G. F. FISHER.

FORM FOR CONCRETE BUILDING CONSTRUCTIONS.

APPLICATION FILED DEC. 10, 1906.

957,414.

Patented May 10, 1910.

6 SHEETS—SHEET 1.

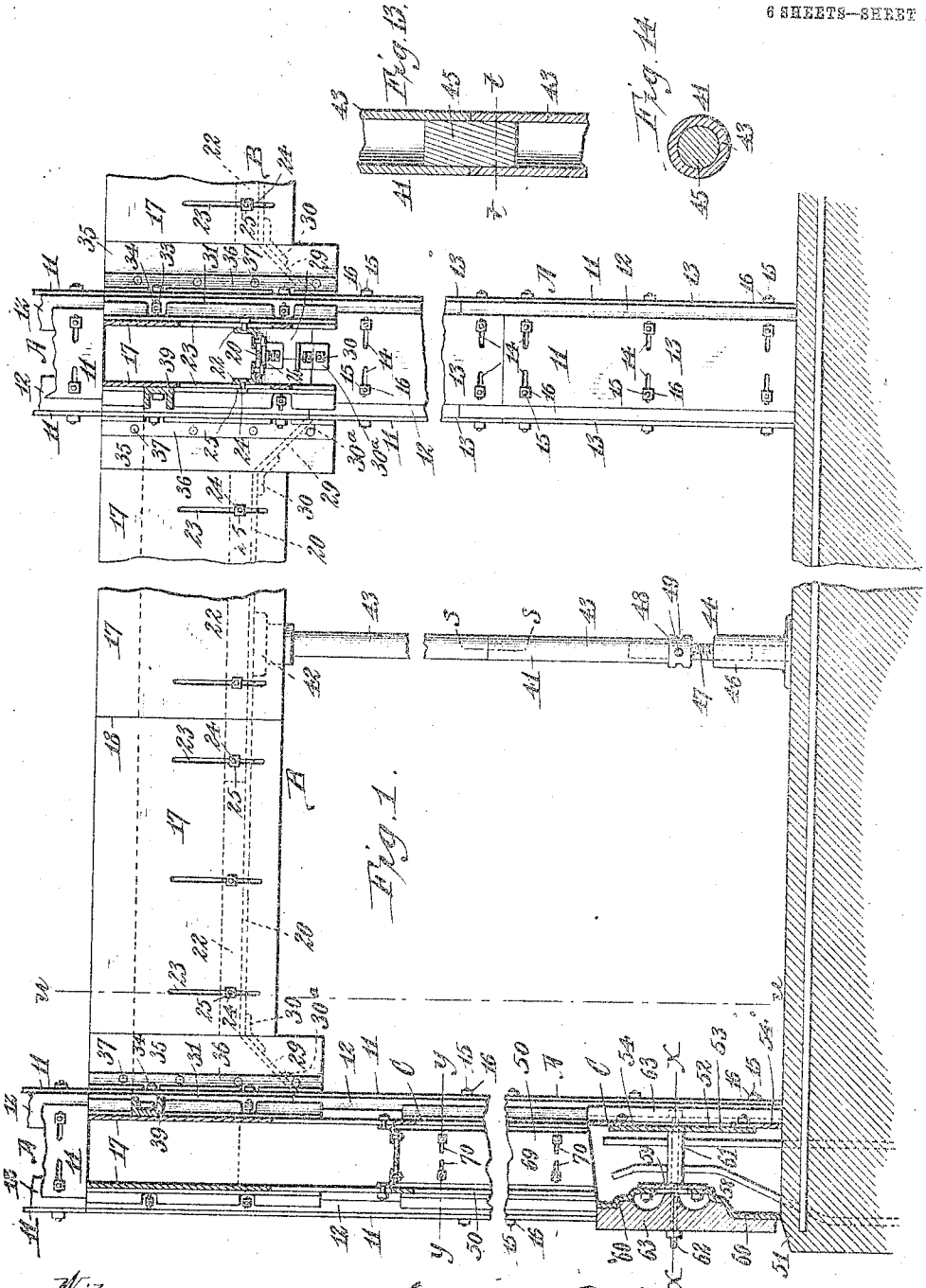

Fig. 1.

Witnesses:
Christ Feinle
Harry D. Rapp.

George F. Fisher, Inventor.
By Emil Neubert,
Attorney.

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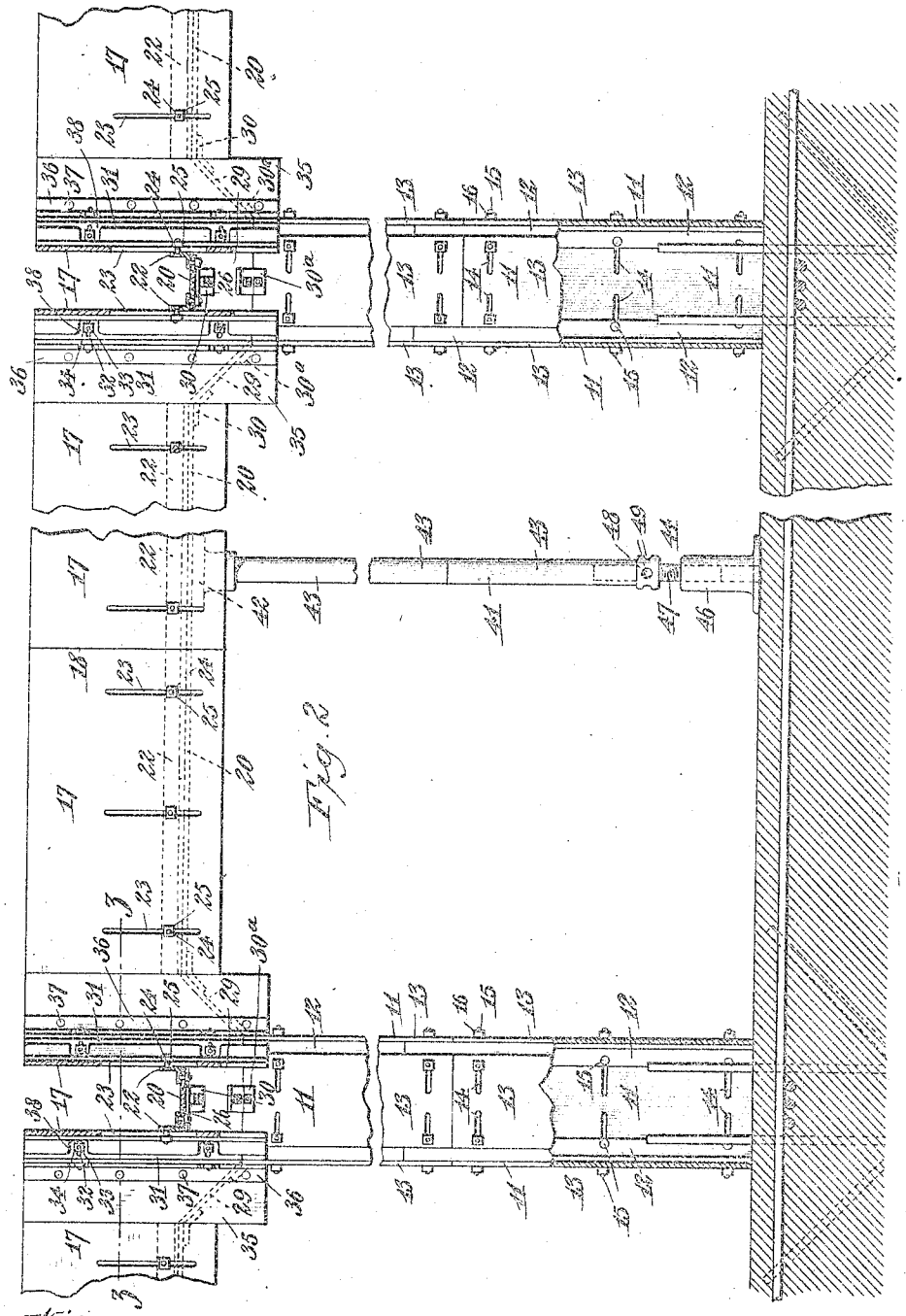

Fig. 2.

Witnesses:
Christ Feinle
Harry D. Rapp

George F. Fisher, Inventor.
By Emil Neukart,
Attorney.

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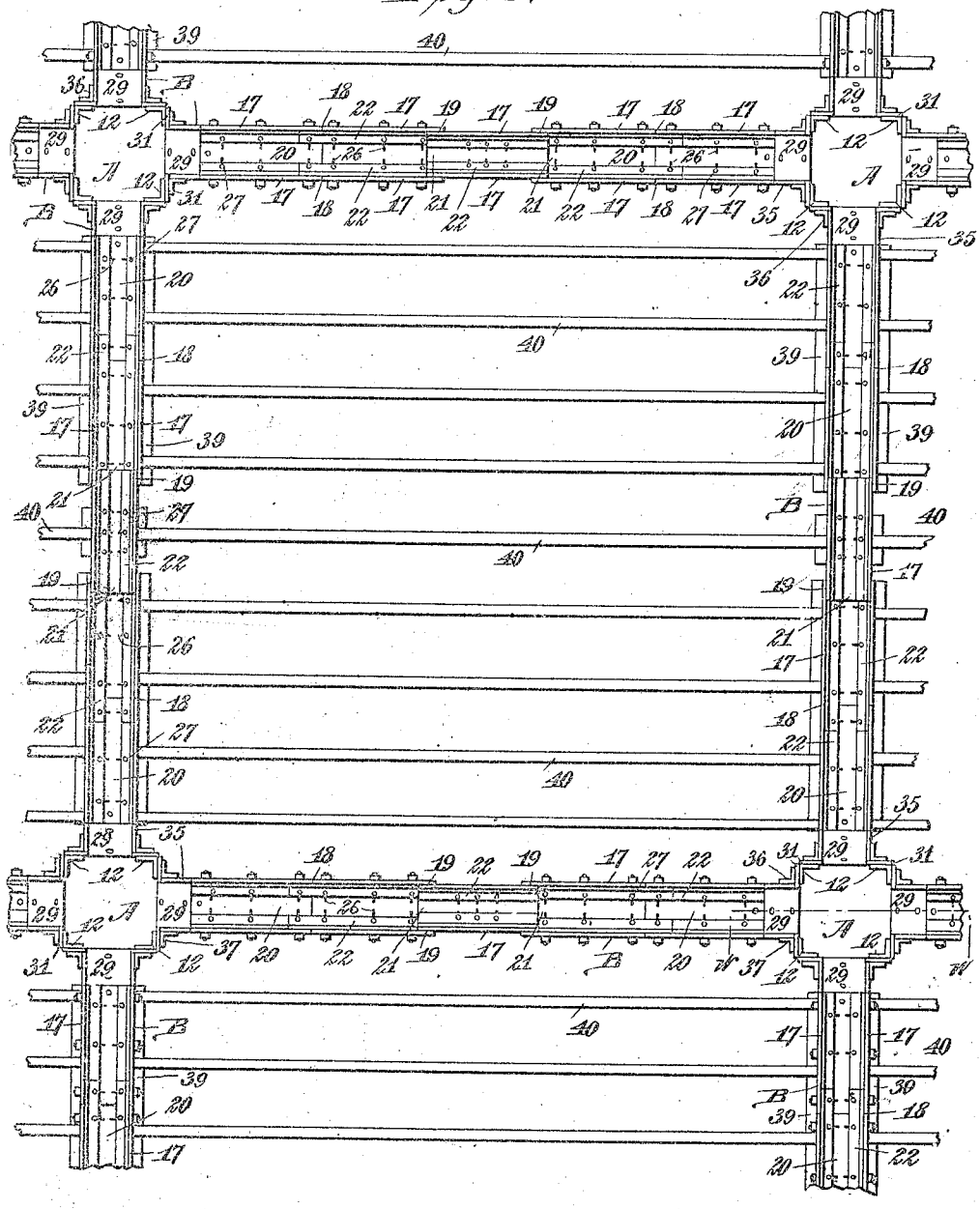
Fig. 3.



Witnesses:
Christ Feinle.
Nancy D. Rapp.

George F. Fisher, Inventor.
By Emil Neukark
Attorney.

G. F. FISHER.

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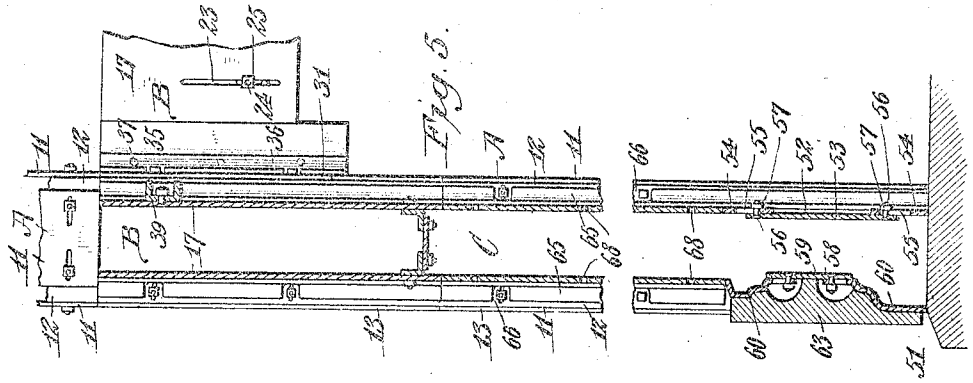

Fig. 5.

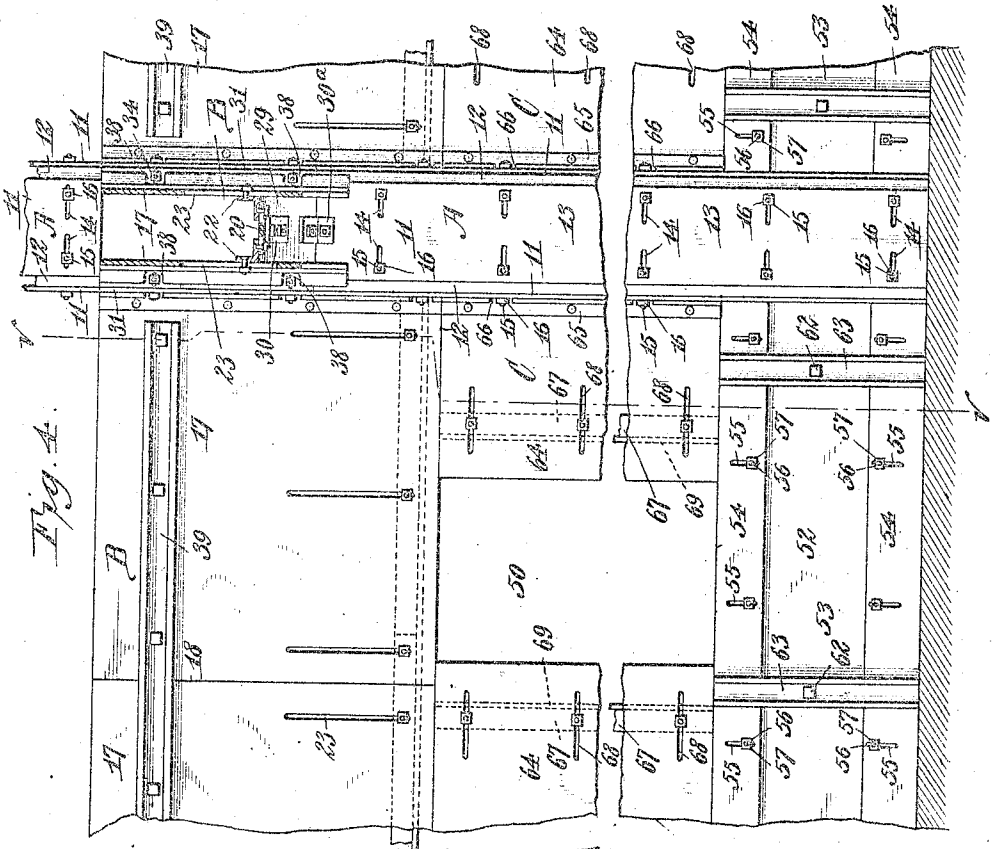

Fig. 4.

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Christ Feinle
Harry D. Rapp.

George F. Fisher, Inventor.
By Emil Neukart
Attorney.

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6 SHEETS—SHEET 5

Fig. 6.

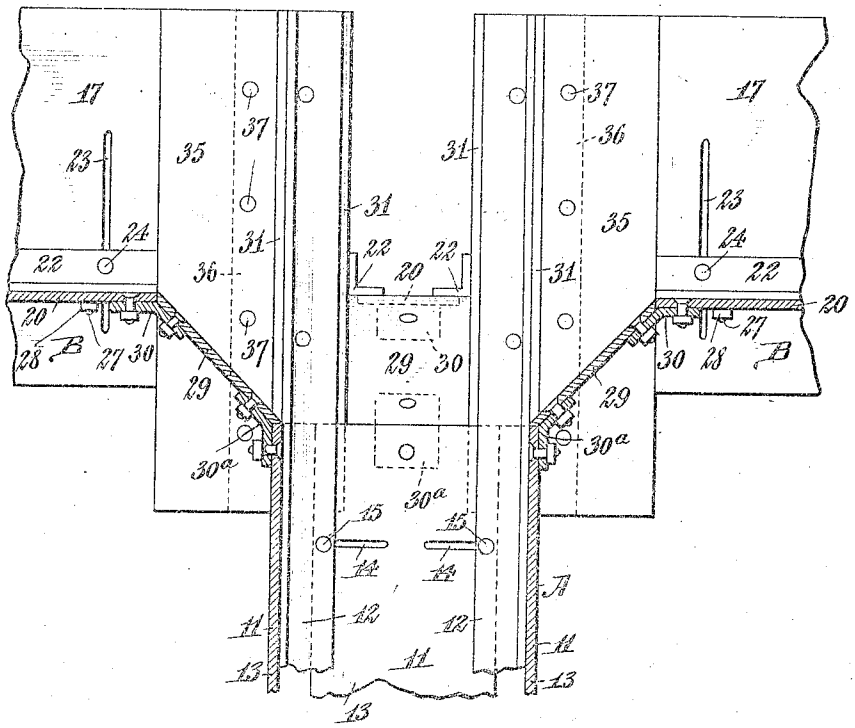


Fig. 7.

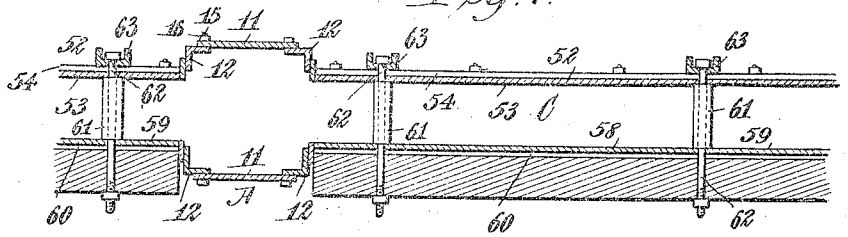
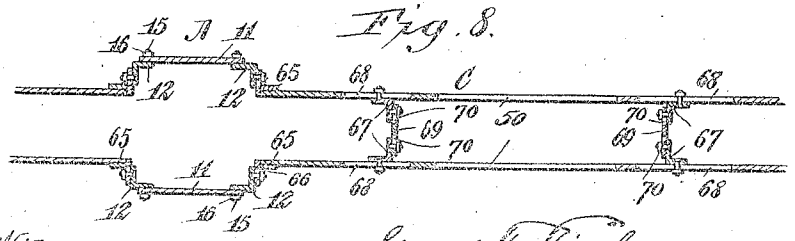


Fig. 8.



Witnesses:
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Harry D. Rapp.

George F. Fisher, Inventor.
By Emil Neuhart,
Attorney.

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6 SHEETS—SHEET 6.

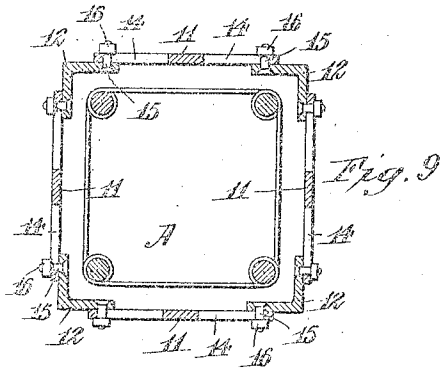

Fig. 9.

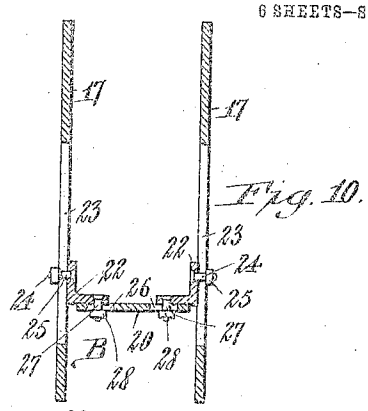

Fig. 10.

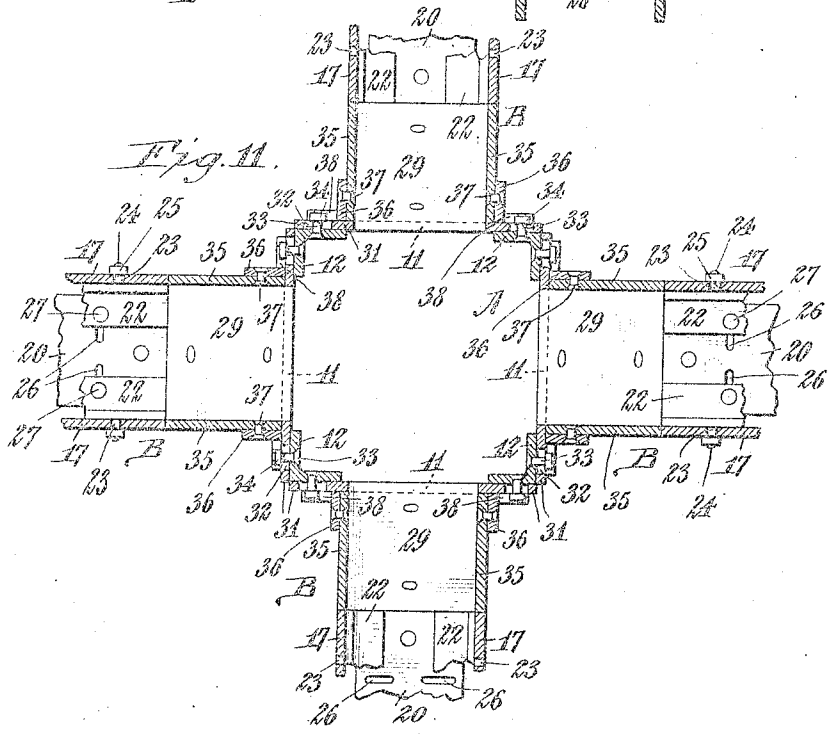

Fig. 11.

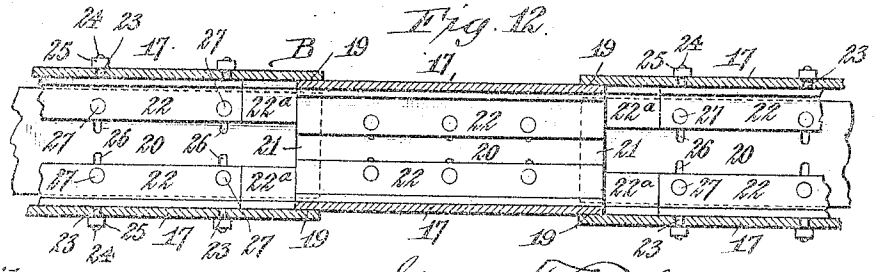

Fig. 12.

Witnesses:
Christ Feinle.
Harry D. Rapp.

George F. Fisher, Inventor:
By Emil Neubart
Attorney.

UNITED STATES PATENT OFFICE.

GEORGE F. FISHER, OF NORTH TONAWANDA, NEW YORK.

FORM FOR CONCRETE BUILDING CONSTRUCTIONS.

957,414. Specification of Letters Patent. Patented May 10, 1910.

Application filed December 10, 1906. Serial No. 347,177.

To all whom it may concern:

Be it known that I, GEORGE F. FISHER, a citizen of the United States, residing at North Tonawanda, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Forms for Concrete Building Constructions, of which the following is a specification.

This invention relates to adjustable and sectional forms for concrete building constructions, and it has for its primary object, the production of a form which can be used numerous times and adjusted to the required size in all directions for various size columns, girders, walls, and other parts of buildings.

Further objects are, to provide simple, reliable, and effective means to connect the various parts and sections of the form; to provide means for leveling and supporting the girder-sections of the form; and to otherwise improve on forms for concrete building constructions now in use.

To these ends the invention consists in the construction, arrangement, and combination of parts to be hereinafter described and particularly pointed out in the appended claims.

The invention is illustrated in the accompanying drawings, in which similar numerals and letters of reference refer to similar parts throughout the several views.

Figure 1 is a broken sectional elevation of a part of my improved form including the side wall-form with window-openings, a girder form supported at one end from said wall-form, and a column-form supporting the opposite end of the girder-form. Fig. 2 is a broken sectional elevation of a part of my improved form including interior column-forms and girder-forms receiving support from said column-forms. Fig. 3 is a plan view of a part of the form including interior column-forms and girder-forms supported thereon. Fig. 4 is a vertical section, taken on line *u—u*, Fig. 1, looking to the left. Fig. 5 is a vertical section taken on line *v—v*, Fig. 4. Fig. 6 is an enlarged vertical section taken on line *w—w*, Fig. 3. Fig. 7 is a horizontal section taken on line *x—x*, Fig. 1. Fig. 8 is a horizontal section taken on line *y—y*, Fig. 1. Fig. 9 is an enlarged cross-section through a column-form. Fig. 10 is an enlarged cross-section taken through a girder-form. Fig. 11 is an enlarged horizontal section taken on line *z—z*, Fig. 2. Fig. 12 is an enlarged horizontal section taken through the intermediate portion of the girder-form. Fig. 13 is an enlarged vertical section, taken on line *s—s*, Fig. 1. Fig. 14 is a cross-section, taken on line *t—t*, Fig. 13.

The reference letter A designates the column-forms, B, the girder-forms, and C, a wall-form.

Each column-form comprises four side plates 11 connected at the corners by angle bars 12 which extend from the floor of the foundation to the floor next above, or from the top of one floor to the next floor above or to the roof, as the case may be. The side plates are formed in sections 13 having the end edges abutting, so that any height of column may be molded by using the proper number of sections, or by using sections of different lengths to form the correct height for the side plates. The angle bars 12 are likewise formed in sections abutting at the ends, but have their joints on different planes from those of the side plates, so that the plates and corner-bars have their joints broken with respect to each other; thus assuring a rigid construction when the plates are properly secured in place.

The side plates may be bolted to the corner angle-bars when adjustment in thickness of column is not desired; but I have herein shown a construction permitting adjustment of the column-form with respect to its width. This I preferably do by providing the several sections of the side plates with horizontal slots 14 at intervals in the length thereof through which extend bolts 15 that are passed through the angle-bars. Said bolts have their heads countersunk into the angle-bars to provide an even interior surface and their projecting ends are provided with nuts 16 to secure the plates to the corner angle-bars. By reason of this construction, columns of different thicknesses can be molded; but it is my intention to limit the extent to which the size of the column may be varied, so that two or three sets of forms will be required to form the different size columns now in use in building-constructions. This I prefer for the reason that extension of the column-forms beyond certain limits, require larger corner

angle-bars, which would not provide such a neat finish to the edges of the column; and moreover, by confining the extent of adjustment within certain limits, a more substantial form will result therefrom.

By extending the ends of the angle-bar sections beyond the ends of the plate-sections, the adjacent ends of the two adjoining plate-sections are bolted to the same angle-bar sections. This is a very desirable feature of my invention, as it assures a rigid and reliable connection between the various sections forming the height of the column-form.

The girder-forms B which are used to mold the girders for the outer walls as well as the bridging of interior columns, or interior columns with wall columns, are also formed in sections so that any length of span between columns can be easily provided for by insertion or substitution of the proper lengths of sections; while provision is made for adjusting the depth and width of this portion of the form to any desired extent within certain limits. Each girder-form comprises side-plates formed of sections 17 which abut at their ends, as at 18, with the exception of the center sections which lie within the adjoining sections, as at 19, best shown in Figs. 3 and 12, to allow a limited extension or contraction in the length of the girder; bottom plates formed of sections 20 which also abut, with the exception of the center-section which lies with its ends on the adjoining bottom plates, as at 21; and corner angle-bars formed in sections which form the longitudinal corners of the trough-like form for the girders. As shown in Fig. 12, short lengths of corner angle-bars 22^a are inserted between the ends of the angle-bars of the intermediate section and the ends of the angle-bars of the adjoining sections, when extension of the girder-form is made, so that the form is closed at the angles throughout its lengths and an even finish given the molded girder. In order that the depth of the girder to be cast may be varied on the different floors, or on different buildings, the side-plates are provided with vertical slots 23, and bolts 24 pass through the vertical webs of bars 22 from the inner side of the form and extend through said slots, having applied to their outer projecting ends, nuts 25 to secure said parts together, and whereby vertical adjustments of the bottom plate is effected. The bottom plates 20 are provided with transverse slots, designated 26, through which extend bolts 27 that are passed through the horizontal webs of the corner-bars and have threaded onto their outer projecting ends, nuts 28 to secure said bottom plates to said corner-bars. The inner ends of bolts 24 and 27 are countersunk into the corner-bars to insure a smooth inner surface to the form. By means of the slots 26 and bolts 27, the width of the form can be adjusted for different size girders, which are, as is well known, progressively narrower and of less depth, on the successive floors of a building.

The joints between the corner angle-bars 22 and the sides and bottom plates of the girder-form are broken, as and in the manner described with reference to the construction of the column-forms; which assures a rigid and substantial connection between the sections forming the girder-forms, except as described in respect to the connection and manner of supporting the center section.

As best shown in Figs. 1, 2, and 4, the end plates 20 of the bottom of the girder-form have connections with the adjacent side-plates of the column-forms by inclined plates 29, each of which is bolted or riveted at one end to the end plate of the bottom of the girder-form by an angle strap 30, and at its other end fastened in like manner by an angle strap 30^a to the sides of the adjacent column-form.

Where the girder-forms connect with the column-form, the side plates of the latter terminate in a plane below the bottom of the girder-form so that the inclined plates 29 may be connected with the ends of both in order to form the usual haunch at the upper ends of the columns; but as stated, the corner angle-bars 12 of the column-forms extend to the floor line next above which is also the top of the girder-form.

On the outer side of the wall column-forms there is no connection with a girder-form, and consequently the side plates are extended up to the upper ends of the angle bars 12 at such places.

Where connection is made between a girder-form and a column-form, narrow extensions 31, (Fig. 11) are provided for the sides of the column-form which are narrow plates that extend from the upper edge of the uppermost full width side plate to the top of the angle-bars 12, two small plates being provided on each side of the column-form, each having horizontal slots 32 through which extend bolts 33 that are passed through the angle-bars 12 and have nuts 34 threaded onto their outer projecting ends to secure said plates to said angle-bars; this permits adjustment of the narrow extensions or plates to conform to the adjustment of the full width plates beneath. These narrow extensions or plates are provided to permit a merging of the interior of the column-forms with the interior of the girder-forms, and they are connected with short and wide connecting plates 35 that lie between the end sections of the girder-forms and said narrow extensions or plates. The connection between these parts is made by corner angle-bars 36 riveted at 37 to the extensions or plates 31 and the connecting plates 35.

The slots 32 in the narrow side-plates 31 need not be as long as the slots 14 in the wide side plates, since upon increasing or diminishing the width of the column-form, a corresponding adjustment is invariably required of the girder-form, to which the narrow side-plates are secured by the rivets 37. For example, a column-form adjusted to sixteen inches, interior measurement, would for strength and proportion require the girder-forms to have an interior measurement of about ten inches in width; this would probably be reduced when setting the form on the floor above, to twelve inches for the column-forms, (a reduction of four inches), and to eight inches for the girder-forms (a reduction of only two inches). Therefore, the adjustment of the wide side plates must permit of a greater adjustment than the narrow side-plates, since the latter are carried inward by the girder form, which effects a two inch adjustment without regard to the adjustment of the said narrow-plates with respect to the angle-bars 12; the remaining two inches of adjustment are effected by adjusting the angle-bars 12 with respect to said narrow side-plates.

In some cases, the adjustment in the width of the girder-form will be the same as that of the column-forms supporting them; and when this occurs, no adjustment of the narrow side-plates is necessary.

Attention is directed to the angle-bars 36, which are notched at 38 to permit the bolts 33 and their nuts to be moved when adjusting the forms.

Secured to the side-plates of parallel girder-forms are supporting-bars 39 having supported thereon temporary joists or bars 40 upon which are to be laid planks or the like. The supporting-bars 39 and the temporary joists 40 are so arranged that when the planks are laid upon the latter the upper sides thereof are even with the upper edges of the side plates 17 of the girder-forms.

To adjust the girder-forms to a perfect level and to prevent sagging of the same, adjustable supports 41 are provided, each of which consists of a head or plate 42, several pipe sections 43, and a screw-jack 44. The pipe sections are interlocked with plugs 45 which are forced into one end of a pipe section and enter the adjacent end of the adjoining pipe sections, serving to rigidly connect the same. By the use of a plurality of sections in the formation of these supports, the different lengths of sections may be used to provide a support of approximately the proper length, the screw-jack serving to adjust the supports to the exact length required to level and support the girder-forms. Each of the screw-jacks comprises a body 46 having a screw 47 adjustably threaded therein, to which is secured a collar 48 having sockets 49 into which the end of a rod or bar may be inserted to revolve the screw. The upper end of this screw is smooth and enters the lower end of the lower pipe section, which is supported on said collar. These supports may be placed at various points in the length of the girder-forms, and serve to support the latter and the concrete when cast therein.

As shown in Fig. 2, the form is supported on the foundation floor, or on a main floor cast and reinforced with metallic bars, and in the latter case reinforcing bars extend upward that are embedded in the columns beneath. To these bars the reinforcing bars of the columns to be cast in the form shown are to be secured, but as any system of reinforcing concrete may be used, I will only state that the spaces within the several mold-portions are provided with the reinforcing-bars and the concrete then poured into the mold spaces around said bars, the desired shape being given to the columns and girders by my improved form.

After the column and girder-forms are filled and stamped, the floor is formed on the planks supported by the bars or joists 40; reinforcing bars properly connected with the girders previously cast are used to reinforce the floor.

Between the outer or wall column-forms and the girder-forms supported thereby are the wall-forms C, which are invariably of the same thickness as the girder-forms and consequently the side plates 17 of the latter are made wider so that they extend down to the top of the window-openings 50, when such are below the lower edge of the girder, as shown in Figs. 1 and 4. When casting the first floor wall, an ornamental portion may be cast above the water table designated 51 in Figs. 1 and 5. This ornamental portion is between the water table and the sill of the window-opening, and the form therefor is adjustable to the desired height by reason of the inner and outer walls thereof being constructed of a plurality of plates, arranged to telescope. The inner wall 52, consists of a center plate 53 and top and bottom plates 54 having each vertical slots 55. Passing through said center plate are bolts 56 that extend through the slots 55 and have threaded on their projecting ends, nuts 57 whereby the said plates are secured together, and wherewith adjustment to the desired height can be effected. The outer wall 58 also consists of a center plate 59 and ornamental top and bottom plate 60. Adjustment and connection of these plates being similar to those of the inner wall. Between said walls are spacing-sleeves 61 through which are passed bolts 62 that extend through the inner and outer walls and through suitable retainers 63 which retain the said walls in proper position. By the use of different lengths of spacing-

sleeves, this portion of the wall-form may be adjusted to any width.

Interposed between the upper edges of said walls and the extended side plates of the girder-form above, are wall-plates 64 secured to the columns by angle-bars 65, having horizontal slots 66 therein. Adjustable on the inner side of the wall plate are angle-bars 67 which have bolts that extend through the slots 68 in the wall plates and onto which are threaded nuts that secure the bars to said plates. To said angle-bars are secured end plates 69 having horizontal slots 70 through which extend bolts that pass through said angle-bars. This permits of increasing or diminishing the thickness of the wall-form, while the width of the wall between openings can be regulated by adjusting the angle-bars 67. The walls cast in the wall-form are also reinforced with metallic bars which are properly connected to the reinforcing bars in the girders.

Having thus described my invention, what I claim is,

1. A form for concrete building constructions comprising adjustable column-forms and an adjustable girder-form supported at its ends by said column-forms, the interior of said forms communicating to permit of casting columns of different sizes in thickness and girders of different sizes in depth and width in connected form without removing any part of the form or adding parts thereto.

2. A girder-form for concrete building constructions comprising a bottom plate, side plates, and corner-bars, said bottom plate being adjustable with respect to the upper edge of the side plates to permit of increasing or diminishing the depth of the form, and said side plates being adjustable toward and from the bottom plate to permit of increasing or diminishing the width of the form, the whole permitting the casting of girders of different depths and widths without adding to or reducing the number of parts.

3. A girder-form supported at its ends and comprising a plurality of sections, each having side plates, a bottom plate, and corner-bars connecting said plates, and the intermediate section lying with its ends within the adjoining sections.

4. A girder-form for concrete building constructions comprising side plates having vertical slots, a bottom plate having transverse slots, and corner-bars having bolts passed therethrough and projecting through the slots in said bottom and side plates, and nuts applied to the projecting ends of said bolts.

5. A girder-form for concrete building constructions comprising side plates having vertical slots, a bottom plate having transverse slots and corner angle-bars forming the angles of said form and having bolts passed therethrough whose ends extend through the slots in said bottom and side plates, and nuts applied to the projecting ends of said bolts.

6. A wall-form for building constructions comprising an inner wall having longitudinal slots, an outer wall also provided with longitudinal slots, vertical bars having bolts passed therethrough that extend through said slots, and an end wall having transverse slots and secured to said vertical bars by bolts passing through said transverse slots.

7. A form for concrete building constructions, comprising a column-form having interior vertical corner-bars and side plates adjustably secured to said corner-bars, a girder-form adjustable in depth and width and comprising a bottom plate and side plates connected with the side plates of the column-form, and an inclined plate connecting the bottom of the girder-form with one side of the column-form.

8. A form for concrete building constructions, comprising a column-form having corner-bars, wide side plates extending from corner-bar to corner-bar and terminated at their upper ends a distance from the upper ends of said bars, two narrow side plates secured to adjacent bars above each wide side plate and having their inner edges separated by an intervening space; a girder-form having side plates connected with their adjacent narrow side plates of the column-form, and an inclined plate connecting the bottom of the girder-form with the upper end of the adjacent wide side plate of the column-form.

9. A form for concrete building constructions, comprising a column-form having corner-bars, wide side plates provided with horizontal slots, bolts passing through said corner bars and the slots of said plates, a pair of narrow side plates above each wide side plate having horizontal slots, bolts passing through said corner bars and the last mentioned slots; and a girder-form having side plates connected with the narrow side plates of the column form and a bottom plate, and an inclined plate connecting the upper end of the adjacent wide plate of the column-form with the bottom of the girder-form.

10. A form for concrete building constructions, comprising a column-form adjustable in width, and an adjustable girder-form adjustably attached to the column-form, said forms being adjustable to different sizes and the girder-form being adjustable on the column-form without adding to or reducing the number of parts.

11. A form for concrete building constructions, comprising an adjustable column-form, and a girder-form connected to and in communication with the column-form, the connection of the girder-form to the column-

form allowing adjustment of the latter independent of the girder-form without adding to or reducing the number of parts.

12. A form for concrete building constructions comprising a column-form, and an adjustable girder-form connected to and in communication with the column-form, the connection of the girder-form to the column form allowing adjustment of the girder-form independent of the column-form without adding to or reducing the number of parts.

13. A form for concrete building constructions comprising an adjustable column-form, and an adjustable girder-form, said column and girder forms being adjustably connected to permit either one to be adjusted independent of the other without adding to or reducing the number of parts.

14. A form for concrete building constructions comprising an adjustable column-form, and an adjustable girder-form, said column and girder forms being adjustably connected to permit both to be adjusted to the same or different degrees without adding to or reducing the number of parts.

In testimony whereof, I have affixed my signature in the presence of two subscribing witnesses.

GEORGE F. FISHER.

Witnesses:
EMIL NEUHART,
ELLA C. PLUECKHAHN.