

S. L. FRASER & A. E. JACOBSON.
 CONCRETE CONSTRUCTION APPARATUS.

APPLICATION FILED MAY 20, 1913.

Patented Dec. 28, 1915.

2 SHEETS—SHEET 1.

1,165,586.

Fig. 1.

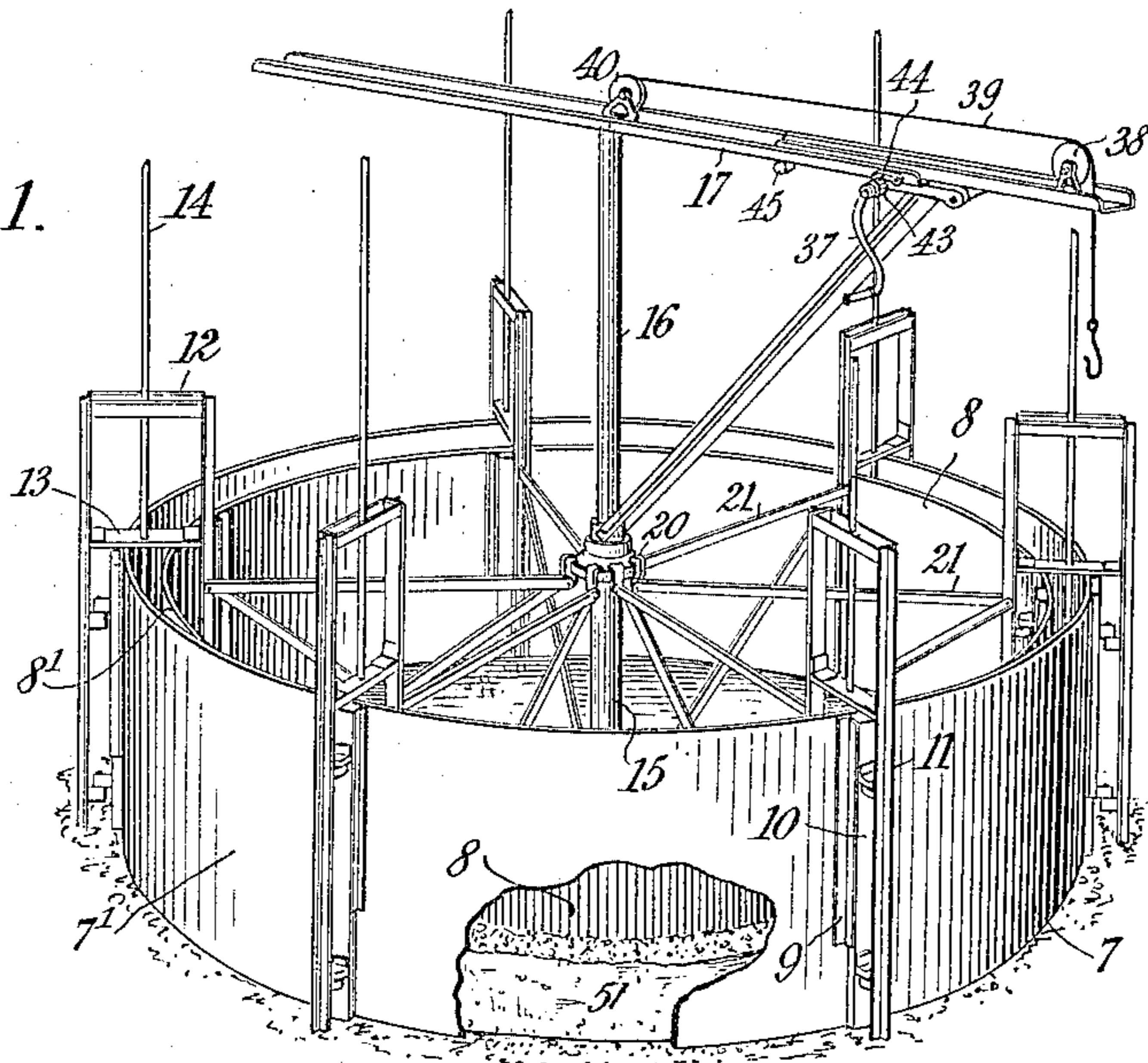


Fig. 3.

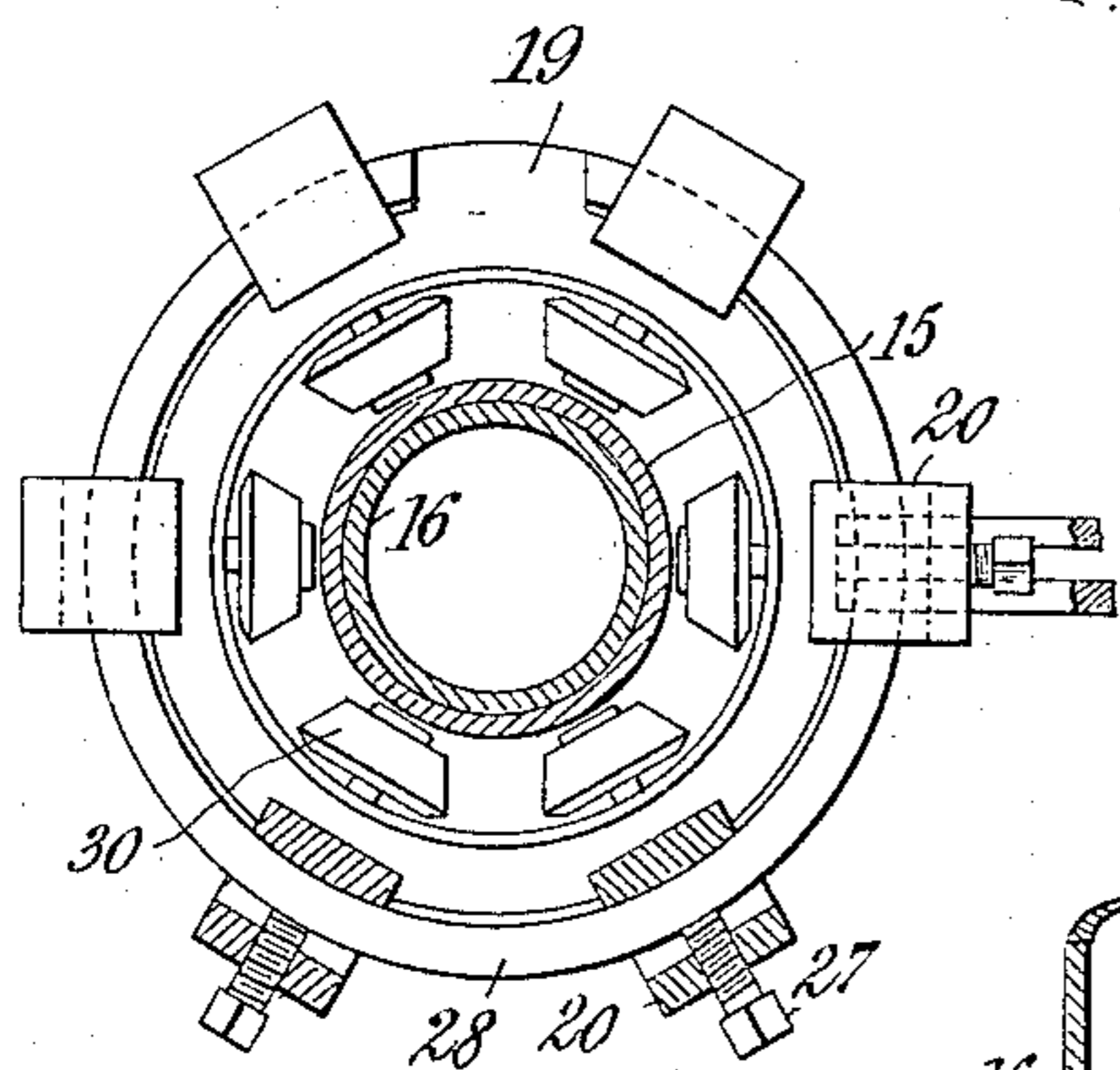
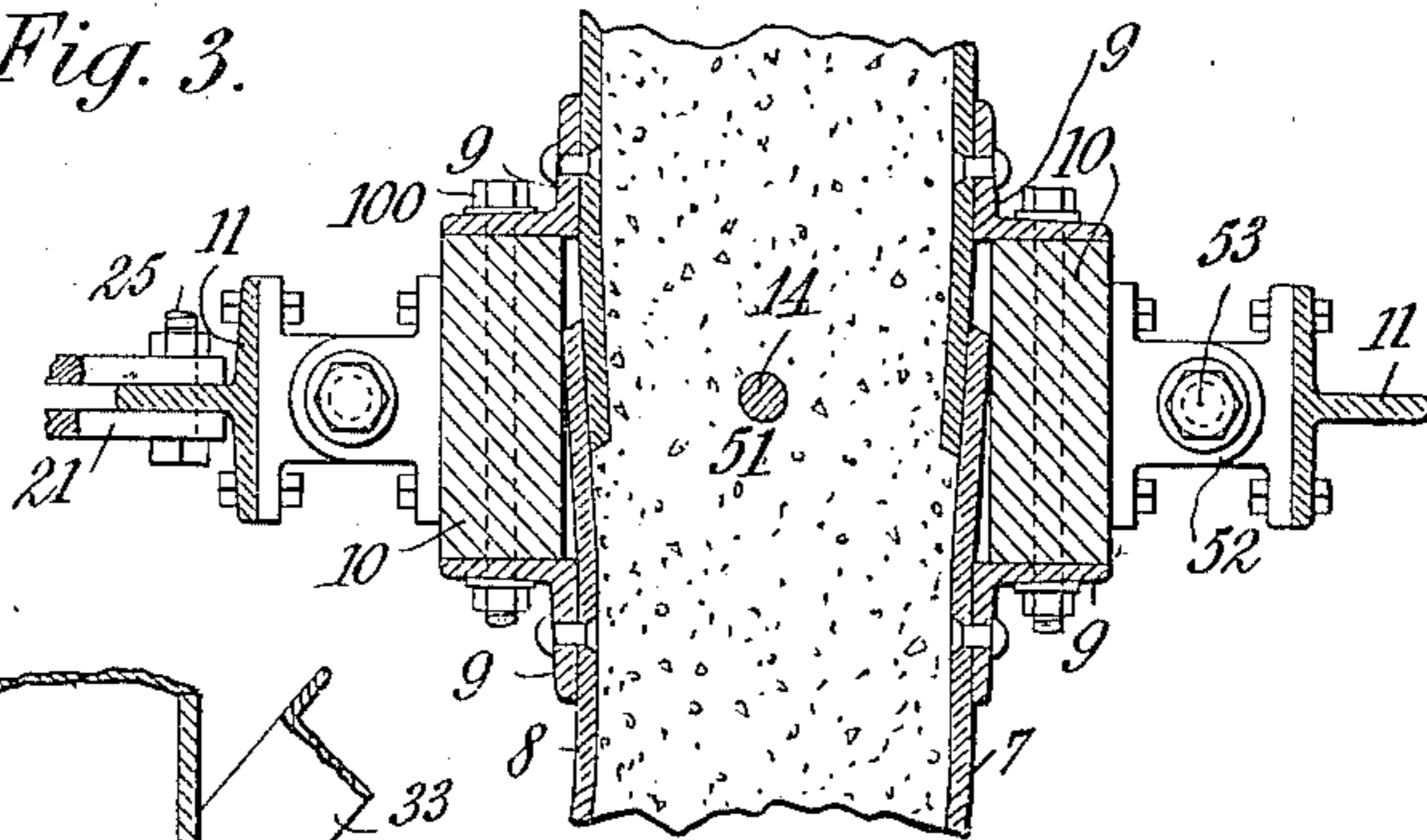


Fig. 4.

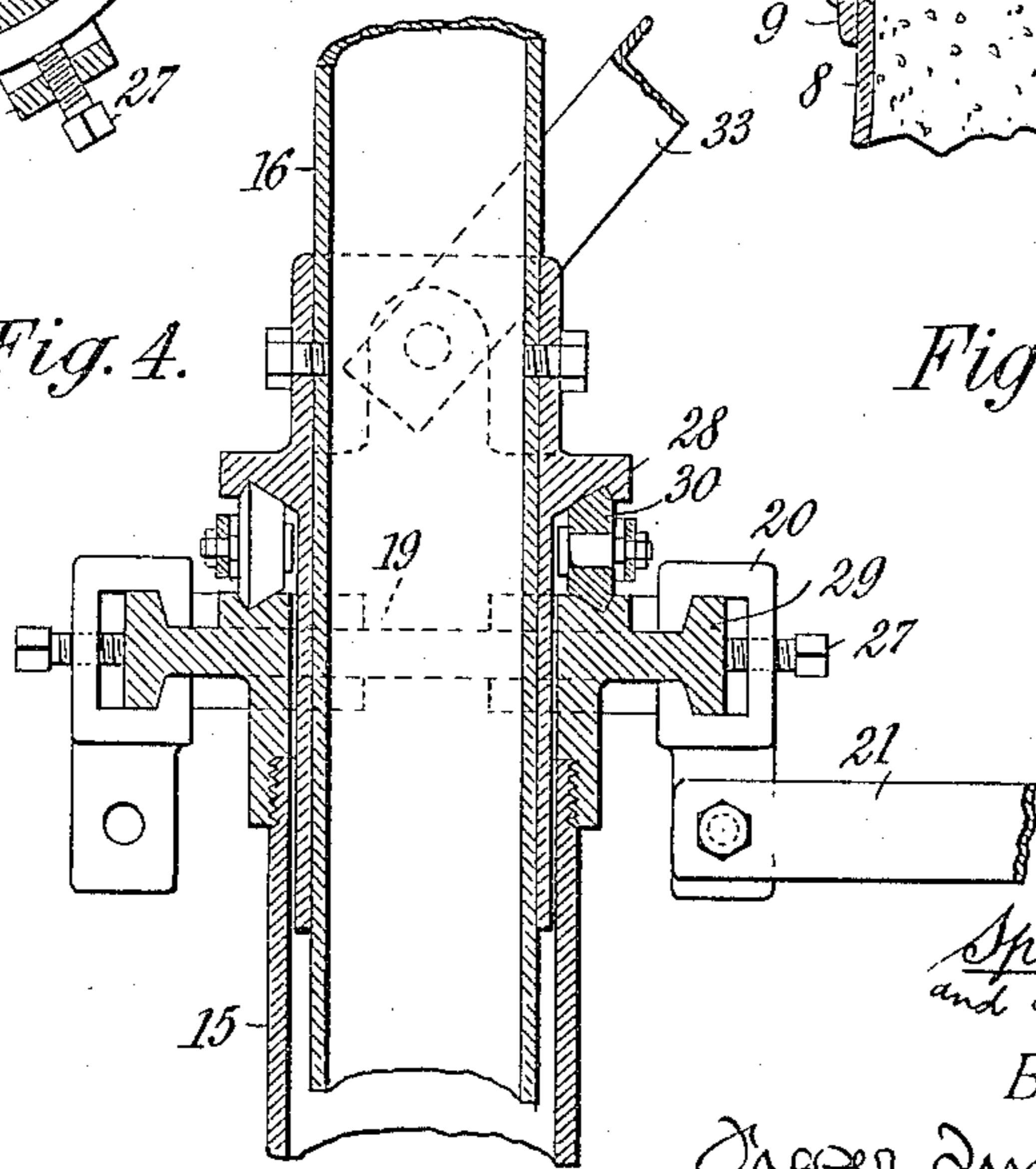
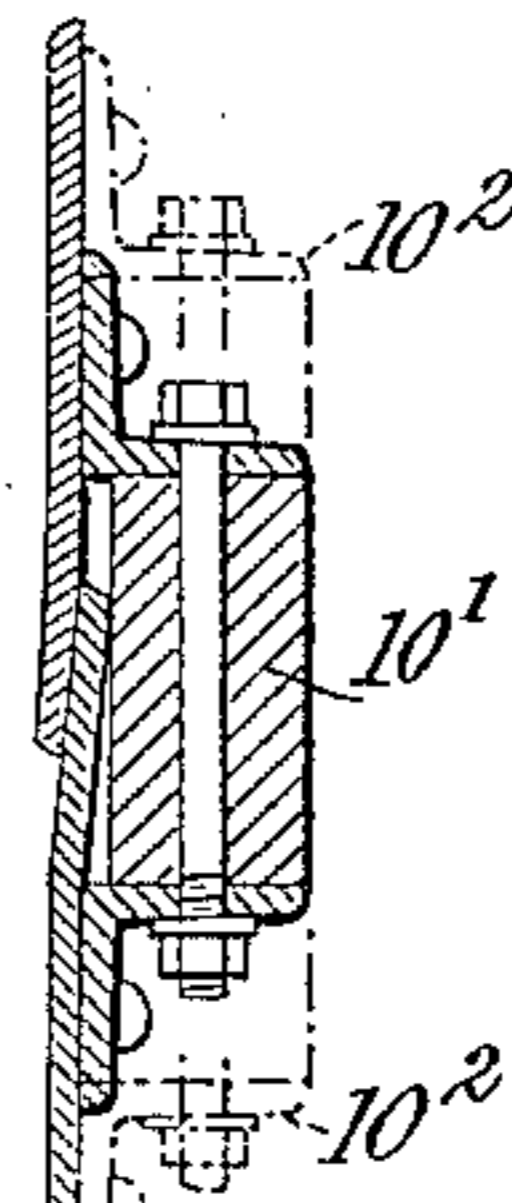


Fig. 7.



WITNESSES:
Rene' Mouine
Fred White

INVENTORS:
Spencer Lee Fraser
and Axel E. Jacobson,
 By Attorneys,
Chas. Dunk & Myers

S. L. FRASER & A. E. JACOBSON.
 CONCRETE CONSTRUCTION APPARATUS.

APPLICATION FILED MAY 20, 1913.

Patented Dec. 28, 1915.

1,165,586.

2 SHEETS—SHEET 2.

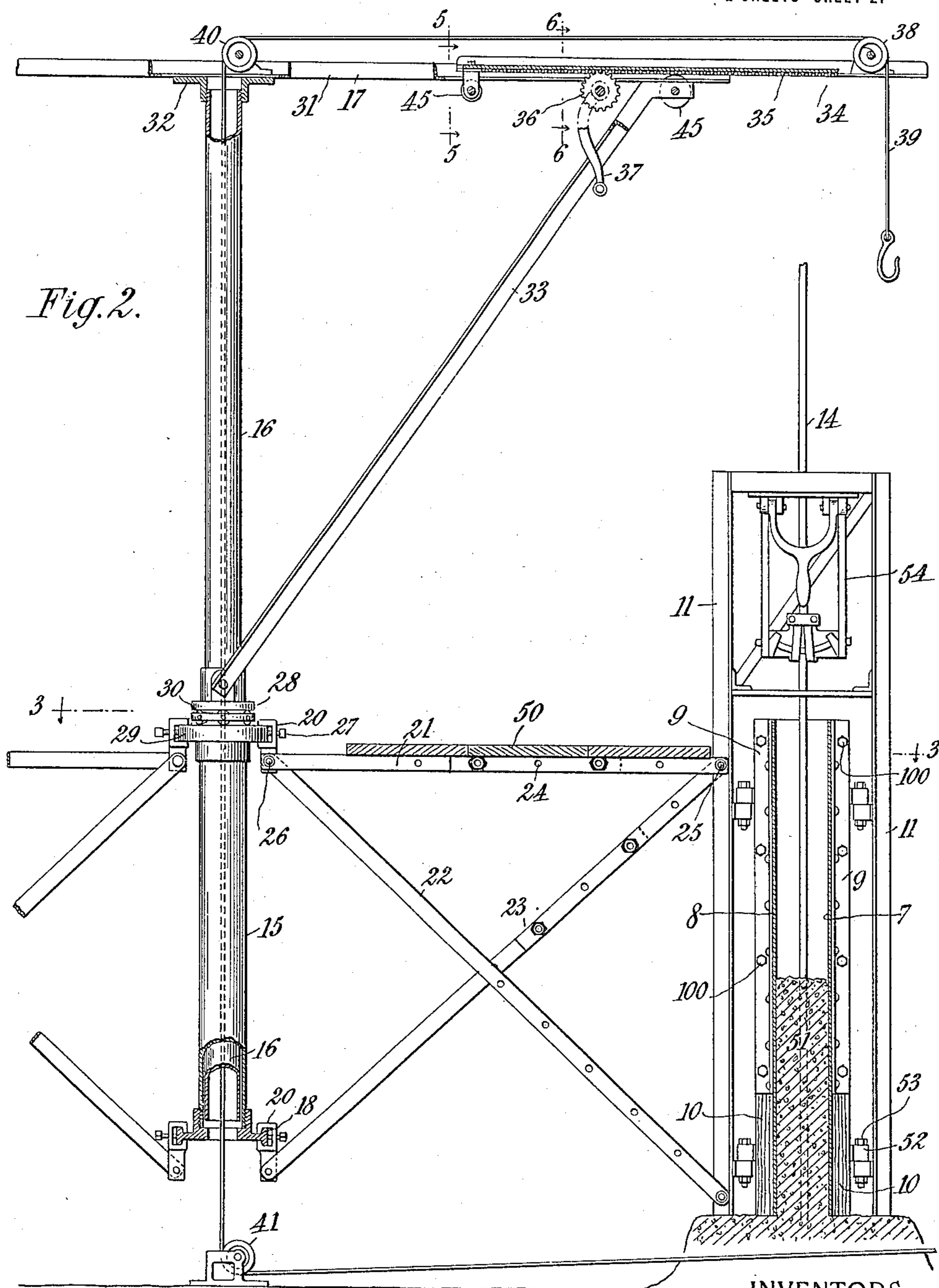


Fig. 2.

WITNESSES:
René Guine
Fred White

Fig. 5.

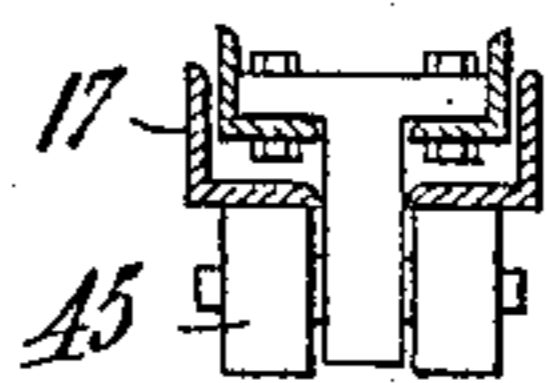
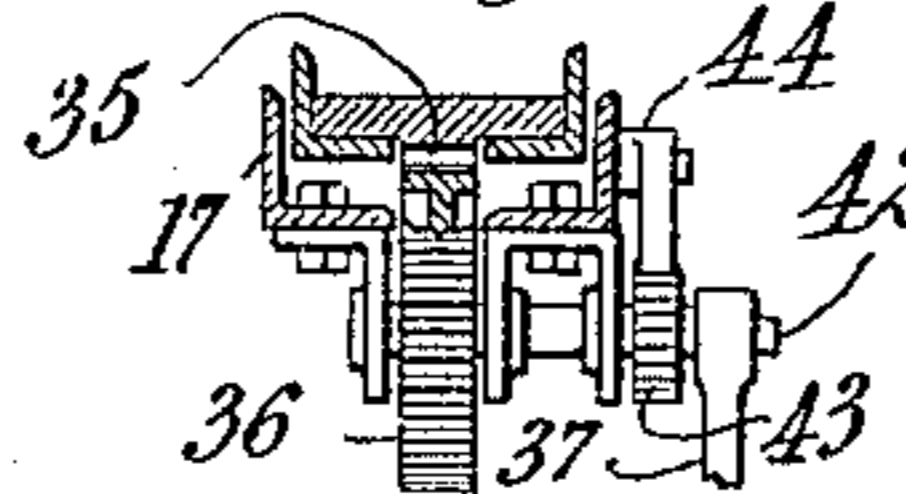


Fig. 6.



INVENTORS:

Spencer Lee Fraser
and Axel E. Jacobson,

By Attorneys,
Innes, Dunk & Myers

UNITED STATES PATENT OFFICE.

SPENCER L. FRASER AND AXEL E. JACOBSON, OF MINNEAPOLIS, MINNESOTA.

CONCRETE-CONSTRUCTION APPARATUS.

1,165,586.

Specification of Letters Patent.

Patented Dec. 28, 1915.

Application filed May 20, 1913. Serial No. 768,717.

To all whom it may concern:

Be it known that we, SPENCER LEE FRASER and AXEL E. JACOBSON, both citizens of the United States, residing in Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Concrete-Construction Apparatus, of which the following is a specification.

10 This invention relates to apparatus for use in concrete construction, and has for an object to provide a form of variable size so that its diameter may be varied as occasion may demand, and also to provide
15 a self-contained working structure. Further, there is provided a platform for workmen, and forms and hoisting mechanism which may be raised as the work proceeds.

20 The invention is particularly applicable for use in building hollow cylindrical structures such, for instance, as tanks or silos.

In the drawings accompanying this specification a practicable embodiment of the invention is illustrated, wherein—

25 Figure 1 is a perspective view of the device set up for use, part of the form being broken away to show the concrete structure within it. Fig. 2 is a view on a larger scale showing one side of the form in cross-section and illustrating a crane support and radial arms and other features in elevation; certain parts of the crane and crane support are also shown in section. Fig. 3 is an enlarged
35 horizontal section taken on the plane at the line 3—3 of Fig. 2. Fig. 4 is a section through the crane support and post taken in a vertical plane. Fig. 5 is a cross-section taken on a plane at about the line 5—5, Fig. 2. Fig. 6 is a cross-section taken on a plane at about the line 6—6, Fig. 6; and Fig. 7 is a detail of the connecting devices for the panels and shows the interchangeable spacing blocks.

45 When the invention is used in connection with an apparatus for building a hollow cylindrical body such, for instance, as a silo, there will be provided an inner and an outer annular form, which will be raised as the work proceeds. These forms are made up of
50 a series of panels or sections, 7, 8, which will

be of some sufficiently flexible material that they may be flexed into the proper curvature. The sections are interchangeable and may be increased and decreased in number
55 for increasing and decreasing the diameter of the structure which is to be formed. The ends of the panels of the forms are shown overlapping and secured together by suitable transversely disposed connections. The con-
60 nections shown comprise angle irons 9 riveted to the form panels a few inches inwardly of their ends. Between these angle irons are blocks 10 of hard-wood and passing through the angle irons and the interposed
65 blocks are bolts 100 for effecting a small amount of adjustment of each of the forms. Interchangeable blocks of varying width may be provided. This is illustrated in Fig. 7 wherein a block 10¹ narrower than the
70 block 10 shown in Fig. 3 is illustrated, and the dotted line position 10² indicates a block wider than that shown in Fig. 3. When a greater range of circumferential adjustment is desired and can be formed by means of
75 the interchangeable block, panels of different length from those of the series will be employed. Each of the forms in the present illustration is shown made up of a series of
80 panels of uniform length and one panel of un-uniform length. In Fig. 1 the panels 8 are of uniform length and panel 8¹ is shorter so also the panels 7 are of uniform length and the panel 7¹ is shorter than are the
85 others of the series. When it is desired to remove the forms from the completed work the bolts 100 on the inner form will be tightened, thereby reducing the size of the inner form and the bolts 100 on the outer form will be loosened, thereby enlarging the outer
90 form. In this manner the form will readily free itself from the work. The inner and outer forms are shown connected at suitable intervals by means of stanchions 11. Each stanchion, which is a framework construction,
95 is carried by the block of an inner and a block of an outer connection. Upon the framework is shown mounted the raising device, which device does not form a part of the present improvement and is not illustrated, except in a general way at 54 in Fig. 2. The frames 11 are provided with bars

or members 12 and 13, through which there are openings for the passage of reinforcing rods 14, which rods at these points are made use of as guides for the frames. When the rods are first set in position the frames will serve to position them in the concrete. After this, however, has been filled up to the top of the form, the rods will then serve as guides when the forms are raised. The forms are held in concentric relation in the present illustration by the frames 11.

The form is shown held in proper position by a spider formed of a series of radial arms and braces which are adjustable in length to suit the varying sizes of the forms. There is shown located centrally of the form a hub or socket 15, which will act as a support for the crane post 16 which carries the crane 17. The socket 15 is provided at its top and bottom, which may be about on the plane of the top and bottom of the form, with an outstanding flange carrying a rail 18, which rail is provided with a notch 19. This rail is for carrying the attaching heads 20 for the stays and radial arms. When the number of arms is determined, the corresponding number of heads 20 will be placed upon each of the rails 18. The panels will be assembled and the ends of adjacent panels connected. The radial arms 21 will then be secured to the upper heads 20 at their inner ends, and to the frames 11 at their outer ends. These arms, as well as the braces 22, 23, are shown made up of a series of bars provided with bolt holes 24, whereby the proper length is secured. The brace 23 will extend from the head 18 to the bolt 25 which secures the radial arm 21 to the frame 11. Brace 22 will extend from the bolt 26 (which connects the radial arm 21 to the upper head 20) to the lower portion of the frame 11. After the heads 20 have been adjusted to their proper positions they may be secured at such positions by means of stay bolts 27.

The concrete will be brought to the work in some convenient manner, preferably in buckets with the assistance of the crane 17. Post 16 for carrying the crane is shown made of tubing and passing within the socket 15 and almost to the lower end thereof, but with sufficient clearance that it may rotate freely. The post 16 is provided just above the head carrying the flange 20 with a flange 28, which provides one face for a roller bearing, the other face being provided upon the flange 29; between such faces there is a series of roller bearings 30 for sustaining the weight of the crane and permitting ready rotation thereof.

The crane is longitudinally adjustable to correspond with the longitudinal or radial adjustment of the radial arms 21, and also to permit the outer end of the crane to move out when a full bucket is being raised, and

to move in to permit the bucket to be emptied in the space between the two forms. A crane for this purpose comprises a platform portion 31 which is fast to the head 32 of the post 16, and is supported at its outer end by means of a brace 33. It also comprises a movable portion 34 which carries a rack 35. There is mounted upon the portion 31 of the crane a pinion 36 in mesh with the rack 35, the shaft of which pinion carries a hand crank 37. By this means the outer end of the crane may be moved in and out for the purpose of adjustment and for the purpose of permitting the more convenient handling of the concrete buckets. A cable is shown guided through the interior of the form to the crane also below the form and outwardly thereof. The outer end of the crane is shown provided with a pulley 38 over which passes the cable 39, which also passes over a pulley 40 mounted upon the head 32, in such a position that the cable will pass through the hollow interior of the post 16 and over a pulley 41 preferably located at the bottom of the structure. The cable from there will pass to some convenient operating device. The cable is shown provided with a bucket engaging device in the form of a hook. For the purpose of holding the crane in its adjusted position the shaft 42, which carries the pinion 36, is provided with a ratchet wheel 43, which is engaged by a pawl 44 mounted upon the crane. The fixed portion 31 of the crane is shown provided with rollers 45 for supporting the weight of the movable part and making the movement thereof free.

From the foregoing description it will be apparent that structures of various diameter may be made with the same equipment by varying the number of panels employed in the form, and that, as the number of panels is increased or decreased, the number of radial arms and stays may be likewise varied. It has been found desirable, in practice, to proportion the parts so that for building a hollow cylindrical structure, say for instance, a silo, of a diameter of 10 feet, six of the arms and six of the frames will be provided, and when making one of 16 feet diameter eight arms and eight frames, and twelve of these arms and frames may be used with a silo of 20 feet diameter. Thus one set of form panels may be used for structures of different diameters, and owing to the built-up character of the radial arms the same equipment will be used for structures of different sizes.

A platform 50 is shown mounted upon the arms or braces 21. This platform will be used by the workmen for a scaffolding upon which to stand and upon which to have such tools and materials as they may need.

This platform, it will be seen, will be raised with the raising of the form so that the entire structure, the forms, the crane and the platform, will be raised from time to time during the progress of the work as the concrete 51 is built up in the form space.

Although but one practicable embodiment of the invention has been illustrated, it will be apparent that changes may be made in the structure within the scope of the claims without departing from the spirit of the invention.

Although the forms are illustrated as circular in outline it will be apparent that they may be given some other shape if occasion may demand.

The jack 54 illustrated in Fig. 2 furnishes a convenient means for raising the forms and spider. This particular jack is shown and described in United States Letters Patent No. 1,044,659 issued to Axel E. Jacobson for jack for raising concrete wall forms, November 19th, 1912.

We claim as our invention:—

1. In a concrete construction apparatus, the combination with a series of form panels, of connections uniting the ends of adjacent panels, a hub, a series of arms of adjustable length radiating from said hub, and stanchions adapted to serve as means for attachment between the said connections and arms.

2. The combination with a form, of a crane support located within and supported by the form, braces connecting the form and crane support, and a platform resting upon the braces.

3. The combination with a circular form of adjustable radius, of radial supporting arms of adjustable length connected thereto at their outer ends, a socket carried by the inner ends of such arms, a post rotatably mounted in such socket, a horizontally disposed crane carried by the post, and means for longitudinally adjusting the crane radially of the form.

4. The combination with a pair of circular forms located one within the other and spaced apart for forming an annular mold, each of said forms being composed of a series of panels, connections between the ends of adjacent panels, a frame pivotally connected to the inner side of the inner connection and the outer side of the outer connection, a crane post support, stays connecting such support to said frames, a crane post mounted in such support, and a crane mounted upon the post.

5. The combination with a form made up of a series of interchangeable panels, a series of arms equal in number to the number of panels and connected to the junctures between the same, a central arm-carrying member comprising a support of about the length of the width of the panels, and pro-

vided top and bottom with a flange carrying a rail, such rail having a recess at one point and a series of heads corresponding in number to the number of arms carried by each such rail, and to which the arms are attached.

6. A concrete foundation apparatus, comprising an inner and an outer form, each form embodying a series of panels, the panels being formed of sheet metal and provided with transversely disposed connecting devices, blocks of wood interposed between the connecting devices, bolts traversing the connecting devices and blocks, and a series of stanchions each connected to a block on the inner and a block on the outer form.

7. A concrete construction apparatus, comprising an inner and an outer form, each form embodying a series of panels, the panels being formed of sheet metal and provided with transversely disposed connecting devices, spacing blocks of varying widths for being interchangeably interposed between the connecting devices, bolts for traversing the connecting devices and blocks, and a series of stanchions each adapted to be connected to a block on the inner and a block on the outer form.

8. A concrete construction apparatus, comprising an inner and an outer form, each form embodying a series of panels, the panels being formed of sheet metal and provided with transversely disposed connecting devices, spacing blocks of varying widths for being interchangeably interposed between the connecting devices, bolts for traversing the connecting devices and blocks, a series of stanchions each adapted to be connected to a block on the inner and a block on the outer form, and a spider connected to such stanchions for holding same in proper relation one to the other.

9. A concrete construction apparatus, comprising an inner and an outer form, each form embodying a series of panels, the panels being formed of sheet metal having overlapping ends and provided inwardly of such ends with connecting devices, blocks of wood interposed between the connecting devices, bolts traversing the connecting devices and blocks, and a series of stanchions each connected to a block on the inner and a block on the outer form.

10. A concrete construction apparatus, comprising an inner and an outer form, each form embodying a series of panels, the panels being provided with connecting devices, blocks interposed between the connecting devices and secured thereto, a series of stanchions each connected to a block on the inner and a block on the outer form, and a spider connected to such stanchions for holding same in proper relation one to the other.

11. The combination with an inclosing form of a crane support located within the same and braces connecting the form and crane support and carrying the latter, and
5 means cooperating with said braces for raising the form, crane support and braces simultaneously.

In witness whereof, we have hereunto

signed our names in the presence of two subscribing witnesses.

SPENCER L. FRASER.
AXEL E. JACOBSON.

Witnesses:

F. R. WILLEY,
H. C. BARNEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."