(No Model.)

4 Sheets—Sheet 1.

O. F. BALSTON.

DRAW BRIDGE.

No. 376,225. Patented Jan. 10, 1888.

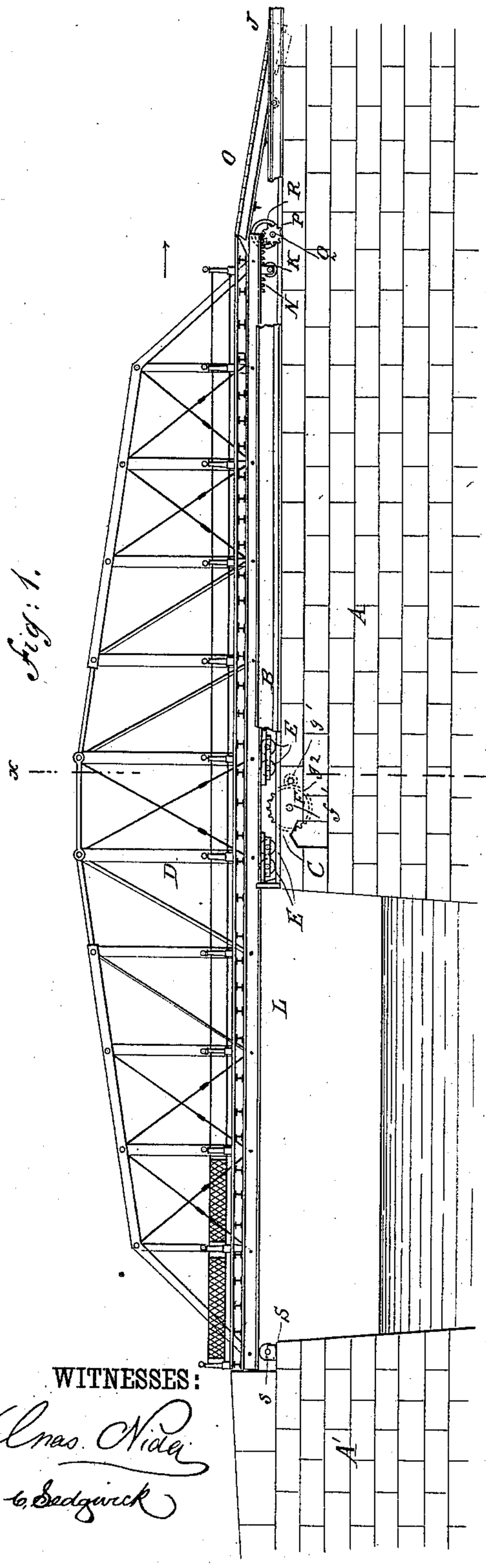

Fig. 1.

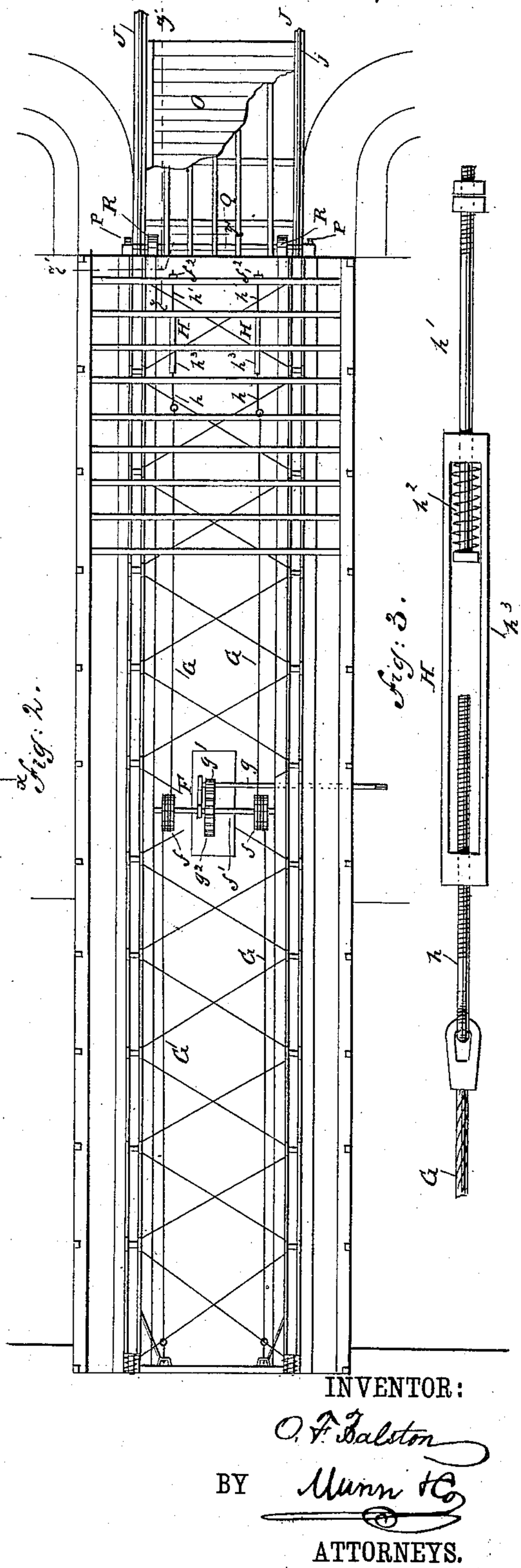

Fig. 2.

Fig. 3.

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(No Model.) 4 Sheets—Sheet 2.

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DRAW BRIDGE.

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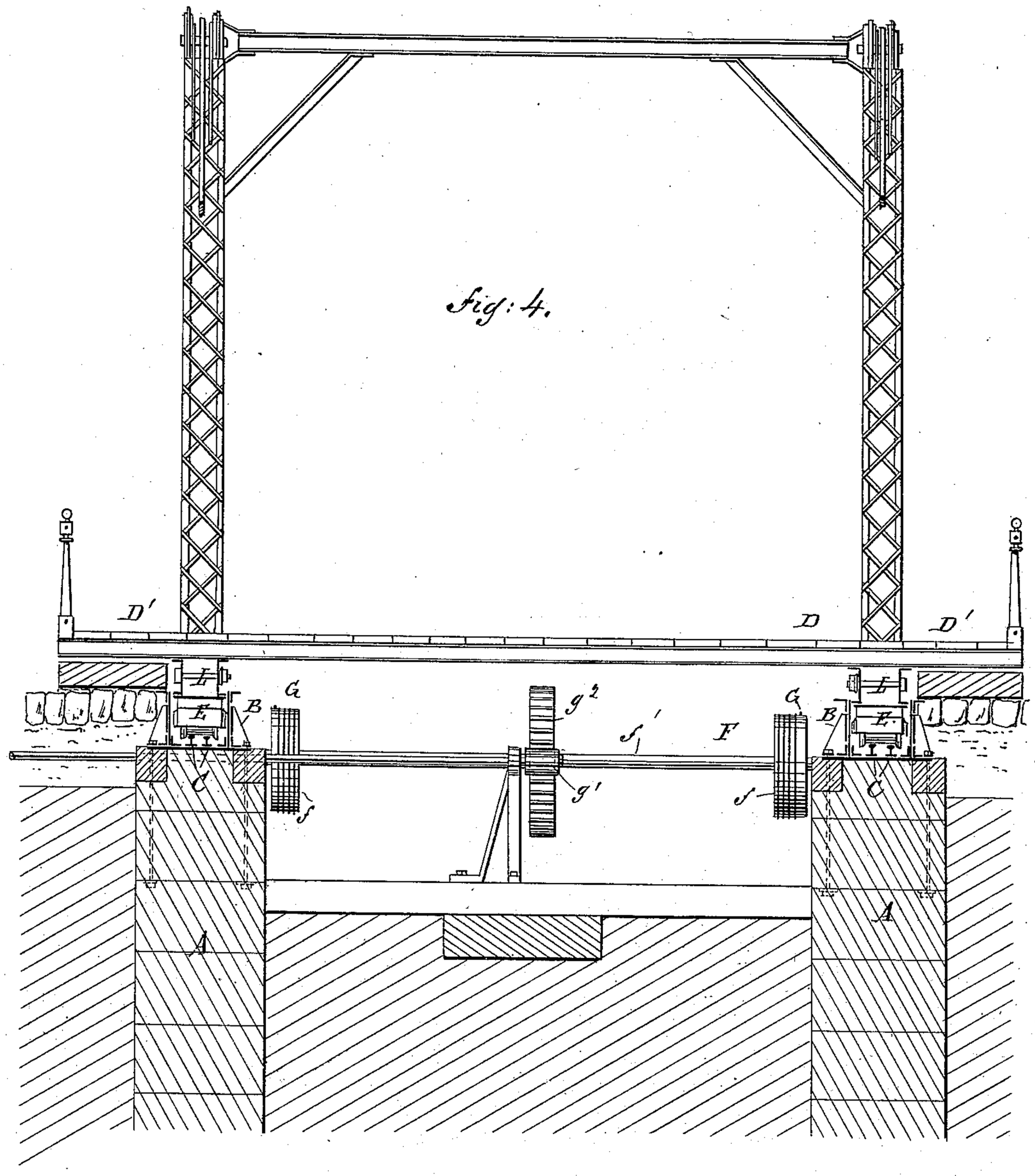
Fig: 4.



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(No Model.) 4 Sheets—Sheet 3.

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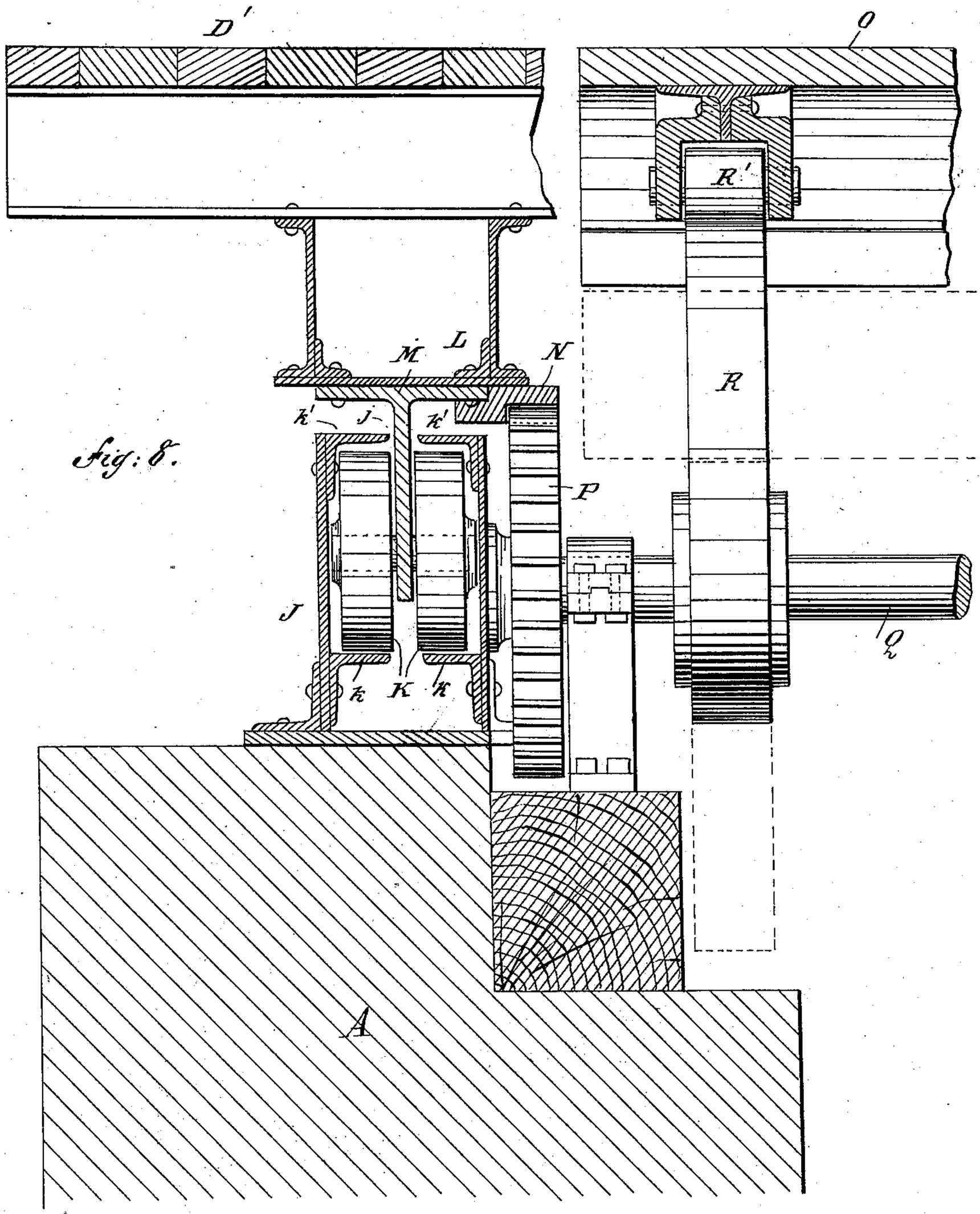
DRAW BRIDGE.

No. 376,225. Patented Jan. 10, 1888.

Fig: 8.



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No. 376,225. Patented Jan. 10, 1888.

Fig. 6.

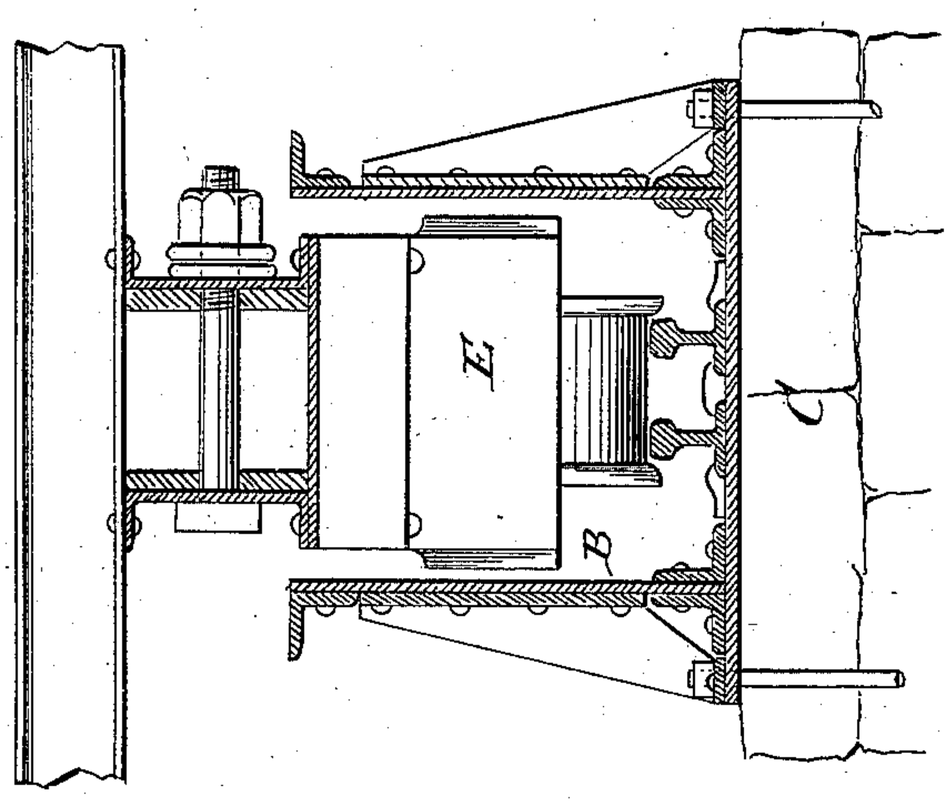


Fig. 5.

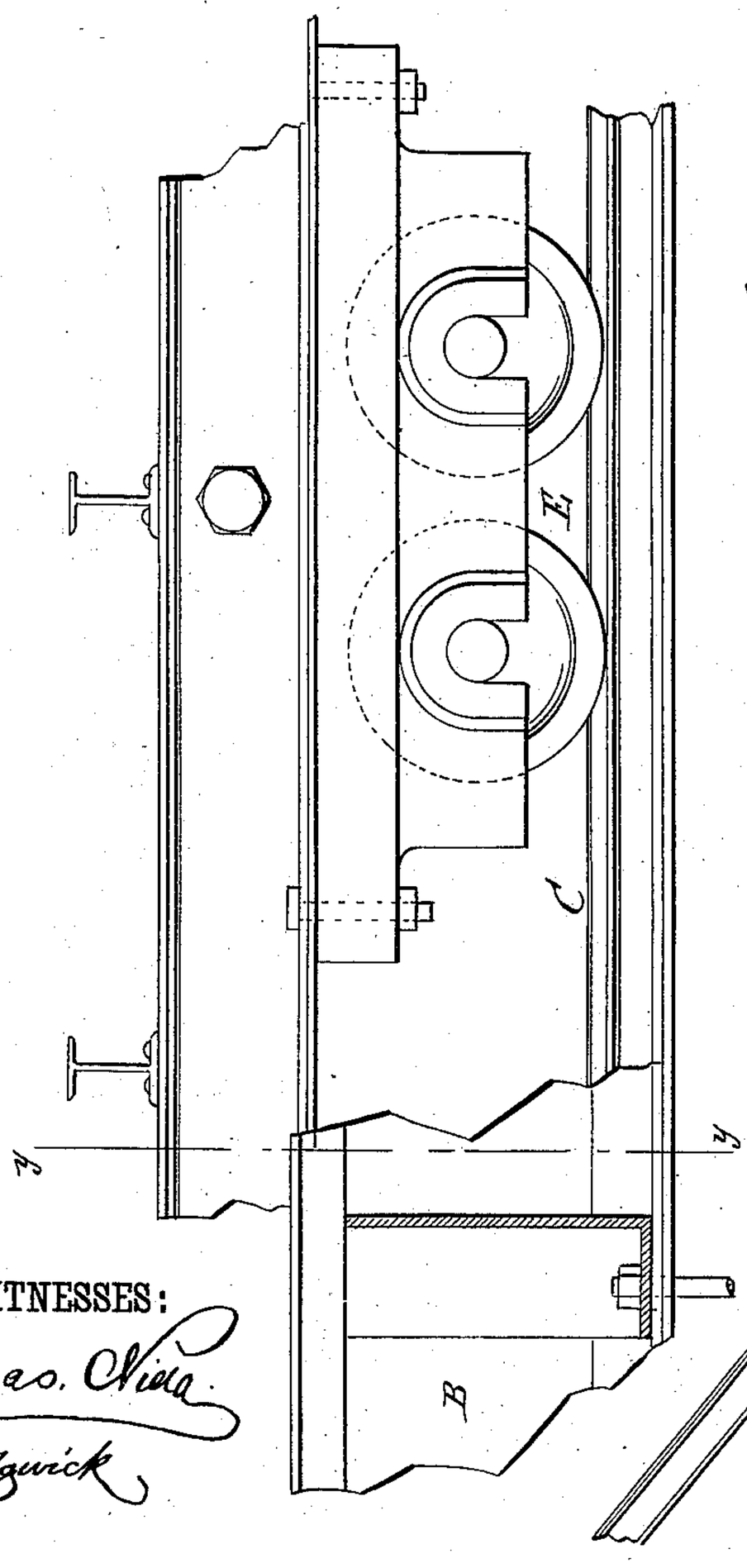
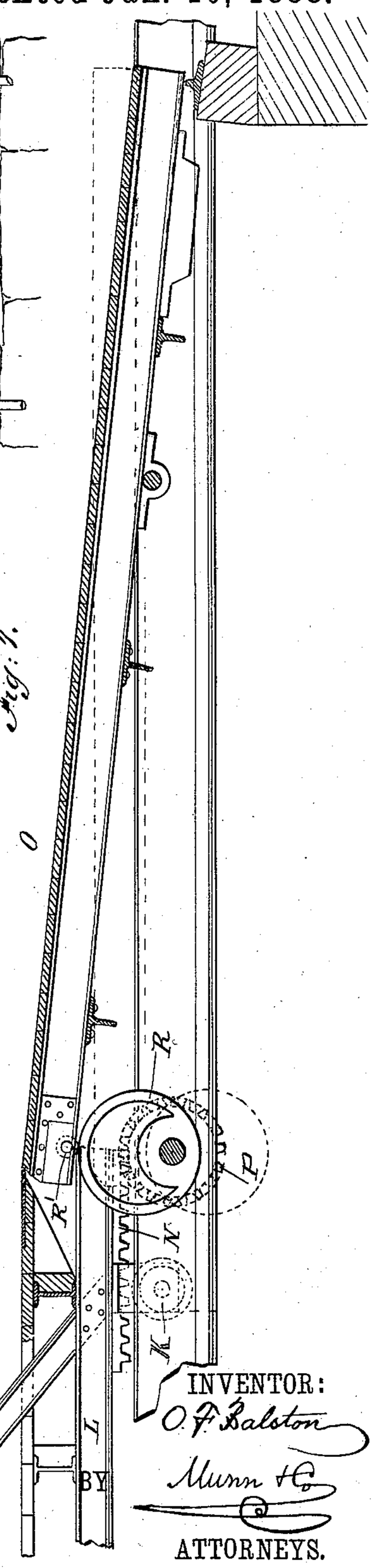


Fig. 7.



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ATTORNEYS.

UNITED STATES PATENT OFFICE.

OSCAR F. BALSTON, OF BROOKLYN, NEW YORK.

DRAW-BRIDGE.

SPECIFICATION forming part of Letters Patent No. 376,225, dated January 10, 1888.

Application filed October 8, 1887. Serial No. 251,816. (No model.)

To all whom it may concern:

Be it known that I, OSCAR F. BALSTON, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Draw-Bridge, of which the following is a full, clear, and exact description.

My invention relates to the construction of a longitudinally-moving draw-bridge; and it consists of the construction, arrangement, and combination of parts, all as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a broken side elevation of my new and improved draw-bridge. Fig. 2 is a broken diagram view of the same. Fig. 3 is a plan view of one of the rope-fastenings for operating the bridge. Fig. 4 is a transverse sectional elevation taken on the line *x x* of Fig. 1. Fig. 5 is an enlarged detailed side view showing part of the large tube B and the rails, carriage, and lower chord. Fig. 6 is a transverse sectional elevation taken on the line *y y* of Fig. 5. Fig. 7 is a longitudinal sectional elevation taken on the line *z z* of Fig. 2, and showing the shifting-approach with the automatic device for raising and lowering the same. Fig. 8 is an enlarged detailed sectional view taken on the line *z' z'* of Fig. 2.

Upon the masonry A are constructed two parallel tubes or channels, B. In each of these are secured two rails, C, upon which the bridge D is supported upon trucks E, and along which it is adapted to be moved back and forth longitudinally for opening and closing the waterway. The bridge is moved by a windlass, F, and ropes or chains G, which are secured to the outer end of the bridge, passed thence around the drums *f f* on the shaft *f'*, and thence made fast to the screw-rods *h* of the turn-buckles H, which are made fast to the street end of the bridge, as shown at f^2, Fig. 2. The rod *h'* of each turn-buckle H is provided with a coiled spring, h^2, between its head and the adjacent end of the frame h^3 of the turn-buckle, so that a desirable flexibility will be given to the ropes G. The shaft *f'* and drums *f* may be revolved by the crank-shaft *g* and gear-wheels *g' g*^{2}, the said crank-shaft *g* being turned by any suitable motive power. The bridge D may be of the common truss construction, and at each side of the main roadway is formed a foot-bridge, D'. (Shown clearly in Figs. 4 and 8.) At the ends of the tubes or channels B (which are a little more than one-half the length of the bridge) are formed or secured upon the masonry A, and extending back into the street, the tubes or channels J, formed with a slot, *j*, at the top, as shown in Fig. 8. These channels are formed with the tracks *k* for the wheels K at the street end of the bridge to run upon, and the top of the channel is closed by the flange *k' k'*, except a small narrow space, *j*, so that dust, snow, or sleet will not enter the channels to interfere with the operation of the bridge. The channels B are covered at all times by the main part of the bridge. The wheels K are attached to the chords L of the bridge by means of a T-beam, M, as shown clearly in Fig. 8, the flange of the said beam being adapted to move in the slot *j*. To one of the chords L is attached a rack, N, or other motive device for automatically causing the pivoted approach O to the bridge to be raised and lowered by the longitudinal movement of the bridge. In connection with the rack N, I employ the gear-wheel P and shaft Q, on which are secured the eccentrics R. When the bridge starts back, the rack N turns the gear-wheel P, shaft Q, and eccentrics R, so that the latter occupy the position shown in dotted lines in Fig. 7, which will lower the approach O, so that the bridge will pass over it. When the bridge is closed, the rack N will return the eccentric to its original position and lift the adjacent end of the approach flush with the end of the bridge. Anti-friction rollers R' are attached to the under surface of the approach to take the friction of the eccentrics, as will be understood from Fig. 8.

The tubes B, in the operation of the bridge, act as stiffening-girders, forming a subway of the truss and preventing displacement of the bridge should any part of the foundation settle unevenly. They also protect the rails against obstructions, such as snow, ice, &c. From the end of the truss the tubes J will continue in the roadway as far as the bridge runs back, and the wheels run upon the angle-irons *k* and

beneath the angle-irons *k'*, so that they are protected from accident from vertical pressure on the outer end of the truss, and these tubes also act as a bearing for the eccentric-shaft Q under the automatic approach.

The power for opening and closing the bridge will be, in the case of heavy bridges, a steam or hydraulic engine acting upon the operating-shafts, and the gear-wheels and drums will be made of the required size for opening and closing in any required time.

With this system no center pier is required in the water-way, and vessels can lie close to the bridge, making property more valuable on each side of the structure, and the truss may be of any approved design in iron or wood, or the two combined.

The anchor end of the bridge when closed is supported upon a table, S, of masonry A, and anti-friction rollers *s s* are supported thereby to support and take the friction of the truss, as will be understood from Fig. 1.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The tubes B J, supported upon the masonry A, in combination with the bridge having trucks E K, the tubes B being provided with the tracks C, substantially as described.

2. The approach O, pivoted to the road-bed, in combination with the longitudinally-moving draw-bridge, and means, substantially as described, for lowering the approach below the bridge on opening the same, and for elevating its free end to a level with the bridge on closing the latter, substantially as described.

3. The tubes J, let into the street and provided with the tracks *k* and spaced top flanges, *k'*, in combination with the longitudinally-movable bridge provided with the rollers K, substantially as described.

4. The chord L of the bridge, provided with the rack N, in combination with the gear-wheel P, shaft Q, eccentric R, and pivoted approach O, substantially as described.

5. The frame h^3 of the turn-buckle H, in combination with the ropes G, screw-rod *h*, rod *h'*, and spring h^2, placed upon the rod *h'*, between its head and the end of the frame h^3, substantially as described.

OSCAR F. BALSTON.

Witnesses:

ISAAC W. LEWIS,

EBENEZER B. WOOD.