Oct. 7, 1924. 1,511,087

J. G. McKENNA

CONCRETE MOLD

Filed Dec. 24, 1920 4 Sheets-Sheet 1

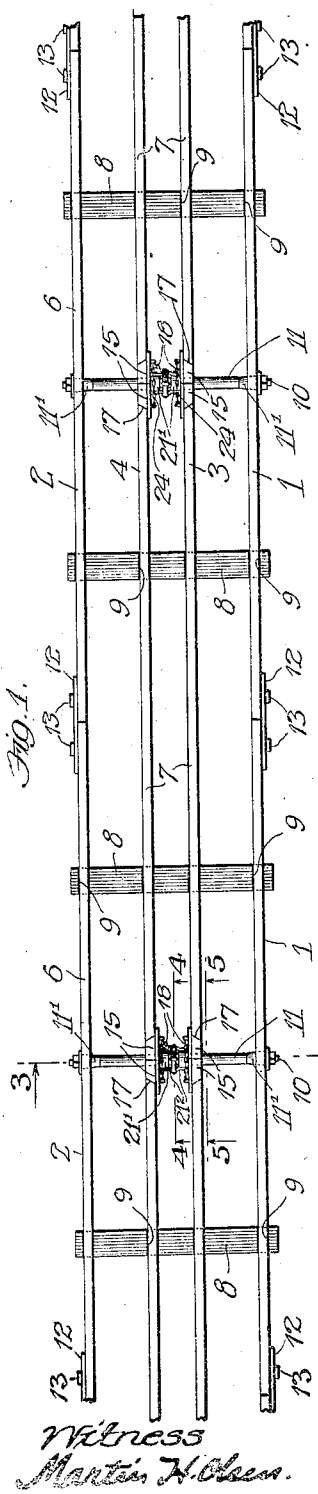


Fig. 1.

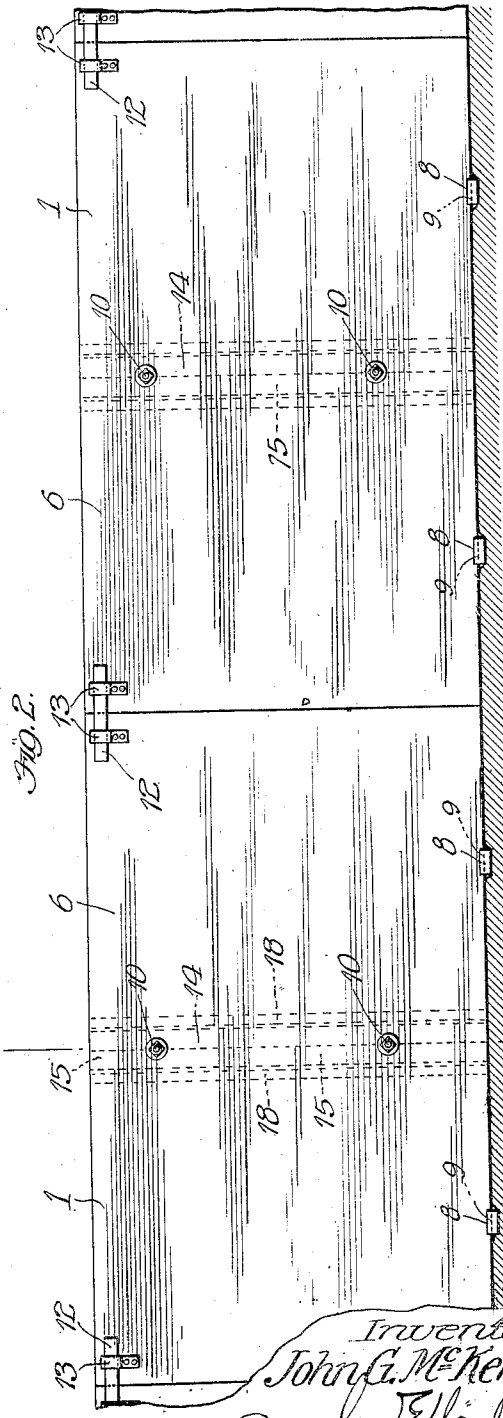


Fig. 2.

Witness
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Oct. 7, 1924. 1,511,087

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CONCRETE MOLD

Filed Dec. 24, 1920 4 Sheets-Sheet 2

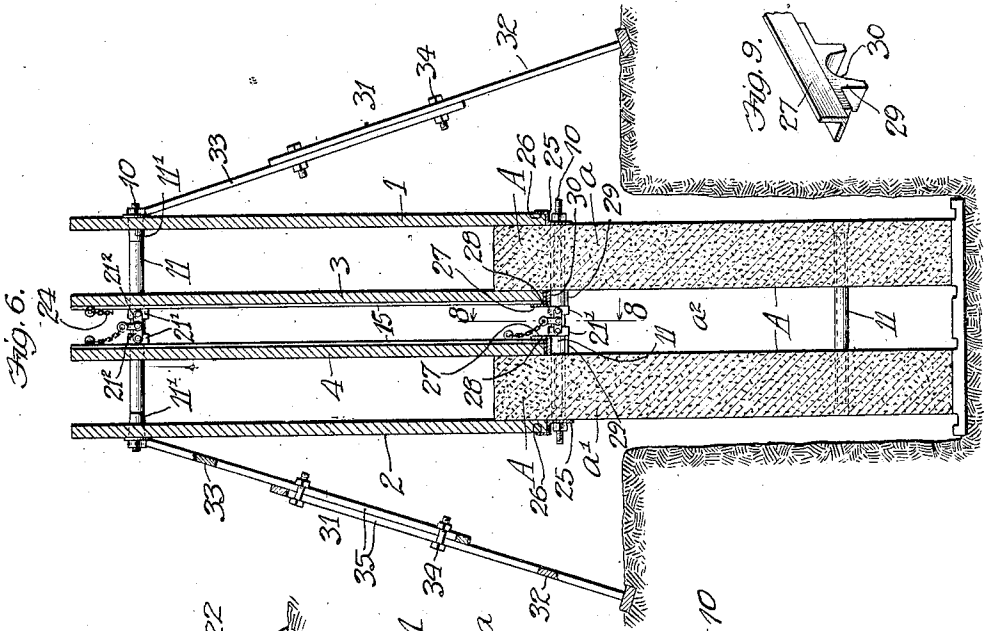


Fig. 6.

Fig. 9.

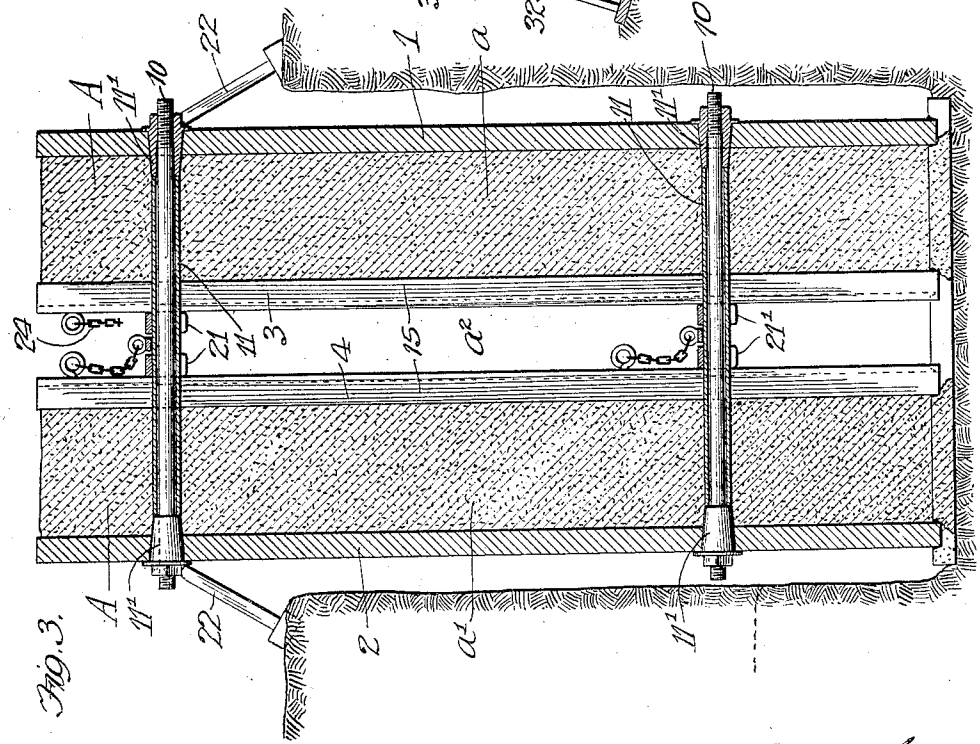


Fig. 3.

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CONCRETE MOLD

Filed Dec. 24, 1920 4 Sheets-Sheet 3

Fig. 7.

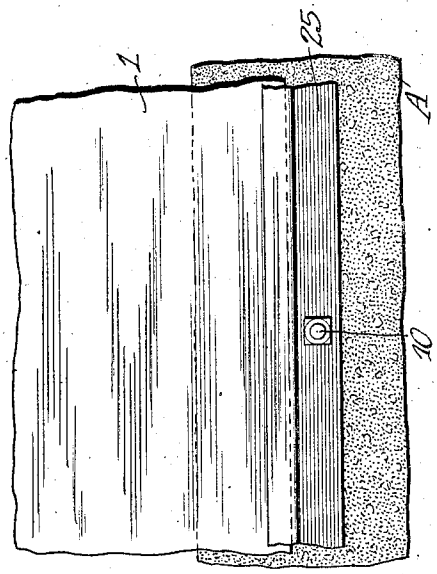


Fig. 8.

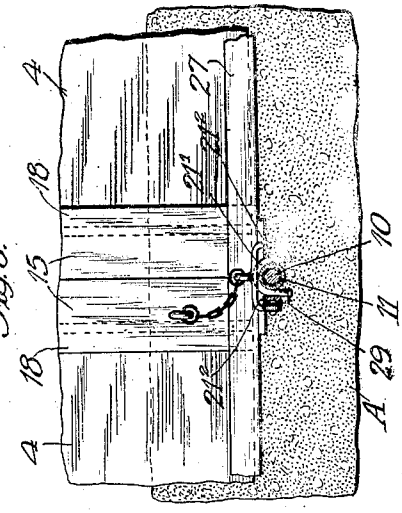


Fig. 5.

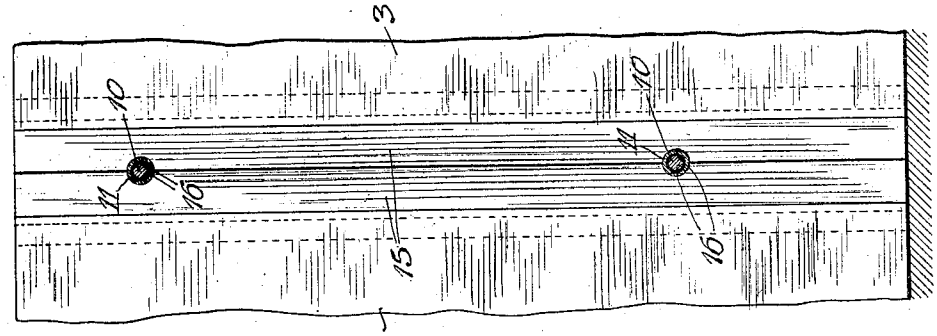
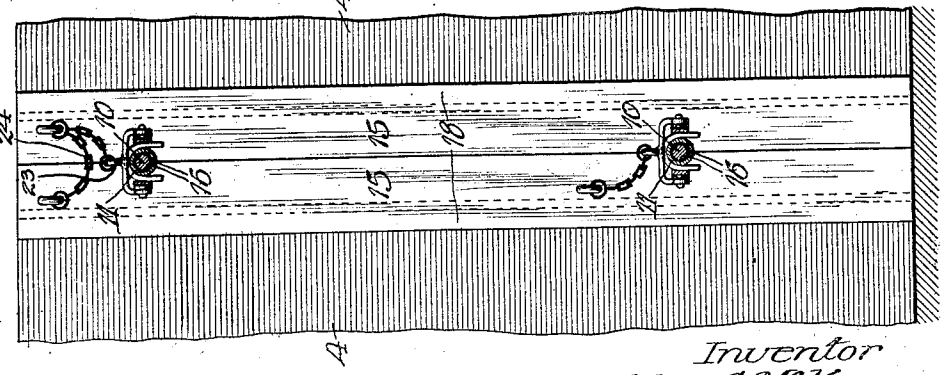


Fig. 4.



Witness
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Oct. 7, 1924. 1,511,087

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CONCRETE MOLD

Filed Dec. 24, 1920 4 Sheets-Sheet 4

Fig. 10.

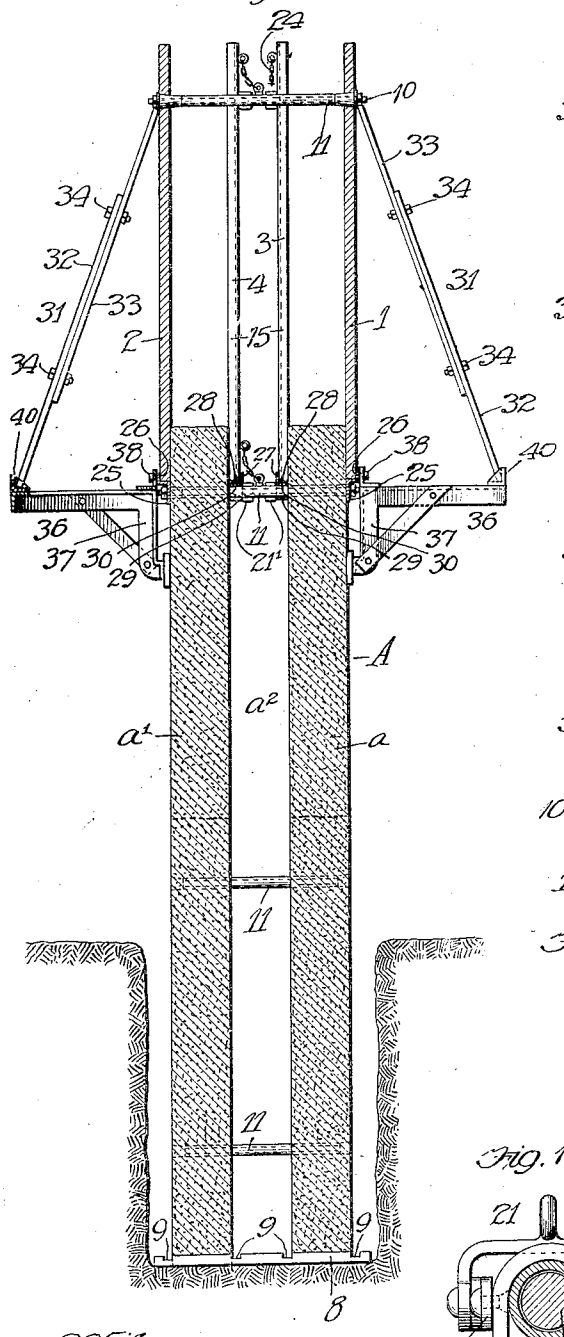


Fig. 14.

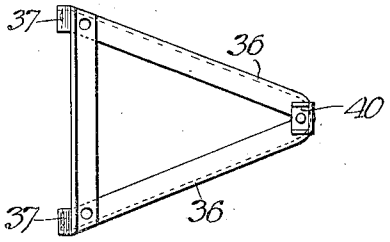


Fig. 15.

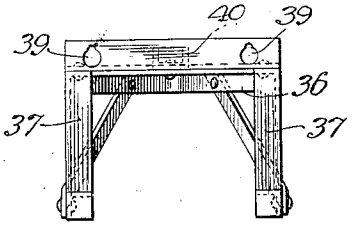


Fig. 11.

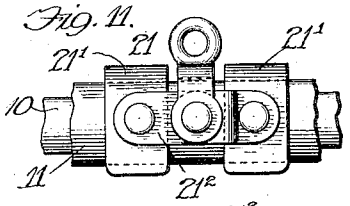


Fig. 12.

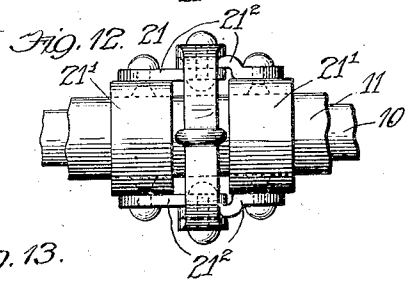
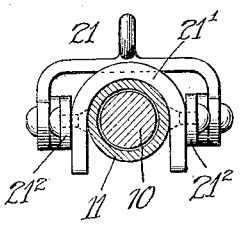


Fig. 13.



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Patented Oct. 7, 1924. 1,511,087

UNITED STATES PATENT OFFICE.

JOHN G. McKENNA, OF MADISON, WISCONSIN.

CONCRETE MOLD.

Application filed December 24, 1920. Serial No. 432,971.

To all whom it may concern:

Be it known that I, JOHN G. McKENNA, a citizen of the United States, and a resident of Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Concrete Molds, of which the following is a specification.

This invention relates to molds for making concrete structures, particularly walls for buildings.

As is well known, when the walls of buildings are made of solid masonry, any considerable difference between the temperature inside and outside of the building—as in the case of a heated house in cold weather—will, on account of the conductivity of such solid walls, produce condensation or "sweating" on the inside of the walls, thus rendering the house damp, disagreeable and unhealthful.

This objectionable condition can be remedied by making the walls hollow, thus providing dead air spaces in the walls, which by interposing a medium of low conductivity, will prevent the sections of the walls at the inner sides of said air spaces from becoming chilled, with attendant condensation, dampness etc.

The object of the present invention is to provide an improved mold for making concrete walls having dead air spaces.

To this end, a mold of my invention comprises the various features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings in which my invention is fully illustrated.

Figure 1 is a top plan view of a section of a mold of my invention, designed and adapted for making hollow concrete walls, shown assembled and ready for use.

Figure 2 is a side elevation thereof.

Figure 3 is an enlarged sectional view on the lines 3—3 of Figs. 1 and 2, showing the mold filled with concrete.

Figure 4 is an enlarged sectional elevation on the line 4—4 of Fig. 1.

Figure 5 is an enlarged sectional elevation on the line 5—5 of Fig. 1.

Figure 6 is a transverse sectional view illustrating the application of my improved mold for forming an upper section of wall.

Figure 7 is an enlarged, framentary, detail view illustrating means for supporting the lower edges of the mold section in the position shown in Fig. 6.

Figure 8 is an enlarged fragmentary, detailed sectional view on the line 8—8 of Fig. 6.

Figure 9 is a detached, fragmentary, perspective view illustrating a detail of construction.

Figure 10 is a view, substantially similar to Fig. 6, illustrating a modified construction.

Figures 11, 12 and 13 are, respectively, enlarged side, top plan and end views of the spacing member for securing the inner mold walls in position; and

Figures 14 and 15 are, respectively, enlarged top plan and end views of the brackets shown in Fig. 10 for supporting the shores for the mold walls.

In Figures 3 and 6 of the drawings, I have, for purposes of definite and concrete illustration, shown a wall of the character which my improved mold is especially designed and adapted for making, designated as a whole A, said wall comprising separate sections a, a^1 separated by a dead air space a^2. In practice, said walls of the building will preferably be made in superposed sections.

In accordance with my invention, my improved mold consists of inner and outer walls 1 and 2 and intermediate walls 3 and 4, said intermediate walls being supported in spaced relation with reference to each other and also with reference to the walls 1 and 2 adjacent thereto, respectively, the spaces between the walls 1 and 3 and 2 and 4 defining the spaces which receive the concrete for forming the wall sections a, a^1 and the walls 3 and 4 defining the dead air space a^2.

The walls of said mold may be made of any usual or suitable material, being preferably made of boards or planks of suitable thickness to afford requisite strength, rigidly connected in any usual or desired manner. Means for thus connecting said boards or planks can readily be supplied by persons of ordinary skill and need not, therefore, be shown or described in detail. Each of the outer walls 1 and 2 of said mold consists of a plurality of sections or panels designated 6, and each of the intermediate walls 3 and 4 consists of a plurality of sections or panels 7, said sections or panels 6 and 7 being made of such size that they may be conveniently handled on the job. In order to keep the size and weight of the mold sections or

panels 6 and 7 to a desired minimum, my invention contemplates forming the walls A of the building in a plurality of superposed sections.

The mold sections 6 and 7 are supported and connected in proper alignment in the following manner:—In erecting the mold for forming what may be called the foundation section of the walls of the building, blocks 8 are laid on the ground transversely of the proposed walls, said blocks being provided in their upper surfaces with notches 9, adapted to receive the lower edges of the mold sections or panels 6 and 7, said notches 9 being spaced proper distances apart to define spaces between the walls 1 and 3, and 2 and 4 equal to the thickness of the sections a, a^1 of the walls of the building, and the intermediate walls 3 and 4 being spaced proper distances apart to define the dead air space a^2 and said blocks 8 being spaced at such intervals that each mold section or panel 6 and 7 will rest upon at least two of said blocks 8.

The notches 9 in the blocks 8 will define the alignment of the walls of the mold and also of the finished walls of the building and said blocks 8 will accordingly be laid with the notches 9 for the different walls of the mold in alignment with each other and corresponding to the proposed alignment of the walls of the building.

Having placed the blocks 8 in proper positions, the mold sections or panels 6 forming the outer walls 1 and 2 are placed in position end to end with their lower edges resting in the outer notches 9 and are rigidly connected by suitable means, consisting, as shown, of tie-rods 10, threaded to the projecting ends of which are nuts adapted to bear against the outer sides of the mold walls 1 and 2, said walls being spaced apart by tubular members 11, inserted over the tie-rods 10. As shown, each set of sections or panels 6 is thus connected by tie-rods 10 and tubular members 11 positioned substantially at their centers, in spaced relation vertically.

In case the spacing members 11 extended entirely through the concrete walls A, it is possible, owing to the high conductivity of said spacing members, that under certain conditions—as in extremely cold weather, condensation might be produced on the inner sides of said walls A adjacent to said spacing members, which might produce damp and sweaty areas surrounding said spacing members, which while they might be of limited size would nevertheless be very objectionable.

I propose to avoid this objectionable feature or condition by using spacing members 11 which are shorter than the designed overall thickness of the walls A and in positioning said spacing members so that they will terminate short of either or both of the remote sides of said walls. Also, to prevent the tie-rods 10 from becoming embedded in the walls A, when formed, removable thimbles 11^1 are inserted over the ends of said tie-rods, which extend from the ends of said spacing members to the outer faces of the outer mold walls 1 and 2 and are provided on their outer ends with flanges which overlap the edges of the holes formed in said outer mold walls to receive said thimbles. Said thimbles will preferably be tapered to provide for withdrawing them from the walls A, when formed.

As shown, the nuts threaded to the ends of the tie rods 10 are formed integral with the thimbles 11^1. In addition to the tie-rods 10 and tubular spacing members 11, the meeting edges of adjacent sections or panels 6 will preferably be connected by suitable means adapted to support said sections or panels in alignment. Many different means for thus connecting the meeting edges of said sections or panels will readily suggest themselves to skilled mechanics and I do not, therefore, desire to limit myself to any particular means for this purpose.

Simple means for this purpose consists of bars 12, adapted to be engaged with hooks 13, secured at or adjacent to the upper edges of the ends of said mold sections. Also, if there is any tendency for the outer walls of the mold to sag outwardly under the weight of the concrete contained in the mold the top edges of the sections or panels 6 of the outer walls 1 and 2 may be rigidly connected by suitable means. Braces suitable for this purpose can be readily provided by persons skilled in the art and it is, therefore, deemed unnecessary to illustrate such means.

The sections or panels 7 of the intermediate walls 3 and 4 of the mold are made shorter than the clear distances between adjacent spacing members 11, and the outer walls 1 and 2 having been erected the sections or panels 7 forming the inner walls, are inserted in position with their lower edges in engagement with the notches 9 in the blocks 8, a section or panel for each wall 3 and 4 being inserted between each space between adjacent tie-rods 10 and spacing members 11, said panels being preferably so positioned that they will be spaced substantially equal distances from the spacing members at the opposite ends thereof, respectively.

With this construction it is obvious that spaces 14 will be formed between adjacent mold sections or panels 7. In accordance with my invention said spaces 14 are adapted to be closed so as to render said intermediate walls 3 and 4 continuous by means of what may be referred to as filler plates 15.

As shown, said filler plates are made of

two symmetrical parts or sections and are adapted to be inserted into the spaces 14—one on each side of the spacing members 11—said sections of said filler plates being provided in their meeting edges with notches being so proportioned that they will fit the spacing members 11 closely, while at the same time, permitting adjacent edges of said filler plate sections to come into contact with each other.

As shown, also, the vertical edges of sections or panels 7 and the edges of the filler plates 15 adapted to engage therewith, are correspondingly beveled as shown at 17, and the positions of said filler plates to bring the inner sides thereof, disposed towards the wall sections a, a^1 flush with the corresponding sides of the mold walls 3 and 4 is defined by battens 18 secured thereto, which are adapted to overlap adjacent edges of the mold sections or panels 7, and which will also close spaces or cracks between the edges of the filler plates and the opposed edges of the opposite mold section.

The mold sections 7 and filler plate 15 having been assembled in the manner described, the mold walls 3 and 4 formed thereby are adapted to be supported in desired spaced relation by means of what may be designated spacing members 21 which are substantially U-shape in cross section and are adapted to be placed upon the spacing members 11 of the outer mold walls with their ends resting against the sides of the filler plates 15 exposed in the dead air space a^2, the length of said spacing members being substantially equal to the width of the dead air space a^2.

To provide for conveniently removing the spacing members inserted between the inner mold walls, which might otherwise be difficult to remove owing to the pressure to which they would be subjected when the molds were filled with concrete and the friction thus produced between said spacing members and the mold walls, said spacing members preferably consist of two blocks 21^1 pivotally connected to the outer ends of the arms of toggle levers 21^2, the relation being such that said toggle levers will be straight when said blocks 21^1 are in operative position, and may be withdrawn out of engagement with the inner mold walls by flexure of said toggle levers.

After the mold walls have been erected, they may be adjusted to and supported in plumb position by means of shores or braces shown at 22, Fig. 3.

My invention contemplates a mold by means of which each superposed section of the walls of the building may be formed complete at a single operation, the size and shape of the mold varying with the design and shape of the building which is to be erected.

Having erected the mold to form a section of the wall of the building the spaces defined by the walls 1, 3, and 2, 4, respectively, are filled with concrete to form the walls a, a^1 which are permitted to stand until they set or harden sufficiently to carry the next section of the wall to be erected on top thereof.

When the walls of the building set and harden the tubular members 11, consisting preferably of pieces of gas pipe or the like of suitable length, will be embedded in the walls of the building and will rigidly connect the same across the dead air space a^2, thereby tying the same together into a very strong and stable structure.

After any section of the wall has set and hardened the mold is then detached and removed therefrom. To detach the outer walls 1 and 2 of the mold it is merely necessary to remove the tie rods 10 and disengage the bars 12 from the hooks 13 whereupon the panels 6 may be quickly and conveniently stripped from the walls a, a^1.

To remove the intermediate walls 3 and 4, the spacing members 21 are disengaged from the spacing members 11. Said spacing members may be conveniently removed by means of a hooked instrument in the nature of a pike pole, the hook on which is adapted to engage eyes 23 formed on said spacing members.

After said spacing members are withdrawn, the sections of the filler plates 15 may be disengaged from the spaces 14 separating the ends of adjacent panels 7. After said filler plates have been disengaged from said spaces 14, both said filler plates and mold sections or panels 7 may be removed from the dead air space a^2, now defined by the concrete wall sections a, a^1.

For the convenience in removing said filler plates they are preferably connected at their upper ends by means of chains 24 or other flexible connection, which affords convenient means for engaging a hook with the sections of said filler plates and withdrawing them.

In the preferable construction shown, also, the spacing members 21 are each connected to a section of an adjacent filler plate whereby said spacing members will be removed with said filler plates, and insuring that said spacing members will not fall to the bottom of the dead air space a^2 from which it might be quite difficult to remove them, particularly after the walls of the building had attained a considerable height.

Having finished a lower section of the walls of the building and the mold having been removed therefrom, all as described, said mold is again erected at the top of the finished portion of the wall, the means for and manner of supporting said mold thereon being as follows:—Secured to the outer sides of the wall sections a, a^1, are angle bars 25,

which form channels 26 adapted to receive the lower edges of the panels 6, forming the outer wall 1 and 2 of the mold. In the preferable construction shown, said angle bars 25 are secured to said wall sections a, a^1, by tie-rods 10 inserted through the top spacing members 11 and through holes formed in said angle bars to receive them.

Also, secured to the inner sides of the wall sections a, a^1, within the dead air space a^2, are angle bars 27 which form channels 28 adapted to receive the lower edges of the panels 7 and filler bars 15, forming the intermediate mold walls 3 and 4. As shown, said angle bars 27 are supported on the tubular spacing members 11, by means of blocks 29 secured to the under sides of said angle bars, said blocks being provided with notches 30 adapted to fit over said spacing members 11. Said angle bars 26 are adapted to be held tightly against the inner sides of the finished wall sections by the spacing members 21, which are inserted between the blocks 29 on the angle bars secured to different mold walls 3 and 4, in substantially the same manner that they are inserted between the filler plates 15 when erecting the first or foundation section of the wall.

The panels 6 and 7 and their filler plates 15 having been inserted in position with their lower edges in engagement with the channels formed by the angle bars 25 and 27, they will be secured together by the tie rods 10, spacing members 11, spacing members 21 and bars 12 and hooks 13, all as heretofore described in connection with the manner of erecting the molds for the first or foundation section of the wall of the building.

After they are connected, said molds will be plumbed and secured in position by shores or props 31, in substantially the same manner as in erecting the mold for forming the first or foundation section of the wall.

As shown, Fig. 6, said shores or props are adjustable in length, consisting preferably of separate overlapping sections 32 and 33 connected by bolts 34 which extend through slots 35 formed lengthwise in the overlapping ends thereof. The upper ends of said shores or props are adapted to be engaged beneath the projecting ends of the tie-rods 10 and, as shown, in said Fig. 6, their lower ends rest upon the ground.

Obviously, however, it will be impractical to support the lower ends of said shores or props on the ground when the walls of the building attain any considerable height. Under such conditions I contemplate supporting the lower ends of said shores or props on brackets rigidly connected to the lower walls section of the building and which project laterally therefrom.

This modification is shown in Fig. 11 of the drawings, in which, excepting as regards the means for supporting the shores or props 31, the various parts and elements are the same as corresponding parts and elements shown in Fig. 10 and are designated by the same reference characters and need not be again described in detail.

In what I now consider to be the preferable form thereof, the brackets for supporting the lower ends of said shores or props 31, designated 36 are formed by angle bars bent between the ends into V-shape, which are rigidly connected at their inner ends to the angle bars 25, their extreme inner ends being turned down, as shown at 37, so as to bear against the walls A of the building below said angle bars 25. In practice, said V-shaped bars 36 will preferably be detachably secured to the angle bars 25. Simple means for this purpose consists of headed studs 38 secured in said angle bars 25 which are adapted to engage keyhole slots 39 formed in the downwardly projecting ends 37 of the V-shaped angle bars closely adjacent to the arms of the brackets proper. To insure rigid engagement of said shores or props 31 with the outer ends of said angle bars 36, said angle bars are provided at their outer ends with sockets which are adapted to receive and confine the lower ends of said shores or props. As shown, said sockets are formed by what may be referred to as shoes 40 secured to said angle bars, said shoes being shaped to form sockets 41 of proper size and shape to receive the lower ends of said shores or props. Said shoes 40 may be made of cast iron riveted or otherwise rigidly secured to said angle bars.

I claim:

1. In a mold for forming concrete walls comprising sections separated by air spaces, the combination of inner, outer and intermediate mold walls each comprising a plurality of panels, means for supporting said mold walls constructed and arranged to permit said mold walls to be detached and removed from the concrete wall when formed, the means for supporting the inner and outer mold walls comprising members which define a space between said mold walls corresponding to a desired over-all thickness of the concrete wall and will become embedded therein, forming bonding members rigidly connecting the sections of the finished concrete wall and will also extend across the space between said sections, the panels forming the intermediate mold walls being shorter than the distance between adjacent bonding members which connect the sections of the concrete walls, filler plates adapted for closing the spaces between adjacent panels of said intermediate mold walls, said filler plates comprising separate sections positioned at opposite sides of said bonding members and provided in their adjacent edges with notches adapted to receive

said bonding members, and means applied to said filler plates and wall panels to support them against the weight of concrete deposited into the mold, said supporting means being carried on bonding members connecting formed sections of the concrete walls.

2. A mold form as specified in claim 1, in which battens on the filler plates overlap the adjacent edges of the intermediate mold wall panels, and the means for supporting said mold wall panels and filler plates are applied directly to said filler plates.

3. A mold form as specified in claim 1, in which the means for supporting the intermediate mold wall panels and filler plates comprises thrust members adapted to be removably interposed between opposite parts of the intermediate mold walls.

4. A mold form as specified in claim 1, in which battens on the filler plates overlap the adjacent edges of the intermediate mold wall panels, and the means for supporting said intermediate mold wall panels and filler plates comprises thrust members adapted to be removably interposed between opposite filler plates thereof.

5. A mold form as specified in claim 1, in which battens on the filler plates overlap the adjacent edges of the intermediate mold wall panels, and the means for supporting said intermediate mold wall panels and filler plates comprises thrust members adapted to be removably interposed between opposite filler plates thereof, said thrust members consisting of blocks and toggle levers which connect the same.

6. A mold form as specified in claim 1, in which battens on the filler plates overlap the adjacent edges of the intermediate mold wall panels, and the means for supporting said intermediate mold wall panels and filler plates comprises thrust members adapted to be removably interposed between opposite filler plates thereof, said thrust members consisting of blocks and toggle levers which connect the same, said blocks being provided with grooves adapted to receive the bonding members on which they are supported.

7. In a mold for forming concrete walls comprising sections separated by air spaces and constructed in superposed sections, the combination of outer and inner mold walls, and means for connecting and supporting said walls to form molds for forming sections of said concrete walls other than the foundation sections thereof, said means comprising angle bars secured adjacent to the tops of the finished portions of said concrete walls which define channels adapted to receive the lower edges of said mold walls.

8. A mold for forming concrete walls as specified in claim 7, comprising means for supporting and plumbing said mold wall comprising brackets secured to the angle bars attached to the finished sections of the concrete walls, and shores inserted between said brackets and the inner and outer mold walls adjacent to their upper ends.

9. A mold for forming concrete walls as specified in claim 7, comprising means for supporting and plumbing said mold walls comprising brackets detachably secured to the angle bars connected to the finished sections of the concrete walls, and shores inserted between said brackets and the inner and outer mold walls adjacent to their upper ends.

10. In a mold for forming concrete walls comprising sections separated by air spaces, the combination of outer, inner and intermediate mold walls, each comprising a plurality of panels, means for supporting said mold walls constructed and arranged to permit the mold walls to be detached and removed from the concrete walls when formed, said supporting means comprising members which define a space between said mold walls corresponding to a desired overall thickness of the concrete walls and will become embedded in the sections thereof, forming bonding members rigidly connecting said concrete wall sections, the panels forming the intermediate mold walls being shorter than the distance between adjacent bonding members, filler plates adapted for closing the spaces between adjacent panels of said inner mold walls, said filler plates comprising separate sections positioned at opposite sides of said bonding members provided with notches in their adjacent edges adapted to receive said bonding members, thrust members inserted between opposite filler plates supported upon said bonding members, and flexible ties connecting the sections of said filler plates and other flexible ties connecting the thrust members with adjacent filler plate sections, whereby the sections of said filler plates attached thereto, and the thrust members can be withdrawn together.

11. In a mold for forming concrete walls comprising a plurality of superposed sections, the combination of mold walls, and means for connecting and supporting said mold walls to form molds for forming sections of said concrete walls other than the foundation section thereof, comprising angle bars secured to the finished portions of said walls which define channels adapted to receive the lower edges of said mold walls.

12. In a mold for forming concrete walls comprising a plurality of superposed sections, the combination of mold walls, and means for connecting and supporting said mold walls to form molds for forming

sections of said concrete walls other than the foundation section thereof, comprising angle bars secured to the finished portions of said walls which define channels adapted to receive the lower edges of said mold walls, the means for securing said angle bars to the finished portion of said concrete wall comprising tie-rods inserted through holes formed in said walls and in said angle bars.

13. In a mold for forming concrete walls comprising a plurality of spaced superposed sections, the combination of inner, outer and intermediate mold walls, and means for connecting and supporting said walls to form molds for forming sections of said concrete walls other than the foundation sections thereof, comprising angle bars secured to the finished portions of said concrete walls which define channels adapted to receive the lower edges of the intermediate mold walls, the means for securing said angle bars to the concrete wall sections comprising bars secured in the finished portion of said concrete walls, blocks secured to said angle bars provided with recesses adapted to slidably engage said supporting bars, and thrust members removably interposed between rigid parts of angle bars applied to opposite wall sections.

In testimony that I claim the foregoing as my invention, I affix my signature this 14th day of December, 1920.

JOHN G. McKENNA.