G. E. DALE.

CENTERING FORM FOR REINFORCED CONCRETE CONSTRUCTION.

APPLICATION FILED FEB. 10, 1909.

1,131,479. Patented Mar. 9, 1915.

6 SHEETS—SHEET 1.

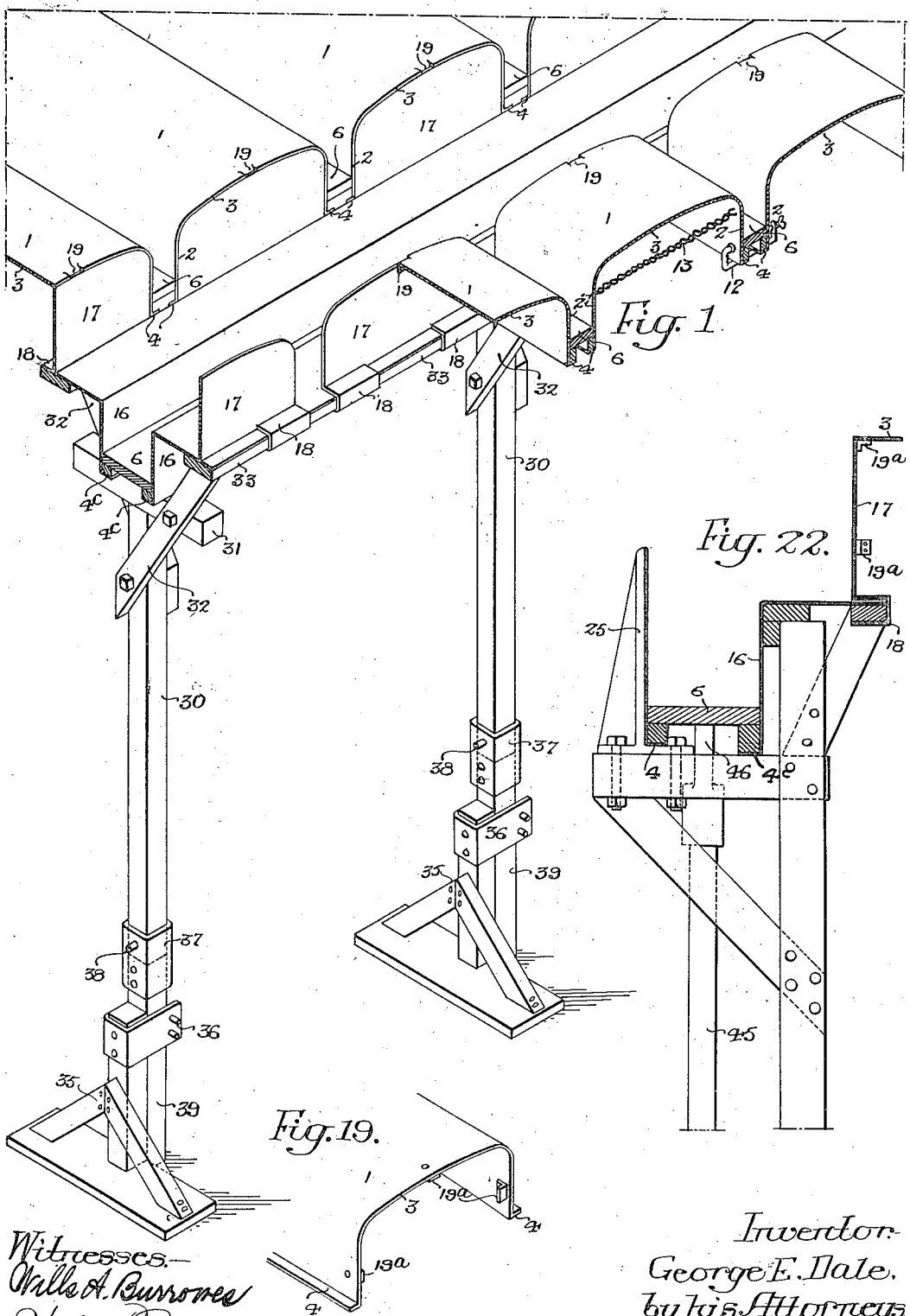


Fig. 1.

Fig. 22.

Fig. 19.

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CENTERING FORM FOR REINFORCED CONCRETE CONSTRUCTION.

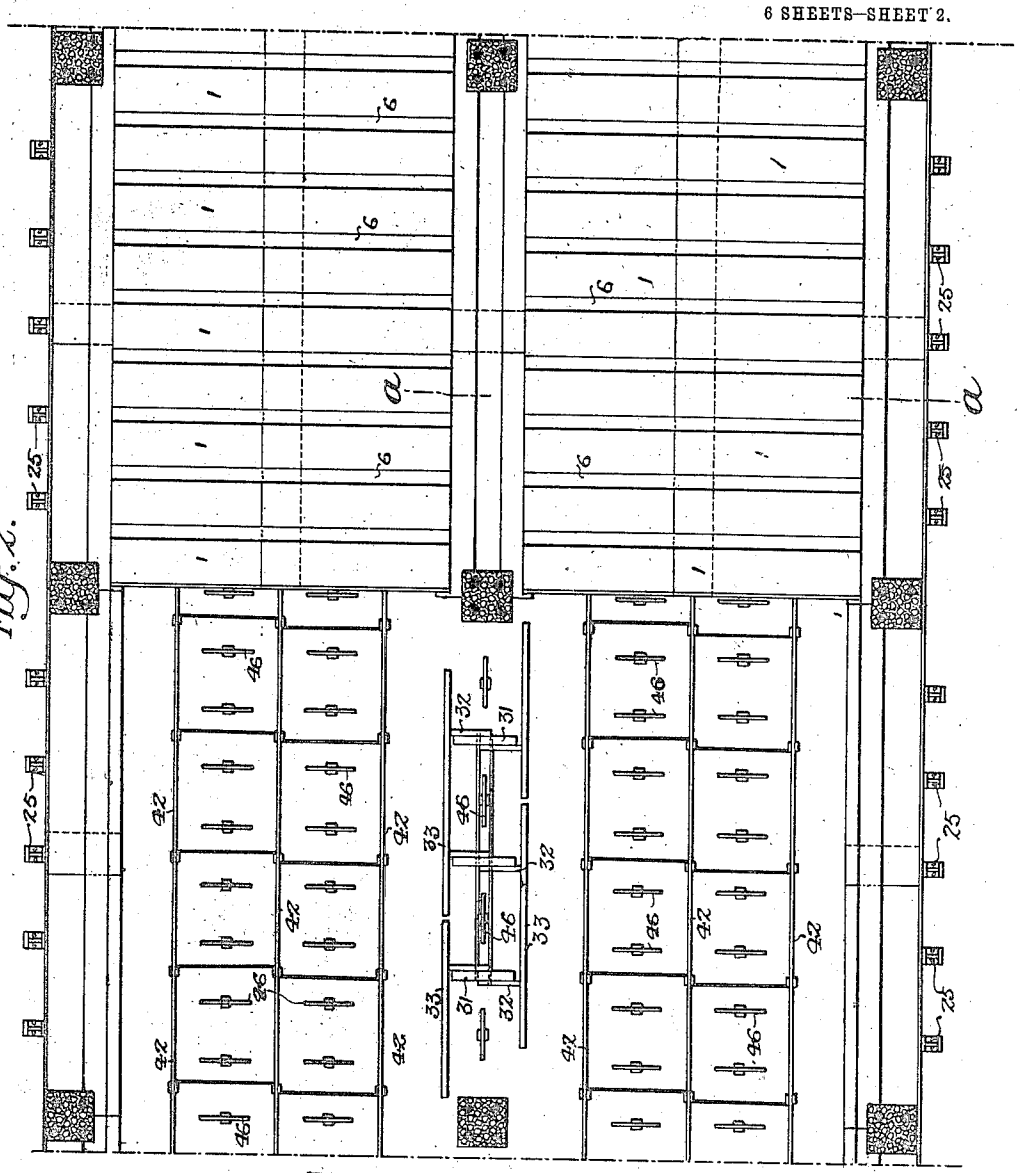
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6 SHEETS—SHEET 2.

Fig. 2.



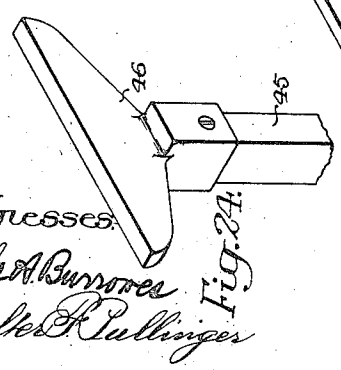


Fig. 24.

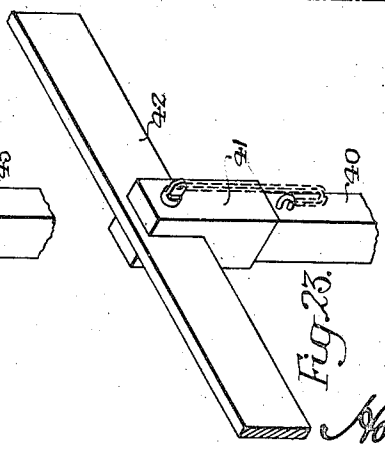


Fig. 23.

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6 SHEETS—SHEET 3.

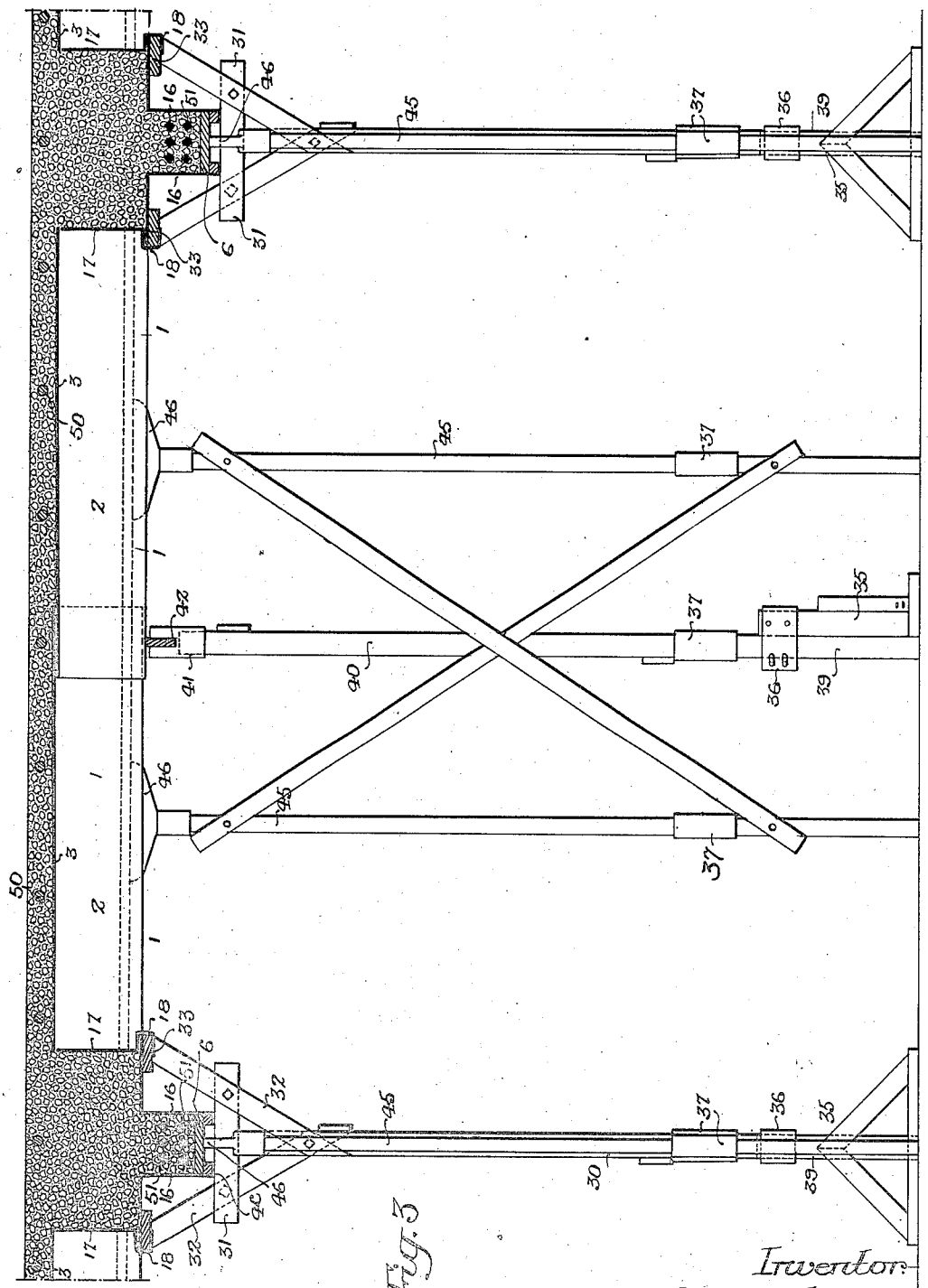


Fig. 3

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1,131,479. Patented Mar. 9, 1915.

6 SHEETS—SHEET 4.

Fig. 3.

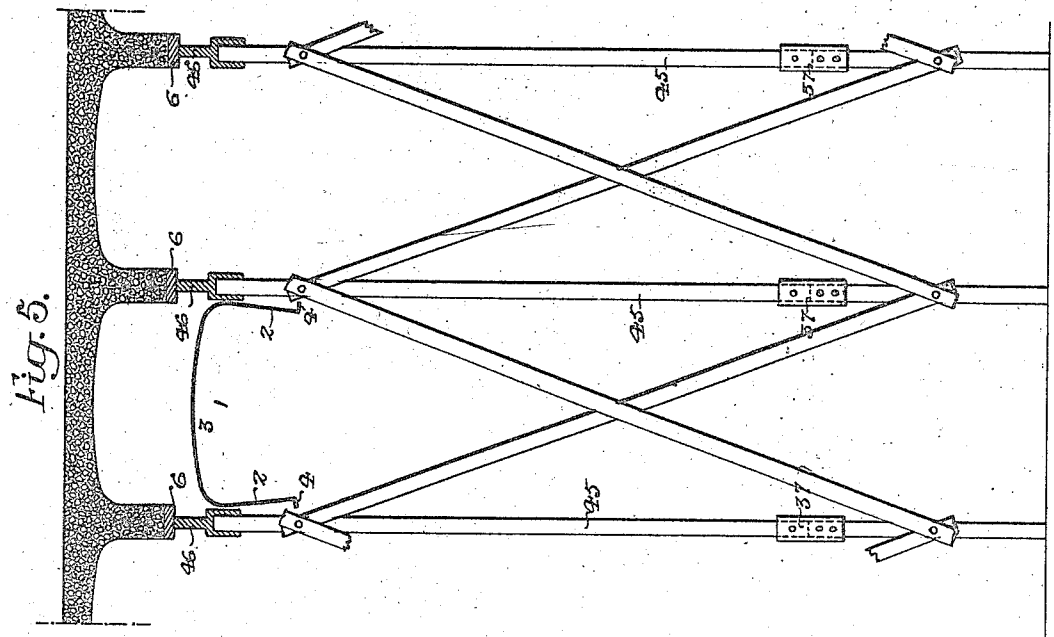
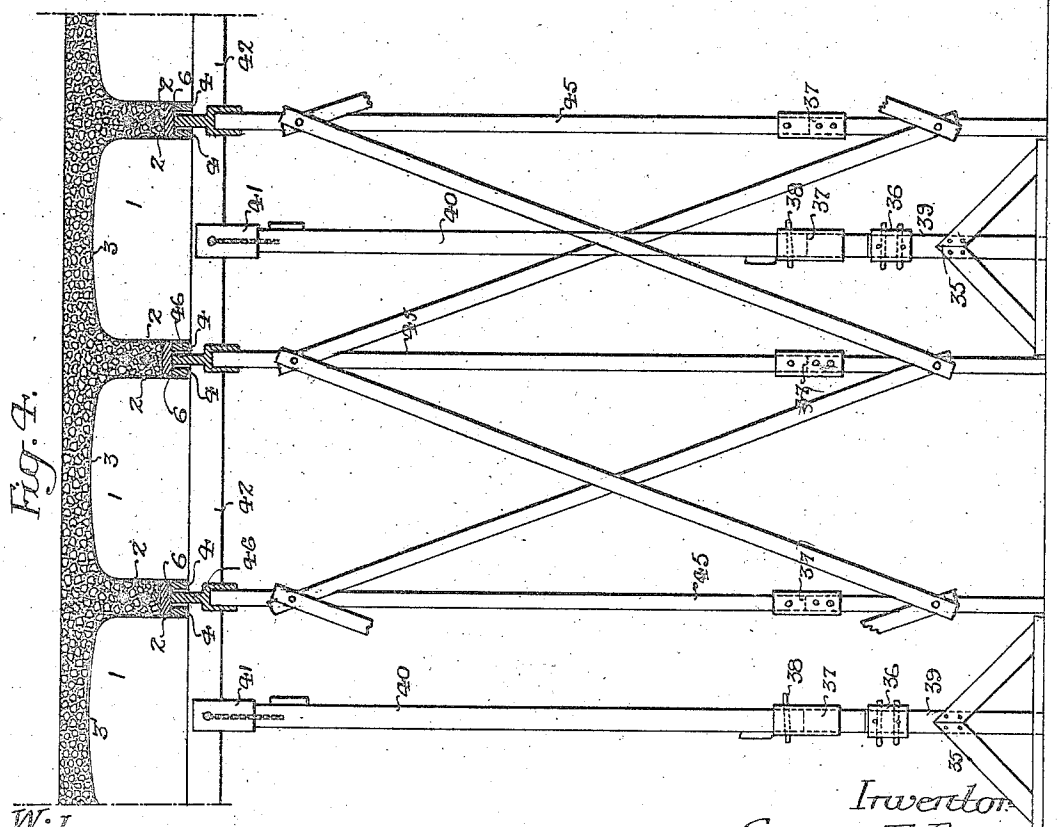


Fig. 4.



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1,131,479.

Patented Mar. 9, 1915.

6 SHEETS—SHEET 6.

Fig. 7.

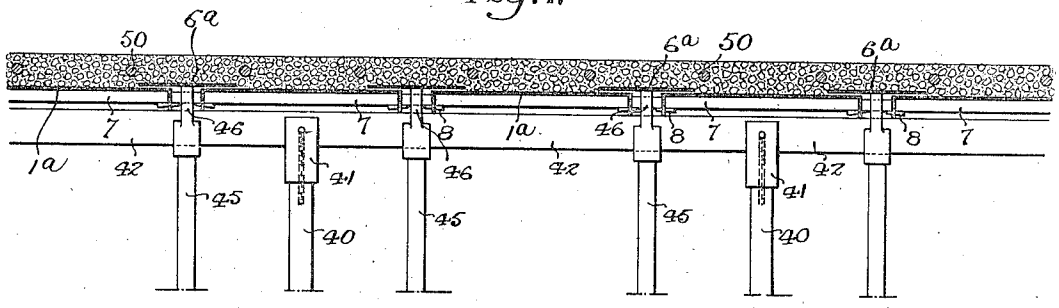


Fig. 8.

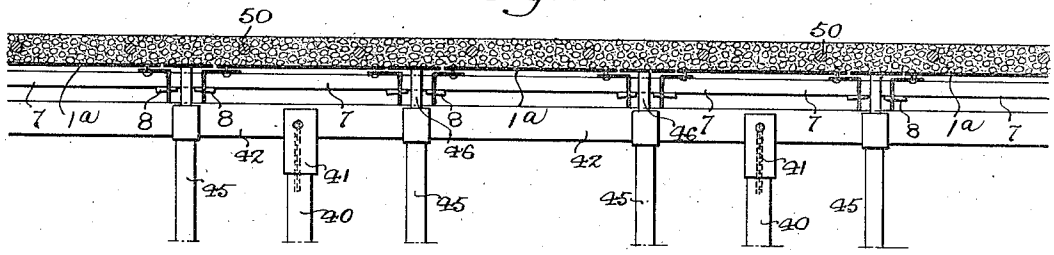


Fig. 21.

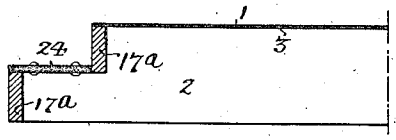


Fig. 20.

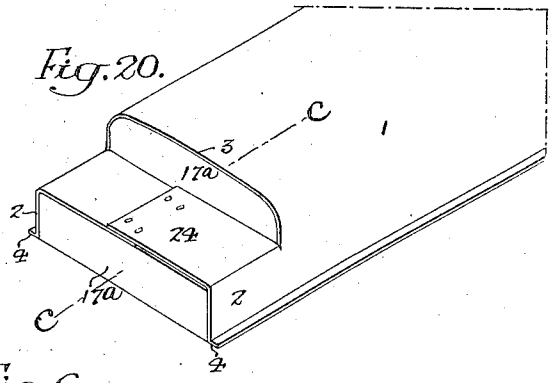
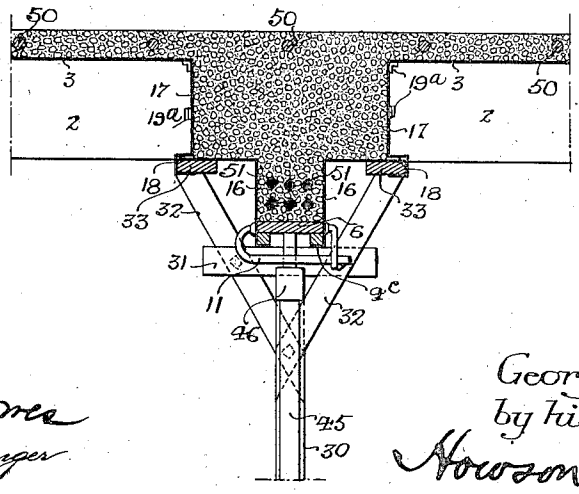


Fig. 6.



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6 SHEETS—SHEET 6.

Fig. 14.

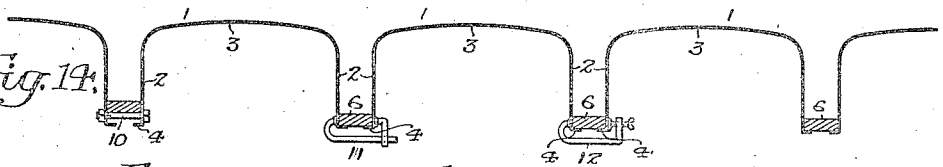


Fig. 15.

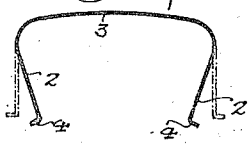


Fig. 16.

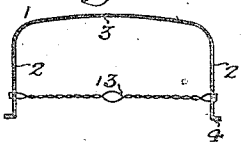


Fig. 18

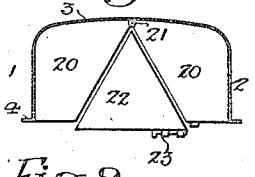


Fig. 17.

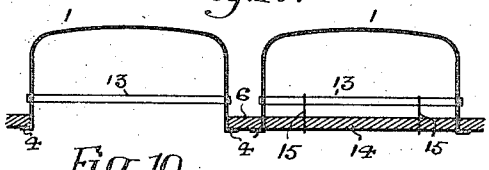


Fig. 9.

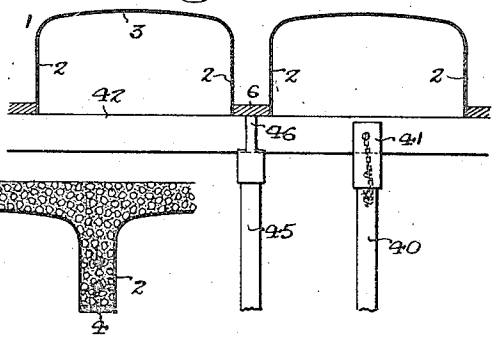


Fig. 10.

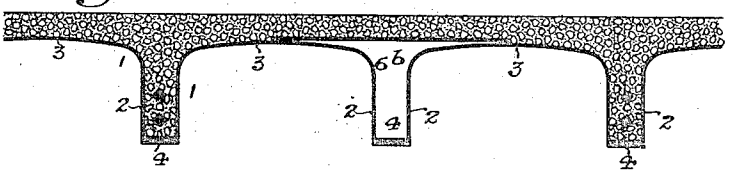


Fig. 11.

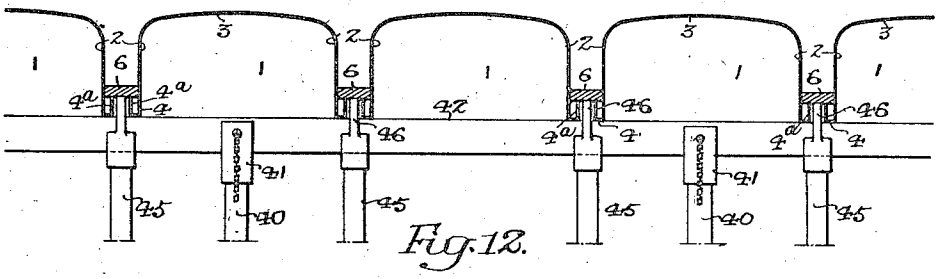


Fig. 12.

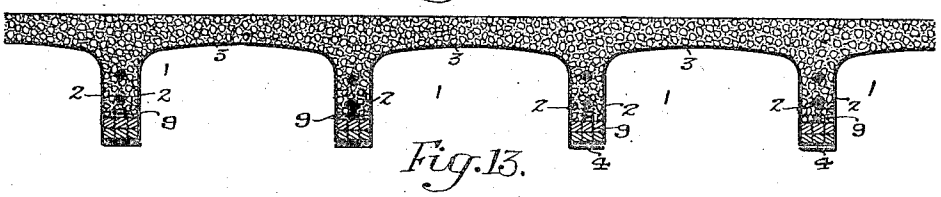
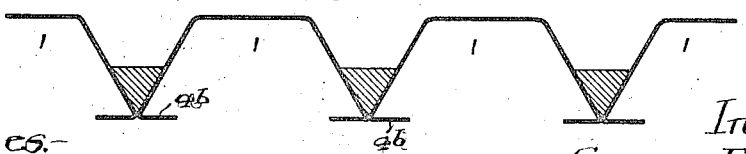


Fig. 13.



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UNITED STATES PATENT OFFICE.

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CENTERING-FORM FOR REINFORCED CONCRETE CONSTRUCTION.

1,131,479. Specification of Letters Patent. Patented Mar. 9, 1915.

Application filed February 10, 1909. Serial No. 477,047.

To all whom it may concern:

Be it known that I, GEORGE E. DALE, a citizen of the United States, and a resident of Trenton, Mercer county, New Jersey, have invented certain Improvements in Centering-Forms for Reinforced Concrete Construction, of which the following is a specification.

My invention relates to means employed in the erection of concrete structures, more particularly those of the monolithic type wherein the supporting columns, beams, girders, walls and floors, (and by the latter term I refer also to the ceiling and roof,) are composed of solid masses of concrete reinforced by the usual metal rods, bars and other reinforcing means.

In the erection of such structures, it is necessary to provide supporting forms for the columns, beams, girders, walls and floors, and at the present time wood is the agent usually employed; a condition doubtless due to its relative cheapness and comparative ease of fitting and manipulation to effect the desired results. Practice has demonstrated, however, that wooden forms cannot withstand damage incident to constant change and removal, and that they are, therefore, in the end highly expensive. There is also more or less difficulty in fitting wooden forms to meet certain exigencies in the erection of monolithic structures, notably at the points where the floors are to be combined with beams and girders. A further disadvantage is the necessity of maintaining the entire centering with its shoring or supporting means in place until the concrete has set to the required degree of hardness. All of these objectionable features I desire to overcome, and I propose to substitute for the wooden centering usually employed, a special form of metal centering combined with means for rendering such centering adjustable and at the same time available for the various uses necessary in the erection of concrete buildings.

The several features of centering construction and supporting means therefor embodying my invention are fully shown in the accompanying drawings, in which:

Figure 1, is a perspective view, showing my improved metallic centers in position for the formation of a concrete beam or girder and floor, in a solid mass; Fig. 2, is a plan view of a portion of a building showing the metallic centering forming the subject of my invention set in place in one part of such view, and the staging for supporting the same, shown in another part of such view; Fig. 3, is a sectional view of the centering on the line *a*—*a*, Fig. 2, showing the beam or girder centering and the floor centering disposed adjacent the same and at right angles thereto, after the concrete has been poured; Figs. 4 and 5, are sectional views of the floor centering on the line *b*—*b*, Fig. 2, showing the staging or supporting means therefor, the concrete having been poured; Fig. 5, showing the floor slab after the metal centering has been removed; such slab being supported by shoring independent of the shoring for supporting the metal centering; Fig. 6 is a sectional view of the centering for the beam or girder, showing also the clamping means for such centering and the independent supporting means or shoring for the centering and the girder; Figs. 7, 8 and 9, are views illustrating modified forms of centering for floor slab construction; Fig. 10, is a sectional view of a floor slab poured upon a metal centering embodying my invention, showing the use of a bridging piece to reduce the number of concrete joists when the floor slabs are relatively light; Figs. 11 to 18, both inclusive, are views illustrating various forms of metallic centering and accessories illustrating various modifications of my invention, more fully referred to hereinafter; Fig. 19, is a perspective view of the end of a metal center illustrating a detail of my invention; Fig. 20, is a perspective view of a modified form of centering for floor slabs; Fig. 21, is a sectional view on the line *c*—*c*, Fig. 20; Fig. 22, is a sectional view illustrating a form of lintel centering and shoring means therefor, and Figs. 23 and 24, are views illustrating details of my improved shoring.

In providing supporting or centering means for concrete construction, my purpose is two-fold: first, that it be of the most substantial character possible, and second, that it be so arranged as to be capable of removal very soon after the initial setting of the concrete. The supporting means for such centering and concrete are duplex in character;

that is to say, I provide shoring or supports for the centering forms, which shoring is designed to support the forms only, independent of any concrete which may be subsequently poured upon such centering, and independent shoring to take the load of concrete poured upon and shaped by such centering. In arranging this staging, I first erect supports or shores for the girder or beam centering extending between the columns, and these supports will range in parallel lines at the proper designated distance apart. I next arrange the supports or shores for the floor centering; such shores being disposed in lines between the rows of columns and the floor centering is laid thereon at right angles to the girder or beam centering. I then provide supports or shores to take the weight of the concrete, and these latter supports are arranged beneath spacing or filling members disposed between the sections of centering for both beams or girders and floors and are designed to support the greater weight of concrete while it is being poured and the full weight after the centers have been removed.

The centering for floor slab construction made in accordance with my invention, consists of metallic channel members 1 having relatively parallel walls 2, connected, in the preferred form, by an arched top 3, integral with said walls; and the latter having, in most instances, side projections 4, usually horizontally disposed, extending the full length of the channel members. These centers or forms may be of various contours, preserving the general design described. They may be arched from the projecting ledges 4 in full curves; they may be provided with flat tops joining the side walls and curve but slightly at the bend; they may be made in sections joined at the top; the projecting ledges may be omitted; they may be of substantially flat channel sections, and they may be of built up sections. These centering members are in various lengths as may be desired, and they are of such proportion with relation to each other that other sections of the same contour may be telescoped therewith for the purpose of spanning the distance between beams or girders. When in use the centering forms are supported upon suitable shoring timbers. When two or more sections are necessary to span a given distance, their joint will be properly shored to insure support of the floor. These center forms may be laid in such manner, shown, for instance in Figs. 10 and 12, that when removing the centering sections, the alternate ones may be first dislodged and then the others. To accomplish this result, the forms may be laid so that the projecting ledges of every other one will lie on top of the adjacent members, with the ledges of said adjacent members beneath those of the others; such arrangement permitting the removal of the form sections whose ledges are lowermost. I prefer, however, to provide the forms with narrow projecting ledges 4, as shown in Figs. 1, 4, 5, *et seq.*, and to provide for the full width of the joists which will be formed by the concrete poured between the side walls of the centering forms, by the use of spacing members 6 resting on said ledges 4. As usually employed, it is desirable to make the centering forms or sections of standard dimensions in substantially the proportions indicated in the drawings. It will be understood, however, that in many instances it may be desirable to provide a floor or ceiling having "joists" considerably less in depth than that provided by the centering, and to accomplish this result I may employ filling means shown in several of the views of the drawings. In the broadest embodiment of my invention, such means comprise filling members 6 of regular thickness which may be placed in the space between the vertical walls of adjacent centering forms, shortening the depth of the same to the extent of the filler and thereby decreasing the depth of the joists which would be formed by concrete entering said spaces. While such arrangement may be employed with the form of centering shown in Figs. 10 and 12, such centering would have to remain in place until the concrete has set to the desired degree. In order that my improved centering may be rendered of much greater value and capable of repeated use on the same job, without the necessity of leaving it in place for the full setting period of the concrete, I prefer a form of structure wherein the side projections of the centering members are comparatively narrow and serve to support a filling or spacing member 6 to form the bottom of the mold or form to receive the concrete, such members being shored from below by independent supporting means and bearing the weight of the concrete deposited upon the centering.

In the erection of floors relatively light, it may be unnecessary to provide the joists which are formed by the concrete between the side walls of the centering, and for such purpose I may employ channel sections 1^a such as shown in Figs. 7 and 8. In the use of such centering it will be desirable to stiffen the centering and for this purpose the flanges of the channels are apertured to receive stiffening bars 7, which are preferably held tightly in place by means of wedges 8. Between adjoining channels, spacing or bridging plates 6^a will be employed, supported in the usual manner by shoring independent of the shoring for the centering.

Fig. 9, shows a form of centering in which the projecting ledges are omitted, the filling

members disposed between the side walls of the centering being supported initially by the shoring for said centering and subsequently by the independent shores which take the weight of the concrete. Under normal conditions, it is desirable that the floor or ceiling produced shall have joists at definite distances, as indicated. When the floor or ceiling is of relatively light construction, however, it is possible to omit several of said joists, and in Fig. 10, I have illustrated a construction in which the forms are bridged by a flat metal plate 6^b which serves to support the concrete and may be removed in the usual manner. With such arrangement, it will be possible to shore the plate independently of the shoring for the arched metal forms so the latter may be removed without affecting the shoring underlying the joists and supporting the greater weight of the whole floor.

In Fig. 11, I have shown the projecting ledges 4 at the lower portions of the side walls as provided with turned up flanges 4^a which support the spacing or filling members and serve to decrease the depth of the joists.

Fig. 12, shows the use of centering with lapping ledges, and a series of filling members supported thereby. This view also shows wire ties 9 embedded in the concrete and designed to be subsequently used to secure metal lathing to said joists for receiving ceiling plaster. The wire ties are disposed in apertures in the spacing members 6.

Fig. 13, shows a form of centering in which the ledges or flanges 4^b of the channel members forming the centering are turned inwardly. In this instance the side walls of the channel members are inclined and the filling members are wedge-shaped.

When center forms of the arched type are employed, it is desirable to hold the side walls of adjacent sections together, and for this purpose I may employ the clamping means illustrated in Fig. 14. In one instance bolts, one of which is shown at 10, may be employed; or I may employ clamps, that shown at 11 being of a wedging type, while that shown at 12, is of the screw type.

It may be desirable to give the side walls of the centering forms a slight inward bend as shown in Fig. 15, and hold them out to the desired shape by means of such clamps; the bend so given tending to cause the form to spring away from the concrete after the clamps have been removed and it is desired to remove the centering. In other instances, I may apply wires 13 between the side walls of the centers, such as shown in Figs. 16 and 17, which upon twisting will tend to pull said walls together and permit the removal of the same. In other instances, it may be desirable to employ braces 14 lying between the side walls of the individual center forms instead of the clamps engaging the side walls of adjacent forms, such braces being shown in Fig. 17. This figure also shows the wires 13, and the braces 14 may be hung from said wires 13 by supports 15, as indicated.

In order to form with the floor slabs the integral beams or girders, I provide centering forms for the latter, which are clearly shown in Figs. 1, 3 and 6. In the present instance, the girder centering consists of metal members 16, substantially L-shaped in cross section; the lower portion of such members having inwardly disposed ledges or flanges 4^c to support filling or spacing members 6 which are shored independently of the girder or beam centering. The girder or beam centering may be made in standard lengths and may be lapped when a plurality of sections are necessary to span the distance between columns. The spacing or filling members forming the bottoms of the girder or beam molds are supported and shored in a manner precisely similar to that indicated with respect to the floor centering. When constructing the floor and beam or girder, it is necessary, of course, that the concrete for the floor, and its joists when the latter form part of the same, shall flow and become integrally connected with the concrete of the girder, and hence it is necessary to provide means whereby the ends of the floor centers may be filled to prevent the escape of concrete, such filling means to be of sufficient strength and resistance as to support such concrete when it has been poured into place, and in Figs. 1, 3, 6, 18, 19, 20, 21 and 22, I have shown several means of accomplishing this result.

In Figs. 1, 3 and 6, I have shown a filler for the ends of the floor centers, consisting of a plate 17, of substantially the same contour as said floor centers. This plate may be secured in position in many ways, but I have shown it as provided with a plurality of clamping portions 18, which embrace the upper portion of the girder centering and the support for the same, such clamping means holding the filling member in a vertical position. In order to prevent the concrete from pushing the end filling plates into the forms, the latter may be provided with projections 19, in the top wall of the same, formed by slitting and bending down a portion of the metal, as shown in Fig. 1. In lieu of this the ends of the forms may be provided with angle members 19^a as shown in Figs. 3, 6, 19 and 22.

Another manner of accomplishing the desired result is to fill the ends of the floor centering with a sectional member such as is shown in Fig. 18. This comprises members 20, hinged at 21 and filling the curved portion of the section. With them is employed

a wedging member 22 which may be held in place by a bolt 23. These filler blocks are preferably of a removable type in order that they may be dislodged prior to other portions of the structure, and if desired, they may cap the arched centers and be removed with the same. In all instances they must be so connected to the floor centers as to resist the flow of the concrete through the ends of the same, and to be readily removable permitting the dislodgment of the several metal forms. In some instances it may be desirable to form the girder centering with projections in line with the floor centering and over which the latter might fit, but as this construction demands perfect correlation between the beam centering and the floor centering, it tends to destroy complete adaptability of the structure forming the subject of my invention, and hence I do not prefer to use the same. In other instances it may be desirable to rabbet the ends of the floor centering and combine the same with a modified form of girder centering. In such instance I arrange the floor centers as shown in Figs. 20 and 21, the tops of such centers being cut and split in the manner shown so as to lap and form a substantially horizontal portion 24, the parts of which may be riveted together. The otherwise open ends of this form of center will have filling blocks or plates 17^a to prevent the flow of concrete.

In addition to the centering forms for the floor and the beams or girders, it is necessary to provide centering for the lintels of the building, such structures being those portions of the outer walls between the columns. The arrangement of the centering for this purpose is fully shown in Fig. 22. One side of such centering consists substantially of one of the beam or girder forms or centers, suitably shored and having the ends of the floor centers resting thereon. The usual filling member for the end of the floor centering will be combined with such lintel form. On the outer side of the lintel a metal plate will be mounted which will be braced by a metal bracket 25, carried by the shoring timbers. The bottom of the lintel formed will be closed by a filling or spacing member 6, independently shored as described. In this instance, as in all the other forms of the centering described and illustrated, the filling or spacing members may rest directly upon the ledges 4 or 4^c of the centering sections, or upon spacing strips carried by said ledges.

The centering for the floors, beams, girders and lintels before referred to is to be supported by suitable staging or shoring, which may be adjustable in height and is preferably braced at intervals in order that it may be completely self-supporting. In the arrangement of this staging, I proceed to erect supports for the girder or beam centering extending between the columns, and these supports will range in parallel lines at the proper designated distance apart. Such supports will consist of uprights 30 carrying short cross-pieces 31 at the upper ends set at right angles thereto and designed to support the lower portion of the girder or beam centering, with angle struts 32 connected to said uprights and the cross pieces, the upper ends of which struts support longitudinal members 33 upon which the upper portion of the girder or beam centering rests. In the present instance, the girder centering consists of metal members, substantially L-shaped in cross section; the lower portion of such members having the inwardly projecting ledges 4^c being supported on the horizontal cross pieces of the uprights while the upper projection is supported by the longitudinal members carried by the upper end of the angle struts.

When it is desired to form a beam or girder for use with a floor, roof or ceiling, I provide a supporting structure of the character shown in Figs. 1 and 3. In this structure, I provide the shoring just described. The longitudinal supporting members 33 running the length of the floor section to be built also receive the ends of the floor centering forms. Disposed at right angles to the floor centering and carried by the longitudinal members 33 as well as the cross-pieces 31 are the angle plates 16 which serve as a combined support and form for the beam or girder to be poured. The lower inner edges of these members 16 have inwardly projecting portions 4^c upon which I may mount strips supporting a filling member 6. Such filling member is shored independently of the centering members 16 so that if it is desired to remove said latter members, together with the floor centers or supports at any time prior to the final setting or hardening of the concrete, it may be done without affecting the actual support of the beam. In erecting the shoring, I employ self-supporting removable base members 35, which may be temporarily secured to the uprights 30, by means of metal straps 36, and when two rows of said uprights have been erected the proper distance apart, they may be connected together and braced by suitable cross members diagonally placed, after which the bases may be removed and employed for the erection of a further set of shoring uprights.

Between each set of beam centering forms the centering forms for the floor slabs are mounted, and these may be in sections extending the full length between beams or in shorter sections telescoping each other, depending entirely upon the width of well to be spanned. In some instances, it may be, and in most instances it will be desirable to furnish shoring supports for these forms independently of the shoring

for the beam forms. The vertical members of the shoring may be provided with sleeves 37 forming sockets which may be slidable with respect thereto and supported by pins 38 passing through said vertical members, or the sockets may be fixed. Below the socket portion a section 39 is provided which determines the actual height of the shore; such section being cut before use so that its length combined with the upper portion of the vertical support will be sufficient to fill the desired distance between the base and the under side of the bottom of the beam or girder form. To support the centering, I may employ uprights 40 having slotted metal caps 41, as fully shown in Fig. 23, to receive a board 42 set edgewise, which board may be of a dimension substantially one inch by six inches, or any other convenient size available. These centering supports or forms will be disposed intermediate the supporting means for the spacing or filling members underlying the joists, and independently of the latter, so that when removed the metal forms can be removed without interfering with the spacing supports which sustain the load of concrete.

As before indicated and as shown in the drawings, the filling or spacing members 6 forming the bottom of the joist molds of the floor centering are disposed between the side walls of the sections of such centering. These supports may be metal sheets or boards, and when it is desired to shorten the depth of the joist, a number of filling members may be placed at this point to cut down the amount of concrete employed. The supports for these spacing members will consist of uprights 45 carrying at their upper ends cross pieces 46 disposed in line with said supporting spacing members, and by preference I employ metal members secured to the upper ends of said uprights and they may be of a length not less than two feet, or any other suitable length desired, although their length will depend very largely upon the width of the well between the girders. By this arrangement, the metal centering forms, nominally supporting by far the lesser bulk of the concrete, may be removed after two or three days; the shoring 45 beneath the filling or spacing members underlying the joists being left in place until the concrete sets, and the metal forms thus removed may be employed for another portion of the floor or another structure without the long wait usually necessary when wooden forms with the usual shoring are employed which must remain in place the full period.

The members forming the several shoring uprights are connected together by sleeves, which may be permanently secured to one portion of such uprights or detachably held by means of pins. The board or supporting member 42 carried by the metal caps may also be temporarily secured thereto by removable pins; such connections facilitating the removal of such shoring. The shoring for the beam and girder forms may be bolted together, if desired; such bolts being readily removable when the centering is to be removed. It will be understood that all of the shoring is in place before the concrete is poured so that in removing the shoring for the centering and subsequently the centering itself there will be no disturbance of the shoring underlying the beams or girders, or the lintels and the joists of the floor slabs.

In the erection of monolithic structures, it is, of course, understood that the walls and columns will be joined integrally with the floors, beams and girders, and in a companion application filed February 10, 1909, Serial No. 477,048, I have shown the further embodiment of my invention consisting of column and wall supports of metal, preferably of channel shape, strengthened and reinforced and adjustable for various purposes. These forms will be available for use with the beam or girder and floor centering in order to effect the formation of integral, monolithic structures.

Although I have described the use of wooden timbers for the purpose of providing shoring for supporting the centering structures, it will be obvious that I may employ tubular or semi-tubular supports of metal, preferably telescoping, with pins or other means whereby they may be adjusted vertically and held when so adjusted. In the use of such metal supports, I may employ tension rods or cords connected to the floor at one end and connected at regular intervals to said supports, such stays running in both directions so that the members forming the supports will be maintained in proper vertical position with respect to any and all forms of centering which they support. It will be understood, of course, that these metal members may carry the metal cap pieces before described, in the one instance to support the spacing members beneath the joists, and in the other instance to support the notched or slotted members which carry the boards set on edge to form the shoring for the metallic centering forms.

I claim:

1. Centering for concrete floor and ceiling construction, comprising channel members having side flanges, supports for said members, spacing means disposed between said channel members and carried by the flanges, and independent supports for said spacing means.

2. Centering for concrete floor and ceiling construction, comprising metal channel members having side flanges and spaced apart, supports for said members, bridging means carried by said flanges and spanning

the space between said channel members, and independent supports for said bridging means.

3. Centering for concrete floor and ceiling construction, comprising integral channel members, supports for said members, spacing means disposed between said channel members, clamps for the adjacent walls of independent channel members retaining the spacing means in place, and independent supports for said spacing means.

4. Centering for concrete floor and ceiling construction, comprising a plurality of channel members integral throughout and having side walls terminating in lateral flanges, supports for said members, spacing means disposed between the side walls of adjacent members, clamps in engagement with said side walls for retaining the spacing means in place, and independent supports for said spacing means.

5. Centering for concrete floor and ceiling construction, comprising flanged members having substantially horizontal portions between said flanges, said members being spaced apart, supports for said flanged members, bridging pieces overlying the spaces between said flanged members, and independent supports for said bridging pieces.

6. Centering for concrete construction, comprising metallic girder forms spaced apart and presenting T-shaped spaces when set in place, lateral flanges carried by said girder forms, filling pieces mounted on said flanges, separable bottoms mounted on said filling pieces, supports for the girder forms, and independent supports for said bottoms.

7. Centering for concrete construction, comprising metallic girder forms made up of a pair of integral angled members spaced apart and presenting T-shaped spaces when set in place, lateral flanges carried by said girder forms, filling pieces mounted on said flanges, separable bottoms mounted on said filling pieces, supports for the girder forms, independent supports for said bottoms, and floor centering disposed at right angles to said girder forms and having its ends supported by the same.

8. Centering for concrete girder, floor and ceiling construction, comprising metallic members substantially L-shaped in cross section, lateral flanges carried by the lower part of said L-shaped members, bottom pieces serving as spacing and filling members mounted on said flanges, supports for said L-shaped forms, independent supports for the bottom pieces, metallic floor or ceiling forms having their ends mounted on said L-shaped members and disposed substantially at right angles to the latter, and independent supports for said floor or ceiling forms.

9. Centering for concrete girder, floor and ceiling construction, comprising metallic girder forms substantially L-shaped in cross section and spaced apart, supports for the same, filling pieces disposed between the substantially vertical walls of said L-shaped members, independent supports for said filling pieces, channel sections forming floor or ceiling forms disposed at right angles to the girder forms and having their ends mounted on the latter, and filling pieces for the ends of said channel forms clamped to the girder forms.

10. Centering for concrete girder, floor and ceiling construction, comprising metallic girder forms substantially L-shaped in cross section and spaced apart, supports for the same, filling pieces disposed between the substantially vertical walls of said L-shaped members, independent supports for said filling pieces, channel sections forming floor or ceiling forms disposed at right angles to the girder forms and having their ends mounted on the latter, filling pieces for the ends of said channel forms clamped to the girder forms, and means carried by said channel sections to brace the upper ends of said filling pieces.

11. Removable centering for concrete floor or ceiling and beam construction, comprising arched metallic members of unitary section transversely, spacing members supported between the side walls of adjacent metallic members, shoring for the metallic members, shoring for the spacing members disposed independently of the shoring for the metallic members, the latter being independently removable, a plurality of angle members of unitary section transversely forming beam molds disposed at right angles to the metallic members and supporting one end of the latter, and filling means for the ends of the arched metallic members whereby a completely closed centering form is provided for the molding of a floor or ceiling slab and beam in a solid monolithic mass.

12. Removable centering for concrete floor or ceiling and beam construction, comprising arched metallic members of unitary section transversely, spacing members supported between the side walls of adjacent metallic members, shoring for the metallic members, shoring for the spacing members disposed independently of the shoring for the metallic members, the latter being independently removable, a plurality of angle members of unitary section transversely forming beam molds disposed at right angles to the metallic members and supporting one end the latter, filling means for the ends of the arched metallic members, and clamps for securing said filling means in place whereby a completely closed centering form is provided for the molding of a floor or ceiling slab and beam in a solid monolithic mass.

13. Centering for concrete floor and beam construction, comprising arched metallic members forming floor forms, said members having projecting flanges, spacing members mounted on said flanges, shoring for the arched metallic members, independent shoring for the spacing members, and metal caps carried by the shoring for the spacing members, the shoring for the metallic members being removable to permit their withdrawal while the shoring for the spacing members is maintained in place and supports the floor during the period of setting.

14. Centering for concrete floor and beam construction, comprising arched metallic members forming floor forms, said members having projecting flanges, spacing members supported by said flanges, shoring for the metallic members, shoring for the spacing members mounted independently of the shoring for the metallic members, angle sections forming beam molds and supports disposed at right angles to the metallic floor supports and arranged to support one end of the same, filling means for the ends of the metallic floor supports whereby the floor slab and beam may be molded in a solid monolithic mass, and means carried by the floor forms for engaging said filling means.

15. Centering for concrete floor and beam construction, comprising arched metallic members forming floor forms, spacing members mounted between said arched metallic members, shoring for the metallic members, shoring for the spacing members mounted independently of the shoring for the metallic members, angle sections forming beam molds or forms disposed at right angles to the metallic floor supports and arranged to support one end of the same, spacing means disposed between the beam molds, fillers for the ends of the metallic floor supports whereby the floor slab and beam may be molded in a solid monolithic mass, shoring for the beam molds or forms, and independent shoring for the spacing means disposed between the same.

16. The combination with arched metallic members forming centering supports for the same, of a plurality of filling members disposed between the side walls of said metallic members, and independent supports for said filling members.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEO. E. DALE.

Witnesses:
MURRAY C. BOYER,
JOS. H. KLEIN.