(No Model.) 2 Sheets—Sheet 1.

B. L. WORDEN.

DRAWBRIDGE.

No. 536,313. Patented Mar. 26, 1895.

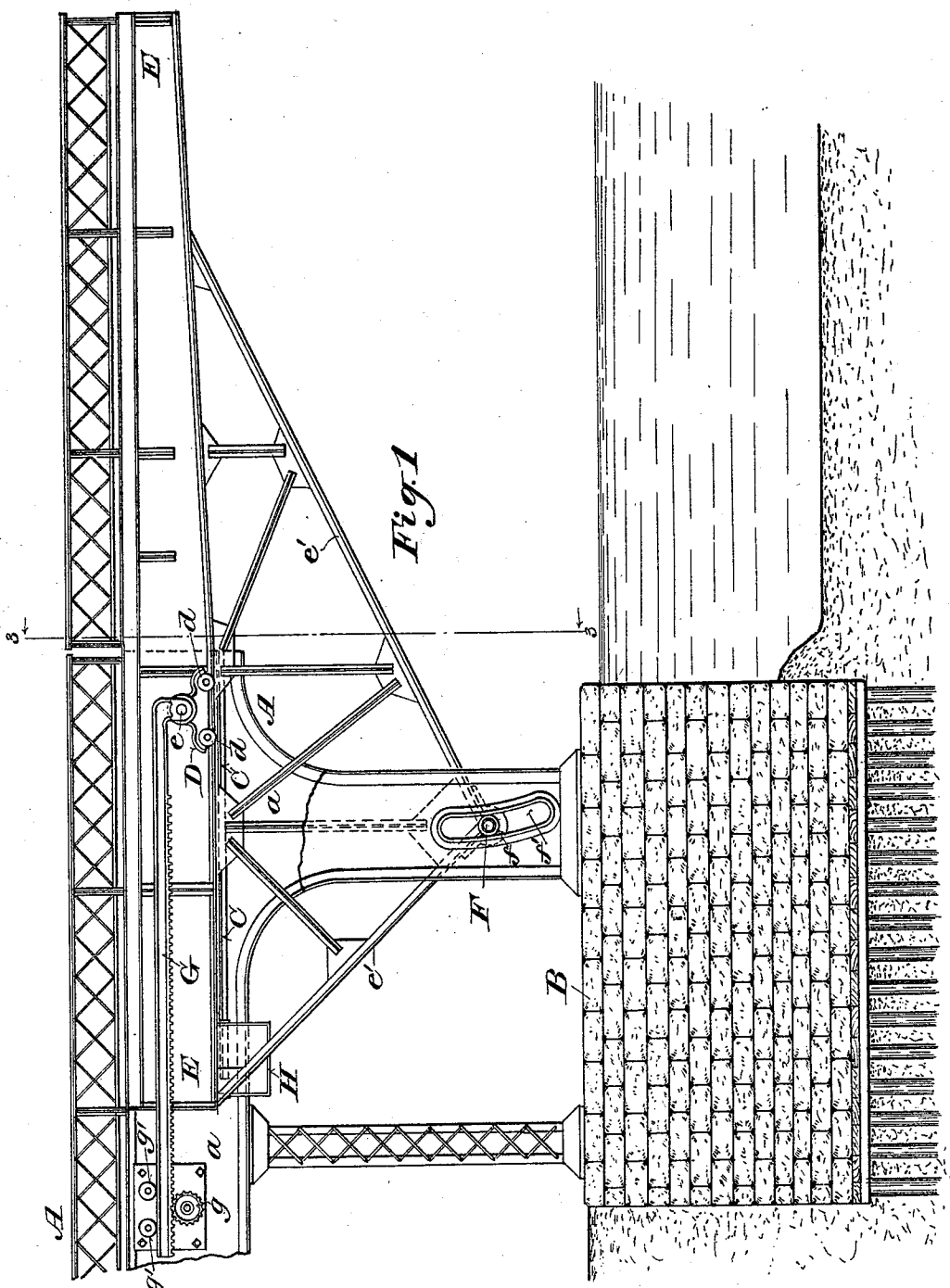

Fig. 1

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(No Model.) 2 Sheets—Sheet 2.

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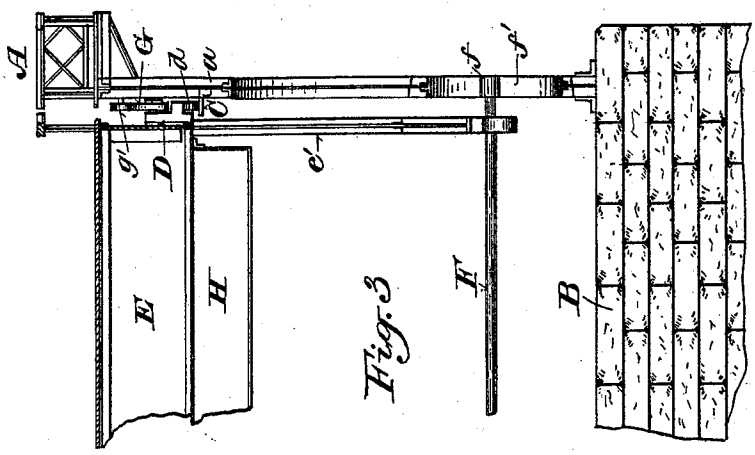

Fig. 3

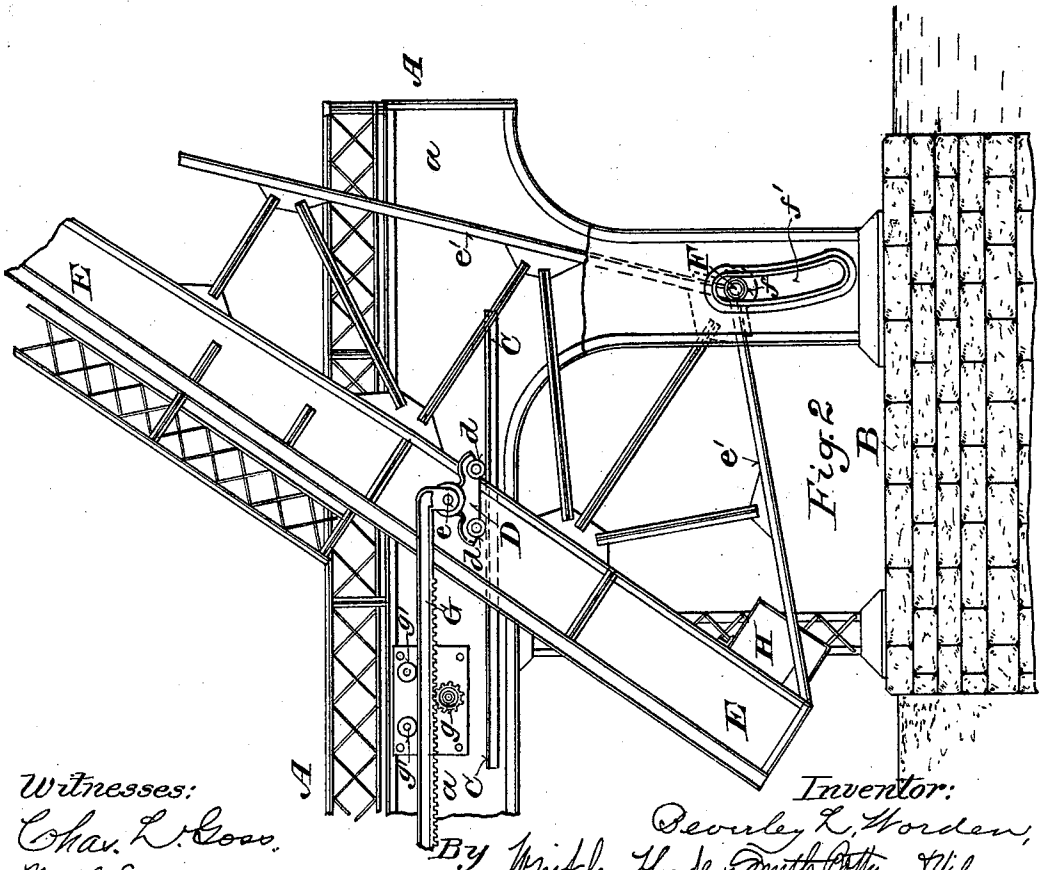

Fig. 2

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UNITED STATES PATENT OFFICE.

BEVERLEY L. WORDEN, OF MILWAUKEE, WISCONSIN.

DRAWBRIDGE.

SPECIFICATION forming part of Letters Patent No. 536,313, dated March 26, 1895.

Application filed January 28, 1895. Serial No. 536,450. (No model.)

To all whom it may concern:

Be it known that I, BEVERLEY L. WORDEN, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Drawbridges; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The main objects of my invention are to afford a clear, unobstructed channel between the abutments or bridge supports on opposite sides thereof, to simplify the construction and facilitate the operation of bridges of this class.

It consists essentially of a vertically swinging bridge section having horizontally movable hinge or pivot supporting connections located at or near its center of gravity, and a turning connection at a distance therefrom with a fixed guide or support, together with suitable means of moving said pivot or hinge supporting connections horizontally so as to open and close the bridge.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a side elevation of a vertically swinging bridge section and supporting structure embodying my invention, a portion of the front girder of the approach or supporting structure being broken away. Fig. 2 is a similar view showing the bridge section open, and Fig. 3 is a vertical cross section of a portion of the bridge on the line 3, 3, Fig. 1.

In the construction of bridges of this class, difficulty has been experienced in so counterbalancing the various moving portions as to bring the work required to open and close the bridge within convenient limits, thereby reducing the weight of the operating mechanism so that it may be turned manually by the number of men ordinarily required as tenders. To overcome this difficulty various devices have been proposed, among which may be mentioned bridges so constructed or counterbalanced that the center of gravity of the entire mass will move in approximately a straight line horizontally in opening and closing them. Among the best of this class of bridges is a form in which a vertically swinging bridge section has a vertically movable supporting and guiding connection at or near one end, and a link connection at or near the other end, with a suitable supporting structure whereby in opening and closing the bridge the center of gravity is caused to move in an approximately horizontal direction.

Referring to the accompanying drawings illustrating my invention, A designates the bridge supporting structure, in the present instance made of iron or steel, and resting upon a foundation B of masonry. The side girders *a* of this supporting structure which serves in the present instance to carry the road or passageway constituting the approach to the bridge, are formed or provided on their inner sides with parallel horizontal ways C.

D are slides mounted and freely movable upon said ways and preferably provided with sheaves or rollers *d d* to reduce the frictional resistance to their movement.

E designates a bridge section hinged or pivoted at *e* on each side in or near its center of gravity, to said slides so as to be supported thereby, and to swing vertically thereon.

F is a transverse rod or bar rigidly connected with the swinging bridge section parallel with the axis on which it turns by braces *e' e'*. The projecting ends of this bar or rod, preferably provided with rollers *f* to avoid friction, engage with guiding slots or openings *f'* formed in the girders *a* or the standards or members which carry them. The rod or bar F and the guiding slots or openings *f'* with which it engages, constitute what may be conveniently designated the "turning connection" of the bridge. I do not, however, wish to be understood as limiting myself to the specific devices shown and described for this purpose, as this connection may be variously constructed and arranged to adapt it to different conditions.

For the purpose of operating the bridge I have shown a rack-bar G pivotally connected at one end with the swinging bridge section concentrically with its hinge or pivot connection *e* with one of the slides D, and engaging with a gear or pinion *g* to which any suitable power may be applied in any convenient

manner (not shown). A duplicate of this rack-bar and pinion may be provided on the other side of the bridge, the two pinions being in that case fixed upon the same transverse horizontal shaft to which the actuating power is applied. Each rack-bar may be held in engagement with its actuating pinion or gear *g* by one or more rollers *g'* arranged to bear at their peripheries against the back or opposite side of said bar. The bridge operating mechanism may be applied to the cross-rod or bar F or to other points in the swinging bridge section E, and various other devices may be employed for the purpose, such for example, as screws in place of the rack-bars.

H designates a box or receptacle which may be provided with suitable weights in order to counterbalance the moving parts of the structure and bring the center of gravity as near as practicable to the supporting pivot connections *e*. The amount of weight required will vary according to different conditions, such as the distance of the supporting pivot connections from the ends of the swinging bridge section. The turning connection may also be variously formed and located according to the construction of the bridge, its weight, length and elevation, and the location of the movable pivot connections on which it is supported and turns. In short, various changes may be made in details of construction and arrangement of the component parts of the structure within the spirit and intended scope of my invention.

I claim—

1. In a draw-bridge the combination with a suitable support, of a bridge section arranged to turn vertically, and having horizontally movable pivot or hinge supporting connections at or near its center of gravity, with said support, substantially as and for the purposes set forth.

2. In a draw-bridge the combination with a suitable support, of a bridge section arranged to turn vertically, and having pivot or hinge connections with said support, movable in an approximately horizontal direction and supporting it at or near its center of gravity, and a turning connection with a fixed part located at a distance from the line of said pivot connections, substantially as and for the purposes set forth.

3. In a draw-bridge the combination with a suitable support provided with parallel horizontally disposed ways, slides mounted upon said ways, a vertically swinging bridge section having pivot connections with said slides, and a turning connection with a fixed part, substantially as and for the purposes set forth.

4. In a draw-bridge the combination with a suitable support, of a vertically swinging bridge section having horizontally movable hinge or pivot connections with said support, and a turning connection at a distance therefrom with a fixed part, and a bar or rod pivotally connected with said bridge section and arranged to move its supporting pivot connections horizontally, substantially as and for the purposes set forth.

5. In a draw-bridge the combination with a suitable support having parallel horizontally disposed ways, slides movably mounted upon said ways, a vertically swinging bridge section having pivot connections with said slides and a turning connection at a distance therefrom with a fixed guide, and an operating bar or rod pivotally connected with said bridge section in or near the line of its pivot connections with said slides, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

BEVERLEY L. WORDEN.

Witnesses:
ROBERT E. GROTH,
CHAS. L. GOSS.