

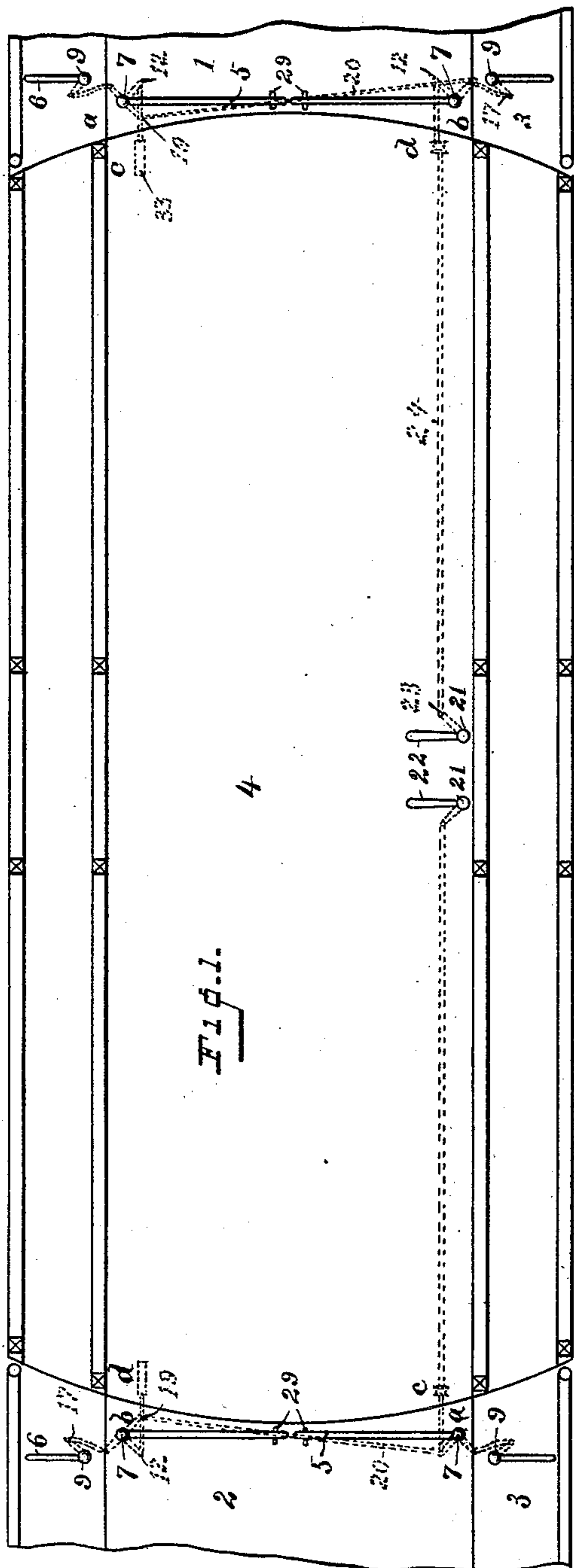
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2 Sheets—Sheet 1.

C. R. BROTHWELL.
GATE FOR DRAW BRIDGES, &c.

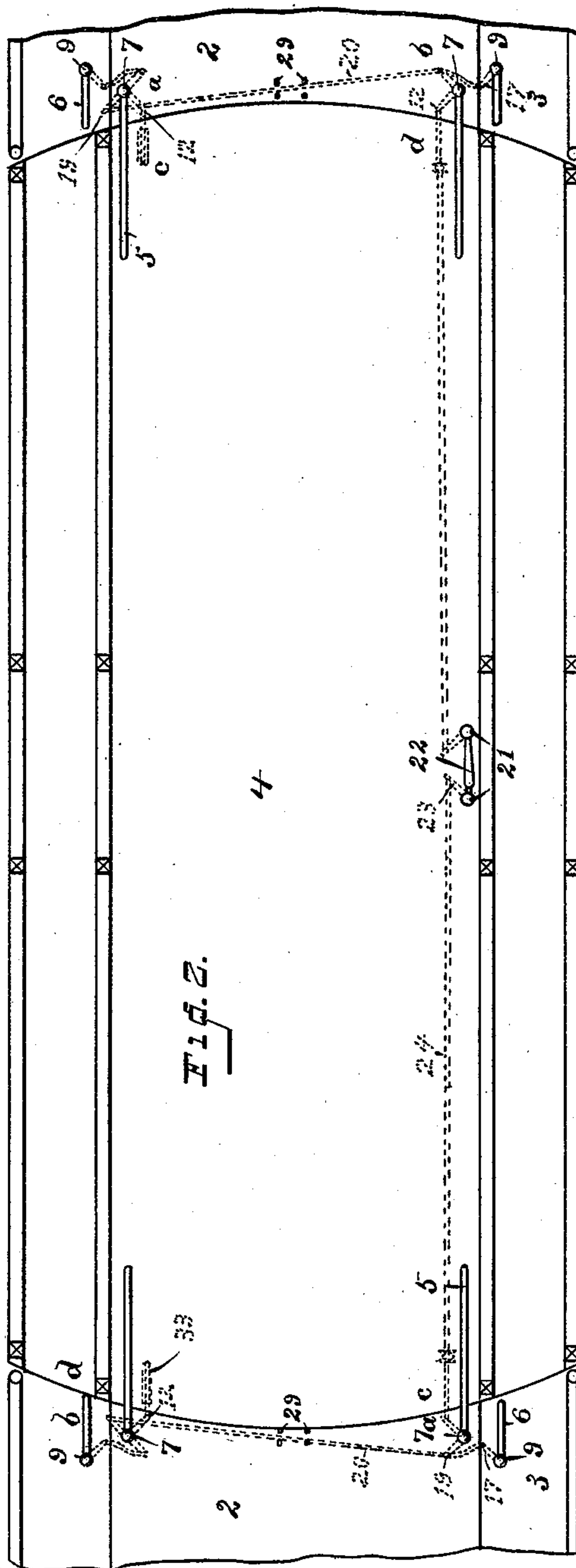
No. 431,838.

Patented July 8, 1890.



WITNESSES

C. M. Newman.
Arley I. Munson.



INVENTOR

Charles R. Brothwell
By J. M. Wooster
Atty.

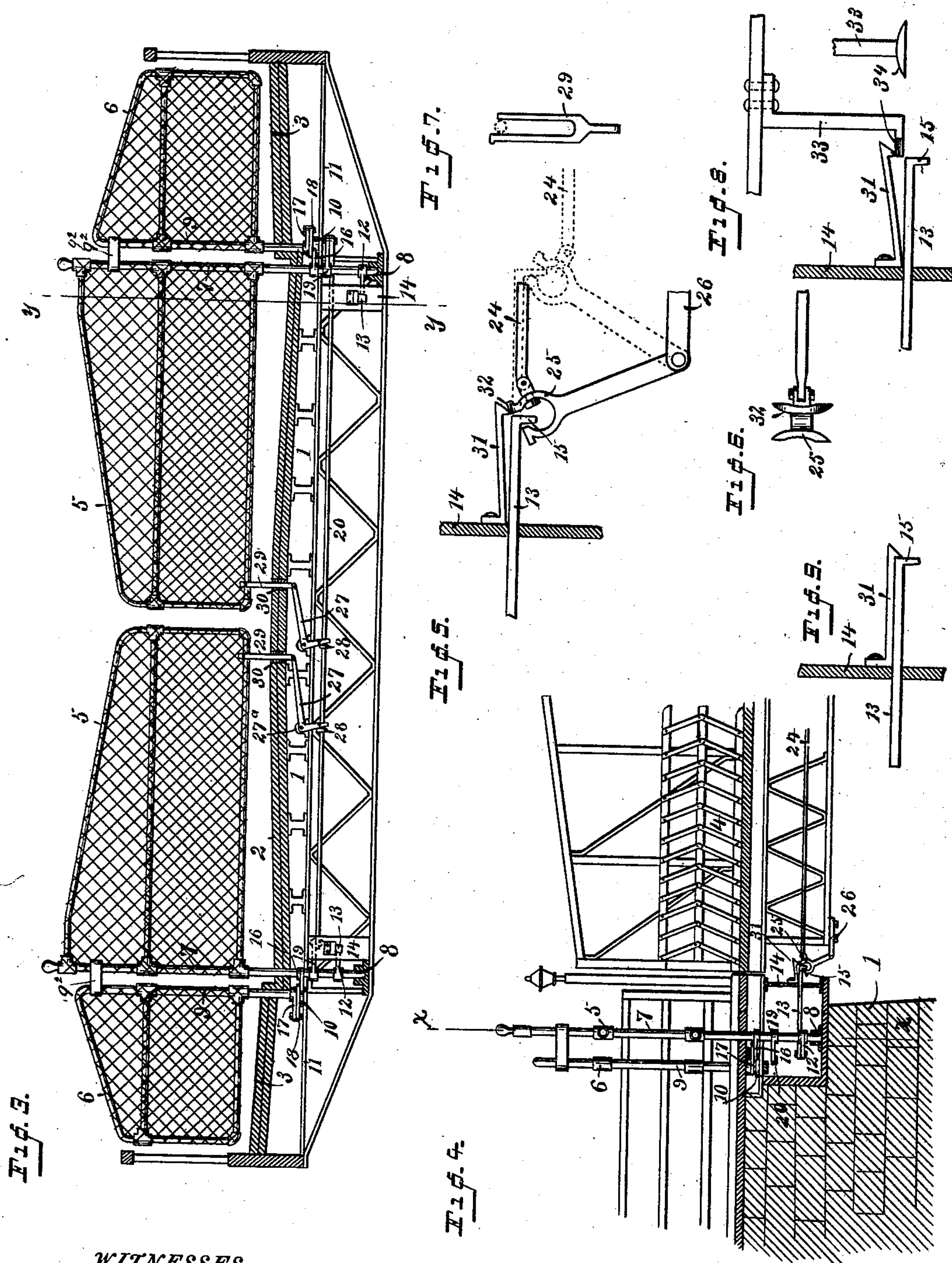
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UNITED STATES PATENT OFFICE.

CHARLES R. BROTHWELL, OF BRIDGEPORT, CONNECTICUT.

GATE FOR DRAW-BRIDGES, &c.

SPECIFICATION forming part of Letters Patent No. 431,838, dated July 8, 1890.

Application filed March 7, 1890. Serial No. 342,955. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. BROTHWELL, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Gates for Draw-Bridges, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide a system of gates for closing roadways and walks which shall be adapted for general use, but more especially adapted for use in connection with draw-bridges. I have therefore illustrated my invention as applied in connection with a draw and as operated from the center of the draw.

It has been found in practice that for this class of bridges it is desirable that the gates should swing inward—that is, toward the draw—in opening and outward in closing. It has been customary to build the draws to make a quarter-turn to open and a quarter-turn back again to close. I have recently, however, superintended the building of a draw-bridge at Bridgeport, Connecticut, and in connection with which I obtained Letters Patent No. 408,370, dated August 6, 1889, in which the draw in use is made to swing in a circle and to change ends each time it is opened and closed. As it was desirable in connection with this widely-known bridge to have the best gates that could be procured, a number of different gates were tried; but none of them were able to operate satisfactorily and to stand the hard usage incident to the rapid working of this bridge. I have therefore devised the set of gates which I will now describe to meet the requirements of this bridge and have found them satisfactory in every respect.

In the accompanying drawings, forming part of this specification, Figure 1 is a diagram plan view of the draw and the ends of the roadway, the draw being closed and the gates in the closed position, as when ready to open the draw or at the instant of closing; Fig. 2, a similar view showing the draw closed and the gates open; Fig. 3, a section on the

line *xx* in Fig. 4, looking toward the left; Fig. 4, a section on the line *yy* in Fig. 3, looking toward the right; Fig. 5, a detail view, on an enlarged scale, of an operating-yoke, an operating-rod, an operating-arm, and a locking-hook; Fig. 6, a plan view of one of the operative yokes detached; Fig. 7, a detail view of the upper end of one of the bifurcated locking-arms; Fig. 8, a detail view showing a locking-hook disengaged by one of the lifting-brackets on the side of the draw opposite to the operating-rods; and Fig. 9 is a detail view showing one of the operating-arms as locked by a locking-hook.

In operating my novel gates I have dispensed entirely with cams, gears, sprockets, chains, &c., and operate the gates by means of crank-arms, links, and rods.

1 denotes the abutment of the bridge proper; 2, the roadway; 3, sidewalks; 4, the draw; 5, the roadway-gates, and 6, the sidewalk-gates. These gates may be made of any suitable material. In practice, however, I preferably make a frame-work of gas-piping and cover it with heavy wire-netting, as shown in the drawings. The roadway-gates are carried by vertical shafts 7, the lower ends of which rest in steps 8, themselves resting upon the abutment, as is clearly shown in Fig. 4. The sidewalk-gates are carried by shafts 9, which rest in similar steps 10, which are supported by a cross-piece 11 or in any suitable manner, it being understood, of course, that these special details of construction are not of the essence of my invention. The upper ends of these shafts are connected by bands 9^a, which permit both shafts to turn freely, at the same time bracing and supporting said shafts. Near the lower end of each of the shafts 7 is a crank-arm 12, and pivoted thereto is an operating-arm 13, which extends forward through a support 14, and is provided at its forward end with an angle-piece 15. 16 denotes another crank-arm upon each of the shafts 7. Crank-arms 12 and 16 extend forward from shaft 7 at approximately right angles to each other, as is clearly indicated in diagrams Figs. 1 and 2. Each of the shafts 9 is provided with a crank-arm 17. Crank-arms 16 and 17 are connected by a link 18. It will of course be understood that the mechanism on the

abutment at each end of the draw is the same and that it is the same on opposite sides of the abutment.

19 denotes a crank-arm on each of the shafts 7, and 20 a cross-rod extending from crank-arm 19 on the shaft 7 at one side of the bridge to the crank-arm 19 on the shaft 7 at the opposite side of the bridge. The action of this cross-rod is to cause the mechanisms on opposite sides of the draw to operate simultaneously in opening and closing the gates.

At the center of the draw are placed two vertical shafts 21, each of which is provided with an operating-handle 22 and with a crank-arm 23.

24 denotes an operating-rod, one end of which is pivoted to crank-arm 23 and the other to an operating-yoke 25 at the end of the draw. The construction of this yoke is clearly shown in Figs. 5 and 6. The arms of the yoke are curved and are placed at sufficient distance apart, so that when the draw is swung to the closed position angle-piece 15 upon operating-arm 13 will pass between the arms of the yoke, as clearly shown in Fig. 5. The lower end of yoke 25 is pivoted to a bracket 26 upon the draw.

27 denotes bell-crank levers pivoted to suitable brackets 27^a on cross-piece 11 under the roadway of the abutment near the center thereof. One of the arms of each of these levers extends downward and is bifurcated to embrace cross-rod 20, collars 28 being provided on said rod to engage the lower ends of the bell-crank levers. At the outer ends of the bell-crank levers are pivoted by a slotted connection bifurcated locking-arms 29. When the cross-rod is moved longitudinally in the act of closing the gates, collars 28 engage the lower arms of levers 27, swing the other arms upward, and lift the bifurcated locking-arms into position to engage the gates, as is clearly shown in Fig. 3. These locking-arms move in sockets or bushings 30, which hold them firmly in position. It will be noticed (see Fig. 7) that one of the bifurcations of the arm is shorter than the other. This permits the gate to pass to the closed position, after which the locking-arm moves up slightly and locks it firmly, the position of the lower bar of the frame-work of the gate in the locked position being indicated by dotted line in Fig. 7. The instant the cross-bar is moved in the opposite direction, as when the gates are thrown open, the locking-arms drop downward by gravity below the surface of the roadway, so as to offer no obstruction to travel when the gates are in the open position.

In order to provide a double lock for the gates, thus affording double security and also insuring that the gates will be locked in the closed position under all circumstances, I provide strong spring-hooks 31 on supports 14, which spring downward when the operating-yoke is moved out of the way and engage the outer face of the angle-piece at the end of op-

erating-arm 13, (see Fig. 9,) thus making it absolutely impossible to move said arm inward to open the gate until the hook is lifted upward out of the way. It will be noticed (see Fig. 6) that the inner arm of the operating-yoke is beveled, as at 32, the bevel acting when the draw is swung to position to lift the hook upward out of the way, as is clearly shown in Fig. 5. In practice I provide four of these locking-hooks and four operating-arms—that is, one on each side of the draw at each end thereof. It will be noticed (see Fig. 3) that I have placed one of the crank-arms 12 and the corresponding operating-arm upon shaft 7 lower than the other, the one at the right being the lowest. I have not shown the two operating-yokes, but have shown the two operating-arms in Fig. 3. It will be understood, of course, that the yoke at one end of the draw is made of proper height to be engaged by the angle-piece on the lower operating-arm, but that the angle-piece of the upper operating-arm will pass over it, the other yoke being placed at proper height to be engaged by the angle-piece of the upper operating-arm. This is in order to permit the draw to be used as a double-ender—that is, to be caused to change ends each time it is opened or closed—so that in swinging the draw to the closed position the upper operating-arm will swing over the lower yoke and will not be engaged until it meets a high yoke.

In practice I use but two operating-yokes—that is, one at each end of the draw upon one side thereof—but use four operating-arms and locking-hooks—that is, I use four if it is designed to use the bridge as a double-ender; but two only are required if the draw makes but a quarter-turn to open and is swung back to place each time it is closed. When four operating-arms and locking-hooks are used, two diagonally opposite to each other are placed at the high position, as at the left in Fig. 3, and the other two, diagonally opposite each other, are placed at the low position, as at the right in Fig. 3. Upon the opposite side of the draw to that having the operating-rods and operating-yokes I place lifting-brackets 33. These brackets may be secured in any suitable manner at the ends of the draw. I have shown them as bolted to the under side thereof. (See Fig. 8; also see dotted position of said brackets in Figs. 1 and 2.) At the forward end of each bracket is a plate 34, which is rounded, as shown in Fig. 8, so that as the draw swings to place the two locking-hooks that are not engaged by the two operating-yokes will be engaged by these plates and lifted out of operative position, as is clearly shown in Fig. 8. It should be understood that the relative positions of the lifting-brackets correspond with the positions of the operating-yokes, one of the lifting-brackets corresponding in position with the high operating-yoke and the other with the low operating-yoke, the lifting-bracket upon the end

of the draw having the high operating-yoke being low, and the lifting-bracket at the end of the draw having the low operating-yoke being high. This construction permits the draw to operate continuously in a circle, making a half-turn each time it is opened and closed; or should it be desired to have the draw make but a quarter-turn and to swing back to place in closing no change whatever in the parts would be required, as the operation would be precisely the same. The angle-pieces at the ends of the high operating-arms will swing over the low operating-yokes and lifting-brackets and will be engaged by the high operating-yokes and lifting-brackets.

In order that the arrangement of the operating-arms, operating-yokes, and lifting-brackets may be clearly understood, I have in diagrams Figs. 1 and 2 indicated the corners of the abutments having high operating-arms by *a*, the corners of the abutments having the low operating-arms by *b*, the corners of the draw having a high operating-yoke or lifting-bracket by *c*, and the corners of the draw having a low operating-yoke or lifting-bracket by *d*. It will be seen that whether the bridge is turned forward or backward, or whether it changes ends or not, *c* will always pass over *b* and will engage *a*, and *d* will always pass under *a* and engage *b*.

The operation is as follows: Suppose the parts to be in the position shown in Fig. 2. When it is desired to open the draw the operator at the center thereof turns handles 22 from the position shown in full lines in Fig. 2 to that shown in full lines in Fig. 1. This movement forces the operating-rods outward. Before this movement is made the operating-yokes and operating-arms will be at the position shown in dotted lines in Fig. 5, and at the completion of the movement they will be in the position shown in full lines in said figure. The gates will now be closed, as in Figs. 1, 3, and 5. Simultaneously with the movement of the operating-rods cross-rods 20 will be moved to actuate the gates on the opposite sides of the bridge. The collars on these rods will engage bell-crank levers 27, swinging said levers on their pivots and raising the bifurcated locking-arms toward the position shown in Figs. 3 and 7. It will of course be understood that the movements of the bell-crank levers and locking-arms are accurately timed, so as to permit the gates to just swing past the shorter arm and be engaged by the longer arm, as shown in Fig. 7. At the fully-closed position of the gates the lower piece of the frame-work thereof will be embraced by the bifurcated arms, as clearly shown in Fig. 7. The manner in which the draw is opened and closed has of course nothing to do with my present invention. The draw of the bridge to which these gates have been applied is operated by an electric motor, as stated in my former patent referred to. As soon as the draw begins to turn, the operating-yokes and the lifting-brackets will

pass out from under hooks 31 and will allow said hooks to drop down over the outer face of the operating-arms, as clearly shown in Fig. 9, thus affording a double lock for the two gates controlled by each operating-arm, as it is impossible for said arms to be moved inward to open the gates until the locking-hooks have been raised. When the draw is swung back to place, or when the ends swing around into engagement with the abutments, the two high locking-hooks will be lifted by a high operating-yoke and a high lifting-bracket, and the two low locking-hooks will be lifted by a low operating-yoke and lifting-bracket, as has been already fully described.

Having thus described my invention, I claim—

1. The gates, shafts 7 and 9, by which they are carried, and crank-arms on said shafts, in combination with a link connecting crank-arms on a shaft 7 and 9 on each side of the bridge, a cross-rod 20, connecting crank-arms on shafts 7 on opposite sides of the bridge, an operating-arm pivoted to a crank-arm on one of the shafts 7, whereby the gates on both sides of the draw are operated simultaneously, operating-yokes 25, and operating-rods 24, substantially as described.

2. In combination, the gates, shafts 7 and 9, by which they are carried, crank-arms on said shafts, links connecting crank-arms on a shaft 7 and 9 on each side of the bridge, a cross-rod connecting crank-arms on opposite sides of the bridge, bell-crank levers 27, collars on the cross-rod by which said bell-crank levers are operated, and vertically-moving locking-arms connected to the bell-crank levers, which are moved upward to lock the gates when they are thrown to the closed position, substantially as described.

3. The combination, with shafts 7, having crank-arms 19, and a cross-rod connecting said arms and having collars 28, of bell-crank levers 27, one arm of which is engaged by said collars, and locking-arms 29, pivoted to the other ends of said levers, whereby when the cross-arm is moved in one direction the gates are closed and the locking-arms raised to lock them, and when the cross-arm is moved in the opposite direction the locking-arms are allowed to drop and the gates are opened.

4. In combination, shafts 7, having crank-arms 12, 16, and 19, shafts 9, having crank-arms 17, links connecting crank-arms 16 and 17, a cross-rod connecting crank-arms 19, and operating-arms 13, connected to crank-arms 12.

5. The combination, with shafts 7, having crank-arms 12, and operating-arms 13, pivoted to said crank-arms and having angle-pieces at their forward ends, of operating-yokes 25 on the draw, adapted to engage the angle-pieces when the draw is moved to the closed position, and operating-rods 24, pivoted to the yokes, whereby the gates are opened and closed.

6. Shafts 7, having a crank-arm 12, and an

operating-arm 13, pivoted to said crank-arm and having an angle-piece at its forward end, in combination with a pivoted locking-yoke adapted to engage the angle-piece, an operating-rod pivoted to the operating-yoke, whereby the shaft is oscillated, and a locking-hook 31, which engages the outer face of the angle-piece to lock the parts in position when the yoke is swung out of engagement at the opening of the draw.

7. The combination, with operating-arm 13, having an angle-piece at its forward end, and locking-hook 31 on the abutment, of swinging operating-yoke 25 and operating-rod 24 on the draw, said yoke being beveled, so as to lift the locking-hook when the draw is moved to the closed position.

8. In a draw-bridge, two high and two low operating-arms placed diagonally to each other

on the abutments and provided at their forward ends with angle-pieces and locking-hooks adapted to engage said arms, in combination with a high and a low swinging operating-yoke and operating-rods therefor on one side of the draw and high and low lifting-brackets on the opposite side of the draw, so that in use the draw may be moved either forward and backward or continuously forward and the locking-hooks will engage the locking-arms, and when the draw is swung to the closed position the locking-hooks will be raised by the yokes and brackets.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES R. BROTHWELL.

Witnesses:

ARLEY I. MUNSON,
A. M. WOOSTER.