

Jan. 29, 1952

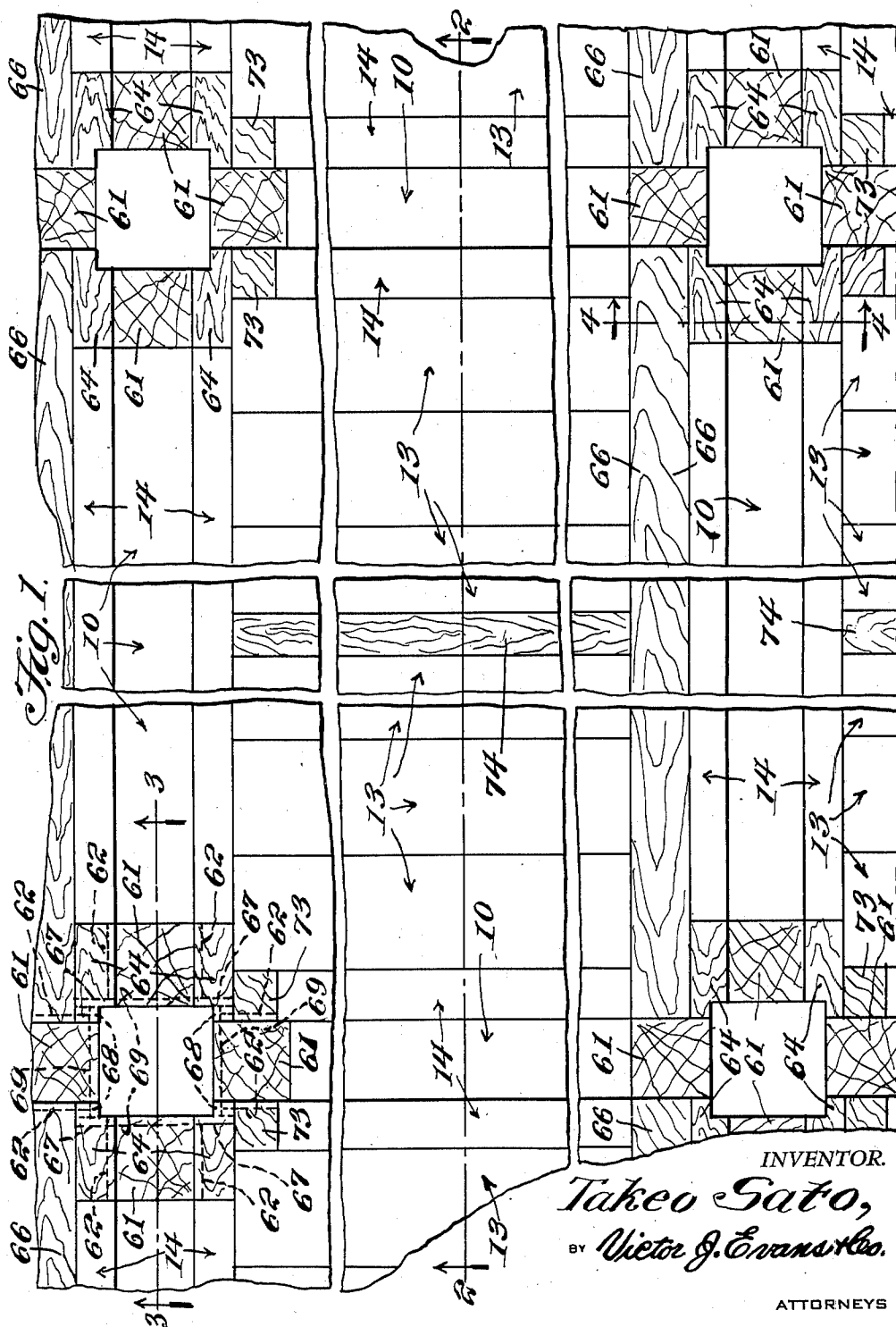
T. SATO

2,583,670

COLLAPSIBLE CONCRETE BEAM FORM

Filed Dec. 9, 1948

6 Sheets-Sheet 1



Jan. 29, 1952

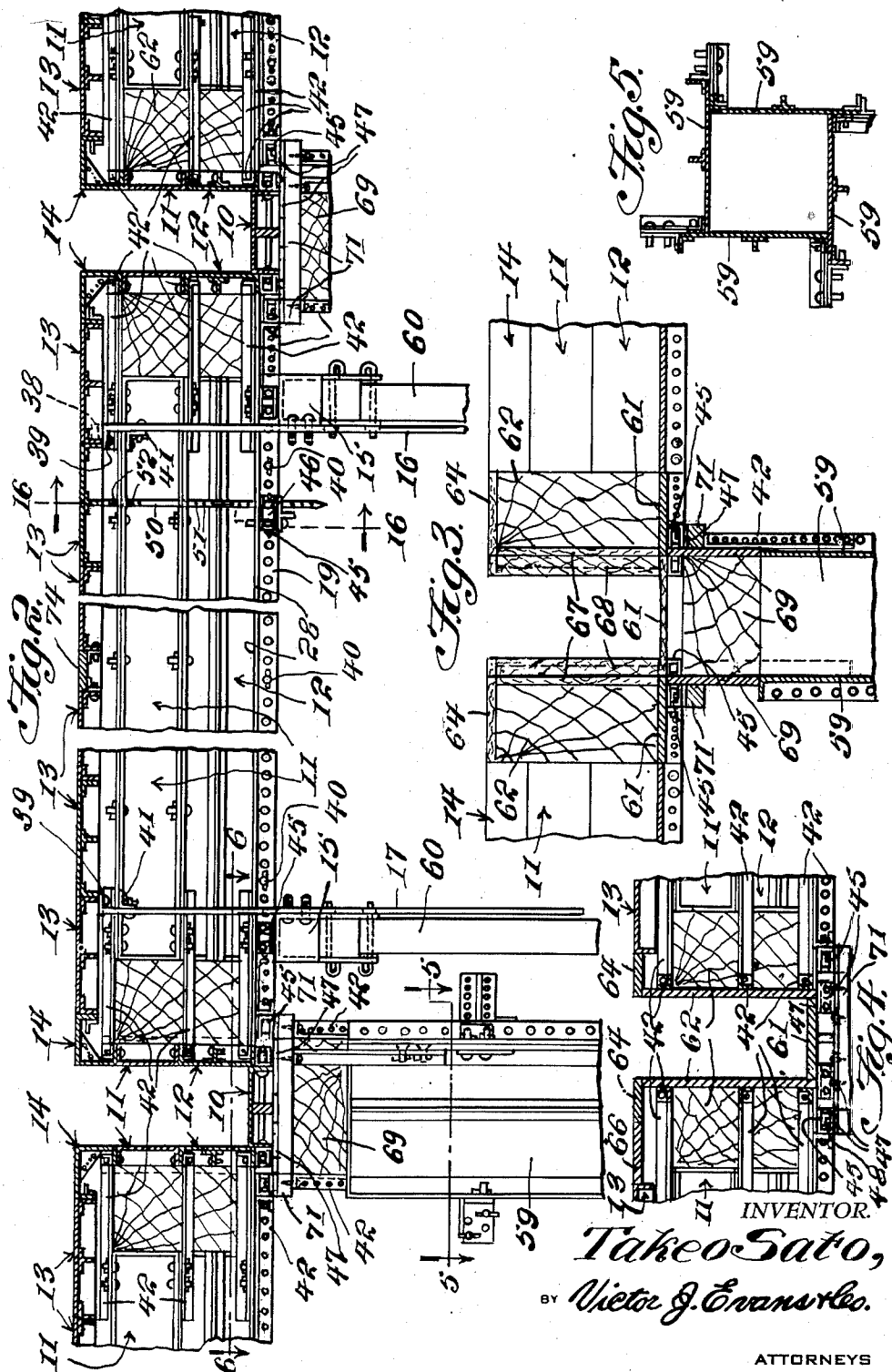
T. SATO

2,583,670

COLLAPSIBLE CONCRETE BEAM FORM

Filed Dec. 9, 1948

6 Sheets-Sheet 2



Jan. 29, 1952

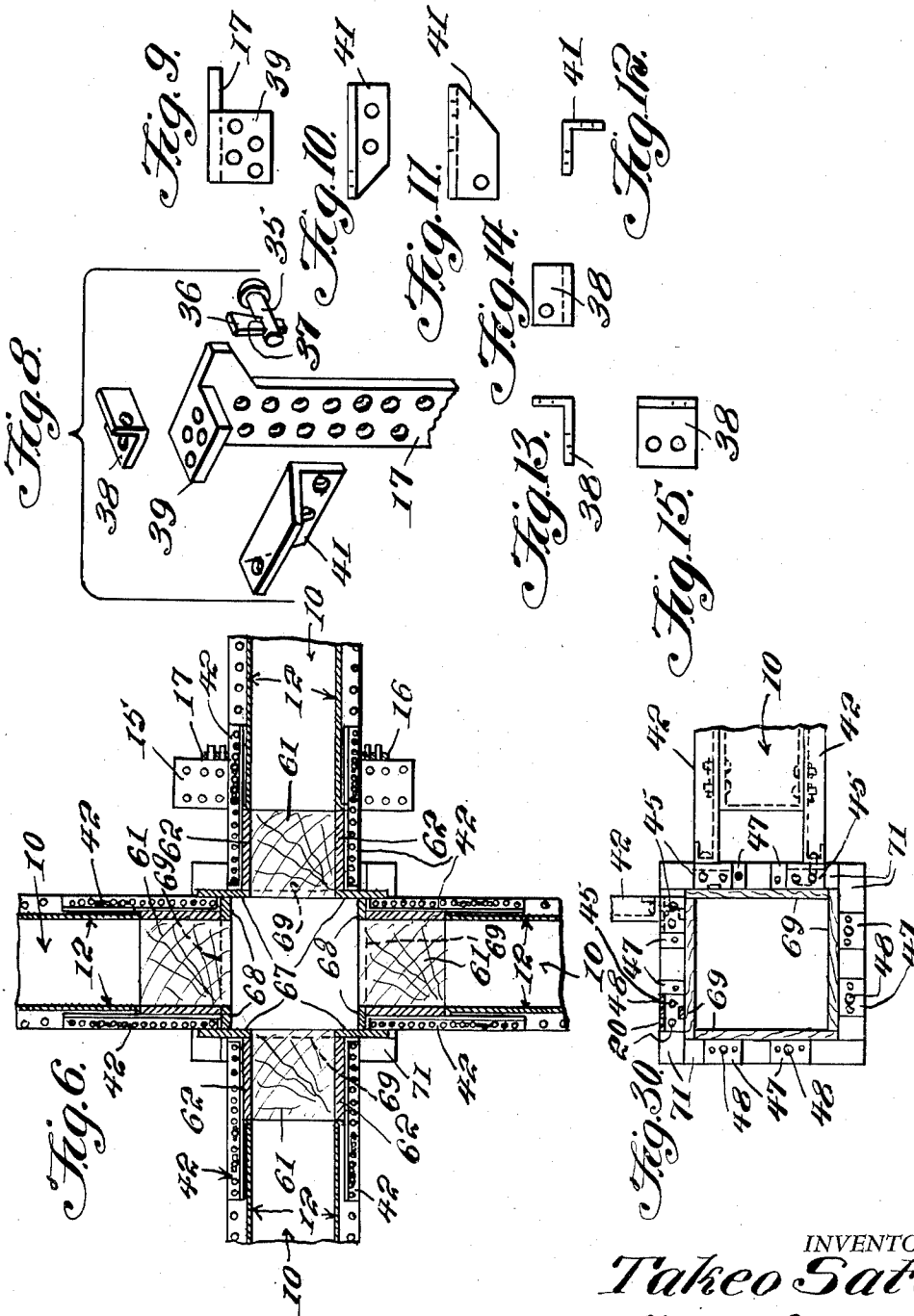
T. SATO

2,583,670

COLLAPSIBLE CONCRETE BEAM FORM

Filed Dec. 9, 1948

6 Sheets-Sheet 3



INVENTOR.
Takeo Sato,
BY *Victor J. Evans & Co.*

ATTORNEYS

Jan. 29, 1952

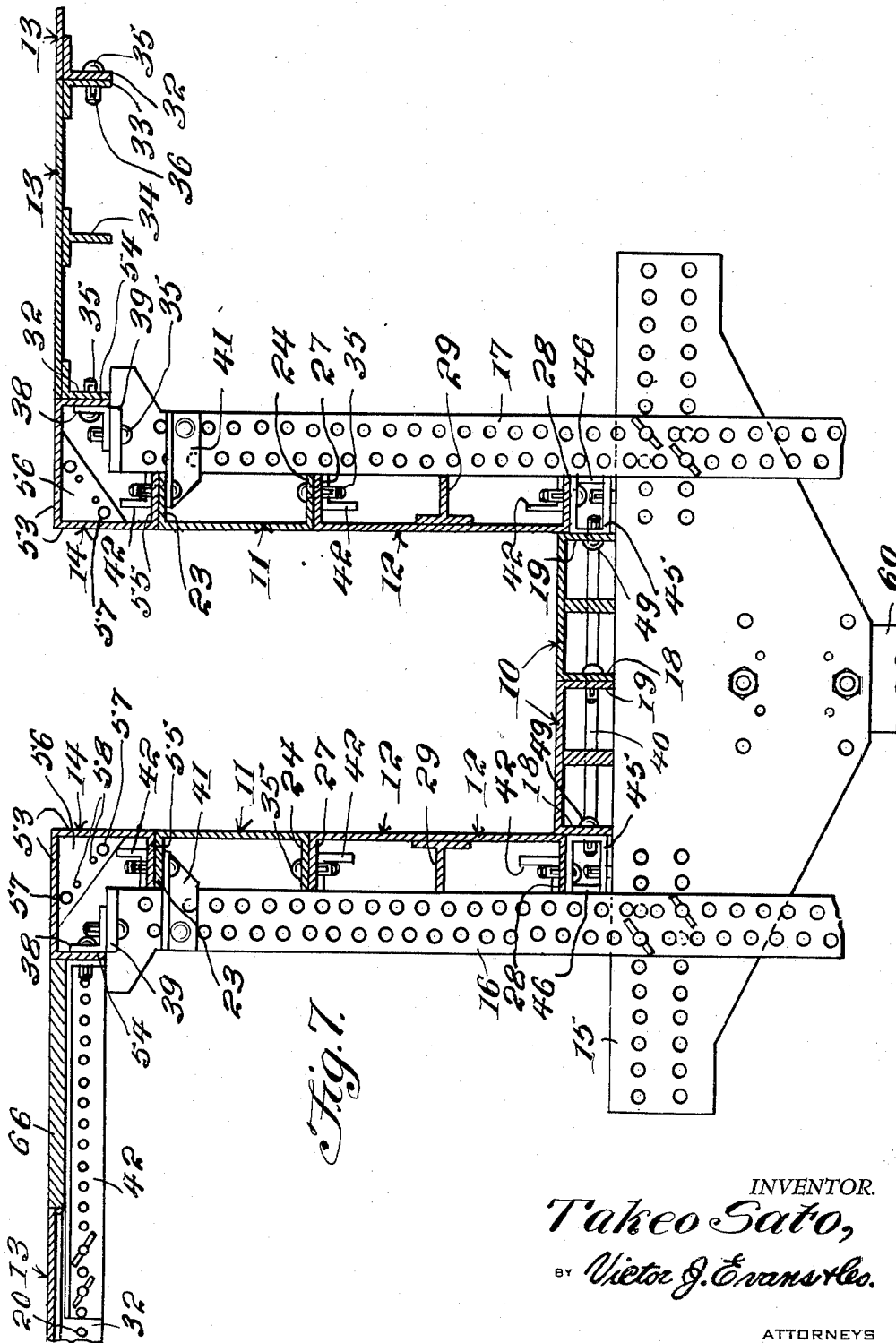
T. SATO

2,583,670

COLLAPSIBLE CONCRETE BEAM FORM

Filed Dec. 9, 1948

6 Sheets-Sheet 4



Jan. 29, 1952

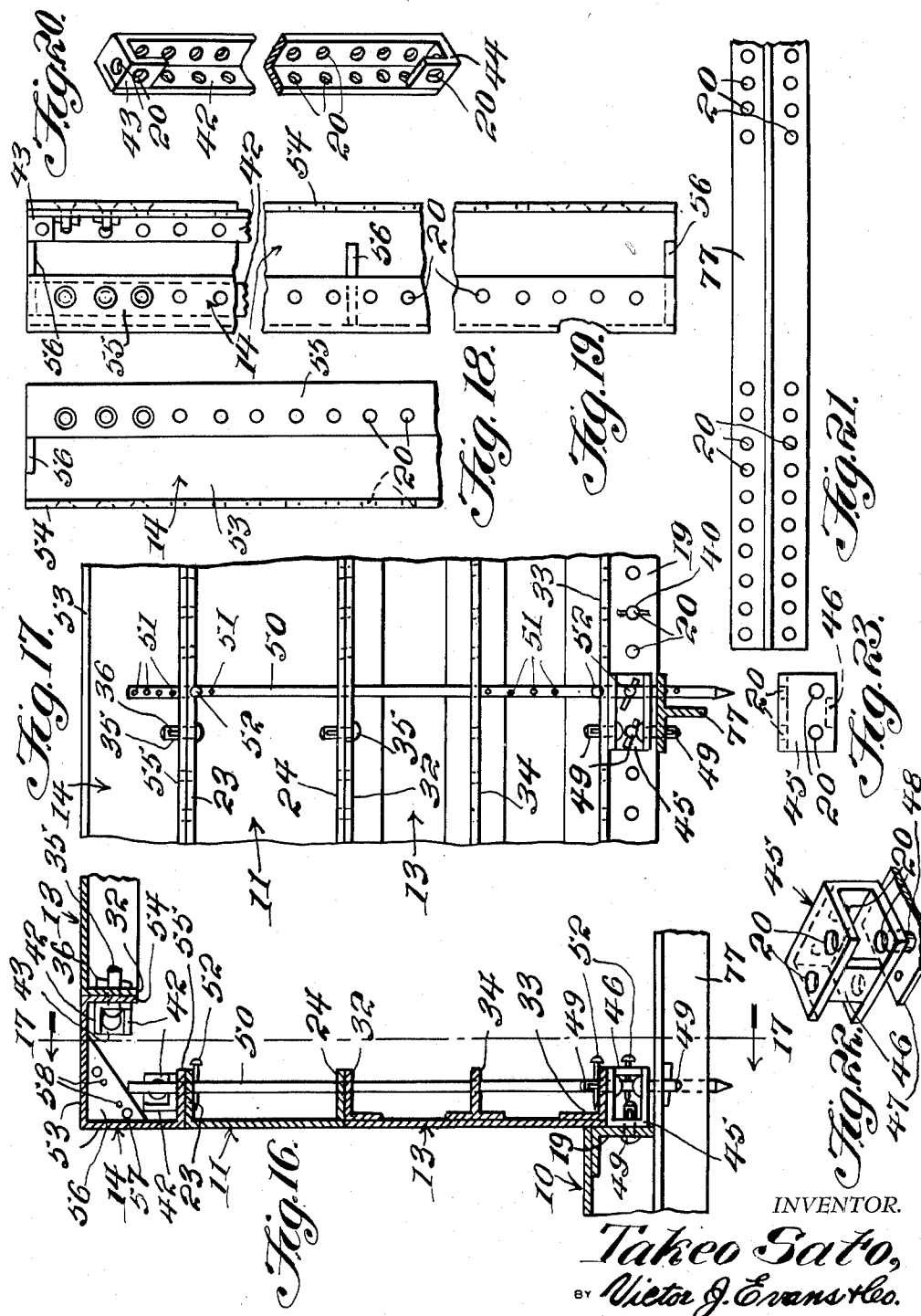
T. SATO

2,583,670

COLLAPSIBLE CONCRETE BEAM FORM

Filed Dec. 9, 1948

6 Sheets-Sheet 5



Jan. 29, 1952

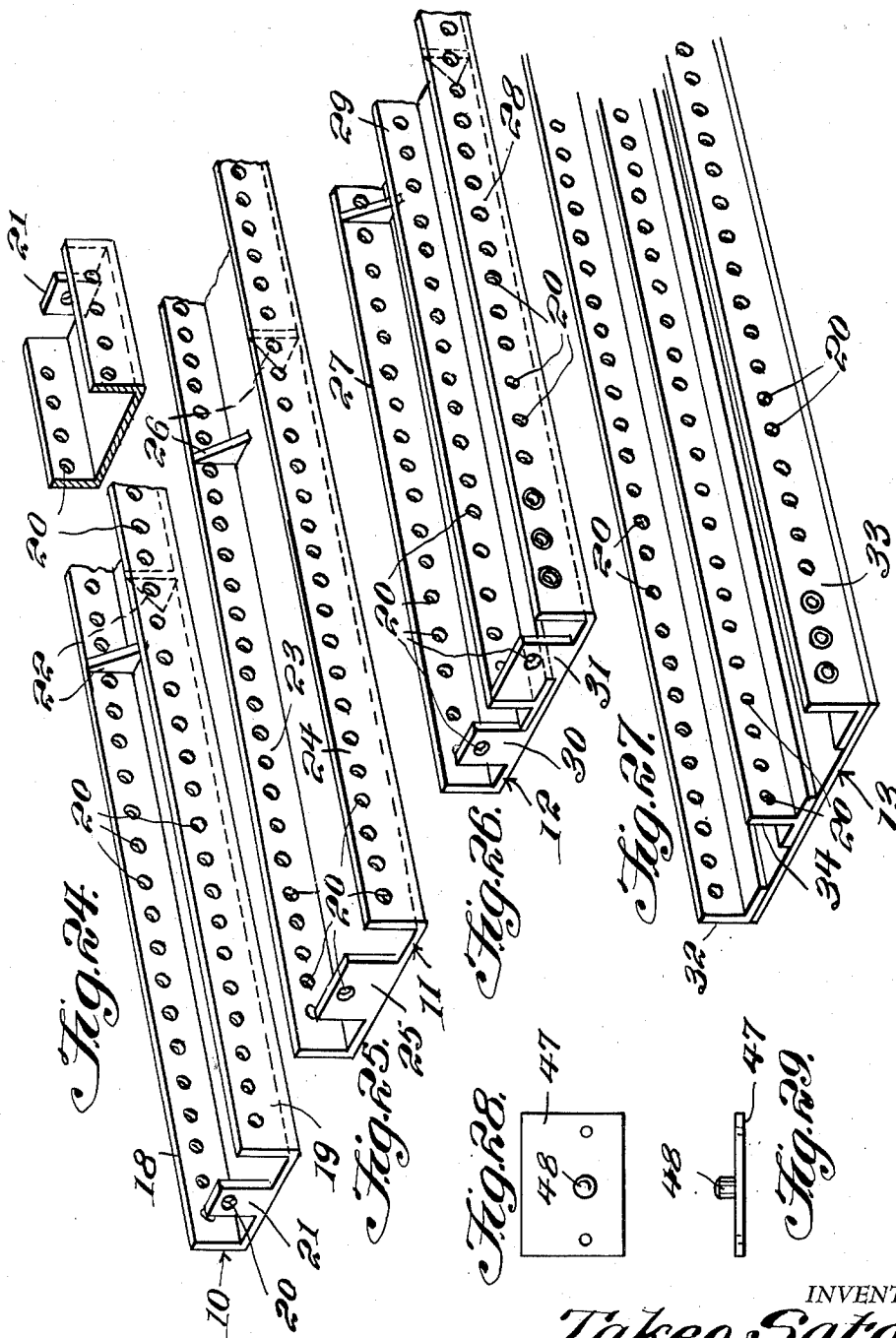
T. SATO

2,583,670

COLLAPSIBLE CONCRETE BEAM FORM

Filed Dec. 9, 1948

6 Sheets-Sheet 6



INVENTOR.

Takeo Sato,
BY Victor J. Evans & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE

2,583,670

COLLAPSIBLE CONCRETE BEAM FORM

Takeo Sato, Honolulu, Territory of Hawaii

Application December 9, 1948, Serial No. 64,343

4 Claims. (Cl. 25—131.5)

1

This invention relates to forms for concrete beams and floor slabs of the type adapted to be taken down after use and re-used, and in particular includes a plurality of shapes in different sizes and designs that may be assembled and temporarily bolted together to provide forms for beams of different sizes and for floor slabs of different thicknesses.

The purpose of this invention is to provide collapsible forms for forming concrete in building construction wherein the forms are made of structural shapes and plates and temporarily secured together until concrete poured therein sets or hardens sufficiently to carry the load thereof.

Form work for beams and floor slabs particularly for floors spaced above the ground are built up with studding and boards and these are supported from the floor below by a network of posts. Where pre-formed forms are used, it is difficult to assemble the forms for beams of different sizes and for floor slabs of different thicknesses. To change the size requires considerable framework and fitting and for this reason, pre-formed panels or shapes are objectionable. With this thought in mind, this invention contemplates building up forms of structural shapes and plates to provide channel shaped elements for flat surfaces, angle shaped elements for corners and units of a plurality of different forms for temporarily connecting the elements.

Another object of the invention is to provide means for connecting a plurality of forms of different shapes and sizes whereby units of the form are readily secured together and also readily taken apart.

Another object of the invention is to provide a collapsible form for concrete structures wherein the parts may be combined with wood blocks to facilitate framing at the corners.

With these and other objects and advantages in view, the invention consists of the new and useful combination, construction, and arrangement of parts as hereinafter more fully described, set forth in the claims appended hereto and disclosed in the accompanying drawings, wherein:

Figure 1 is a plan view with parts broken away showing the framing of a concrete floor form structure illustrating the relative positions of the parts;

Figure 2 is a longitudinal section taken on line 2—2 of Figure 1 showing cross-sections through beam forms and with column forms shown in elevation, and with parts broken away;

Figure 3 is a similar section taken on line 3—3 of Figure 1 illustrating the framing of a column

2

with beams extended from the sides thereof;

Figure 4 is a similar section also taken on line 4—4 of Figure 1 showing the framing at one side of a column for forming a beam;

Figure 5 is a section or plan taken on line 5—5 of Figure 2 illustrating the use of the adjustable column forms of my copending application with the Serial No. 32,971;

Figure 6 is a similar sectional plan taken on line 6—6 of Figure 2 illustrating the connection between the adjustable column form and beam form;

Figure 7 is a vertical section illustrating the combination of the beam forms and forms for floor slabs with the shoring head of my copending application with the Serial Number 46,327;

Figure 8 is a detail illustrating the connecting elements at the upper end of the shoring head supports whereby the supports are connected to the upper corner elements and floor slab forming units, and with the elements exploded for the purpose of illustration;

Figure 9 is a detail illustrating a clip for connecting intermediate parts of the shoring head support to the forms;

Figure 10 is a similar detail showing a clip angle for connecting the upper ends of the supports to the form;

Figure 11 is a plan view of a clip angle shown in Figure 10;

Figure 12 is an end view of the clip shown in Figures 10 and 11;

Figure 13 is a detail showing the clip angle by which the floor forming forms are tied to the upper ends of the supports;

Figure 14 is a view showing a side elevation of the clip angle shown in Figure 13;

Figure 15 is a plan view of the clip angle shown in Figure 13;

Figure 16 is a cross section through one side of a beam form taken on line 16—16 of Figure 2 showing a tie rod for securing the elements in the assembled position;

Figure 17 is a detail taken on line 17—17 of Figure 16 showing a section of a beam form in elevation and illustrating the position of the tie rod therein;

Figure 18 is a detail showing a side elevation of the upper unit for forming the corner between a beam and a floor slab and with the corner gussets removed;

Figure 19 is a bottom plan view looking upwardly toward the underside of the corner section shown in Figures 16 and 17 and with parts broken away;

Figure 20 is a perspective view of a connecting brace or bracket for tying the elements together;

Figure 21 is a detail showing a brace bar also used for tying the elements together;

Figure 22 is a detail showing a channel-shaped connector for connecting the elements at the lower corners of the beam form;

Figure 23 is a plan view of the connector shown in Figure 22;

Figure 24 is a detail showing a channel-shaped element adapted to be used in the side of a beam form or as a spacing element in a form for a floor slab;

Figure 25 is a view showing a similar element of greater width and illustrating that the elements may be formed of different widths;

Figure 26 is a view showing a similar channel-shaped element of still greater width and with the intermediate part thereof reinforced by structural shapes;

Figure 27 is also a view showing a similar element and in this form the gusset plates and connecting flanges at the end are omitted;

Figure 28 is a plan view of a spacing plate adapted to be used under the beam side forms; and,

Figure 29 is a view showing the side elevation of the plate shown in Figure 28.

Figure 30 is a plan view of a column form showing a beam form extended therefrom.

Referring now to the drawings wherein like reference characters denote corresponding parts, the improved concrete beam and floor form of this invention includes elongated channel-shaped sections 10, 11, 12 and 13, corner units 14, and a shoring head 15 with vertically disposed bars 16 and 17 providing supports.

The units 10 are provided with side flanges 18 and 19 having bolt holes 20 therein, tabs 21 at the ends also having bolt holes therein, and triangularly shaped gussets 22 for reinforcing the sides. The units 11 are provided with side flanges 23 and 24, tabs 25 at the ends and gussets 26. The flanges and tabs of these units are also provided with bolt holes, and as the bolt holes are similar throughout the various units, they are designated by the numeral 20 throughout.

The unit 12 is also provided with side flanges as indicated by the numerals 27 and 28 and this unit is provided with a centrally disposed T-shaped web 29 with tabs 30 and 31 at the ends. The flanges, web and tabs are also provided with bolt holes 20. The units 13 are provided with side flanges formed by angles 32 and 33 and the plate forming the face of this unit, as indicated by the numeral 13, is reinforced by an intermediate T-bar 34.

These elements are retained in assembled relation as illustrated in the different drawings with the flanges held together by studs 35 with keys 36 positioned in slots 37 therein. It will also be understood that bolts or any other suitable connecting elements may be used.

As illustrated in Figure 7, two of the units 10 may be used to form the lower surface of a beam and the sides may be formed by units 12 in combination with the units 11 and corner elements 14. The corner elements are combined with the units 13 to provide supporting means for the floor slab and the units 13 are connected to the corner elements by the clip angles 38 shown in Figures 13 to 15. The corners are additionally supported by the supports 17 of the shoring head 15 wherein the clip angles 38 are secured by the studs to the flanges 39 on the upper ends of the supports 17. The upper ends of the supports are also connected to flanges 55 of the corner ele-

ments by the clip angles 41 shown in detail in Figures 10 and 11. The studs 35 connecting the clip angles 41 to the flanges of the elements 11 and 14 also extend through horizontally disposed braces 42 which are shown in detail in Figure 20. The braces 42 are angle shaped with the sides provided with bolt holes 20, and with the ends provided with clip angles 43 and 44 in which bolt holes are also provided.

In assembling the units to construct a beam form, the units of the sides are supported on the channel-shaped connectors 45 illustrated in Figure 22, the outer edges of the flanges of which are connected by a web 46, and these connectors are positioned against the ends of the units 10 and below the ends of the units 12. Spacing plates 47 which have studs 48 thereon, are used below the connections as shown in Figures 7 and 16. The plates 47 are shown in detail in Figures 28 and 29 and it will be understood that these may be used in combination with the forms with the pins 49 extended into openings in the connectors or forms, as shown in Figure 22. The connectors 45 are secured in place by short studs 49 as shown in Figure 17, and these elements are further secured in assembled relation by tie rods 50 which have spaced openings 51 in the ends thereof in which pins 52 are positioned and these tie rods may be positioned at spaced intervals along the beam form. The forms are also provided with transversely disposed tie rods 40 as shown in Figures 7 and 17.

The corner units 14 are provided with upper horizontally disposed webs 53 with flanges 54 at the edges thereof and with flanges 55 on the lower edges of the sections 14 and the webs 53 are supported by gussets 56 that may be provided with bolt holes 57 and nail openings 58.

As illustrated in Figures 1 and 2, the beam forms are centered on the column forms 59 which may be assembled as shown in Figure 5, and the shoring heads 15 which are supported on the posts 60 are spaced from the columns. By this means, the length of the units 10 to 13 inclusive may be slightly shorter than the distance between the columns and spaces in between the beam forms and columns are filled with wood shoring, as illustrated in Figures 3 and 4. To seal these areas around the edges of the beams, boards 61 are used on the bottom with boards 62 at the sides, as shown in Figures 4 and 6, and, as shown in Figure 3, boards 64 are positioned on the upper edges of the boards 62, thereby providing spacing elements between the corners at the intersections of the beams and undersurface of the floor slabs, between the beams and members 13. In Figures 1 and 4, an additional board 66 is provided to compensate for unevenness or odd dimensions in the length of the parts.

As shown in Figures 3 and 6, additional boards 67 and 68 may be provided at the edges of the boards 62 to seal the corners.

The upper ends of the column units 59 may also terminate below the lower edges of the beam forms and the gap between the elements may be filled with boards 69, as shown in Figure 3, and these boards may be supported by blocks 71. The blocks 71 are bolted to the upper ends of splice or brace bars 42 which are attached to the angles at the sides of the column units 59. Additional braces 42 are also used in horizontal positions as shown in Figure 4, to support the boards at the ends of the beam forms. These braces also provide connecting means between the sides of the beam forms and particularly

between beam forms extending at right angles or where one beam is perpendicular to another. It will be understood that this arrangement of wood blocks and boards is only typical as the wood blocks and boards may be formed in the corners in any suitable manner to close gaps between the structural elements and provide smooth connecting surfaces.

It will be noted, in Figure 6, that the boards 67 at the ends of the laterally extending beams overlap the edges of the short boards 68 in the corners and thereby seal the corners.

Blocks or boards 73 are provided at the ends of the members 14 and filling strips 74 may be used between the sections of the forms, as shown in Figure 1.

With the elements provided as shown and described, the different units may be assembled and these are tied together by the supports of the shoring heads at the ends and by the tie-rods 50 at intermediate points and the lower ends of the tie-rods may be held together by T-bars 77 that extend across under the undersurface of the beam forms as shown in Figures 2, 16 and 17. These bars are also provided with bolt holes 20 in the extending webs or flanges thereof.

It will be understood that other structural shapes such as clip angles and plates may be used in combination with the units to facilitate assembling the units to provide beam forms and also forms for supporting floor slabs, particularly from the shoring head and column form.

With the parts assembled in this manner, they may be set up to form beams of substantially any size and to provide a floor slab of any desired thickness. After the concrete is poured into the forms and has been permitted to set, the keys and studs may be removed and the units taken down so that they may be re-used.

It will be understood that modification may be made in the design and arrangement of parts without departing from the spirit of the invention.

What is claimed is:

1. In a collapsible concrete beam form, the combination which comprises a support, spaced vertically disposed bars having rows of bolt holes therein secured to the sides of the support, angles spaced from the upper ends of the bars and extended from the edges thereof, angles positioned on the upper ends of the bars and extended outwardly perpendicularly to the plane of the bars, vertical longitudinally disposed channel shaped form sections having webs with outwardly extended flanges positioned against the bars for forming the sides of a beam, longitudinally disposed horizontally positioned channel shaped form sections having webs with downwardly extended flanges mounted on the upper end of the support for forming the lower surface of a beam, bolts with slots therethrough and keys positioned in said slots extended through the flanges of the vertical and horizontally positioned channel shaped sections for securing the sections together and box-like units positioned below the vertical form sections and against the sides of the horizontally disposed form sections for connecting the lower ends of the vertically disposed channel shaped form sections to the edges of the horizontally positioned channel shape sections, and vertically disposed rods extended through the said box-like unit and through the flanges of the vertically disposed form sections for tying the said form sections to the support at points intermediate of the said vertically disposed bars.

2. In a collapsible concrete beam form, the combination which comprises a support, spaced vertically disposed bars having rows of bolt holes therein secured to the support, angles spaced from the upper ends of the bars and extended from the edges thereof, angles positioned on the upper ends of the bars and extended outwardly perpendicularly to the plane of the bars, vertical longitudinally disposed channel shaped form sections positioned against the bars for forming the sides of the beam, longitudinally disposed horizontally positioned channel shaped form sections mounted on the support for forming the lower surface of a beam, bolts with slots therethrough and keys positioned in said slots extended through the flanges of the vertical and horizontally positioned channel shaped sections for securing the sections together and box-like units connecting the lower ends of the vertically disposed channel shaped form sections to the edges of the horizontally positioned channel shape sections, and wood framing elements positioned at the ends of the vertical and horizontal channel shaped form sections for framing the beam form at intermediate sections thereof with column forms.

3. In a collapsible concrete beam form, the combination which comprises a support having laterally extended arms with spaced rows of bolt holes therein, spaced vertically disposed bars having rows of bolt holes therein secured to the sides of the support, angles spaced from the upper ends of the bars and extended from the edges thereof, angles positioned on the upper ends of the bars and extended outwardly perpendicularly to the plane of the bars, vertical longitudinally disposed channel shaped form sections having webs with outwardly extended flanges positioned against the bars for forming the sides of a beam, longitudinally disposed horizontally positioned channel shaped form sections having webs with downwardly disposed flanges mounted on the upper end of the support for forming the lower surface of a beam, and box-like units positioned below the vertical form sections and against the sides of the horizontally disposed form sections for connecting the lower ends of the vertically disposed channel shaped form sections to the edges of the horizontally positioned channel shape sections.

4. A collapsible concrete beam form as described in claim 3, wherein the height of said box like unit is less than the width of the flanges of the horizontally disposed channel shaped form sections whereby the lower edges of the vertically disposed sections extend below the upper surfaces of the horizontally disposed sections retaining said vertically disposed sections in spaced relation.

TAKEO SATO.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
857,524	Hindman et al.	June 18, 1907
957,414	Fisher	May 10, 1910
1,122,772	Lambie	Dec. 29, 1914
1,154,998	Meyer	Sept. 28, 1915
1,235,542	Bagby	Aug. 7, 1917
1,579,822	Knickerbocker	Apr. 6, 1926
1,687,976	Ford	Oct. 16, 1928