(No Model.) 3 Sheets—Sheet 1.

E. S. SHAW.

BASCULE OR TILTING BRIDGE.

No. 564,164. Patented July 14, 1896.

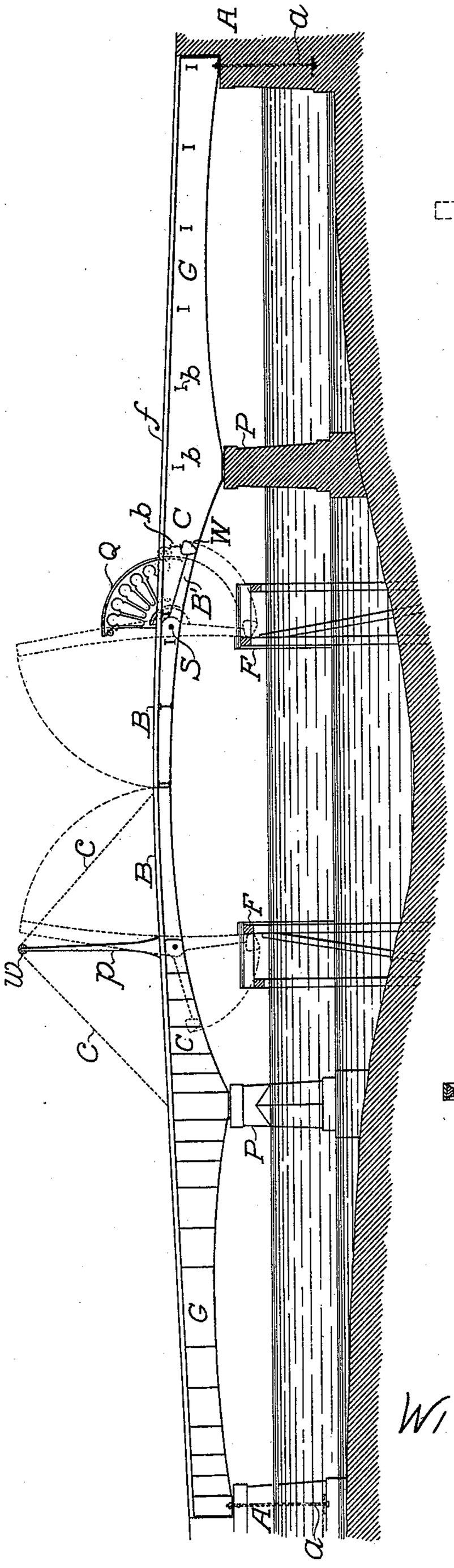

FIG. 1

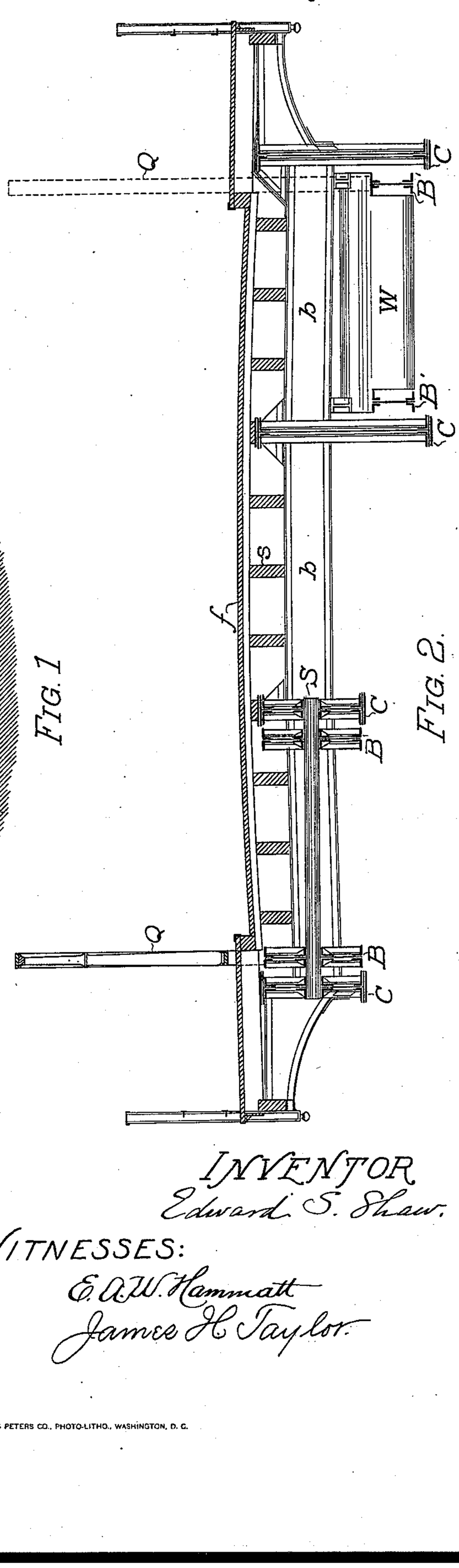

FIG. 2.

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(No Model.) 3 Sheets—Sheet 2.

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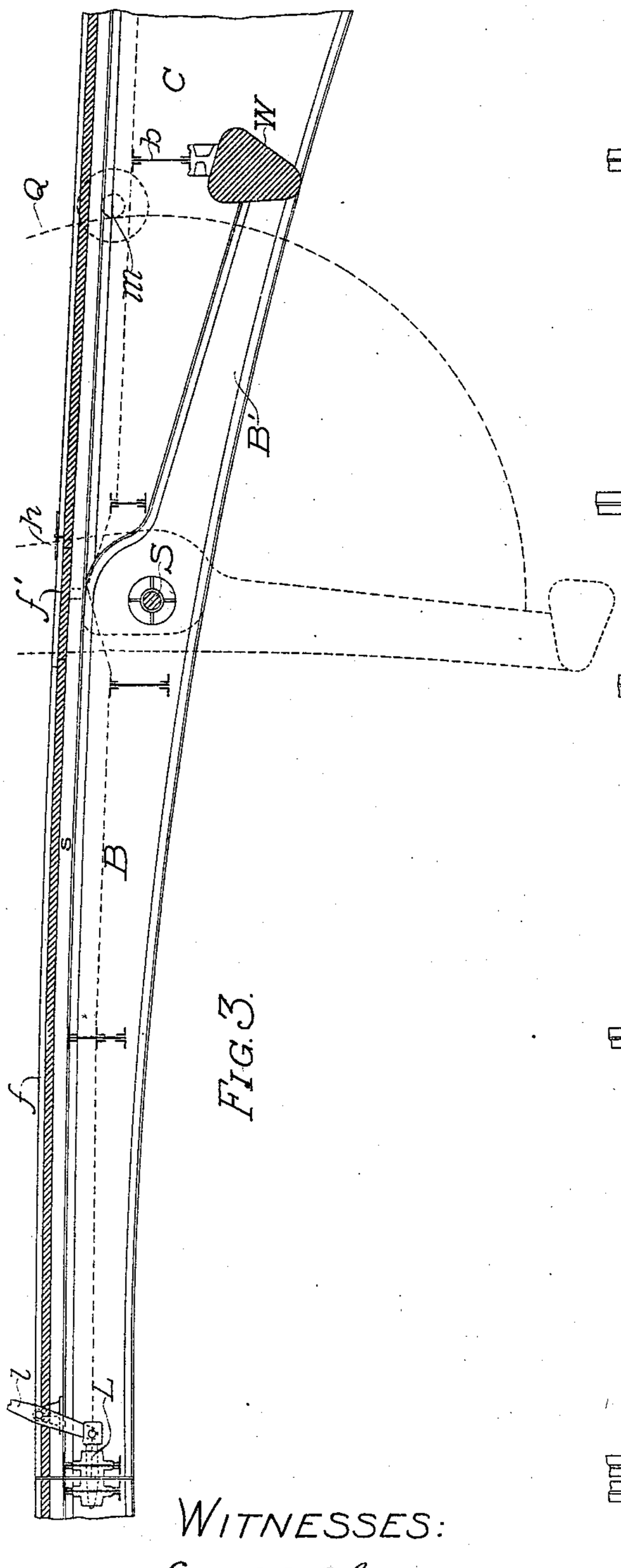

FIG. 3.

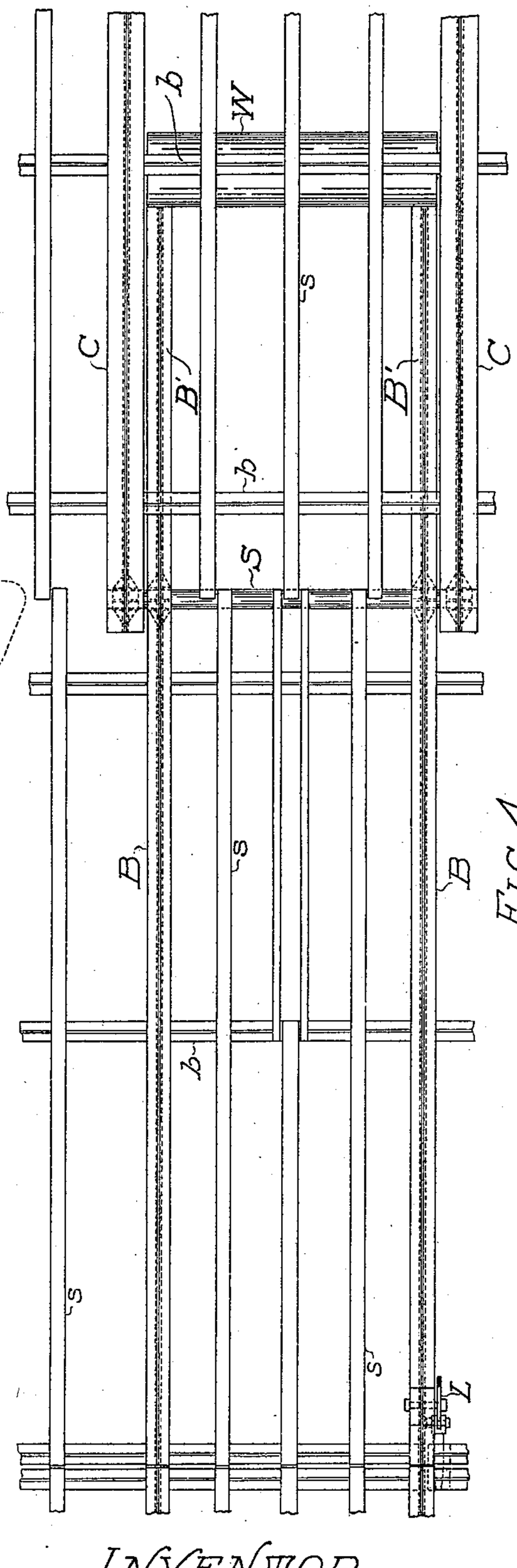

FIG. 4.

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(No Model.) 3 Sheets—Sheet 3.

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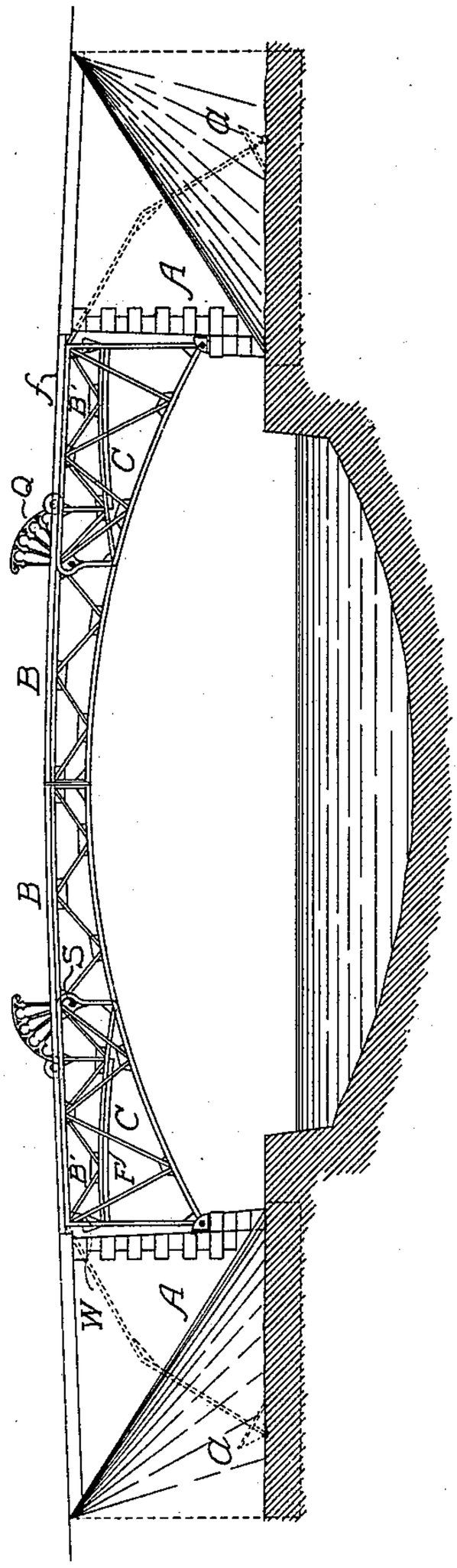

FIG. 5.

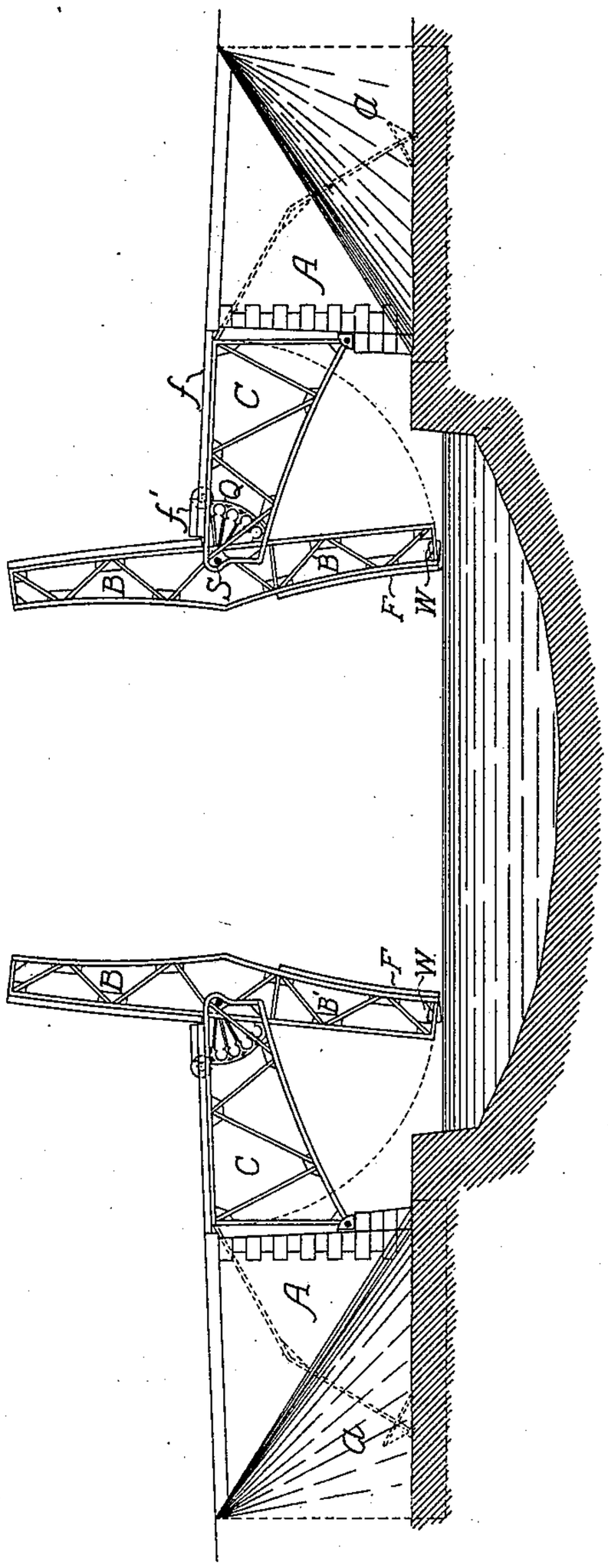

FIG. 6.

WITNESSES

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Edward S. Shaw.

UNITED STATES PATENT OFFICE.

EDWARD S. SHAW, OF CAMBRIDGE, MASSACHUSETTS.

BASCULE OR TILTING BRIDGE.

SPECIFICATION forming part of Letters Patent No. 564,164, dated July 14, 1896.

Application filed June 7, 1895. Serial No. 552,028. (No model.)

To all whom it may concern:

Be it known that I, EDWARD S. SHAW, a citizen of the United States, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Bascule or Tilting Drawbridges, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to the class of drawbridges known as "bascule-bridges."

A bascule-bridge is one in which a portion of the bridge may be tilted or turned up and down upon a horizontal axis or pivot, moving through an angle of about ninety degrees, from a horizontal to a vertical or nearly vertical position, to allow the passage of vessels through the opening thus made, and in which the tilting portion of the bridge extends back from the pivot on the opposite side from the opening and is counterweighted, so as to nearly balance the part overhanging the opening. Bascule-bridges are usually provided with a pair of bascules or tilting parts, the ends of which meet in the middle of the draw-opening, and the rear or counterweighted ends bear upward against some fixed portion of the bridge when the bascules are in their horizontal position and the draw is closed.

In bascule-bridges heretofore built the pivot has been placed above or over a pier or abutment of the bridge, and in bascule-bridges having masonry piers or abutments a chamber or hollow space in these piers or abutments must be provided to allow the rear arm of the bascule to swing down freely and without obstruction.

The object of my invention is to allow the piers or abutments flanking the bascule-span to be set back from the pivots upon which the bascules tilt at distances equal to or greater than the length of the rear portion of the bascule-arm, thus allowing the rear arm of the bascule to clear the pier or abutment and considerably lengthening the span which contains the bascule-opening. The advantages of this setting back of the piers are obvious in all waterways of symmetrical cross-section in which the deepest water or channel is in the middle of the stream, for these supports are thus brought into shallower water, diminishing their cost and the difficulty of constructing their foundations, giving less obstruction to the waterway, and in bridges of several spans a better proportion of middle to side spans.

I accomplish the objects above alluded to by pivoting the bascule arm or arms of the bridge upon or near the end of a fixed cantaliver arm or arms, projecting from a pier or abutment of the bridge. When the bridge has three or more spans, this cantaliver is an extension of one of the side spans, as in Figure 1, but when the bridge has only one span the cantaliver projects from and is anchored directly to the abutment, as in Figs. 5 and 6.

Referring to the drawings, Fig. 1 is a side elevation and longitudinal section of a bridge over a tidal river of somewhat over two hundred feet in width. It has three spans, the middle span, containing the draw, being considerably wider than the side or fixed spans.

The superstructure is supported upon two abutments A and two piers P, and consists of longitudinal girders G over the side spans, having extensions in the form of cantaliver-arms C projecting into the middle span a distance equal to about one-fourth of this span. The rear ends of the girders G are anchored to the abutments by anchor-bolts *a*.

Pivoted upon horizontal shafts S, close to the outer extremities of the cantaliver-arms C, are the bascules B B′, in which B is the fore arm and B′ the rear arm. At the rear end of the rear arm B′ of the bascule is attached the counterweight W, which nearly balances the weight of the fore arm B of the bascule, and which bears upward when the draw is closed upon one of the horizontal floor-beams *b*, which connect transversely the cantaliver-arms and main girders throughout.

The bascules may be raised and lowered into the position shown by the dotted lines by means of chains *c*, passing over wheels *w* at the tops of posts *p*, and over a drum, provided with a crank and gearing at the other end, or by means of a quadrant-gear Q, into which a pinion meshes, and to which an electric motor or hand gearing may be attached, or by other mechanism not here shown and not a part of this invention.

Fender-piers F may extend up and down stream from the outer limits of the bridge to guide vessels through the draw-opening, or

these piers may be omitted and "dolphins" or clusters of piles substituted.

Fig. 2 is a transverse section, Fig. 3 a partial longitudinal section and side elevation, and Fig. 4 a partial plan, of the bridge shown by Fig. 1, all the latter figures being on an enlarged scale to show details.

The left-hand side of Fig. 2 shows a cross-section of the bridge close to the pivot-shaft, while the right-hand side shows a cross-section close to the rear end of the bascule and adjacent to the counterweight. In this figure *f* is the floor and *s* the floor-stringers of wood. There are four cantaliver-girders C shown, also four bascule-girders B B′, all in this drawing of steel or iron, and connected by transverse floor-beams *b* of the same metal. The details of bearing of the girders B upon the pivot-shaft S and of the counterweight W against the floor-beams *b*, as well as the position of the several girders with reference to the effective support of the roadway and sidewalks, and also the position of the quadrant-gear Q transversely, are all clearly shown.

In Fig. 3 the bascule-girder is shown in detail. This figure also shows the latch or lock bolt L, operated by the lever *l*, which bolt holds the outer ends of the bascule-arms together when closed, transfers a portion of a concentrated load upon one side of the center to the other side, and prevents vertical motion. The flap *f′* with hinge *h*, which closes the opening in the floor necessary to allow the bascules to be raised, is also shown. The plan Fig. 4 does not require explanation, the same letters being used in this as in all other drawings to denote the same or similar parts. Fig. 5 is a side elevation of a single-span bridge over a canal about eighty feet in width, and Fig. 6 an elevation of the same bridge, with the bascules raised to allow the passage of masted vessels. The bridge shown in these figures has the form, when closed, of a single segmental arch, having a headroom or height above water-level sufficient for the passage of ordinary barges without masts. If, however, the canal is also used for the passage of vessels having tall masts, it then becomes necessary to tilt up the bascules, as shown in Fig. 6, thus providing a wide opening for such vessels, in the middle or deepest part of the canal.

In Figs. 5 and 6 the fixed cantaliver-arms C project from massive abutments A, to which they are anchored by bolts or tie-rods passing down to anchor-plates *a*, situated in and near the rear lower portion of the abutments. The bascules B B′ tilt or turn up and down upon the pivot-shaft S, as in the figures preceding. The rear arms of the bascules are longer in proportion to the fore arms than in those figures, and extend back to the abutments, thus lessening the amount of counterweighting required. The under side of the rear arms of the bascules are covered by thick planking F, which planking serves as a fender in case one of the arms should be grazed by a vessel passing through. In these figures the counterweights are indicated by the letter W and quadrant-gear by the letter Q, as in previous figures.

Although the drawings referred to in this specification show bridges of moderate span with draw-openings sufficient for the passage of vessels of medium size, yet my invention is not necessarily restricted to bridges of the spans shown, nor limited by the forms here used for purposes of illustration. It may be applied to bridges of longer span placed at greater heights above the water and to bridges in which the lower cords of the trusses are straight or level, instead of arched or curved upward, and in which portions of the girders or trusses of the cantaliver arms or bascules project above the floor of the bridge.

It will be apparent from the above description and the drawings referred to that the original and characteristic features of my invention are the pivoting of the bascules upon the ends of fixed cantaliver-arms, instead of over a pier, abutment, or vertical support, and in the several combinations and arrangements of the parts involved, by which combinations and arrangements the novel result is accomplished. Therefore

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A bridge containing a fixed cantaliver arm or portion, projecting horizontally from a pier or abutment, and a bascule, or counterweighted, tilting, or upward-and-downward turning portion, pivoted upon or near the end of the said cantaliver-arm, substantially as and for the purposes herein shown and described.

2. A number of cantaliver girders or trusses, placed parallel to one another, with intervals between, and supporting, at or near their outer extremities, a horizontal shaft, or a number of disconnected shafts, axles, pivots or trunnions, upon which a number of bascule, or tilting, girders or trusses, turn up and down, the rear or counterweighted ends of the bascule girders or trusses, being contained, inclosed, or packed in the intervals or spaces between the cantaliver girders or trusses, when the bascules are in their horizontal position, and the draw is closed, substantially as set forth.

3. A bascule-bridge, having its bascules, or tilting longitudinal girders, trusses or arms, pivoted upon or near the ends of fixed cantaliver girders, trusses, or arms, projecting from piers or abutments of the bridge, substantially as shown and described.

4. A bascule-bridge, in which the bascules, or tilting girders, trusses or arms, are pivoted upon a shaft or axle, placed at or near the ends of fixed cantaliver girders, trusses, or arms, the rear or balancing ends of the bas-

cules bearing upward upon, and being confined by transverse beams, connecting the cantaliver-arms, substantially as set forth.

5. The combination of the bascules B B', cantalivers C and pivots S, substantially as shown and described.

6. The combination of the bascules B B', cantalivers C, pivots S, counterweights W and floor-beams *b*, upon which the counterweights bear, substantially as shown and described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD S. SHAW.

Witnesses:
FRANK G. PARKER,
WILLIAM H. PARRY.