

No. 896,679.

PATENTED AUG. 18, 1908.

H. B. ANDREWS.
REINFORCED CONCRETE BEAM.
APPLICATION FILED JAN. 9, 1907.

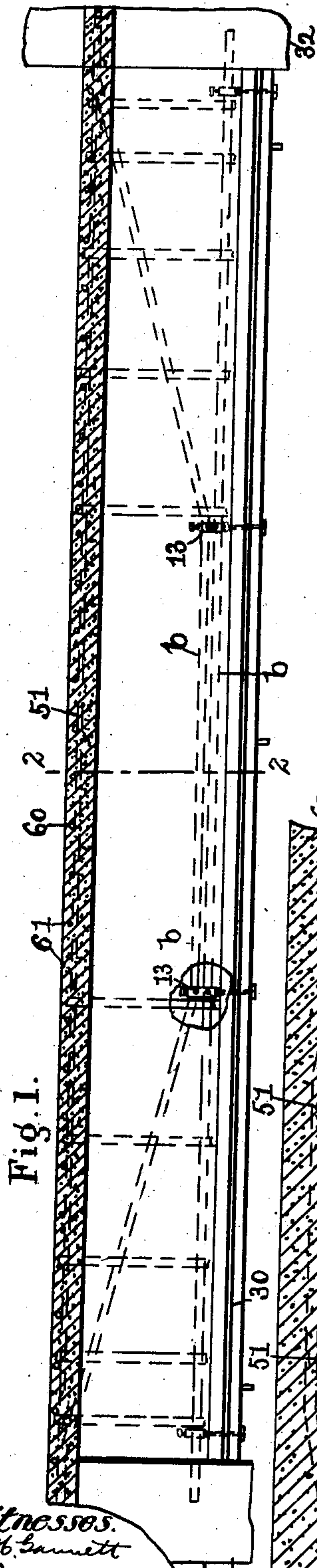


Fig. 1.

Witnesses.
676. Barnett
J. Murphy

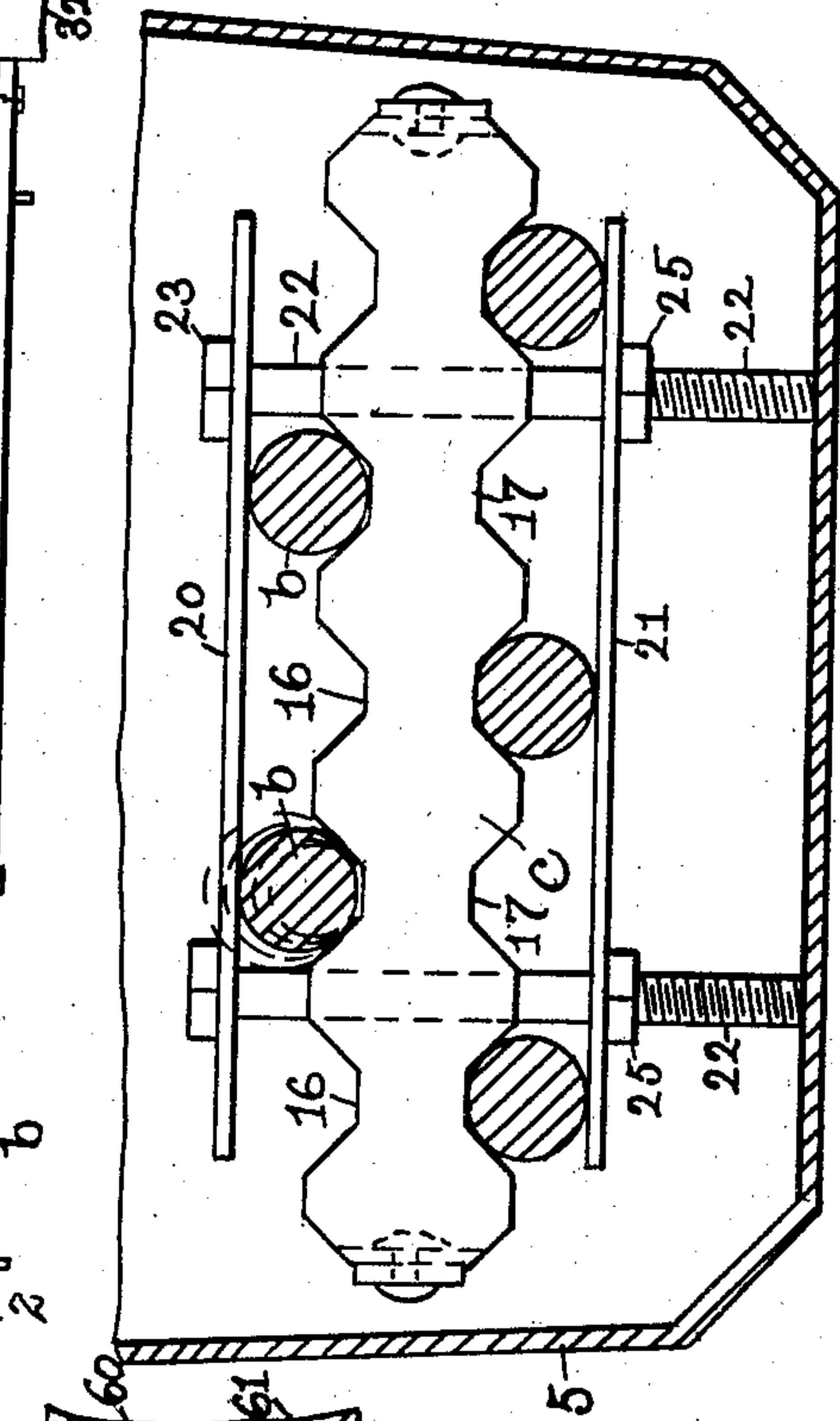


Fig. 2.

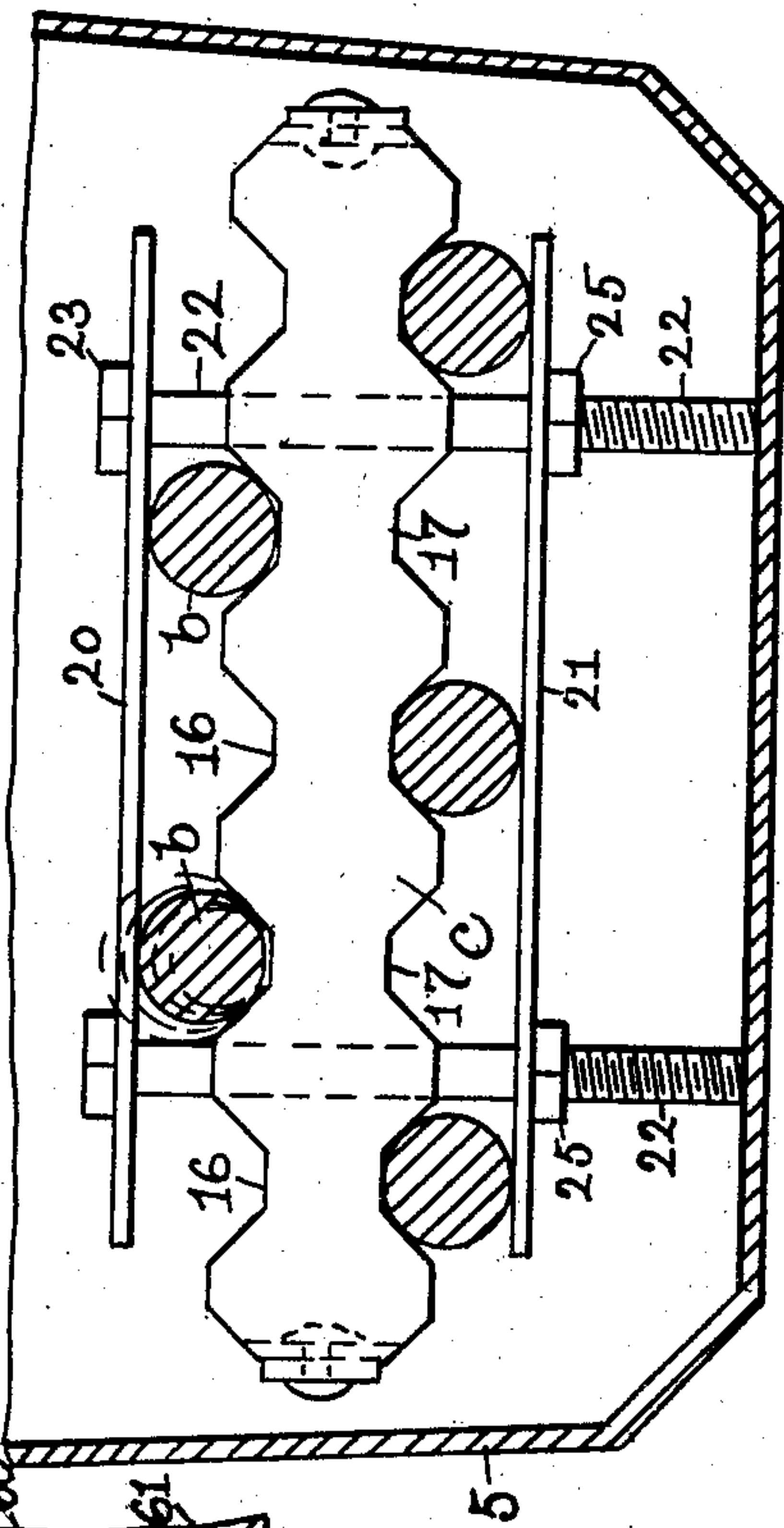


Fig. 3.

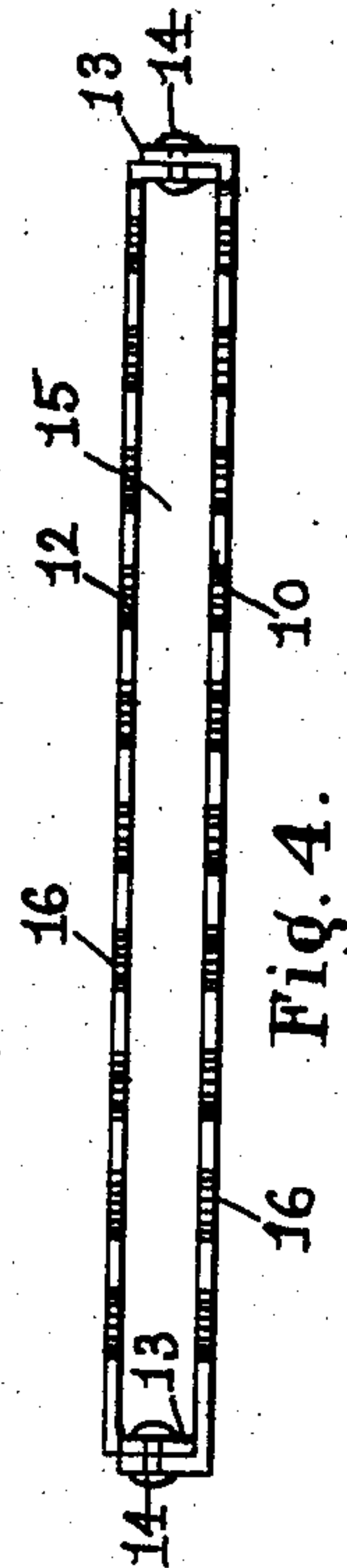


Fig. 4.

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UNITED STATES PATENT OFFICE.

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REINFORCED CONCRETE BEAM.

No. 896,679.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed January 9, 1907. Serial No. 351,407.

To all whom it may concern:

Be it known that I, HIRAM B. ANDREWS, a citizen of the United States, residing in Melrose, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Reinforced Concrete Beams, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a reinforced concrete beam such as now commonly used in the construction of buildings, and has for its object to provide a more effective beam of this character for the purpose specified.

In accordance with this invention, the tension rods which extend longitudinally of the concrete beam are separated from one another by means of spreader bars or devices, which are arranged between upper and lower rows of reinforcing tension rods, and said spreader bars or devices may, for the best results, be provided on their upper and lower edges with grooves, notches or recesses for the reception of the tension rods, which insure the tension rods being most effectively positioned and spaced in the concrete beam, and which also permit the tension rods to be interchangeable in different positions. The spreader bar or device has coöperating with it means for clamping the tension rods to it, whereby the said tension rods are locked and retained in their effective position and are prevented from being displaced during the construction of the reinforced beam, which displacement if permitted to take place is liable to diminish the thickness of the cement between adjacent tension rods, thereby weakening the strength of the beam. Provision is also made for utilizing the bolts employed to clamp the tension rods to the spreader bar, for supporting means for sustaining the hanger bolts for shafting, whereby the hanger bolts may be moved or adjusted for substantially the length of the beam between the columns on which the beam is supported. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is a side elevation with parts broken away of a reinforced concrete beam embodying this invention. Fig. 2, a cross section on an enlarged scale taken on the line

2—2, Fig. 1. Fig. 3, an enlarged detail to be referred to, and Fig. 4, a detail in plan to be referred to.

Referring to the drawings *a* represents the concrete portion, and *b* the tension rods of a reinforced concrete beam, which may be of any suitable or usual construction and which is made in a form or mold 5 in the manner now commonly practiced.

The tension rods *b* extend longitudinally of the beam, and for the best results it is desirable that the rods should be separated from one another by a thickness of concrete equal to from one and one-half to two diameters of the tension rod, and approximately the same distance between the rods and the sides and bottom of the concrete beam, while at the same time it is desirable to have the tension rods as near as possible to the bottom of the beam, subject to these conditions. To this end the tension rods are arranged in upper and lower rows and the rods in the upper row are separated from the rods in the lower row by one or more spreading devices or bars *c*, which are arranged transversely of the mold or form 5 in which the beam is made.

The spreading device *c* may be made as represented in Fig. 4 and consists of two side pieces 10, 12 provided with end flanges 13, which are firmly secured together by rivets 14 or otherwise to form a spreader bar or device having an opening 15 for the passage of the cement.

The spreader bar or device *c* is provided on its upper and lower surfaces or edges with means for spacing the tension rods *b*, and in the present instance said surfaces or edges are provided with notches, grooves or recesses 16, 17, for the reception of the tension rods. The grooves, notches or recesses 16 may be separated from each other substantially uniform distances apart, after the manner represented in Figs. 2 and 3, and the grooves, notches or recesses 17 in the lower surface may be separated from each other in like manner and may be arranged in vertical line with the notches 16.

The spreader bar or device has coöperating with it means to clamp the tension rods thereto and retain them in the grooves or notches in which they are placed, which may be accomplished as herein shown, by bars 20, 21, located above and below the spreader bar

and through which extend clamping bolts 22, which pass through the opening 15 and are provided with heads 23, which engage the clamping bar 20 and with nuts 25, which en-
 5 gage the underside of the bar 21. The clamping bolts 22 may be made of sufficient length to permit the spreader bar to be used with tension rods of different sizes or diameters.

10 By reference to Figs. 2 and 3, it will be seen that the tension rods are properly spaced from one another and from the sides and bottom of the mold, and are firmly held against displacement by the concrete when
 15 the latter is placed in the mold, and especially when the portion of the concrete, which fills the upper part of the mold, is tamped or subjected to pressure to solidify the concrete body in the mold.

20 The clamping bolts 22 may be made of a length which will permit their lower ends to rest upon the bottom of the mold and support the lower row of tension rods the proper or desired distance above the said bottom, or
 25 said bolts may be made long enough to pass through suitable holes in the bottom of the mold, so as to permit them to be used as hangers for supports, herein shown as bars 30, 31, which may be secured to the reinforced beam
 30 after the latter has been placed in position in a building and rests upon suitable columns or other supports 32.

When the clamping bolts 22 are used as hangers for the supports 30, 31, they may be
 35 provided with nuts 35 which rest upon the bottom of the mold and properly position the tension rods and spreader bar, and the supports or bars 30, 31 may be secured to the bottom of the beam by the nuts 36. The
 40 bars 30, 31 are separated from each other by a space or slot 40, which may extend the length of the beam between the column 32 and through which extends the shanks of bolts 41, which may be used as hangers for
 45 shafting. The hanger bolts 41 are freely movable in the slot 40, which enables them to be adjusted to any desired or convenient position for attachment to the boxes in which the shafting is supported or hung, said boxes
 50 and shafting being not herein shown as they form no part of the present invention.

It will be observed that by means of the spreader bar, the tension rods are fixed with-
 55 in the beam, which enables them to be used as rigid supports for straps or stirrups 50, which extend up to near the top of the beam and act as supports for auxiliary rods 51 which extend longitudinally of the beam near its upper surface and afford a support
 60 for reinforcing rods 60 of the floor slab 61, which, in the present instance, is shown as part of the beam.

The object of keeping the rod 60 near the top of the slab over the beam, is to increase
 65 the strength of the floor slab, inasmuch as

the reinforcing rods 60 extend in practice continuously over the parallel beams and through the floor slabs supported thereby.

The straps or stirrups 50 may be strips of metal, having their lower ends bent or folded
 70 about the tension rods and their upper ends bent or folded about the rods 51.

By means of the invention herein shown, I am enabled to provide a reinforced concrete beam of maximum strength at a minimum
 75 cost, and one in which the tension rods may be arranged to the best possible advantage.

By the term "concrete" as herein used, I mean to include any cementitious material suitable for use in building purposes. I pre-
 80 fer to make the bars 30, 31 separate from each other, but it is evident that they may be connected at their ends and yet leave the slot 40, and in fact form a trough-shaped structure provided with a slot in its bottom, or the
 85 clamping bolts 22 may be used to support a straight plate having the slot 40, in which case the bottom of the beam may be provided with a channel in which the head of the bolt 41 may move freely.
 90

I have herein shown one form of spreader bar, but I do not desire to limit my invention to the construction shown.

By the term "outer surfaces" as used in the claims, it is desired to be understood as
 95 meaning the surfaces of the rods opposite to the parts of the rods which are in contact with the spreader bar.

Claims.

1. In a reinforced concrete beam, in com-
 100 bination, a concrete body portion, independent tension rods embedded therein and arranged in upper and lower rows, the rods in each row being capable of being placed in different positions with relation to one another
 105 before being covered by the concrete body portion, a spreader bar extended transversely of said beam between said upper and lower rows of rods and provided on its upper and lower surfaces with means for spacing the
 110 rods in the upper and lower rows from one another, clamping bars extended transversely of the said tension rods in contact therewith above and below the same, and bolts coöperating with said clamping bars to firmly
 115 clamp the tension rods to the upper and lower sides of the spreader bar, substantially as described.

2. In a reinforced concrete beam, in combination, a concrete body portion, independ-
 120 ent tension rods embedded therein and arranged in substantially parallel rows, the rods in each row being capable of being placed in different positions with relation to one another before being covered by the con-
 125 crete body portion, a spreader bar extended transversely of said beam between said substantially parallel rows of rods and provided on its opposite surfaces with means for spacing the rods in said rows from one another,
 130

clamping bars extended transversely of said rods in contact with the outer surfaces thereof, and clamping bolts cooperating with said clamping bars to firmly clamp the tension rods to the opposite sides of the spreader bar, substantially as described.

3. In a reinforced concrete beam, in combination, a concrete body portion, independent tension rods embedded therein and arranged in substantially parallel rows, the rods in each row being capable of being placed in different positions with relation to one another before being covered by the concrete body portion, a spreader bar extended transversely of said substantially parallel rows of rods between the same and provided on its opposite surfaces with recesses of a depth less than said tension rods, clamping bars extended transversely of said rods in contact with the outer surfaces thereof, and clamping bolts connecting said clamping bars to firmly clamp the tension rods to the opposite sides of the spreader bar and in said recesses, substantially as described.

4. In a reinforced concrete beam, in combination, a concrete body portion, independent tension rods embedded therein and arranged in substantially parallel rows, the rods in each row being capable of being placed in different positions with relation to one another before being covered by the concrete body portion, a spreader bar extended transversely of said substantially parallel rows of rods between the same and in contact with each rod in said rows, clamping bars extended transversely of said rods and engaging the outer surfaces thereof, and means to tie said clamping bars together to firmly hold the said rods in fixed engagement with the said spreader bar, substantially as described.

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

HIRAM B. ANDREWS.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.

It is hereby certified that Letters Patent No. 896,679, granted August 18, 1908, upon the application of Hiram B. Andrews, of Melrose, Massachusetts, for an improvement in "Reinforced Concrete Beams," were erroneously issued to "Simpson Bros.," as owner of the entire interest in said invention; whereas said Letters Patent should have been issued to the inventor *Hiram B. Andrews and Simpson Bros., jointly*, said Simpson Bros. being the assignee of *one-half* interest only in said patent, as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of October, A. D., 1908.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.