Dec. 4, 1928. 1,694,037

I. J. KUERT

CONCRETE FORM, METHOD OF MOLDING A CONCRETE WALL, AND WALL

Filed Aug. 26, 1924 4 Sheets-Sheet 1

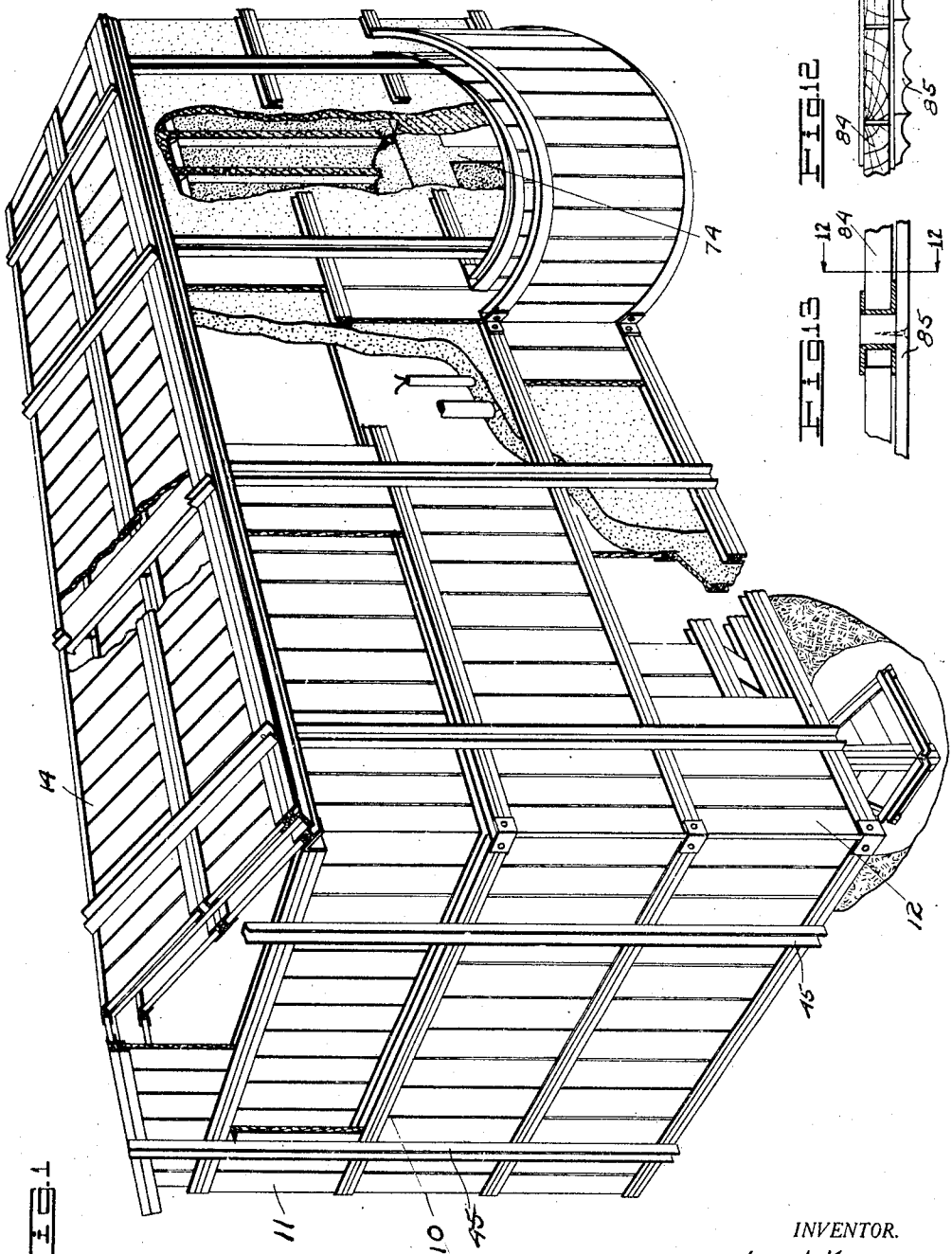


FIG. 1

FIG. 12

FIG. 13

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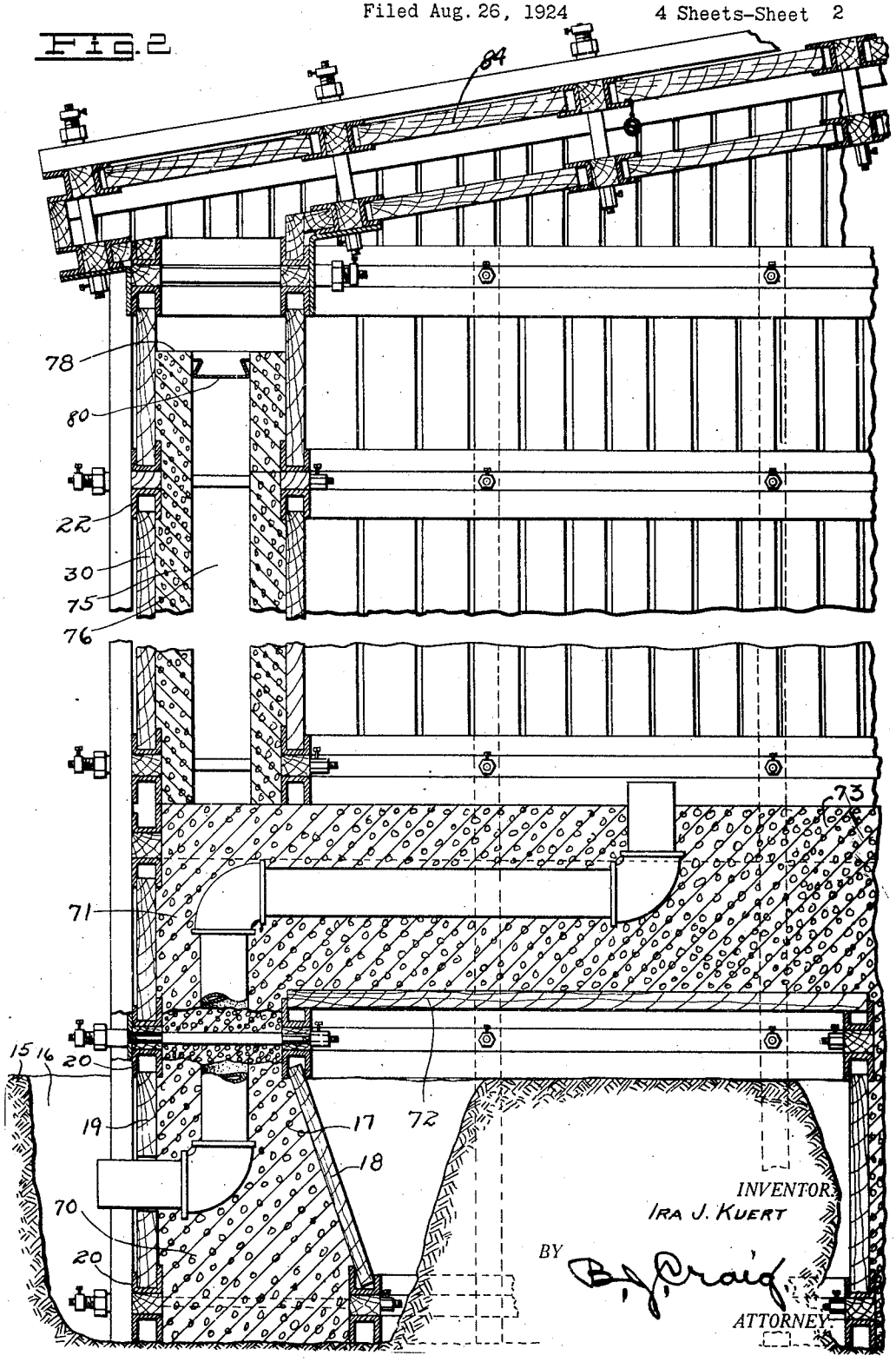
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CONCRETE FORM, METHOD OF MOLDING A CONCRETE WALL, AND WALL

Filed Aug. 26, 1924 4 Sheets-Sheet 2

Fig. 2



Dec. 4, 1928. 1,694,037

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CONCRETE FORM, METHOD OF MOLDING A CONCRETE WALL, AND WALL

Filed Aug. 26, 1924 4 Sheets-Sheet 3

FIG. 3

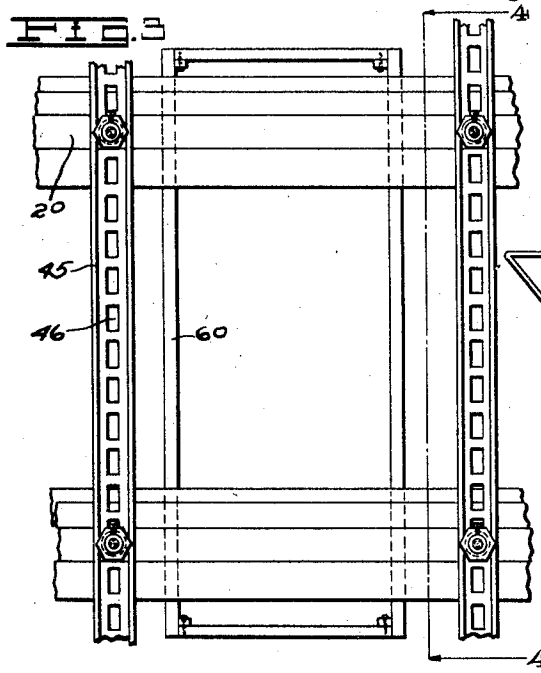
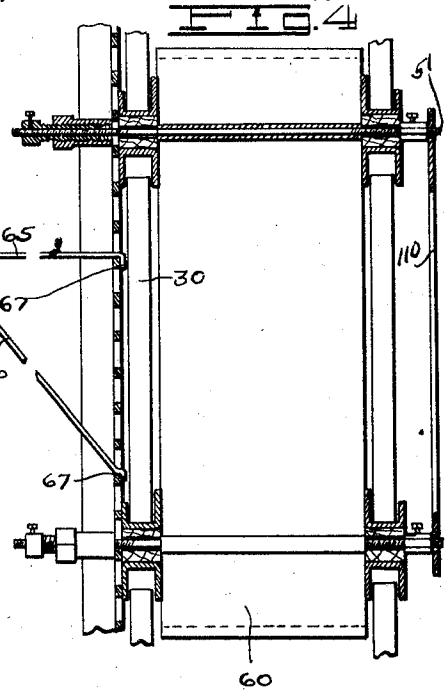


FIG. 4



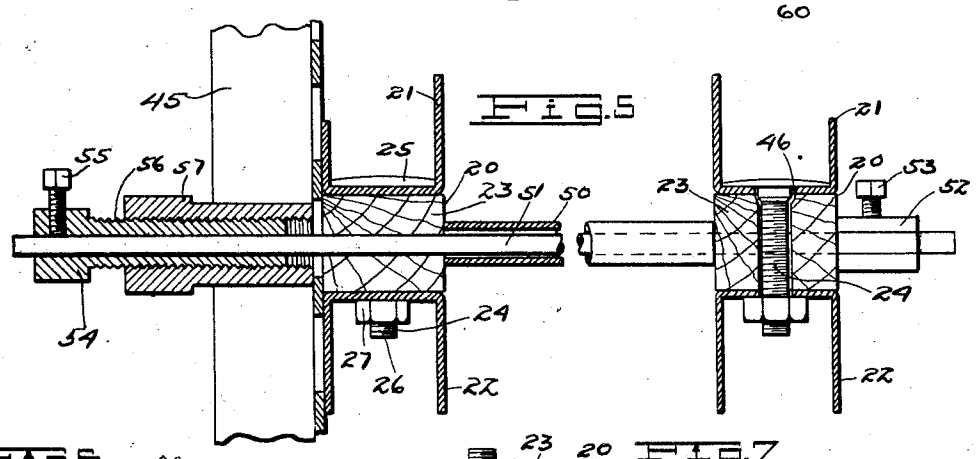


FIG. 5

FIG. 6

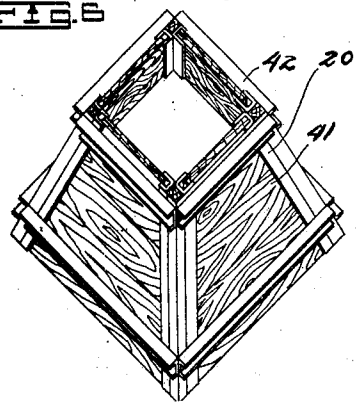
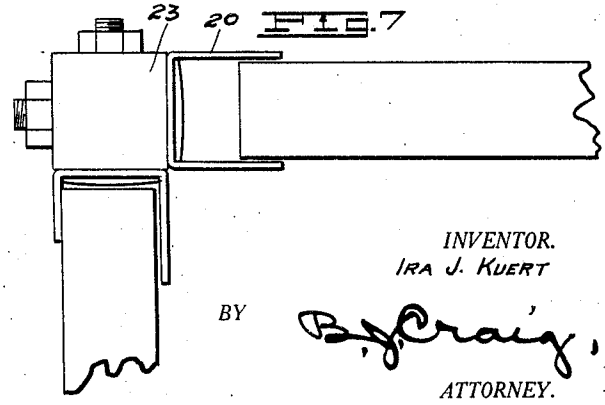


FIG. 7



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Dec. 4, 1928. 1,694,037

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CONCRETE FORM, METHOD OF MOLDING A CONCRETE WALL, AND WALL

Filed Aug. 26, 1924 4 Sheets-Sheet 4

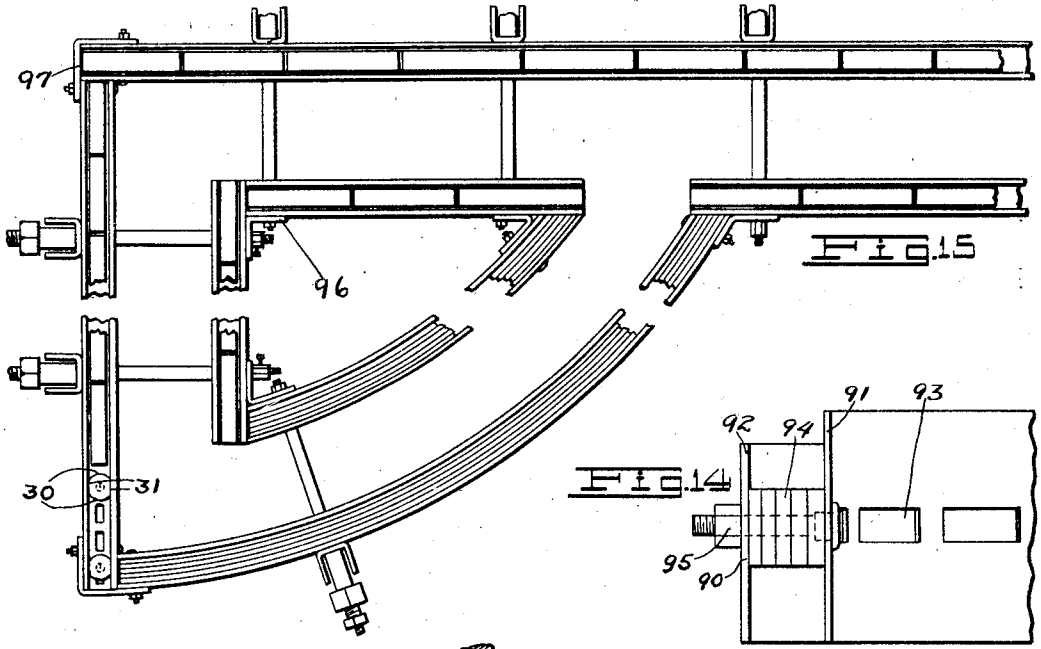


Fig. 15

Fig. 14

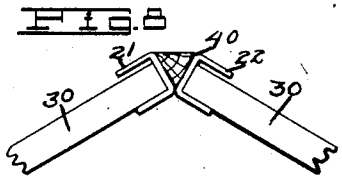


Fig. 8

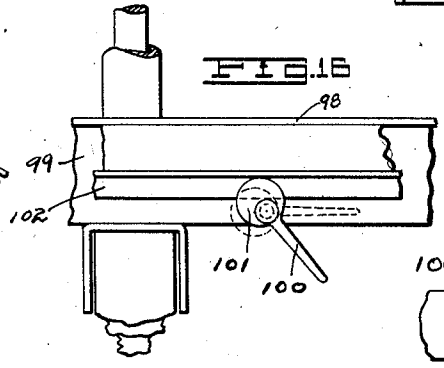


Fig. 16

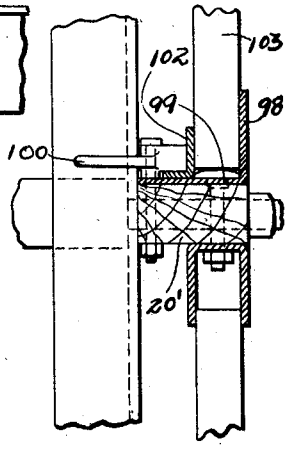


Fig. 17

Fig. 9

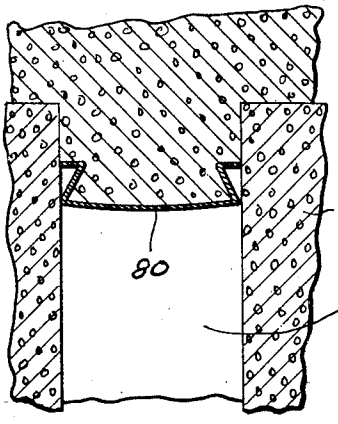


Fig. 10

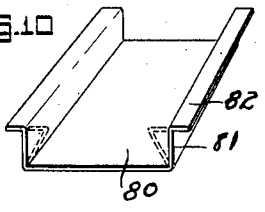
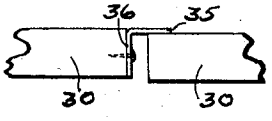


Fig. 11



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UNITED STATES PATENT OFFICE.

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CONCRETE FORM, METHOD OF MOLDING A CONCRETE WALL, AND WALL.

Application filed August 26, 1924. Serial No. 734,178.

This invention relates to a method and apparatus for building concrete buildings.

The general object of the invention is to provide an improved method and apparatus which will facilitate the erection of concrete houses, lessen the cost thereof and at the same time provide a durable, lasting structure.

One of the specific objects of the invention is to provide an improved method of making concrete buildings whereby the lower portion of the building including footing, flooring, beams, and other parts may be poured at one time.

Another object of the invention is to provide an improved method of making concrete roofs whereby the roof, which may be provided with air cells may be poured as a unit and wherein a portion of the side wall may be poured simultaneously with the roof.

A further object of the invention is to provide an improved collapsible form for use in making concrete houses.

An additional object of the invention is to provide an improved concrete roof for buildings wherein the roof is provided with air cells.

Another object of the invention is to provide a concrete roof for buildings wherein the upper portion of the roof is formed to simulate tile.

A further object of the invention is to provide an improved device for holding the moulding boards in concrete forms.

Another object of the invention is to provide a standard for supporting concrete forms wherein the standard is provided with improved means for holding it in position.

Another object of the invention is to provide an improved staging which is adapted to co-operate with the standards of my invention.

A further object of the invention is to provide a novel form of joint for the molding boards of a concrete form wherein compensation may be made for swelling or contracting of the boards.

Another object of the invention is to provide an improved spacing means and clamping member for holding the members of a concrete form in assembled relation.

Other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein Fig. 1 is a perspective view showing a building embodying the features of my invention; Fig. 2 is a vertical section showing the details of a portion of the building illustrated in Fig. 1; Fig. 3 is a fragmentary detail in elevation showing the supporting standards and a part of the frame; Fig. 4 is a section on line 4—4, Fig. 3; Fig. 5 is an enlarged detail showing the spacing and clamping member; Fig. 6 is a perspective view showing a form adapted for making a pillar; Fig. 7 is a top plan partly in elevation showing a detail; Fig. 8 is a view similar to Fig. 7 showing another detail; Fig. 9 is a section of a portion of a wall showing the joint; Fig. 10 is a perspective view of a pan used in making the joint; Fig. 11 is a fragmentary view showing details of my improved molding board joint; Fig. 12 is a cross section showing the manner of forming a corrugated roof; Fig. 13 is a side elevation of the means for forming a corrugated roof; Fig. 14 is a fragmentary top plan view of a strip adapted for forming curved walls; Fig. 15 is a top plan view showing the combined use of curved forms and straight forms; Fig. 16 is a fragmentary top plan view of a modification of the invention and Fig. 17 is an elevation partly in section of the modification.

Referring to the drawing by reference characters, I have shown a building embodying the features of my invention at 10. This building comprises an end 11, a side 12 and a roof 14.

In the following description I have described my invention as used in the making of a certain character of building. It will be understood, however, that the invention is not limited to any particular class of buildings but is applicable to the building of houses, barns, silos, and to the construction of such engineering structures as bridges, conduits, etc.

Referring again to the drawing and particularly to Fig. 2 I show here a ground line at 15. A trench 16 is dug for the reception of footing 17. The footing is preferably plane on the outside and truncated on the inside as shown. The footing is preferably poured between molding boards 18 and 19. These molding boards are held within the frame members 20.

Since the many parts of the building are

adapted to be constructed with the use of these frame members, I will not proceed to describe them in detail.

Referring to the drawing it will be seen that the frame members 20 as illustrated (see particularly Fig. 5) comprise channel shaped members 21 and 22. These channel shaped members, as indicated, are arranged upon a block 23 and are secured to the block 23 by means of a fastening member 24. The blocks 23 are preferably of wood and may be removed from time to time when worn or when drilled with so many holes as to be unsuitable. This fastening member comprises a head portion 25 having a threaded extremity 26 upon which a nut 27 may be secured. The head 25 as shown is defined by arcuate curved ends 30 (see Fig. 15) and by parallel side portions 31. The parallel side portions 31 are spaced apart a sufficient distance so that they fit between the flanges of the channel members 21 and 22 and are prevented from turning.

As shown, the frame members 20 are arranged with the flanges 22, which are of even height, directed downward while one of the upper flanges 21 is of less height. The frame members 20 are adapted to be arranged one above the other to receive the molding boards 30 as shown in Fig. 2. In using the form, after the frame members are in place the upper ends of the molding boards are inserted in the upper channel 22 and the lower ends are brought into engagement with the back wall of the channel 21. After this is done, the boards are moved downwardly whence they are locked securely in position.

The molding boards 30 may be of any desired width although I prefer to use boards of twelve inches or less. These narrow boards prevent the suction of the wet concrete from holding the boards. The switch panels and other fixtures can be secured upon the boards 30 thus greatly facilitating erection.

After the frame members are assembled the plumbing and wiring can be installed after which the mold boards may be inserted and the cement poured. I consider this an important feature since with all former devices with which I am familiar the forms were built up solid thus preventing assembly of plumbing and wiring after the forms were ready for pouring. The forms are also extremely light but strong, thus allowing speed in erection.

The molding boards 30 are subject to weather conditions and also when they are used in the frame the wet concrete causes them to swell. For this reason, it is desirable that the boards, when inserted, be spaced a slight distance apart and that suitable means be provided for closing the joints between the boards. I have shown joint closing means which involve a part of my invention in Fig. 11. This joint closing means comprises a metal member 35 which, as shown, has an angular portion 36 secured to one edge of the board. The edge 35 is adapted to engage the rear portion of an adjoining board to prevent the concrete from leaking.

It is frequently desirable that the molding boards 30 be arranged at an angle to each other and in order to do this, I show in Fig. 8 the center member 40 as provided with sides arranged at an angle to each other to bring about the desired result.

For corners and for other uses which will suggest themselves, I may provide the channel members on adjacent sides of the strip 23 as shown in Fig. 7. An instance of the use of the frame member shown in Fig. 7 is illustrated in Fig. 6 where a form for making a pillar is disclosed. This form, it will be noted, comprises the molding boards 41, each of which is supported by the inclined frame members 20, which are shown as secured in place by removable fastening members 42.

In order to assemble the form and to hold it in wall forming position, I provide vertical standards 45. Each of these standards 45, as shown, comprises a channel shaped member having rectangular slots or apertures 46 arranged in the base thereof. Said rectangular shaped slots are adapted to engage the square head on the fastening bolts to prevent turning of the bolts. This arrangement also facilitates erection of the form. The frame members 21 and 22 may also be provided with these rectangular slots as shown in Fig. 5.

In using my form the standards 45 which may be arranged vertically or horizontally depending on the requirements in each case, are arranged with the frame members 20 secured thereto. The frame members 20 are spaced apart vertically in parallel series and in order to secure the frame members 20 in this position, I show combined spacers and clamping members. These are illustrated in detail in Fig. 5 where the standard 45 is associated with two frames 20. In assembly a spacer, which may be a pipe 50, is inserted between the members 23. These members 23 being preferably of wood, may be drilled to receive a fastening member shown as comprising a rod 51.

A stop member 52 is adapted to be adjustably secured by means of a set screw 53 upon the end of the rod 51. The other end of the rod is provided with an adjusting member 54 which may be secured on this rod by means of a set screw 55. The adjusting member is threaded as at 56 to receive a threaded clamping member 57. This clamping member may be provided with a square or hexagonal head so that it may be

tightened. When the member 57 is tightened it will engage the base of the standard 45 and will pull the blocks 23 into tight engagement with the spacer 50 thus providing a solid and substantial form.

In order to provide a building embodying the features of my invention with a door, window or other opening, I may insert a frame 60 (Fig. 3) at any desired locality between the frame members. This frame 60 should be of sufficient width so that when the clamping members 57 are tightened the frame will be pulled into tight engagement between the portions of the form.

In erecting the building it is desirable that means be provided for holding staging about the forms. In Fig. 4 I show staging supports embodying the features of my invention. This staging support as shown comprises a horizontal portion 65 and an inclined leg 66. Both the leg and the wall portion are indicated as provided with narrow tongues 67 which are adapted to fit within the rectangle apertures 46 in the standards 45. The tongues 67 will engage the outer surface of the molding boards 30 and thus be held against accidental movement.

In erecting a building according to my invention, I provide forms for the footing as shown at 70, in Fig. 2. This form is constructed by arranging the vertically disposed frame members 20 at the front and by spacing the lowermost frame member further from the front than the upper frame member thus supporting the rear molding board inclined. Over the footing forms, I provide foundation forms for the foundation 71. This form is provided with bottom forming molding boards 72 which are arranged upon upper frame members 20 as shown. The shortened flanges on these upper frame members assist very much in positioning the bottom molding members.

In order to provide strength for the floor 73 I provide floor beams 74 which are best shown in Fig. 1. These floor beams are provided by arranging cores upon the molding board 72. These cores may be of any desired construction and are so arranged that they provide rectangular spaces above the molding boards 72.

After the forms for the footing, the floor, and the floor beams have been assembled, I may insert the wiring and plumbing fixtures after which the mold boards may be placed and the concrete poured. The upper surface of the floor 73 will be smoothed with a trowel or in any desired manner.

After the floor has cured the side wall forming molds are next erected. The side wall shown at 75 is preferably provided with air spaces 76 therein. In forming this wall the mold board will be erected as shown in the drawing after which the core will be inserted in the space 76. Although any type of core member for forming the cores may be used, I prefer to use a core as shown in my Patent No. 1,477,065, granted December 11, 1923.

The side wall forms having been erected and the wiring and plumbing installed therein the concrete is poured. In pouring the cement, I prefer that the upper end thereof terminate a short distance below the top of the upper form for a purpose to be presently described.

It will be understood that with my invention buildings of one, two or more stories can be constructed and that the invention is applicable to the manufacture of various types of buildings.

After the side walls 75 have cured, the cores are removed. This done, I insert, what I term pans 80 in the spaces within the side wall. These pans each comprise a bottom portion having side parts 81 thereon and having flanges 82 upon the side portions. These pans are preferably somewhat wider than the width of the opening 76 so that it will be necessary to bow the bottoms of the pans when inserting them. An assembled pan is shown in Fig. 9 with the bottom portion bowed.

The roof forms may be arranged in operative position before or after the pans 80 are inserted. These roof forms may include bottom members and top members as illustrated in Fig. 2. The upper molding boards 84 for the roof, as illustrated in Figs. 12 and 13, may be provided upon their lower surface with protuberances forming portions 85. This enables a roof to be made which will simulate roofing tile.

After the roof and side wall frames are erected and the molding boards are inserted concrete will be poured adjacent the ridge pole and will flow downward into the upper portion of the side wall 75. This will fill the pan 80 so that the joint will connect the roof to the side wall as shown in Fig. 9. In building a house or other building the staging necessary will be supported by means of the staging supports previously described.

The roof is preferably poured after suitable cores have been inserted therein. When the roof is completed the cores are withdrawn and a hollow cement roof will be provided.

It will be understood that buildings constructed according to my invention include others than that described and that I may use wooden roofs upon the cement foundation and side wall described or that I may use my improved concrete roof upon buildings of different types.

It frequently is desirable that a curved form be used and it is sometimes also desirable that the use of channel members be avoided. To bring this about, I show, in

Figs. 14 and 15, a frame member 90 comprising a back member 91 and a front member 92. The back member and the front member are preferably strips of metal. These strips are provided with rectangular apertures 93. The strips are shown as provided with a plurality of thin spacing boards 94 and with fastening member 95 for securing the assembly together. As described in connection with the frame member 20, the strip 92 is preferably shorter than the strip 91 so that the molding boards may be inserted.

In Fig. 15 I show the method of joining the two side walls of the building to form a corner. According to this construction the contiguous members are abutted and are secured together by angle members 96 and 97. This construction results in a square corner when the building is poured.

In Figs. 16 and 17, I show a modified construction wherein the frame member 20′ is provided at its upper portion with a channel member 98. This channel member 98 has a bottom flange 99 upon which a pivoted locking member 100 is arranged. This locking member 100 has an eccentric clamping portion 101 to engage an angle member 102. When a molding board 103 is in position the handle 100 may be turned so that the clamping portion 101 will engage the molding board and will hold it in position.

In order to hold the rods 51 in spaced position while the frame members are being assembled, I show, in Fig. 4, a holding strip 110. This strip comprises preferably a metal member having a slot or aperture at each end. The rods 51 are adapted to be fitted within the aperture at each end to thus temporarily hold them in position.

Having thus described my invention, I claim:

1. The method of making concrete walls, comprising pouring a section of the wall, with an upper cavity, arranging a closure to close the cavity, then pouring the next section of the wall and allowing the concrete to engage the upper closure.

2. The method of making concrete walls, comprising pouring a section of the wall with an upper cavity, arranging a closure within the cavity then pouring the next section of the wall and allowing concrete to run into the upper part of the cavity.

3. A concrete form comprising a plurality of frame members, each frame member comprising a central member and a pair of recessed holding members arranged on the central member, and means to removably secure said central member to the recessed holding members.

4. In a concrete form, a frame, said frame comprising vertically extending members spaced apart and having apertures spaced apart vertically therein, means passing through said apertures for holding said frame in assembled position, a support for for staging, said support including a horizontal portion and an inclined portion, each of said portions having a tongue thereon, said tongues being removably fitted within said apertures.

5. A concrete form comprising a plurality of parallel frame members spaced apart vertically, means on said members for engaging molding boards, supporting standards for said members, said standards being arranged adjacent a vertical series of said members, and single means to secure the standards to one of said members and to secure a second member to the said one member.

6. In a concrete form, frame members comprising a series of horizontally arranged strips, each having recesses in their upper and lower faces, the upper recesses being deeper than the lower recesses whereby a board may be inserted in the recesses, a supporting standard for said members, said standard comprising a channel shaped member and means to releasably clamp said channel shaped members against the frame.

7. A concrete form comprising a plurality of parallel frame members spaced apart laterally and vertically, means on said members for engaging molding boards, supporting standards for said members, said standards being arranged adjacent a vertical series of said members, and single means to secure the standards to one vertical series of members and to secure a second vertical series of members to the said one series of members, said means comprising a rod having a spacing member thereon, a stop member and a threaded member mounted for adjusting movement.

8. In a concrete form, a frame member, said frame member comprising front and back metallic strips, spacing means between said strips, said spacing means comprising a flexible strip, means to secure said flexible strip and said metallic strips together in spaced relation, one end of each of said metallic strips being arranged in a common plane, the other end of said strips being arranged in different planes.

9. In a concrete form, a frame member comprising front and back metallic strips, spacing means between said strips, said spacing means comprising a plurality of thin flexible boards, means to secure said flexible boards and said strips together in spaced relation, said strips being arranged to form channels above and below the spacing boards.

10. In a concrete form, upper and lower frame members having means thereon for engaging molding boards, a plurality of molding boards in said frame, certain of said molding boards having a joint clos-

ing member thereon, said joint closing members being secured to one board adjacent an edge thereof and having another portion for engaging an adjoining board.

11. In a concrete form a plurality of frame members each frame member comprising upper and lower molding board holding devices, one of said devices comprising an angle member secured to the frame and means to secure a molding board against said angle member, said means comprising a locking member having an eccentric locking portion thereon, a lever for operating said locking member and means to pivotally mount the locking member on the frame.

12. The combination of a concrete wall having a cavity therein and a pan, said pan comprising a flexible body portion having upstanding edge portions thereon, flanges secured to said edge portions, said flanges extending outwardly in a plane substantially parallel with the plane of the body portion and said edge portions being inclined with respect to the body portion.

In testimony whereof, I hereunto affix my signature.

IRA J. KUERT.