

Feb. 24, 1925.

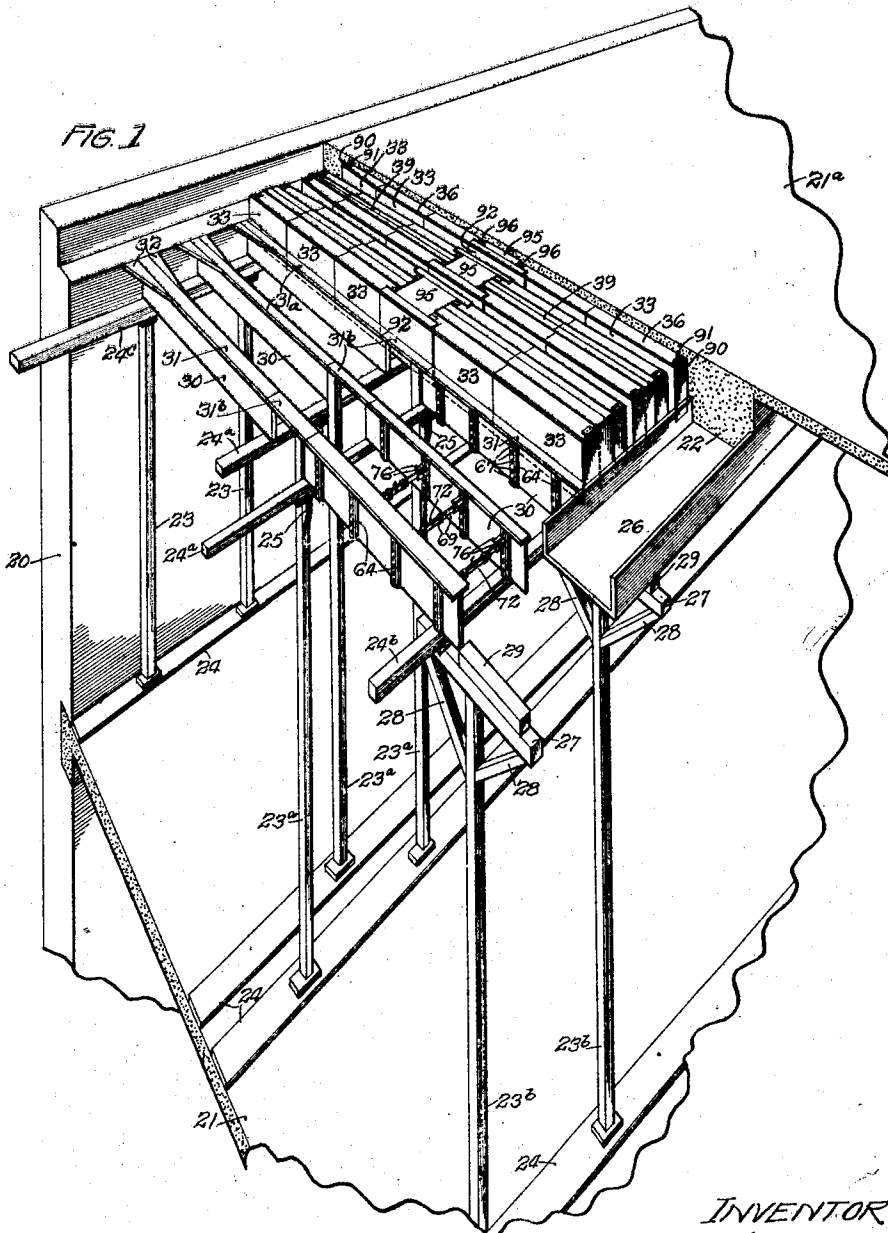
E. E. HALL

1,527,432

FORM FOR CONCRETE WORK

Filed April 22, 1922

3 Sheets-Sheet 1



INVENTOR:

Eug. E. Hall.

By John Howard Muller,
HIS ATT'Y.

Feb. 24, 1925.

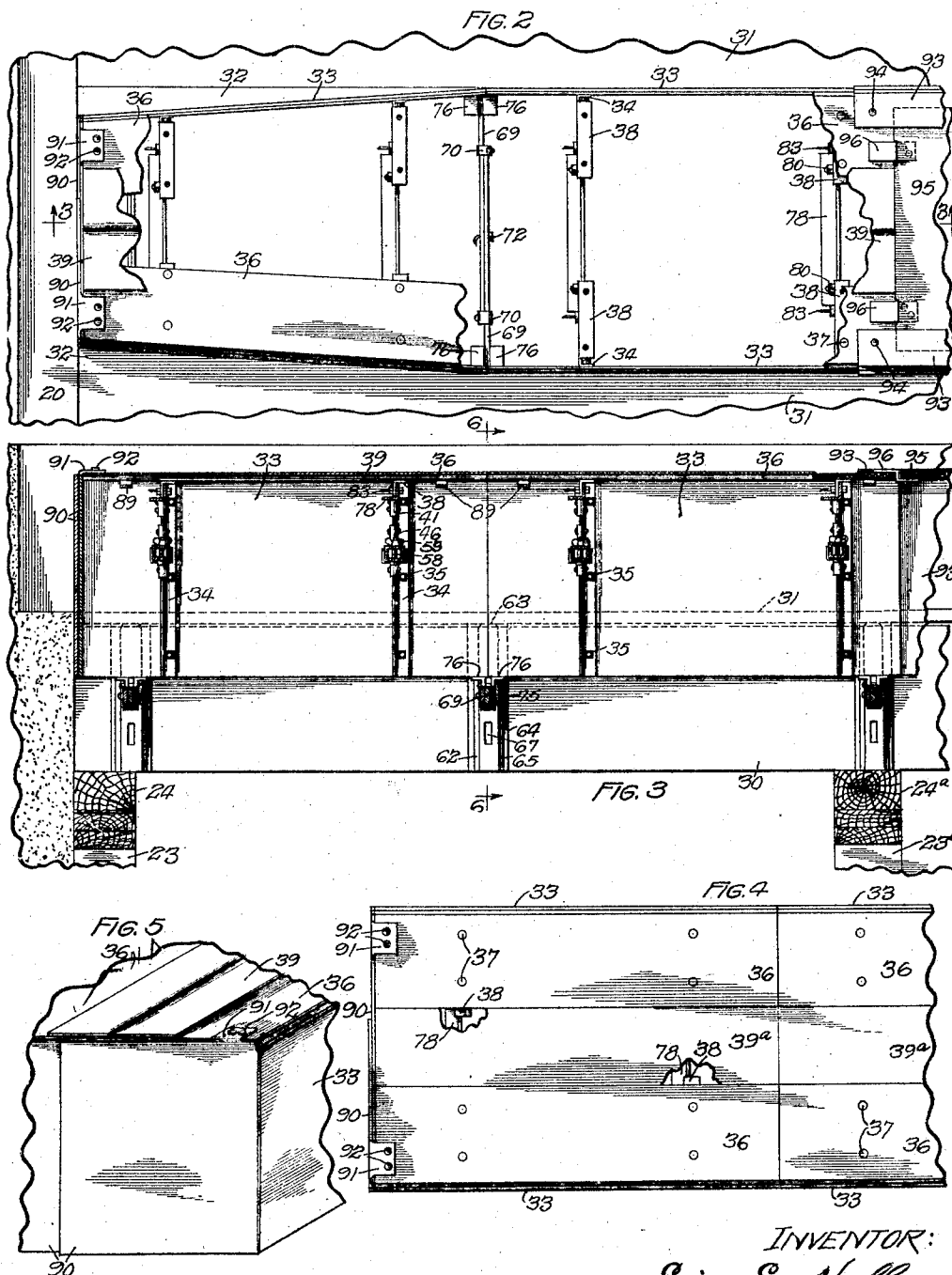
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3 Sheets-Sheet 2



Feb. 24, 1925.

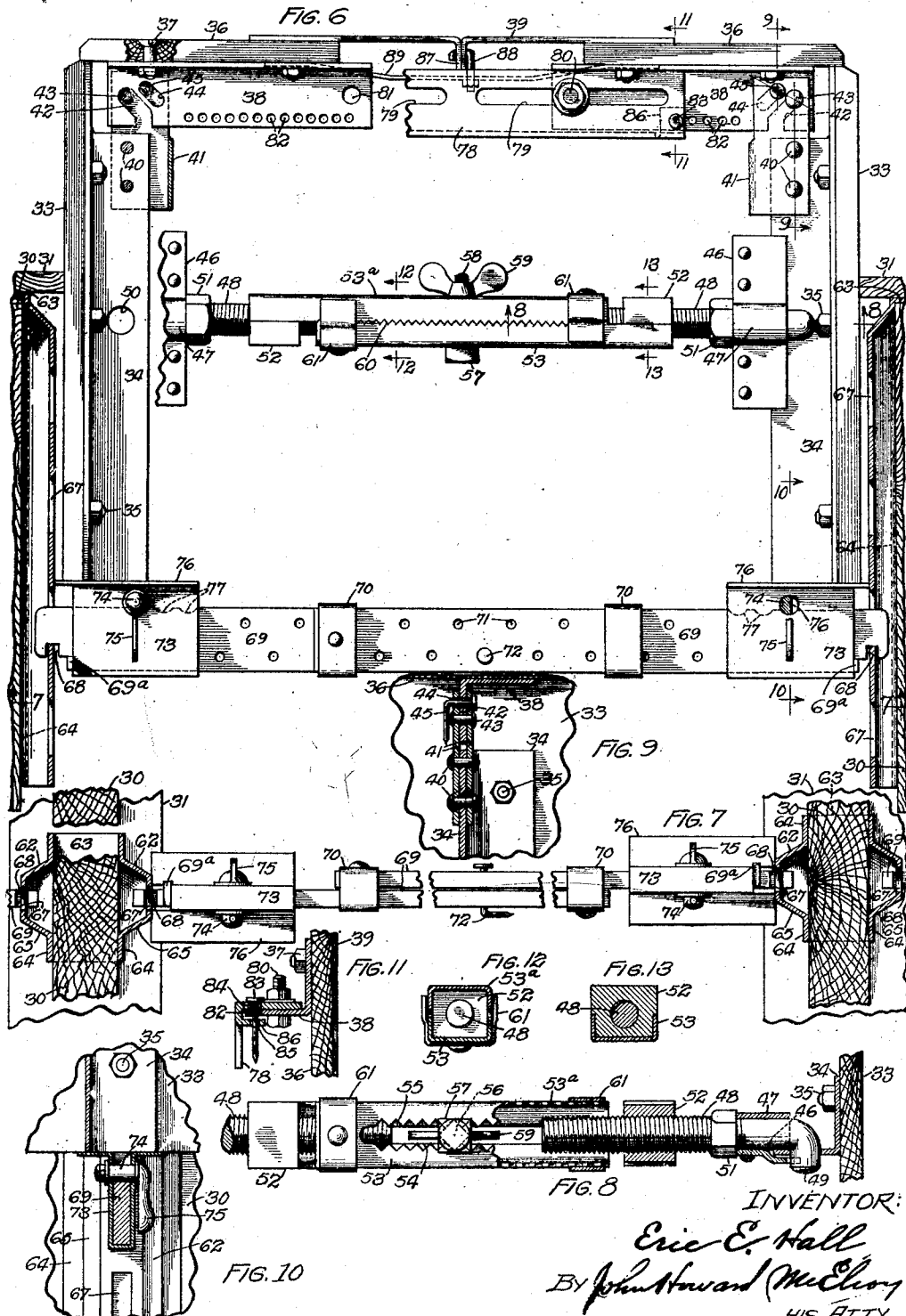
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FORM FOR CONCRETE WORK

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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE.

ERIC E. HALL, OF CHICAGO, ILLINOIS.

FORM FOR CONCRETE WORK.

Application filed April 22, 1922. Serial No. 556,048.

To all whom it may concern:

Be it known that I, ERIC E. HALL, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Forms for Concrete Work, of which the following is a full, clear, and exact specification.

My invention is concerned with forms and scaffoldings for making concrete floors, ceilings, etc., and is designed primarily to produce simple mold sections or forms that can be used repeatedly without the liability of material damage thereto; either in use or in transportation from one job to another, and in which the wooden faces which come in contact with the concrete can be readily renewed if it becomes necessary.

It is further concerned with the production of forms or mold sections that can be quickly and easily set up when they are to be used, and which can be as easily and quickly taken down when the concrete is sufficiently set.

It is further concerned with the production of forms or mold sections that can be readily adjusted to vary the width thereof so as to produce a series of parallel floor joists that are spaced nearer to or farther from each other.

It is further concerned with the production of forms or mold sections that can be adjusted to make one end of one section narrower than the other end of the same section, as is desired where floor joists are to be molded that are wider at their ends to strengthen them at the point of their connection with the main beams or girders.

It is further concerned with the production of forms or mold sections that can be combined and adjusted to form floor joists of different lengths, widths or depths.

It is further concerned with the production of such forms or mold sections as shall be capable of adjustment in any two or more, or in all the ways incorporated in the three preceding paragraphs.

A further feature of my invention resides in a novel scaffolding and form structure by which I am enabled to support the forms or molds with a minimum of material going to make up said scaffolding.

Another feature resides in the use of such a novel structure built up so that the various elements thereof are provided with connections that can be easily assembled or

taken down without the necessity of employing any screws or nuts.

Another feature resides in the employment of such a scaffolding structure with the parts thereof adjustable to vary the depth and distance apart of the resulting floor joists, which adjustments do not have to be interfered with when the scaffolding is taken down, so that it can be re-erected on another floor or another job by merely putting the parts together, without the necessity for readjusting any of the parts to insure that the joists of the new floor shall have the same dimensions as those of the preceding floor.

Another feature of my invention resides in a novel scaffolding structure to be used in connection with forms in which I am enabled to use much lighter supporting beams than has been possible heretofore, and still lock the beams securely in place while they are in use, and readily remove them when the work is finished.

To illustrate my invention, I annex hereto three sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which,—

Fig. 1 is a perspective view, showing a portion of the scaffolding with a portion of the forms thereon before the concrete is poured, and another portion with the concrete in place;

Fig. 2 is a top plan view of one of the forms on a larger scale, with portions of the top thereof broken away;

Fig. 3 is a vertical section on the line 3—3 of Fig. 2;

Fig. 4 is a top plan view showing one form and a portion of another somewhat modified from the construction shown in Figs. 2 and 3;

Fig. 5 is a perspective view of one end of a form section with the overlapping end sections applied thereto;

Fig. 6 is a view in section on the line 6—6 of Fig. 3, but on a still larger scale;

Fig. 7 is an inverted plan view in section on the line 7—7 of Fig. 6;

Fig. 8 is an inverted plan view in section on the line 8—8 of Fig. 6; and

Figs. 9, 10, 11, 12 and 13 are sections on the lines 9—9, 10—10, 11—11, 12—12 and 13—13 of Fig. 6.

Referring first to Fig. 1, 20 represents one wall of a building, and 21 represents a concrete floor that has already been erected

therein and hardened, while 21^a represents a portion of similar floor above the floor 21, which similar floor has been poured but not yet hardened. The portion 22 represents
 5 a girder in connection with the concrete floor parallel to the wall 20.

After the floor 21 has set sufficiently to stand the strain of erecting the floor above, I form a scaffolding which is made up of
 10 uprights 23 placed upon planks 24 laid on the floor 21. On the uprights 23 adjacent the wall 20, I place the transverse beam 24^a, and where the space between the wall 20 and the girder 22 or the adjacent wall
 15 is long, so as to need an intermediate support, I employ one or more of the uprights 23^a, which uprights will have the blocks 25 secured thereon to support the transverse beams 24^a in the same plane as the beam 24^a.
 20 On the uprights 23^b, located beneath the trough 26, in which the girder 22 is formed, I place the cross heads 27, which may be braced by the pieces 28, and on the cross heads I place the transverse beam 24^b, as
 25 well as the filler 29 on which the trough 26 rests.

The longitudinal beams or joists of the scaffolding are preferably formed in two parts, the lower part 30 consisting of
 30 wooden planks 2 x 10, placed on edge, and resting on the beams 24^a, 24^a and 24^b. The necessary width for forming the bottoms of the molds for the concrete floor joists is secured by placing centrally over the planks
 35 30 the narrow planks 31, which are preferably made of inch stuff of the proper width, say four or five inches, to form the desired thickness of the joist, and it will be understood that narrower joists may be produced
 40 by using narrower planks, as seen at 31^a. Where the ends of the concrete floor joists are to be thickened, as, for instance, those connected with the wall 20, the width of the ends of the planks 31 is increased by
 45 nailing or otherwise securing to the ends thereof the triangular pieces 32.

Passing now to the construction of the forms, which is shown more especially in the other figures, these forms are composed
 50 of the wooden sides 33, preferably made of inch stuff, and preferably secured to the angle irons 34 by the bolts 35 having countersunk heads. When the forms are in place, the edges of the planks 31 engage the
 55 sides 33, as shown in Fig. 6. The tops of the forms are made of the boards 36, of the same character as the side boards 33, which boards are secured by the countersunk bolts 37 to the angle irons 38. It will
 60 be understood that I preferably employ a pair of the angle irons 34 fastened to the boards 33 near their ends, and that I likewise employ a pair of the angle irons 38 fastened to the top boards 36 at the same
 65 relative position, as the angle irons 34 and

38 co-operate in a manner to be subsequently described. The central space of the top of the mold may be formed either of the thin metal 39, or of the boards 39^a,
 shown in Fig. 4, and it will be understood
 70 that where the job requires frequent changes in the distance between the joists, I preferably employ the thin-metal top central portion 39, as, inasmuch as it overlaps at its
 75 edges the boards 36, it can be adjusted to different distances between the joists without any difficulty. Where the adjustments of the distance between the joists are infrequent,—that is to say, where a large number
 80 of joists of the same distance apart are to be produced—I preferably employ the boards 39^a, shown in Fig. 4, which will be sawed to the exact width necessary to fit in
 between the boards 36, and it will be understood that instead of making the boards 39^a
 85 of the same length as the mold sections, say four feet, the boards 39^a are made in one piece as long as is necessary to extend from the wall 20 to the girder 22, if such a length
 90 is possible. If not, two boards are employed which have the proper length when placed end to end so that they will extend from the wall 20 to the girder 22.

It is desirable that the sides 33 can be drawn toward each other slightly in removing them after the concrete is set, and, for
 95 this purpose, I employ the connections between the angle irons 34 and 38 now to be described: On the upper ends of the angle
 100 irons 34, I secure, as by the rivets 40, the metallic piece 41, which is preferably constructed of metal bent to substantially a U-shape in cross section but with the connecting
 105 portion thereof removed above the top of the angle irons 34, as clearly shown in Fig. 6. The angle irons 38 have formed therein, near the outer end, the inclined slot
 110 42, through which passes the rivet 43 secured at its ends to the part 41. A parallel slot 44 in the angle irons 38 accommodates the pin or heavy nail 45 passed through aligned
 115 recesses in the part 41. If the sides 33 are drawn toward each other, it will be seen that the action of the pins 43 and 45 on the inclined slots 42 and 44 will be to simultaneously draw the sides 33 from the top
 pieces 36.

To hold these side pieces 33 properly spaced apart, while at the same time permitting them to be quickly detached, I employ
 120 the adjustable thrust bar best shown in Figs. 6 and 8, where it will be seen that I employ a pair of foot pieces 46, made of a pair of metal strips riveted together at their inner
 125 edges and one of them having the concave central portions 47 forming a substantially circular passage for the adjacent portion of the bolt 48, which has its outer end 49 turned
 130 at right angles so as to fit into the aperture 50 formed in the angle iron 34. A nut 51

screwed up against the foot 46, which embraces the edge of the angle iron 34, as shown in Fig. 8, serves to secure the bolt 48 rigidly in position projecting at right angles from the associated angle iron 34. The bolt 48 is threaded into a nut 52, which nut is rigidly secured in the end of the channel piece 53, which has formed in the bottom thereof the slot 54 with the notches 55 formed in the edge thereof so that the squared portion 56 adjacent the head 57 of the bolt 58 will fit in any desired pair of the opposed notches 55 and hold the bolt in position so that when the wing nut 59 is screwed down the channel 53 will be secured relative to the companion channel 53^a, both of which channels have their co-operating edges serrated, as seen at 60, so as to enable me to make a quick adjustment of the length of the spacing bar. The channels 53 and 53^a have secured on their other ends the U-shaped pieces 61, overlapping the adjacent channel pieces 53 or 53^a, as the case may be, to hold the two channel pieces in alignment. With the construction shown, it will be obvious that the sides 33 can be quickly spread by first adjusting the length of the spreader bars roughly by unloosening the nut 59 so that the serrations 60 can be disengaged, and then screwing down the nut 59 to secure the bar in its rough adjustment, after which the final adjustment is secured by simply rotating the locked channels 53 and 53^a on the ends of the oppositely threaded bolts 48, thus securing the ordinary turnbuckle action.

To support the forms at the proper height relative to the boards 31, and thus regulate the depth of the concrete joists, I preferably employ the following mechanism: At suitable intervals on the vertical boards 30, I hang stirrup members 62, which are preferably constructed of metal, and have the plain portion 63 at the top adapted to fit over the top of the plank 30, and the sides, which are in the form of channels in horizontal cross section. While these sides might be plain rectangular channels, I preferably construct them as shown, with the edges 64 engaging the sides of the planks 30 and the inclined portions 65 connecting the edges 64 with the central portion 66, which is spaced away from the planks 30 and provided at suitable intervals with the longitudinal apertures 67, there being as many of these apertures 67 on each side of the stirrup as there are desired adjustments for different depths of the concrete joists. Co-operating with these apertures 67 are the hooks 68 formed on the ends of the overlapping bars 69, each of these bars having secured on its end a loop 70 embracing the co-operating bar. These bars have formed therein regularly spaced apertures 71, and the complete bar formed by the two bar

sections can be made of any desired length as is necessary to secure the desired distance between the concrete joists by bringing the necessary apertures 71 in the two bar sections into register and thrusting the nail 72 through a co-operating pair of the apertures 71. The end of the wire nail 72 is then turned over; and by keeping these bars in the same adjustment, the same distance between any number of concrete joists can be secured without any change or readjustment of this supporting bar. Instead of resting the sides 33 directly on the bars 69, I preferably employ the seat piece 73, which is preferably formed of metal, and, as shown in Fig. 10, is U-shaped in cross section with its upper edges turned out. The seat member 73 is held in place on the bar 69 by the key 74, journaled in suitable bearings in the piece 73 and having the handle 75 extending on the outside, by which it can be manipulated. This key has a portion 76 thereof, of the width of the bar 69, cut away, and the top of the bar 69 preferably has a plurality of curved recesses 77 formed therein, in which the key 74 rests in different adjustments of the same relative to the end of the bar 69. The turned over tongue 69^a keeps the seat piece 73 from falling off of the bar 69 while being handled.

When the forms are assembled and ready for pouring, as shown in Fig. 6, the handle 75 of the key is vertical, and the seat member 73 is held at its highest position. After the concrete has sufficiently set so that the forms can be removed, and before the thrust bar has been shortened up, the handles 75 are turned at right angles to bring the cut-away portion 76 next to the bar 69. This allows the flange portions of the seat pieces 73 to fall away from the sides 33 enough so that the seat pieces can be slid inward and from beneath the sides 33, and when they are so slid in, the bars 69 can be lifted sufficiently to disengage the hooks 68 from the recesses 67. When they are disengaged, they can be removed, and by operating the turnbuckle of the thrust bar, the sides 33 can now be drawn in to disengage them from the edges of the planks 31, as well as from the sides of the concrete joists, and the form sections can now be removed.

Provision for the bringing of the top pieces 36 nearer to or farther from each other and for rigidly connecting them is made by employing the angle irons 78, which have the pair of elongated slots 79 therein to accommodate the bolts 80 passed through the apertures 81 in the ends of the angle irons 38. To secure an adjustment for exact widths of the form to space the concrete joists apart the desired distance, I provide in the lower edges of the angle irons 38 the row of spaced apertures 82, and in the end of the angle iron 78, I locate an

aperture 84 for the nail 83, which, when the parts are assembled, will be passed through said aperture 84, the selected aperture 82 in the angle iron 38, as well as the aperture 85 (see Fig. 11) formed in the portion 86 of the angle iron 78 which has been turned up to co-operate with the adjacent edge of the angle iron 38 and keep the two angle irons in proper relative position. After the desired adjustment is made by the nails 83, the bolts on the nuts 80 are tightened up and the desired adjustment is made permanent for that particular job. Where the overlapping top portion 39 is employed, I preferably form it of two pieces with the downturned flanges 87, which will be bolted or otherwise secured together, and are provided at suitable intervals with apertures through which the hook bolt 88 is passed to support the spring strips 89, which are bow-shaped, and which are turned to transverse position so that their ends engage with the under sides of the boards 38 and hold the overlapping top piece 39 in position. Of course, to release the same, all that is necessary is to turn the strips 89 to a position parallel to the flanges 87.

It will be obvious that all these connections and adjustments can be made from the top of the scaffolding, so that it is unnecessary to get underneath the same to put the forms in place, although of course it will be understood that the forms have to be removed from below when they are taken down.

By reference to Fig. 3 will be seen the preferred arrangement of the supporting bars relative to the thrust bars. While I might employ more of the supporting bars, I preferably employ one at each end of each joist, and I place another one where each pair of the mold sections abut, so as to obviate the necessity of employing two of the supporting bars for each mold section, although, of course, it will be understood that two of the thrust bars are necessary for each section. On the two mold sections at the ends of the joists, I employ the overlapping end pieces 90, which are preferably formed of sheet metal, and are shaped to conform to the cross section of the mold. They have the tongues 91 turned at right angles at the top of the upper outer corners, and provided with a couple of apertures therein through which nails 92 may be driven into the boards 36 to secure the end sections in place. When they are assembled, as seen in Fig. 1, their lower ends engage either the walls 20 or the trough 26, and are held firmly in place.

If the concrete joists were of some length that is a multiple of the length of the mold sections, which sections are preferably four feet in length, it would not be necessary to make any additional provision. However,

it sometimes happens that concrete joists of some intermediate length, such as eighteen or twenty-two feet, have to be provided for, in which case the arrangement seen in Fig. 1 and at the right-hand ends of Figs. 2 and 3 has to be employed. Here the ends of the form sections are connected at their sides by sheet-metal pieces 92 overlapping the sides 33 of the forms and having the turned over top portions 93, which are provided at their ends with apertures 94 through which nails can be driven into the boards 36 to hold them in place. The open space at the top is filled by boards 95 of the proper length to span the space and of the proper width to extend under the turned over portions 93, to which they might be nailed, but I prefer to support them by employing the small Z-shaped strips 96, seen in Figs. 2 and 3, which have their top portions lying upon the boards 36 and which have their lower portions extending underneath the boards 95, to which they are preferably nailed, where such gaps have to be bridged, and I employ the uprights 23^a. The intermediate piece 31^b for forming the bottom of the concrete joist at the gap is preferably longer than the gap and is placed directly on top of one of the uprights 23^a, which extend high enough above the blocks 25 to serve this purpose. While I may sometimes not employ an upright 23^a for a beam, in which case the bridging piece 31^b will rest only on the ends of the boards 30, the pieces 31 being shorter than the boards 30 to permit the bridging pieces 31^b to rest on the boards 30, I preferably employ one upright 23^a for each beam, and stagger them, as shown in Fig. 1. Where this arrangement is employed, after the concrete has been poured, set, and the forms removed, it is the practice to leave the beams 30 and 31 in place as an additional support until the concrete is thoroughly hardened, but with the arrangement shown. I may before it is fully hardened remove all the boards 30, and the overlying strips 31 and still leave the beams sufficiently supported, since the bridging pieces 31^b will each be supported by an upright 23^a.

Where the concrete joists are to be formed with the thickened ends, as illustrated at the wall 20 in Fig. 1, where the boards 32 are connected to the boards 31, the end sections are then adjusted as shown in Fig. 2, so that the sides 33 are set slanting, the connections at the end where the section adjoins the adjacent section being slightly taken in, whereas the connections at the end of the beam are shortened up considerably so as to secure the desired narrowing of the mold at this end. The form of end pieces 90 illustrated serves to permit this adjustment, as the ends are simply overlapped more than they would be otherwise.

From the foregoing description, it will be obvious that the scaffolding described can be quickly erected with a minimum amount of lumber entering into it, and after it is erected, the forms can be quickly assembled thereon from the top of the scaffolding; and when assembled the concrete is ready to be poured. After it has set, by reverse action, the forms can be removed from below, leaving the scaffolding intact, to be finally removed when the concrete has hardened to a point where there is no danger in removing the supports for the concrete joists.

While I have described my invention as employed in connection with the making of floors of concrete, it will be understood that it might be employed in connection with the making of floors of any other plastic material, and it will be further understood that while I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it is capable of some modifications, and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. In a scaffolding to support concrete floors, the combination with longitudinal beams for forming the bottoms of the concrete floor joists arranged in pairs in alignment, of means for supporting the outer ends of the pairs, transverse beams upon which the inner ends of the longitudinal beams rest, pairs of uprights adjacent the inner ends of the longitudinal beams and supporting the transverse beams, and bridge pieces between the adjacent ends of the pairs of longitudinal beams supported directly by the pairs of uprights.

2. In a scaffolding to support concrete forms, the combination with longitudinal beams for forming the bottoms of the concrete floor joists arranged in pairs in alignment and composed of the narrow body portion and the wider top portion supported thereon, of means for supporting the outer ends of the pairs of longitudinal beams, transverse beams upon which the inner ends of the longitudinal beams rest, pairs of uprights adjacent the inner ends of the longitudinal beams and supporting the transverse beams, and bridge pieces corresponding to the wider top portions of the longitudinal beams between the adjacent ends of the pairs thereof supported directly by the pairs of uprights.

3. In a scaffolding to support concrete forms, the combination with longitudinal beams for forming the bottoms of the concrete floor joists arranged in pairs in alignment and composed of the narrow body portion and the wider top portion supported

thereon, of means for supporting the outer ends of the pairs of longitudinal beams, transverse beams upon which the inner ends of the longitudinal beams rest, pairs of uprights adjacent the inner ends of the longitudinal beams and having shoulders below their upper ends for supporting the transverse beams, and bridge pieces corresponding to the wider top portions of the longitudinal beams between the adjacent ends of the pairs of said longitudinal beams supported directly by the tops of the pairs of uprights.

4. In a scaffolding for supporting concrete forms, the combination with uprights, of transverse beams supported thereby below the level of the bottoms of the concrete floor joists, narrow longitudinally extending beams supported upon the transverse beams, adjustable supporting bars located between adjacent longitudinal beams, inverted U-shaped forms resting on the supporting bars, and means unconnected with the supported bars for moving the sides of the forms outwardly to engage the edges of the longitudinally extending beams.

5. In concrete form work, the combination with longitudinal beams, the upper surfaces of which form the molds for the bottoms of the concrete joists, of means for supporting said beams, supporting bars located between adjacent beams, means for connecting the supporting bar at different heights on the longitudinal beams to vary the depths of the concrete floor joists, forms of an inverted U-shape in cross section resting on the bars and having their sides engaging the edges of the tops of the longitudinal beams, and means for moving the sides of the forms outwardly to engage the edges of the longitudinally extending beams.

6. In concrete form work, the combination with narrow longitudinal beams, of means for supporting the beams, strips placed on the top of the longitudinal beams to form the bottoms of the concrete floor joists, supporting bars placed at intervals between the adjacent surfaces of the narrow longitudinal beams, forms of an inverted U-shape in cross section resting on the supporting bars, and extensible thrust bars between the sides of the forms to force them apart and into firm engagement with the edges of the strips to form a tight mold.

7. In concrete form work, the combination with narrow longitudinal beams, of means for supporting the beams, strips placed on the tops of the longitudinal beams to form the bottoms of the concrete floor joists, stirrup pieces hanging over the narrow longitudinal beams at intervals and having apertures therein at different heights, supporting bars having means at their ends for engaging the apertures in the stirrup pieces, forms of an inverted U-shape in

cross section resting on the supporting bars, and extensible thrust bars between the sides of the forms to force them apart and into firm engagement with the edges of the strip

5 to form a tight mold.

8. In concrete form work, the combination with narrow longitudinal beams, of means for supporting the beams, strips placed on the tops of the longitudinal beams to form the bottoms of the concrete floor joists, stirrup pieces hanging over the narrow longitudinal beams at intervals and having apertures therein at different heights, supporting bars having means at their ends for engaging the apertures in the stirrup pieces, forms of an inverted U-shape in cross section resting on the supporting bars, and extensible thrust bars between the sides of the forms to force them apart and into firm engagement with the edges of the strips to form a tight mold, said means being disengagable from the stirrups before the thrust bars are loosened.

9. In concrete form work, the combination with narrow longitudinal beams, of means for supporting the beams, strips placed on the tops of the longitudinal beams to form the bottoms of the concrete floor joists, stirrup pieces hanging over the narrow longitudinal beams at intervals and having apertures therein at different heights, supporting bars having means at their ends for engaging the apertures in the stirrup pieces, forms of an inverted U-shape in cross section resting on the supporting bars, and extensible thrust bars between the sides of the forms to force them apart and into firm engagement with the edges of the strips to form a tight mold, said means being disengagable from the stirrups before the thrust bars are loosened and consisting of the pieces sliding on the thrust bars and having keys passed therethrough with the narrowed portions which can be turned into position to release the pieces from being held in fixed position on the bars.

10. In an apparatus of the class described, the combination with a removable scaffolding comprising uprights and longitudinal beams directly supported thereby, the tops of the longitudinal beams serving as the molds for the bottoms of the concrete floor joists, of transverse supports connecting adjacent beams and extending from the sides thereof and vertically adjustable to vary the depth of the concrete floor joists, and forms, of a generally inverted U-shape in cross section, resting on the supports and having their sides engaging the tops of the longitudinal beams, for the purpose described, said transverse supports being adjustable as to length and the forms adjustable as to width to vary the distance between the floor girders.

11. In an apparatus of the class described,

the combination with a removable scaffolding comprising longitudinal beams the tops of which serve as the molds for the bottoms of the concrete floor joists, and means for supporting said longitudinal beams, of stirrup pieces located at intervals along the longitudinal beams adapted to rest thereon and having their depending portions U-shaped in horizontal cross section with recesses therein at vertical intervals, transverse supports adapted to enter the recesses in the stirrup pieces, and forms, of a generally inverted U-shape in cross section, resting on the supports and having their sides engaging the tops of the longitudinal beams, for the purpose described.

12. In a form for concrete floors, the combination with a plurality of side and top sections, each consisting of longitudinal boards having a pair of metallic connecting members arranged transversely of and secured on the inner face thereof, adjustable connections between said connecting members so that the width of the form may be varied, and a pair of extensible thrust bars arranged to co-operate with the metallic connecting members of the side sections, said thrust bars being provided with means for roughly regulating their length and forming a turn-buckle for finer adjustments.

13. A form for concrete work consisting of a plurality of angle irons extending across the form on the inside thereof with the vertical webs of the irons projecting inwardly, a plurality of boards having their faces secured to the outside of the bars and extending transversely of the bars to form the mold surfaces, and extensible thrust bars connecting the vertical angle irons for holding them spaced firmly apart.

14. In a form for concrete work, the combination with side portions and top portions having means for varying the effective width of the form, of extensible thrust bars connecting the sides, said thrust bars being provided with means for catching them quickly at suitably spaced distances, and with screw mechanism for intermediate adjustments.

15. In a form for concrete work, the combination with side portions and top portions having means for varying the effective width of the form, of extensible thrust bars connecting the sides, each of said thrust bars consisting of a pair of threaded members connected to the sides and projecting inwardly toward each other, and a second pair of members screwed onto the first, and adjustable connections between said second pair whereby they can be quickly connected or disconnected in any one of various spaced positions, and then rotated to turn the second pair on the first pair for finer adjustment.

16. A form for concrete work consisting

of side portions, top portions, and connections between said side portions and top portions whereby one of said sides may be preliminarily moved inward toward the other side 5 side to disengage the form from the said concrete without displacing the top portions relative to the concrete and while maintaining said side portions parallel to the concrete surface with which it had been in 10 contact.

17. A form for concrete work consisting of side portions, top portions, and connections between said side and top portions whereby both of said sides may be preliminarily moved inward to disengage the form 15 from said concrete without displacing the top portions relative to the concrete and while maintaining said side portions parallel to the concrete surface with which it had 20 been in contact.

18. A form for concrete work consisting of side portions, top portions, and connections between said side and top portions

whereby one of said sides may be preliminarily moved inward toward the other side 25 and downward from the top portions to disengage the form from said concrete while maintaining said side portions parallel to the concrete surface with which it had been in contact. 30

19. A form for concrete work consisting of side portions, top portions, and connections between said side and top portions whereby both of said sides may be preliminarily moved inward and downward from 35 the top portions to disengage the form from the concrete while maintaining said side portions parallel to the concrete surfaces with which they had been in contact.

In witness whereof, I have hereunto set 40 my hand and affixed my seal, this 19th day of April, A. D. 1922.

ERIC E. HALL. [L. s.]

Witness:

JOHN HOWARD MCELROY.