

**No. 663,484.**

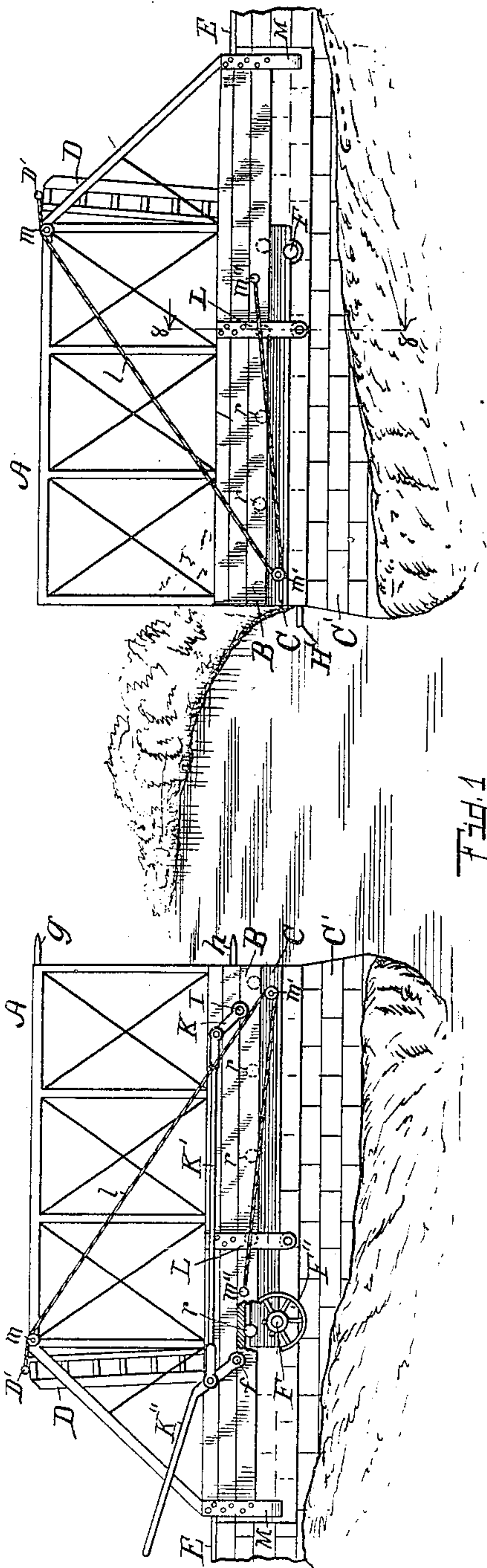
**Patented Dec. 11, 1900.**

**T. R. BEVANS.  
DRAWBRIDGE.**

(Application filed Feb. 23, 1900.)

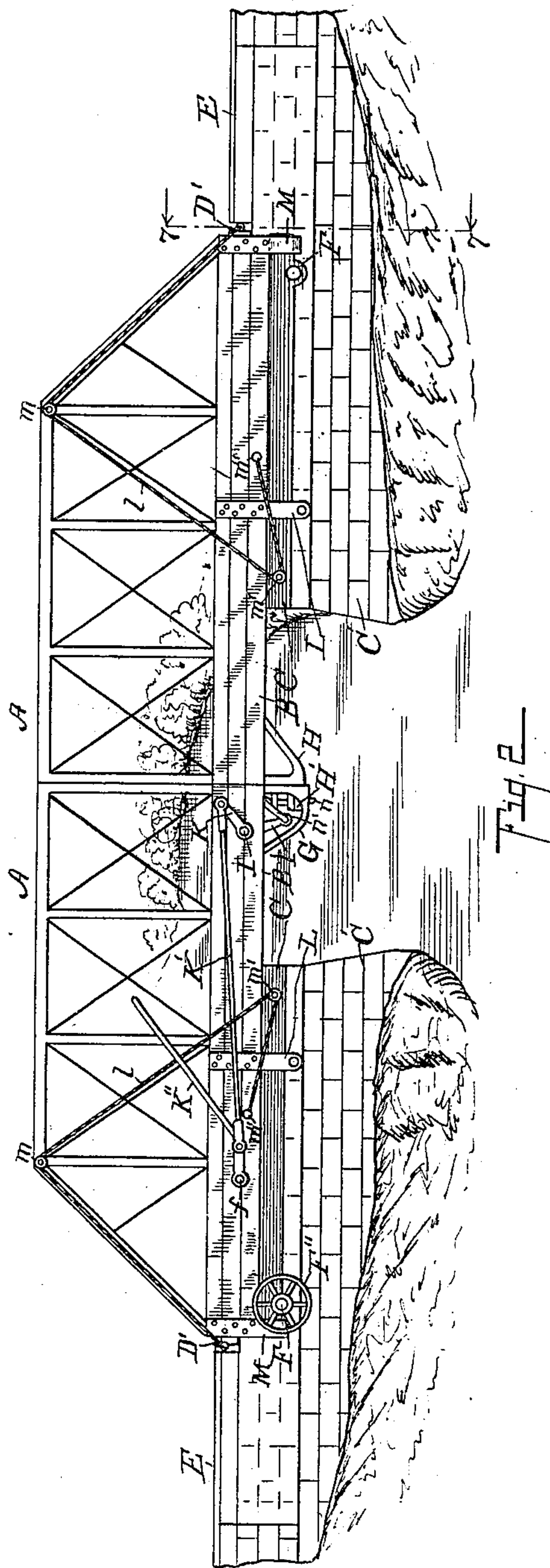
(No Model.)

**3 Sheets—Sheet 1.**



Witnesses:

Mary Gidner  
Otis A. Earl



Inventor,

Thomas R. Barnes  
By Fred L. Chappell  
Att'y.

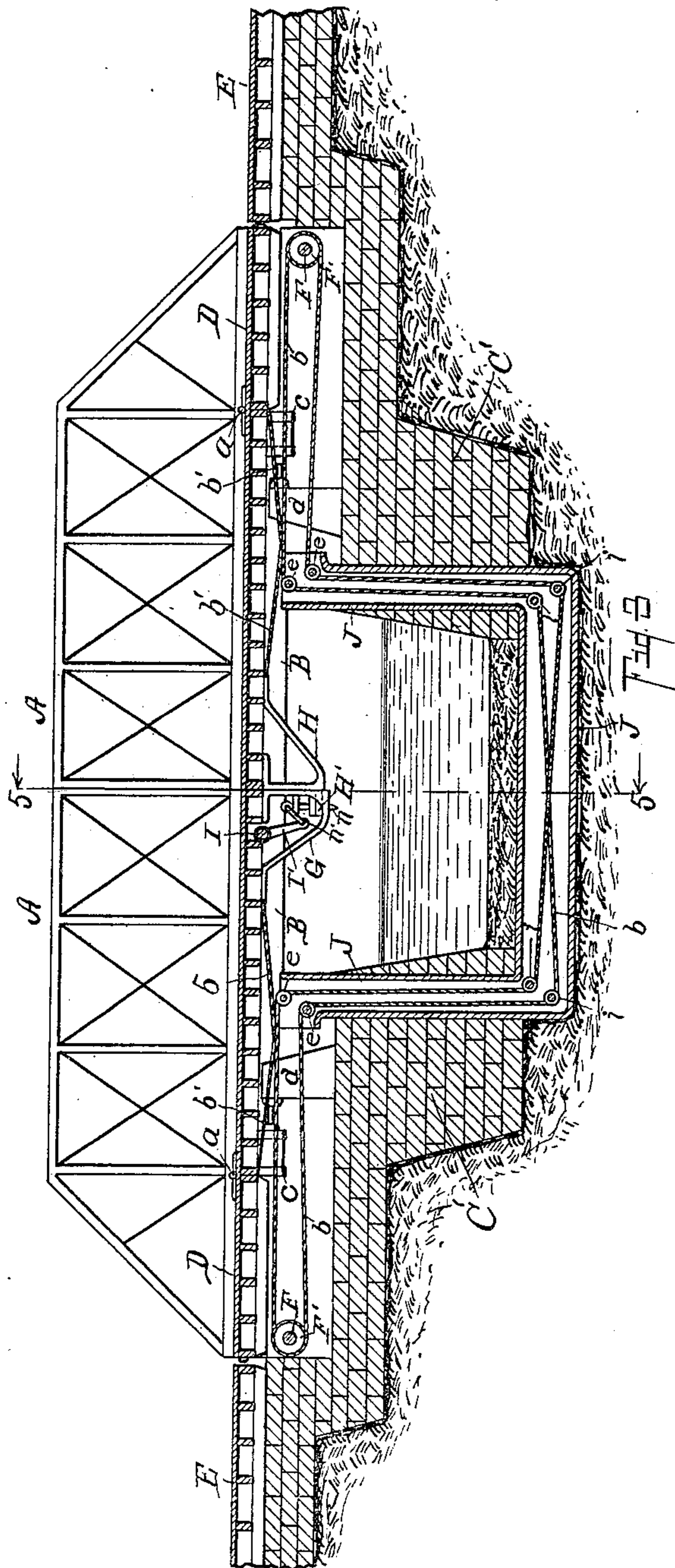
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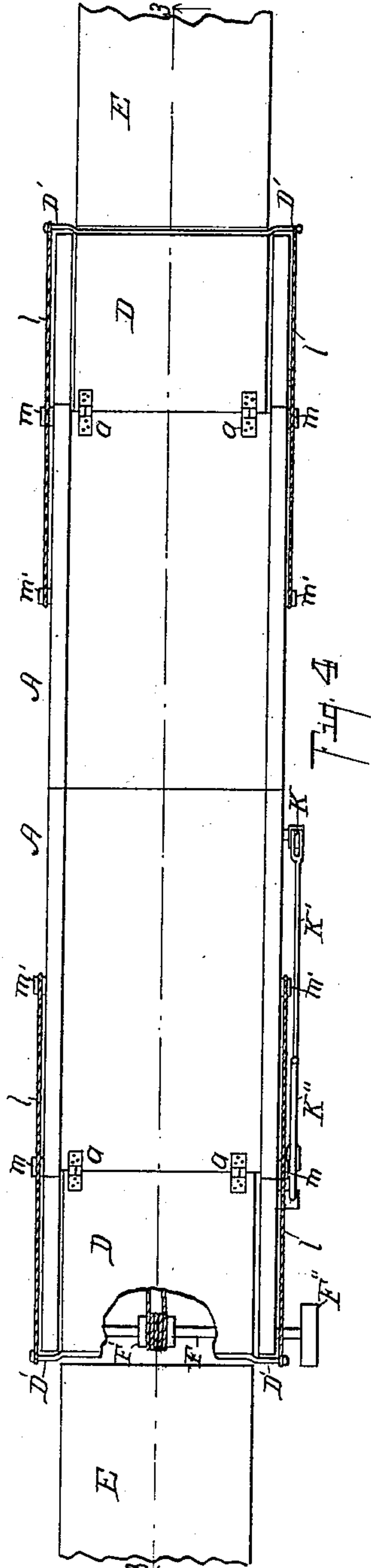
(No Model.)



Witnesses:

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3 Sheets—Sheet 2.



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No. 663,484.

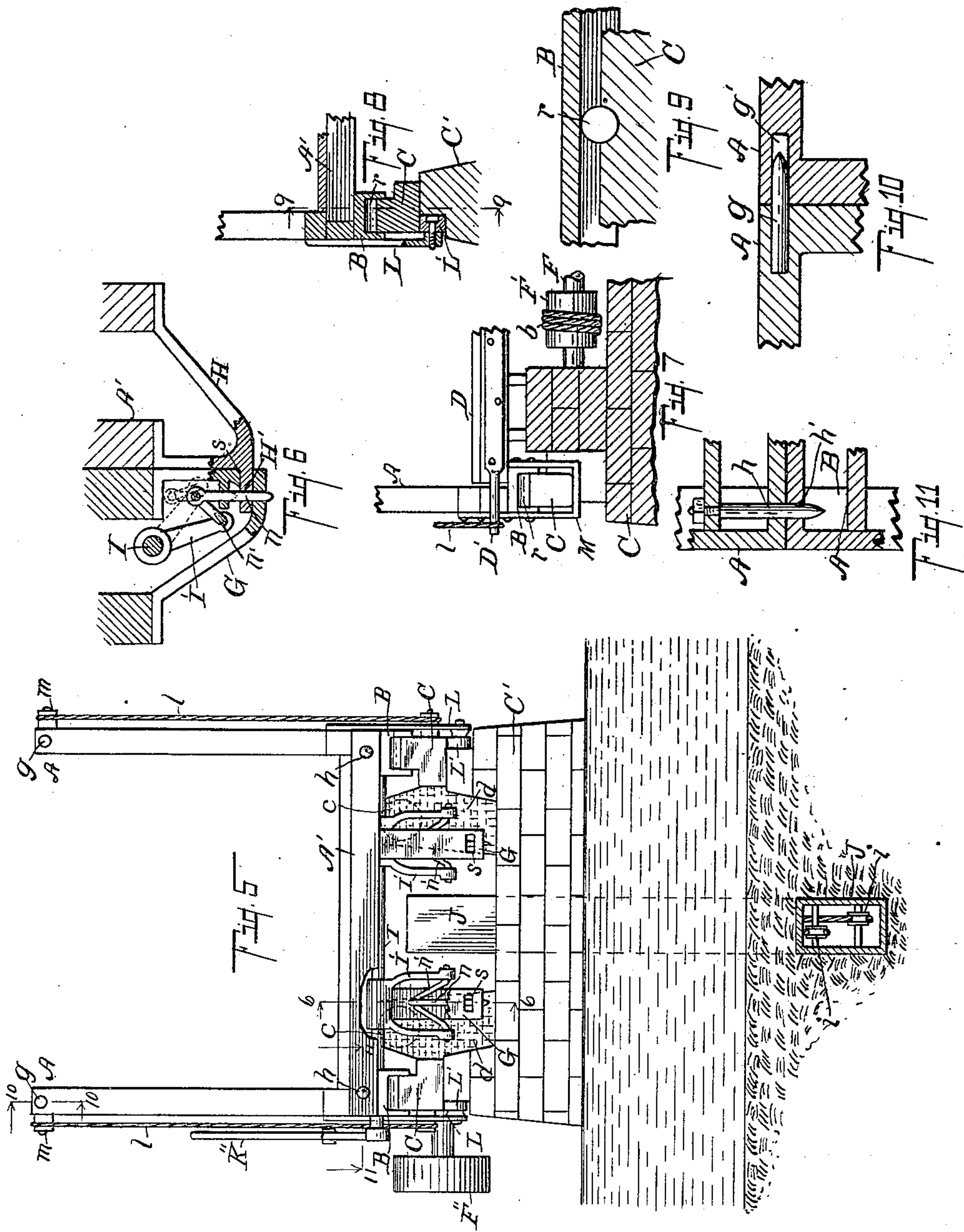
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(Application filed Feb. 23, 1900.)

(No Model.)

3 Sheets—Sheet 3.



Witnesses:

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# UNITED STATES PATENT OFFICE.

THOMAS R. BEVANS, OF KALAMAZOO, MICHIGAN.

## DRAWBRIDGE.

SPECIFICATION forming part of Letters Patent No. 663,484, dated December 11, 1900.

Application filed February 23, 1900. Serial No. 6,319. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS R. BEVANS, a citizen of the United States, residing at the city of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented new and useful Improvements in Drawbridges, of which the following is a specification.

This invention relates to improvements in drawbridges, and particularly to that class of drawbridges which move or reciprocate on tracks or ways to project them across the stream or opening to close the draw and to open the draw.

The objects of the invention are, first, to provide a structure of drawbridge having movable sections to each side to close the draw in which efficient locking means are provided for securing the meeting ends of the sections together; second, to provide improved means of actuating the locking mechanism on a drawbridge of this style; third, to provide an improved mechanism for actuating the sections or a section of a drawbridge of this class; fourth, to provide an improved structure and means for actuating the sections of a drawbridge of this class simultaneously; fifth, to provide an improved construction of ways for supporting the sections of the drawbridge; sixth, to provide, in connection with the drawbridge having a reciprocating draw, improved means of locking the bridge to the abutment when in its extended or closed position; and, seventh, to provide in a drawbridge construction a gate portion connected to and operated thereby for closing the approach when the draw is open and at the same time clearing a way for the outer end of the bridge.

Further objects will definitely appear in the detailed description to follow.

I accomplish these objects of my invention by devices and means described in the specification.

The invention is clearly defined, and pointed out in the claims.

A structure embodying the different features of my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved drawbridge with the draw open. Fig. 2 is a similar side elevation of the bridge, showing the draw closed. Fig. 3 is a vertical longitu-

dinal detail sectional elevation taken on line 3 3 of Fig. 4, showing the draw closed and illustrating details of construction. Fig. 4 is a detail plan view of the bridge with the draw closed, a portion of the flooring being broken away to show the actuating-drum. Fig. 5 is a vertical transverse detail sectional elevation taken on line 5 5 of Fig. 3. Fig. 6 is an enlarged detail elevation, partially in section on line 6 6 of Fig. 5, showing the locking mechanism and its operation. Fig. 7 is an enlarged transverse detail sectional elevation showing the means for locking the bridge in position when the draw is closed and also a portion of the actuating mechanism. Fig. 8 is a transverse detail sectional elevation taken on line 8 8 of Fig. 1, showing structure of the guideways and the longitudinal beams of the bridge at this point. Fig. 9 is an enlarged detail sectional view taken on line 9 9 of Fig. 8, showing construction of roller-guides for supporting the bridge. Fig. 10 is an enlarged detail sectional view taken through the meeting ends of the bridge on a line corresponding to line 10 10 of Fig. 5. Fig. 11 is an enlarged detail horizontal sectional view of the meeting ends of the bridge, taken on a line corresponding to line 11 11 of Fig. 5.

In the drawings all of the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, A A are opposite halves of the drawbridge, which are provided with channel-beams B B on their sides to receive suitable rollers on the tops of beams C, which are supported on the piers or abutments of the bridge. The beams C are adapted to project up and into the channels of the under sides of the beams B. Rollers r, Fig. 9, are supported in the same way and permit the bridge to be moved backward and forward in opening and closing the draw. In these particulars both halves of the bridge are constructed alike. Between the beams C is an open space to receive the operating devices and means which are arranged beneath the bridge.

The rear ends of the bridge-beams B are provided with downwardly-extending loops



M, and the rear ends of the beams C project to engage in these loops to serve to lock the bridge in a level position and retain it there independent of other means.

- 5 The upper portion of the bridge is provided with rails and is trussed and supported in any well-known way, or in case of short draws this upper part can be omitted.

10 Dowel-pins *g* and *h* are provided on one section of the bridge to engage suitable openings on the opposite section when the meeting ends of the bridge are brought together in closing the draw.

- 15 Connected by suitable hinges *a* to the outer ends of the draw of the bridge are gates D, which are adapted to fold up and close the ends of the bridge when the draw is open, thus preventing any one passing over or onto the bridge at that time. This closing of the  
20 gate is effected by means of a cable *l*, which is connected at D' to the end of the gate and is extended over guide-wheel *m*, and thence downwardly and forwardly around a guide  
25 beam B of the bridge at *m''*. It will be observed from this that when the drawbridge is opened motion is imparted to the cable *l* and to its connection to the bridge, and the movement backward causes it to act upon the  
30 hinged section D at each end and raise it to a vertical position, thus forming a gate at that point. The raising of this section D of the bridge at each side opens up the space, which permits the remaining portion of the  
35 bridge to slide back when the draw is opened and avoids the necessity of making any provision for moving the outer end of the bridge backward.

- 40 On the right-hand section of the bridge as it appears in the drawings is a bracket H, depending downward and having a projecting tongue H'. It is held on the bridge by its attachment at the upper end to the cross-beam A' and the other beams on the under side of  
45 the bridge. On the opposite section of the bridge is a bracket *g*, having a mortise S to receive the tongue H'. A pin *n* is provided to extend through a hole in the tongue H' and through the upper and under sides of  
50 the mortise to securely lock these parts together. This structure is duplicated toward each side of the bridge. The pins *n* are operated simultaneously by rock-shaft I. The rock-shaft is connected by a suitable yoke I',  
55 having a link *n'* extending from the inner end of the same and curved upwardly to engage the perforation in the top of the pin *n*, so that by actuating the rock-shaft I these pins *n* will be withdrawn, so that the bridge  
60 can be opened. When the parts are locked together, the pins, in connection with dowels *g* and *h* above, secure the meeting ends of the bridge together by a very strong joint, so that the bridge will support any load which a span  
65 of that length will carry.

The rock-shaft I is operated by an arm K, which is connected by a suitable pitman or

rod K' to a lever K'', which is fulcrumed at *f*. It will be seen that by operating the lever K'' the pins *n* will be drawn up, releasing the  
70 sections of the bridge, so that they can be drawn apart. Connecting the abutments to each side of the stream is a casing J, which is U-shaped or forms the faces of three sides  
75 of a rectangle the main portion of which is located below the bottom of the stream to be crossed. Within this casing are supported  
80 suitable guide-rolls *i i* at the bottom and *e e* at the top. A shaft F extends from side to side through the beams C, which are supported by the piers C' of the bridge. On  
85 these shafts F are supported windlasses F', about which an endless cable *b* is looped and extended through the tube or casing J and over the guide-rollers *e e* and *i i*, respectively,  
90 to actuate the bridge. The cable is crossed under the stream. The two halves of the bridge are operated by a pull, the cable being connected at each side to the movable  
95 sections by short pieces of cable *b'*, extending in opposite directions. From this arrangement it will be seen that by actuating pulley F' by any suitable power or by actuating the shafts F by any suitable means the  
100 bridge can be conveniently and expeditiously opened and closed. Arms L are attached to beams B and extend downwardly and bear  
105 rollers N', which engage under the beams C and serve to support the bridge when the draw is closed, relieving friction at that point.

To operate my improved bridge it will be noted that when the draw is closed it is first necessary to raise the lever K'', which by its  
110 connections actuates the rock-shaft I, which lifts the pins *n*, unlocking the bridge at the center. When this is accomplished, power is applied to the shaft F, preferably through the pulley F', and the sections of the bridge  
115 are drawn apart. This motion of the sections causes, through the connection of the cable *l* at *m''* and to the hinge-gates D at D', a raising of the sections D, closing the outer ends of the draw, thus preventing any approach to the bridge when the draw is open.  
120 The raising of the sections of gates D also makes room for the bridge when the draw is open. When it is desired to close the draw, these operations are reversed, the shaft F actuates the cable *b*, and the sections of the  
125 bridge are drawn together, the dowels *g* and *h* making engagements between the meeting ends and the tongue H' projecting into the mortise S on the opposite side. When the parts are closed, the lever K'' is pushed down, which forces the pins *n* into the couplings,  
130 locking the bridge securely at the middle with a strongly-supported truss-joint. Under each section of the bridge I provide a buffer or bumper *c*, which can either be provided with an air-cushion or spring-cushion. This bumper strikes against stop *d*, suitably positioned to receive the force of the same. This prevents the sections of the bridge coming together with a heavy blow and makes



the operation of the same easy and substantially noiseless.

I desire to state in this connection that my improved drawbridge, while it is especially well adapted for all ordinary uses of a drawbridge, is well adapted for use on streams liable to floods or freshets, as the sections of the bridge can be made long, so as to span a wide waterway, and in a time of flood they can be withdrawn onto either pier, where they are securely fastened. Suitable breakwater constructions can be easily made for each section on the banks and allow the flood to pass between the sections without injury. This could not be accomplished with the usual swing-drawbridge, as it would be supported on a pier in the center of the stream, and it would not be possible to conveniently provide it with a breakwater at that point.

I desire to state, further, that my improved drawbridge can be considerably varied in its details without departing from my invention. I have shown the construction of ways for the bridge to move upon which I believe to be superior and especially well adapted for use in this connection. I am aware, however, that the same can be varied and still produce satisfactory results. I also desire to remark that the supports M, I have supplied make a strong bridge; but they are not an absolute essential to the remaining structure. I also desire to state that the gates D could be omitted, although they coact with the remaining parts of the bridge to secure a very desirable result—namely, a safe drawbridge—and also avoid the necessity of providing other means to accommodate the ends of the bridge when the draw is open. While I have shown dowels *g* and *h* to coact with my fastening-loops below, I desire to remark that the fastening below for ordinary structures is sufficient. Other variations are suggested in the preceding description, and no doubt still others will occur to those skilled in the art to which this invention pertains.

It is needless to remark that this bridge can be easily adapted for use as a railway-bridge.

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

1. In a drawbridge the combination of the abutments C', C' to each side; beams C supported on said abutments; oppositely-facing sections A, A of the drawbridge, having beams B under the same adapted to fit over the beams C on the abutments; rollers *r* on which the beams B ride and move; arms L extending down from the bridge-sections carrying friction-rollers L' which engage underneath the beams C; a hinged section D to the outer end of each bridge-section; connections for folding same to vertical position when the draw is opened suitable dowels between the meeting ends of the bridge; a locking means consisting of brackets G and H, supported beneath the sections of the bridge, the bracket H being provided with tongue H' fitting into mortise S

in bracket G; pins *n* for coupling the parts together; the lever K'' suitably connected for actuating the locking-pins *n*; an endless cable *b*; windlass under each section of the bridge around which said cable wraps; a tubular casing extending beneath the stream; suitable guide-pulleys therein for cable which is crossed at this point; connections to the cable at each side to actuate the sections of the bridge by a pulling action; suitable buffers under the sections of the bridge, all coacting for the purpose specified.

2. In a drawbridge the combination, of the abutments C', C' to each side; beams C supported on said abutments; oppositely-facing sections A, A of the drawbridge, having beams B under the same adapted to fit over the beams C on the abutments; rollers *r* on which the beams B ride and move; arms L extending down from the bridge-sections carrying friction-rollers L' which engage underneath the beams C; a hinged section D to the outer end of each bridge-section; connections for folding same to vertical position when the draw is opened; suitable dowels between the meeting ends of the bridge; a locking means consisting of brackets G and H, supported beneath the sections of the bridge, the bracket H being provided with tongue H' fitting into mortise S in bracket G; pins *n* for coupling the parts together; the lever K'' suitably connected for actuating the locking-pins *n*; and endless cable *b*; windlass under each section of the bridge around which said cable wraps; a tubular casing extending beneath the stream; suitable guide-pulleys therein for cable which is crossed at this point; connections to the cable at each side to actuate the sections of the bridge by a pulling action, all coacting for the purpose specified.

3. In a drawbridge the combination, of the abutments C', C' to each side; beams C supported on said abutments; oppositely-facing sections A, A of the drawbridge, having beams B under the same adapted to fit over the beams C on the abutments; a hinged section D to the outer end of each bridge-section; connections for folding same to vertical position when the draw is opened; suitable dowels between the meeting ends of the bridge; a locking means consisting of brackets G and H supported beneath the sections of the bridge, the bracket H being provided with tongue H', fitting into mortise S in bracket G; pins *n* for coupling the parts together; the lever K'' suitably connected for actuating the locking-pins *n*; an endless cable *b*; windlass under each section of the bridge around which said cable wraps; a tubular casing extending beneath the stream; suitable guide-pulleys therein for cable which is crossed at this point; connections to the cable at each side to actuate the sections of the bridge by a pulling action, all coacting for the purpose specified.

4. In a drawbridge the combination, of the abutments C', C' to each side; beams C sup-



ported on said abutments; oppositely-facing sections A, A of the drawbridge, having beams B under the same adapted to fit over the beams C on the abutments; a hinged section D to the outer end of each bridge-section; connections for folding same to vertical position when the draw is opened; a locking means consisting of brackets G and H supported beneath the sections of the bridge, the bracket H being provided with tongue H', fitting into mortise S in bracket G; pins *n* for coupling the parts together; the lever K'' suitably connected for actuating the locking-pins *n*; an endless cable *b*; windlass under each section of the bridge around which said cable wraps, a tubular casing extending beneath the stream; suitable guide-pulleys therein for cable which is crossed at this point; connections to the cable at each side to actuate the sections of the bridge by a pulling action, all coacting for the purpose specified.

5. In a drawbridge the combination, of the abutments C', C' to each side; beams C supported on said abutments; oppositely-facing sections A, A of the drawbridge, having beams B under the same adapted to fit over the beams C on the abutments; a hinged section D to the outer end of each bridge-section; connections for folding same to vertical position when the draw is opened; an endless cable *b*; windlass under each section of the bridge around which said cable wraps; a tubular casing extending beneath the stream; suitable guide-pulleys therein for cable which is crossed at this point; connections to the cable at each side to actuate the sections of the bridge by a pulling action, all coacting for the purpose specified.

6. In a drawbridge the combination of suitable abutments or supports; oppositely-facing draw-sections placed on the abutments to be thrown across the space; dowels on said oppositely-facing sections to retain the same in line; brackets projecting beneath, having a mortise and tenon to engage each other; and a pin to extend through the mortise-and-tenon joint to lock the parts in position.

7. In a drawbridge the combination of op-

positely-facing sections; a mortise and tenon between the sections; a pin to lock the mortise and tenon together; a rock-shaft; an arm thereon connected by suitable links to said pin; and a lever on the side of the bridge and connected by suitable rod to the rock-shaft for withdrawing the pin to release the sections of the bridge as specified.

8. In a drawbridge the combination of oppositely-facing sections; means for moving the same into position; gate-sections hinged to the outer ends of said draw, said sections being adapted to fold up and form a gate for the end of the bridge and permit the sections to be withdrawn in a straight line for the purpose specified.

9. In a drawbridge an abutment, the section adapted to reciprocate upon the same; a gate-section pivoted to swing upwardly to form a gate when the draw is open and permit the section to be withdrawn in a straight line as specified.

10. In a drawbridge the combination of a section A supported on a suitable abutment and adapted to move back and forth; a hinged gate-section, pivoted to the end of the same and adapted to fold upwardly to form a gate and open a space for the accommodation of the bridge; a cable connected to said bridge-section, passing around a guide on the abutment and over a guide on the drawbridge and connected to the folding section to fold it upwardly when the drawbridge is opened, for the purpose specified.

11. In a drawbridge the combination of an abutment; a guide-beam resting on said abutment; bridge-section having a beam resting on the guide-beam on the abutment; loop M to the outer end of said bridge-beam adapted to engage the end of the guide-beam when the draw is closed, to serve as an additional support for the bridge-section as specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

THOMAS R. BEVANS. [L. S.]

Witnesses:

MARY GIDNER,  
OTIS A. EARL.