.

APPLICATION FILED OCT. 25, 1909.

1,032,419.

Patented July 16, 1912.

5 SHEETS—SHEET 1.

Fig. 1.

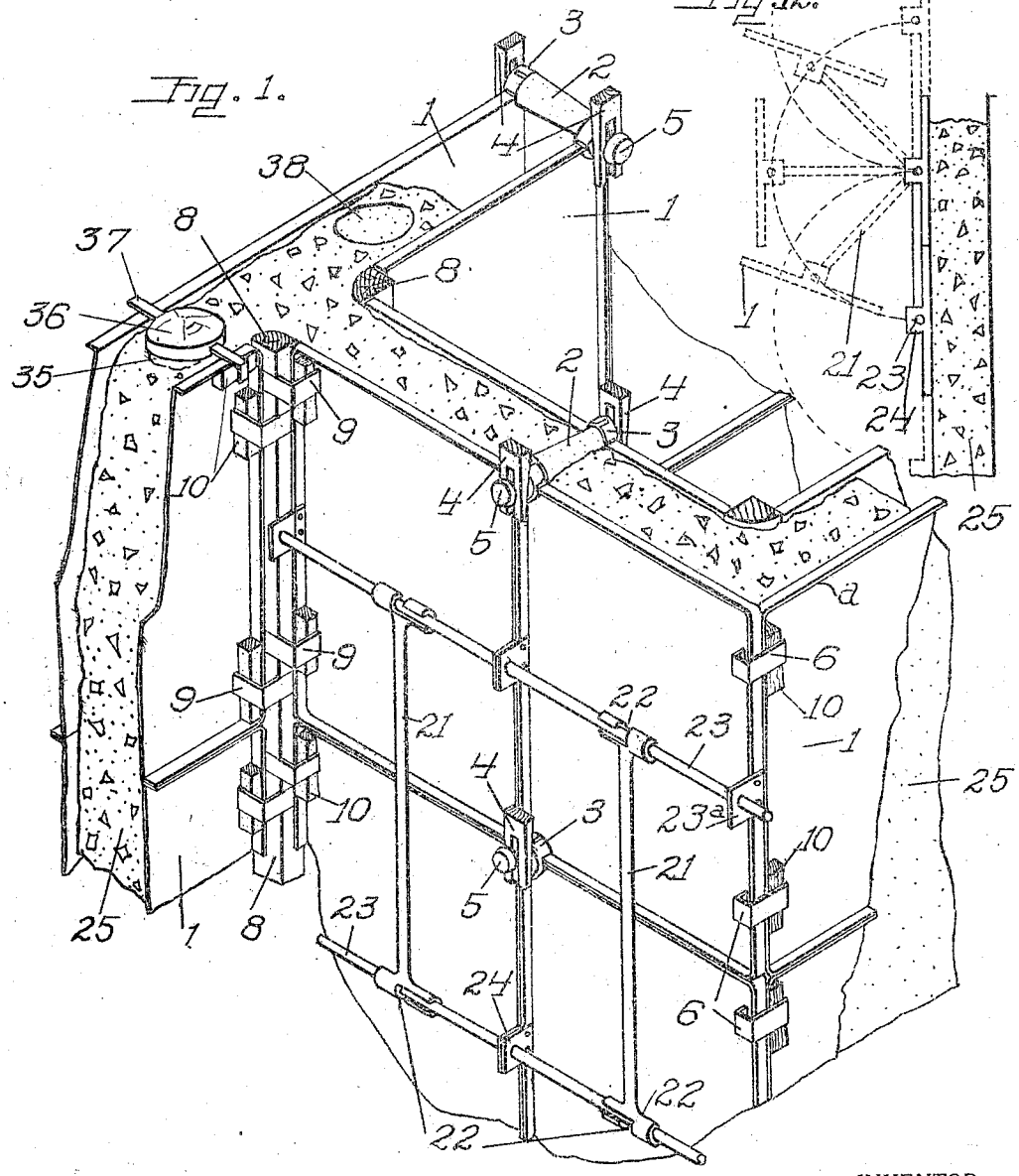

Fig. 12.

WITNESSES:

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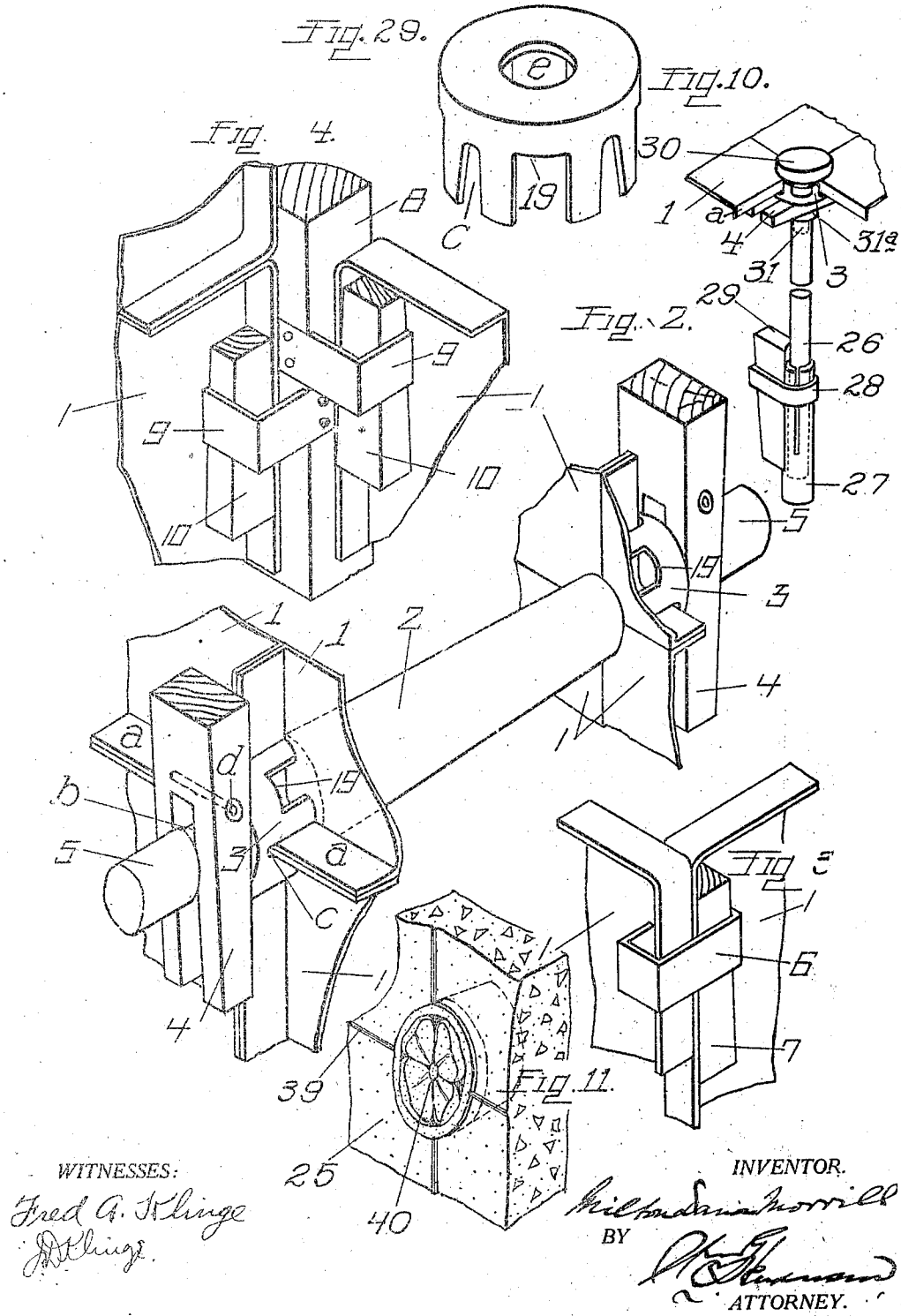

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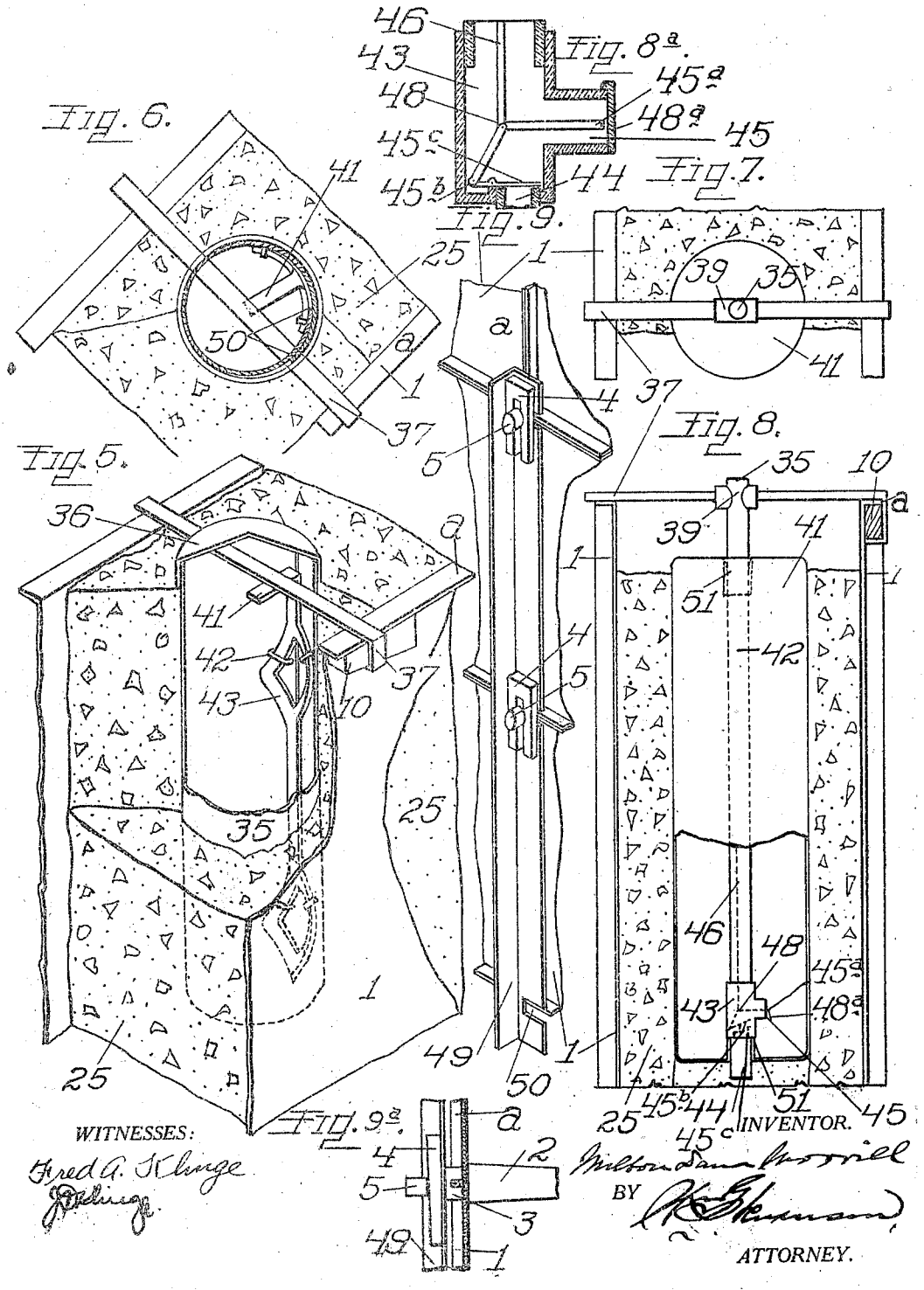

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5 SHEETS—SHEET 4.

Fig. 13.

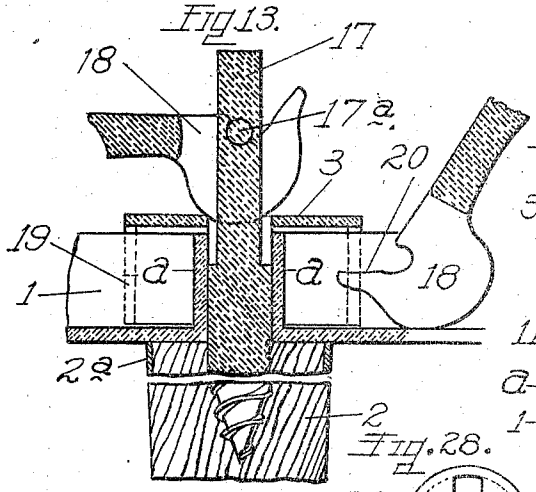

Fig. 17.

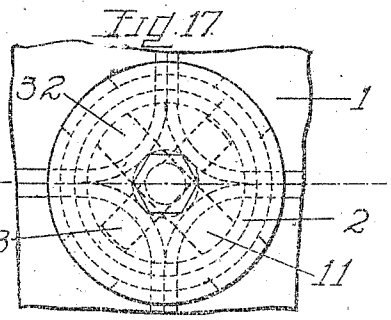

Fig. 16.

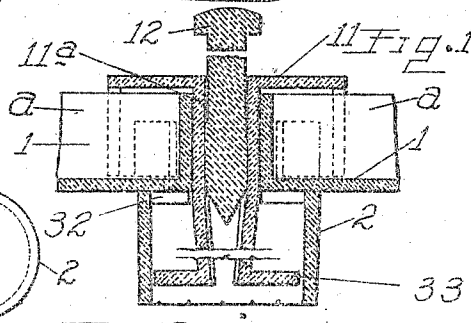

Fig. 28.

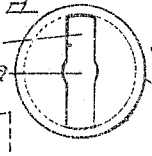

Fig. 14.

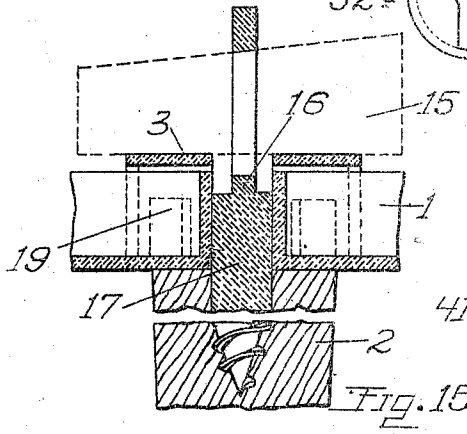

Fig. 18.

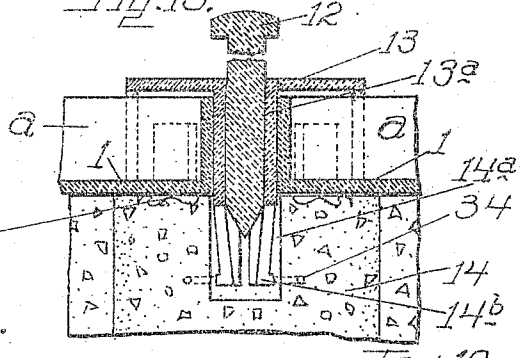

Fig. 15.

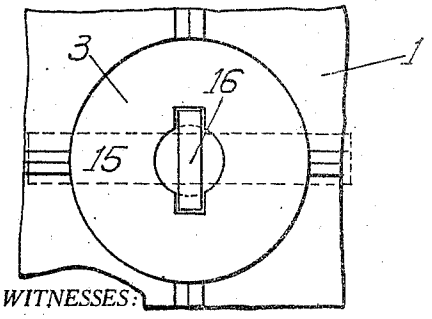

Fig. 19.

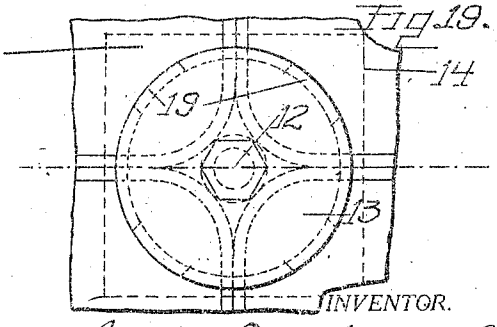

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Fig. 20.

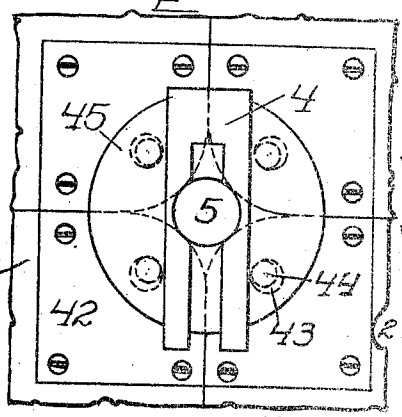


Fig. 21.

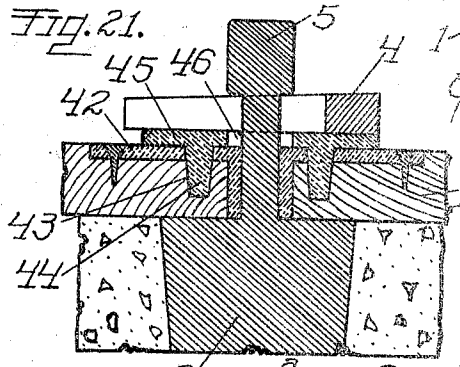
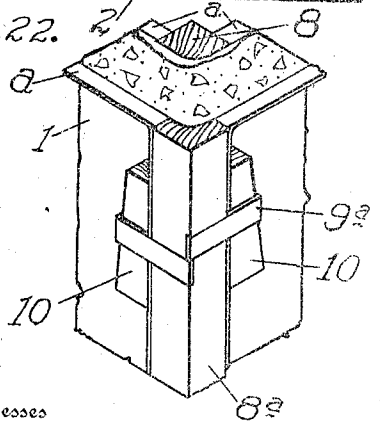


Fig. 22.



Witnesses

Fred A. Klinge

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Fig. 28.

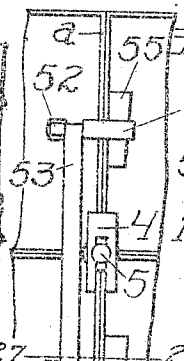


Fig. 27.

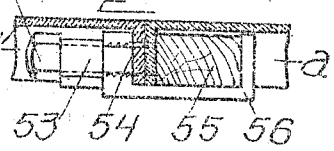


Fig. 24.

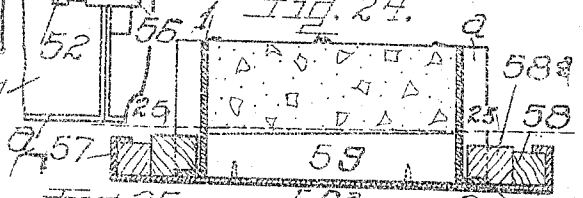


Fig. 25.

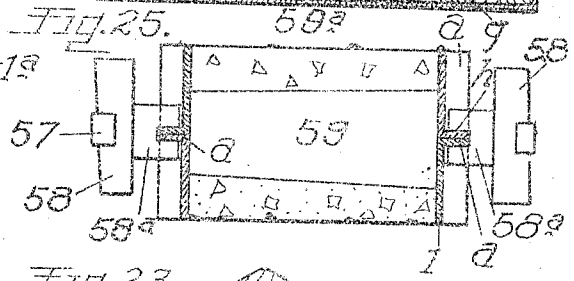
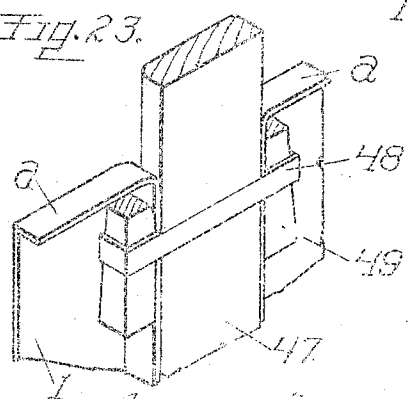


Fig. 23.



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SECTIONAL MOLD FOR CONCRETE WALL CONSTRUCTION

1,032,419. Specification of Letters Patent. Patented July 16, 1912.

Application filed October 25, 1909. Serial No. 524,510.

To all whom it may concern:

Be it known that I, MILTON DANA MORRILL, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Sectional Molds for Concrete Wall Construction; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to molds or forms for construction of concrete walls and the like, and it has for its object to simplify the construction of the molds in sections so that their parts may be readily assembled and taken apart and reassembled as the building progresses, the construction being such that the parts will be securely fastened together and braced when assembled, and which also admits of the parts being compactly packed for shipment or storage.

It has further for its object to provide improved means for locking the sections of the mold together at their joints, and to provide in connection with the locking means a core for spacing apart the sides of the mold while the mold is being filled with concrete, the holes formed by the cores, after the mold is removed, being closed on the exterior and interior by suitable rosettes or filling pieces.

It has also for its object to provide improved means for forming vertical ventilating and insulating flues in the wall in the progress of building the wall.

It has also for its object to provide improved means for connecting the sections of the mold together at the corners, both inside and outside, or either so as to give firmness and stability at such points, and also to make it possible to form cove or rounded corners.

It has also for its object to provide improved means for securing together plates constituting a base or form in forming concrete floors or ceilings of the building.

To the accomplishment of the foregoing and such other objects as may hereinafter appear the invention consists in the features hereinafter particularly described and then sought to be clearly defined by the claims reference being had to the accompanying drawings forming a part hereof and in which—

Figure 1 is a perspective of a mold embodying features of my invention, the mold being partially filled with concrete; Fig. 2 is a perspective of parts of opposite sides of the mold, and showing one of the spacing cores and means for locking the parts together; Fig. 3 is a detailed perspective of a part of two plates or sides of the mold illustrating the manner of locking them together; Fig. 4 is a perspective of parts of several plates of the mold, illustrating the corner block and manner of locking the parts together at the corner. Fig. 5 is a perspective of opposite plates of a mold and illustrating one form of core for forming the vertical ventilating flues in the wall, parts being broken away for clearness; Fig. 6 is a plan view of Fig. 5 with the cap-washer to the core removed and the core in section; Fig. 7 is a plan view of a modified form of core construction for forming the vertical flues; Fig. 8 is a side elevation of parts shown in Fig. 7; Fig. 8ª is an enlarged detailed sectional view of the valve controlled end of the tube to the flexible collapsible core; Fig. 9 is a perspective of parts of several side plates of a mold, showing a brace or stiffening bar applied at the joints of the parts; Fig. 9ª is a detailed view of a portion of Fig. 9, in side elevation, with two of the mold side plates in section; Fig. 10 is a perspective of several floor or ceiling forming-plates with one of the supports for the same, and showing the manner of locking the parts together; Fig. 11 is a perspective of a portion of the completed wall, showing a rosette in position to close on the outside one of the transverse openings in the wall formed by the core; Fig. 12 is a side view of a portion of the wall and several plates of the mold, illustrating the manner of shifting the plates from one position to another position as the building of the wall progresses; Fig. 13 is a sectional view of a modified form of means for supporting a transverse spacing core and locking the mold plates together; Fig. 14 is a sectional view of another modified form of such parts; Fig. 15 is an end view of Fig. 14; Fig. 16 is a sectional view of another modified form of means for supporting a spacing core and locking the mold plates together; Fig. 17 is a side or end view of Fig. 16; Fig. 18 is a

sectional view of another modified form of means for locking the mold plates together; Fig. 19 is a side or end view of Fig. 18; Fig. 20 is a side view of another modified form of means for supporting and locking the spacing core in position; Fig. 21 is a sectional view of the same; Fig. 22 is a perspective view showing the manner of applying inner and outer corner blocks to the mold plates; Fig. 23 a perspective view showing the manner of applying a spacing block between adjacent plates; Fig. 24 a detail sectional view showing the manner of applying a bracing support for the lowermost side walls of the mold; Fig. 25 a cross sectional view on the line 25—25 of Fig. 24; Fig. 26 a detailed view showing the preferred method of hinging sections of the mold sides together; Fig. 27 a cross section on the line 27—27 of Fig. 26; Fig. 28 a plan view looking at the end of the core illustrated in Figs. 16 and 17; and Fig. 29 is a perspective of the cap-washer, full size, used with the spacing core.

In the drawings, the numerals 1 designate the side plates or walls of the mold which preferably are formed of metal and provided with marginal flanges *a*, which have rounded corners, and which are adapted to rest one on top of another with their adjacent flanged edges together. The inner and outer plates are spaced apart by cores 2 made of suitable material and formed with reduced ends *b* and heads 5 of smaller diameter than the central portion of the core. These spacing cores are located so that their reduced ends will pass through the spaces formed by the round corners of the plates at the junction of the plates, said spaces being sufficiently large to permit the reduced ends and the heads of the core to pass therethrough without permitting the core to pass through. Over the projecting ends of the cores are placed cap-washers 3, preferably of metal, which are formed with tapering slots *c* adapted to receive the flanges *a* of the side plates of the mold. Forked or bifurcated wedges 4 are forced between these washers and the heads 5 of the core so that the side plates and cores will be tightly clamped together, and the tapering slots of the caps will draw the plates closely together, thus making close joints and securely holding the parts together with the oppositely disposed side plates spaced apart by the cores. The bifurcated wedges 4 are preferably made of wood and have each a bolt *d* passing through the same so as to prevent the wedges from splitting, and the washers 3 are preferably formed with recesses 19 to receive a tool for releasing the washer when the parts are to be separated.

At the corners of the molds, where the side plates extend at right angles to each other, the inner plates are connected together by means of vertically extending bars or blocks 8 which are formed with angle straps 9 between which and the flanges of the side plates are fitted wedge shape keys 10 so that by driving the keys into position the side plates and the corner blocks will be drawn together and securely locked one to the other. The faces of these corner blocks toward the inside of the mold are curved as shown so as to form cove shaped corners where one wall joins the other. At other corners of the mold the plates may be clamped together by means of angle plates 6 formed to straddle the flanges of the plates and to receive wedge shaped keys 10 which by being driven into place will draw the parts closely together and securely lock them in position. Instead, however, of using the means last described, I may employ at these corners a corner bar or block 8^a, as illustrated in Fig. 22, provided with angle straps 9^a and wedge-shaped keys 10 so that by driving the keys between the angle straps and the flanges of the side plates said plates will be drawn tightly against the corner block so as to clamp the parts tightly together, and in such case the inner face of the corner block may be made concave as illustrated so as to form a round exterior corner to the wall.

For the purpose of shifting the position of the plates of the mold from one position to another position, say from below to a higher position, as the building of the wall progresses, I connect adjoining plates together by means of rods 23 passed loosely through ears 23^a projecting from the plates, and connect such rod of an upper pair of plates to a corresponding rod of a lower set of plates by means of rods 21 which are provided at opposite ends with claws 22 encircling the rods 23 so as to form a hinged connection between the rods 21 and rods 23, thus permitting one set of plates when unclamped to be raised above the next upper set of plates and into position to form an upper extension of the mold for continuing the wall construction, as illustrated in Fig. 12 of the drawing. For the purpose of disengaging the rods 21 from the rods 23 when the parts of the mold are taken apart, the claws 22 of the rods 21 are slotted on opposite sides to each other as illustrated so that when one of the rods 23 is withdrawn from the claws the rods 21 may be turned into an outward position so that their jaws may be readily disengaged from the other rods as will be apparent. These rods also serve to brace the walls of the mold. If desired, metal angle bars 49 may be placed along the vertically disposed flanges *a* of the mold plates 1 against the washers 3 and held in place by the wedges 4 so as to insure the plates 1 being kept in proper alinement, one with the other, one flange of the angle bar being formed with

slots 50 to receive the reduced ends of the cores 2, as illustrated in Fig. 9 of the drawing.

For the purpose of forming ventilating and insulating flues in the wall, and also in the roof if desired, I employ hollow formers or cores 35 which preferably are made of metal with one part overlapping the other part as illustrated in Fig. 6 so as to render the same expansible and collapsible in cross section throughout its length. For the purpose of expanding or collapsing this core a bar 41 is located inside thereof and capable of vertical movement therein, being guided in its vertical movement by clips 42 loosely encircling diverging members 43 of the bar so that when said bar is moved in one direction the core will be expanded and when moved in the other direction the core will be contracted. This core is suspended in position by means of a bar 37 passed through the upper part of the core and through the depending flange of the core cap or cover 36 and resting on top of the plate 1 of the mold, said bar 37 being formed with an angular end between which and the flange *a* of the plate 1 is driven a wedge key 10 so as to clamp the parts together as illustrated in Fig. 5 of the drawing. When this core is to be withdrawn it is only necessary to remove the wedge 10, withdraw the supporting bar 37, lift off the cap 36, operate the bar 41 so as to contract the core, and then lift the latter out of place and locate it in position for the next higher section of the mold. In Figs. 7 and 8 of the drawing is illustrated a modified form of this collapsible core and which consists of a cylindrical shaped tube 51 of suitable flexible material impervious to air or liquid, adapted to be dilated or expanded by introduction of compressed air or a suitable liquid. This tube is secured at its opposite ends by binding inturned portions of the tube as indicated at 52 to a centrally disposed tube or pipe 53 which at its upper end is provided with a coupling 54 through which passes a bar 37 adapted to rest on the top edges of the side plates 1 and formed at one end with an L-shaped part between which and the lateral flange *a* of the plate 1 is driven a wedge 10 so as to bind the parts together. The lower end of the pipe 53 is provided with a valve-casing 54 formed with a nozzle 55 opening into the tube 53 and provided with a flap valve 56, and also provided with a valve 57. When compressed air or a liquid is introduced into the pipe 53 it passes through the nozzle 55 into the flexible core and dilates the same. When the core 51 is to be withdrawn a rod 58, which may be connected to an arm 59 and arm 60, is depressed so as to cause arm 59 to bear against one end of the valve 56 with which it may be pivotally connected at 61 and at the same time throw the arm 57 against the flap valve 56, thereby opening the two valves and permitting the air or liquid to escape from the collapsible core 51 and out through the lower end 62 of the pipe, thus permitting the tube to collapse so as to be removed. By revolving the pipe 53 the material of which the core is composed may be wound around the pipe, and thus aid the easy withdrawal of the core. Any construction of valve permitting the outflow of air or liquid at the time desired may be employed.

In Fig. 10 of the drawing is illustrated means for supporting the plates 1 in position to serve as a support for the cement which will constitute the ceiling or floors of the building. The means consists of a tube 26 which at its lower end fits in a split sleeve 27 which will rest upon a lower floor or suitable base and in which the tube will be clamped by means of a clip 28 and a wedge key 29, said wedge when driven into place contracting the split sleeve so as to hold the tube 26 firmly in position. In the upper end of the tube is fitted a stem 31 formed with a shoulder 31^a which rests on top of the tube 26, the upper end of the stem being formed with a head 30. Encircling the stem 31 is one of the cap-washers 3 in the tapering slots of which fit the flanges *a* of the plates 1, and between the washer 3 and the shoulder 31^a is driven one of the bifurcated wedge keys 4 which will press the washer 3 so that its tapering slots will draw the edges of the plates 1 closely together and clamp the parts in position. When the cement or concrete has set, the key 4 is withdrawn, which loosens washers 3 and permits plates 1 to be removed without disturbing the vertical supports, and the opening which has been formed by the head 30 will be filled by a rosette 40 or with cement so as to make a uniform surface.

In Fig. 13 of the drawing I have illustrated a modified form of the core for spacing apart the opposite sides of the mold. In this form the core 2, made of wood, is provided with a band 2^a to prevent the core from splitting, and a stem 17 screwed into its end is provided with a transverse pin 17^a with which will engage the forked end of a cam lever 18 so that when said lever is turned into the position illustrated in Fig. 13 it will exert an outward pressure on the core 2 and an inward pressure on the washer 3 so as to draw the parts together and clamp them in position substantially in the same manner as is done by the wedges 4 in the form first described. The cam lever 18 may also be employed for detaching the washer 3 when the parts are to be separated by causing its end 20 to engage the top wall of the slot 19 formed in the washer 3 as illustrated in Fig. 4 for the purpose of disengaging said washer from the plates 1.

In Fig. 14 I have illustrated another form similar to that illustrated in Fig. 13 except that the shank of the screw 17 is slotted and a wedge key 15 driven through the slot so as to draw the parts together as illustrated in said figure.

In Fig. 16 is illustrated another form of clamp for holding the plates 1 in position. In this figure the spacing core 2 is of metal and tubular. The washer 11 which grips the flanges *a* of the plate 1 is formed with a central tube 11^a the lower portion of which converges and is split and has outwardly extending lugs 33. A metallic pin or plug 12 is driven into the tubular extension 11^a of the washer and when it reaches the converging split portions of the tube 11^a it spreads them apart and causes the lugs 33 to bind against the spacing core 2 so as to hold the several parts together. The outer end of the core 2 is closed but has a central opening 32^a therein for the passage of the depending tube 11^a and also is formed with slots 32 for the passage of the lugs 33 when it is desired to separate the washer clamp 11 from the core 2, the lugs 3 at other times being out of register with the slots 32 so as to prevent the withdrawal of the washer clamp entirely from the core 2.

In Figs. 18 and 19 is illustrated a modified form in which the spacing core 14 is made of concrete and formed with a central recess 14^a in its ends to receive the central tube 13^a of the washer 13, the lower portion of the tube being split longitudinally and made to converge and having at the ends of the split portions lugs 14^b adapted to bear against the walls of the recess 14^a when the lower members of the tube are expanded by driving in the pin or plug 12, thus holding the core in place. The washer 13 in this form as well as in the other form has tapering slots to straddle the flanges *a* of the side plates 1 so as to draw the plates together. The recess 14^a in the concrete core 14 may be strengthened by means of a reinforcing ring 34 molded in the core around the recess 14^a as illustrated in Fig. 18 of the drawing. In this form the concrete core may remain in place in the molded wall and its exposed face may have any desired fanciful configuration as indicated by the numeral 41 so as to present an ornamental appearance.

In Figs. 20 and 21 of the drawing is illustrated a modified form of mold plates and manner of securing them and the spacing cores together. In this form the side plates 1^a are formed of wood and provided at their edges with metal caps or facings 42 which will be formed with tapering holes 43 designed to receive tapering pins 44 projecting from one face of the metal washer 45 which is formed with a central opening 46 for the passage of the reduced end *b* of the spacing core 2. A bifurcated wedge 4 is driven between the washer 45 and head 5 of the core so as to draw together the core, the side plates of the mold, and force the tapering pins 44 into the holes 43 so as to draw the parts together. It may sometimes happen in building a wall that there will be a space in its length too short to receive one of the plates of the mold. In such case a filling block 47 is provided for such space so as to fit between the ends of two adjacent plates of the mold as illustrated in Fig. 23 of the drawing, said filling block and plates being locked together by a metal strap 48 and wedge blocks 49 driven between the flanges of the plates 1 and the turned ends of the straps 48.

In Figs. 24 and 25 is illustrated means for firmly supporting the lowermost sections of the side-walls. It consists of a member 59 formed with tapering sides and tapering top and adapted to fit between the side walls 1 of the mold. It is attached to a crossbar 59^a which has bent ends 57. Blocks 58^a each formed with a recess *g* to receive the bottom flanges of the side-walls and with slots *h* to receive the end flanges of the side-walls, are placed at opposite sides of the side-walls, and then wedges 58 are driven between the blocks 58^a and bent ends of the plate 59^a so as to draw the plates together and securely clamp the several parts in place. This gives stability to the mold at its base. When the sides of the molds are to be removed, the wedges 58 are driven out of place, the blocks 58^a withdrawn, the side-walls 1 removed, and then the tapering member 59 driven end-wise out of the body of the concrete. This same construction may be employed at the top of the mold sections to give stability to the upper parts of the mold while being filled with concrete, in which case the position of the member 59 is merely reversed from that illustrated in Fig. 24.

In Figs. 26 and 27 is illustrated the preferred means for hinging units of the side-walls together so that one section of units may be shifted from a lower to a higher position in the progress of constructing the wall. In this form clips 56^a are applied so as to straddle flanges *a* of the side-walls 1. One end of the clip is formed with a threaded opening 54^a to receive a threaded bolt 52 the end of which may also enter corresponding openings formed in the flanges of the side-walls, and a wedge 55^a is driven between the other end of the clip and the adjacent flange of the side-walls so as to hold the clip and bolt in position and at the same time lock sections of the side-wall together at such points. A metal strap 53^a connects together two of the bolts 52^a in such manner as to turn on the bolts so as to serve as a hinge connecting sections of the side-walls together. This construction enables one section or a number of connected sec-

tions of the side-walls to be swung from one position into another position in a manner similar to that illustrated and described with reference to Fig. 12 of the drawing. Under this construction any number of units of side plates or walls of the mold may be connected together so as to be swung from one position into another. It is obvious that this same feature of hinging of units of the side-walls together so as to be swung from one position into another may be employed whether the sections or units be positioned so as to swing vertically in building the height of the wall, or horizontally in building the length of the wall, it being merely a question of the position in which the plates or side-walls will be placed to swing either vertically or horizontally.

I have described with particularity the preferred details of construction of the several parts but it is to be understood that changes in such details can be made without departing from the scope of the invention as defined in the appended claims.

Having described my invention and set forth its merits, what I claim is:—

1. A sectional mold for concrete-wall construction comprising removable side walls, a spacing core passing transversely through oppositely disposed side-walls, washers applied to the ends of the core and formed with tapering members engaging parts of the side-walls, and wedges engaging parts of the core and bearing against said washers to lock together the side-walls and the spacing core, substantially as described.

2. A sectional mold for concrete wall construction comprising removable side-walls having corners shaped to form openings at the adjacent corners of a plurality of the side-walls, a spacing core extending between oppositely disposed side-walls and formed with reduced portions fitting in the openings formed at the corners of adjacent side-walls, and wedges applied to the ends of the core to lock the core and side-walls together, substantially as described.

3. A sectional mold for concrete wall construction comprising removable side-walls formed with outwardly extending flanges, a spacing core passed transversely through oppositely disposed walls at the junction of adjacent side-walls, flanged washers applied to the ends of the core and formed with slots receiving flanges of the side-walls, and wedges bearing against the washers and engaging parts of the core to draw the side-walls edgewise together and lock the side-walls and core in position, substantially as described.

4. A sectional mold for concrete wall construction comprising removable side-walls formed with outwardly extending flanges, a spacing core passed transversely through oppositely disposed walls at the junction of adjacent side-walls, flanged washers applied to the ends of the core and having interlocking engagement with the flanges of the side-walls, a bracing member applied to the end flanges of adjacent side-walls, and wedges engaging parts of the core to clamp the side-walls, core and bracing member together, substantially as described.

5. A sectional mold for concrete wall construction, comprising removable sectional side-walls having lateral flanges, clips straddling said flanges and having a threaded opening in one end, threaded bolts passing through the threaded opening of the clips, wedges inserted between one end of the clips and a flange of the wall, and a strap having a hinged connection with the bolts of adjacent sections of the walls to permit one section to be swung from one position to another in relation to an adjacent section in progressive extension of the mold, substantially as described.

6. A sectional mold for concrete wall construction comprising removable side-walls, a vertically extending corner-block interposed between the ends of the side-walls at corners of the wall, angle-plates secured to the corner-block, and wedges inserted within said angle-plates and bearing against the same and a part of the side-walls to lock together said walls and corner block, substantially as described.

7. A sectional mold for concrete wall construction comprising oppositely disposed side-walls, a collapsible core inserted vertically between the oppositely disposed side-walls, a cap covering the top of said core, and a strap passed through the cap and core and resting on the top of the side-walls to suspend the core and lock the cap to the core, substantially as described.

8. A sectional mold for concrete wall construction comprising oppositely disposed side-walls, a collapsible core inserted between the oppositely disposed side-walls, a bar connected with said core and resting on the top of the side-walls and formed with a bent end, and a wedge inserted between a side-wall and the bent end of said bar to lock the bar and core in position, substantially as described.

9. A sectional mold for concrete construction comprising superimposed oppositely disposed side-walls formed with outwardly extending flanges, a removable member extending transversely between the side-walls, a cross-bar to which said member is attached and formed with bent ends, a block placed alongside the walls and formed with a recess to receive a flange of the wall and a slot to receive meeting flanges of the wall, and wedges inserted between said blocks and bent ends of the cross plate to bind the parts together, substantially as described.

10. A sectional mold for concrete construc-

tion comprising oppositely disposed side-walls formed with outwardly-extending flanges, a filling block inserted between the ends of adjacent walls, a strap extending across the filling block and having ends turned inwardly to the walls, and wedges inserted between said inwardly turned ends and the outwardly extending flanges of the side-walls to lock the walls and block together, substantially as described.

11. In concrete construction, a support for the concrete or cement comprising a number of plates having laterally extending flanges at their meeting edges and corners shaped to form an opening at the adjacent corners of a plurality of the plates, a core inserted in said opening and formed with a head and a shoulder at different points, a flanged washer fitted to the core and having tapering slots engaging the flanges of the plates at the corners, a wedge for tightening the washer to clamp the parts together, and means supporting said core and plates, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

MILTON DANA MORRILL.

Witnesses:

FRED A. KLINGE,

GEORGE W EADLINE, JR.