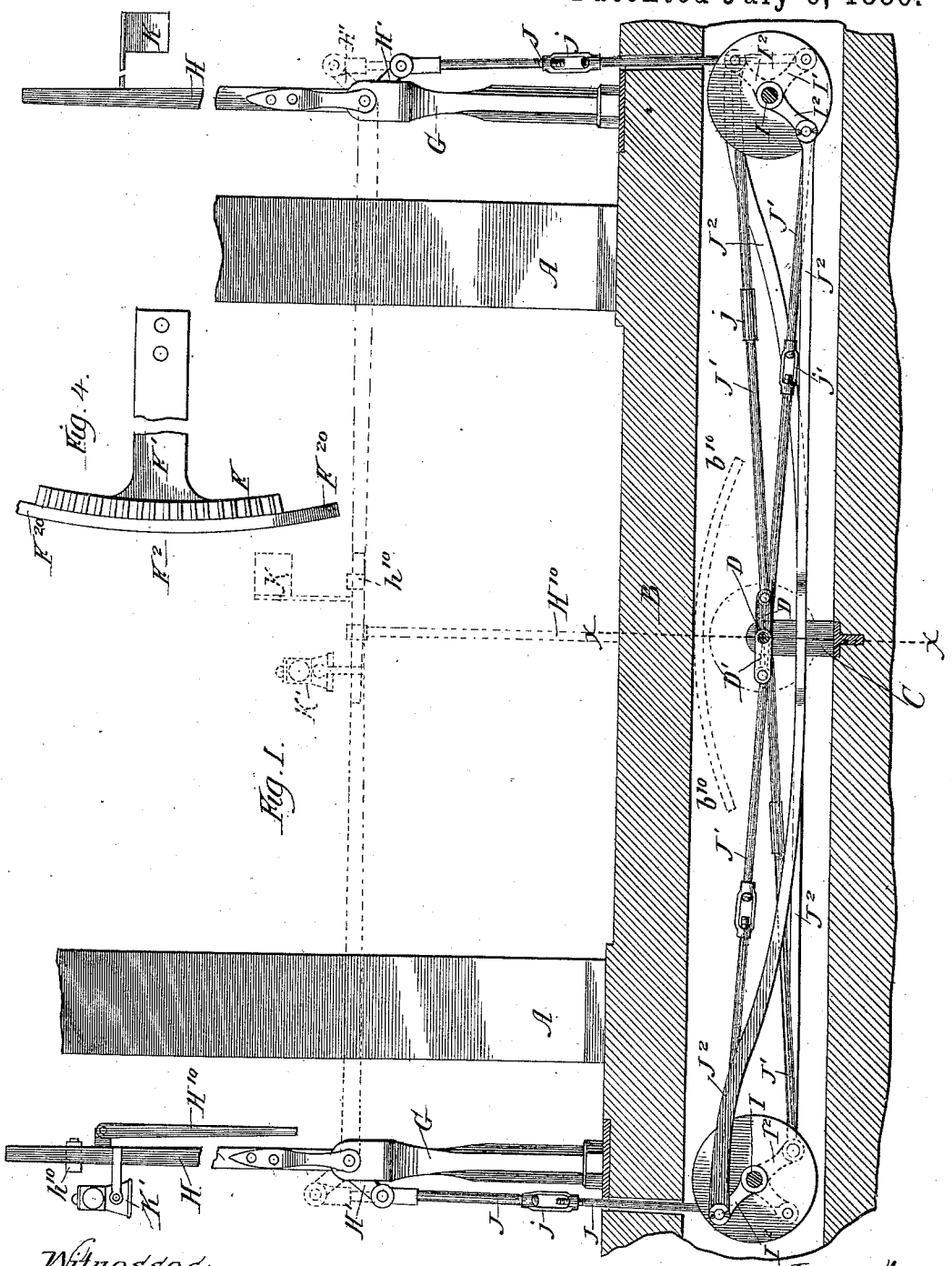
(No Model.)

2 Sheets—Sheet 1.

E. PETRU & J. ZIDEK.

BRIDGE GATE.

No. 344,855. Patented July 6, 1886.



Witnesses:
Frank J. Blanchard
Francis W. Parker

Inventor:
Emanuel Petru
Joseph Zidek
By Chas. S. Burton
Attorney.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

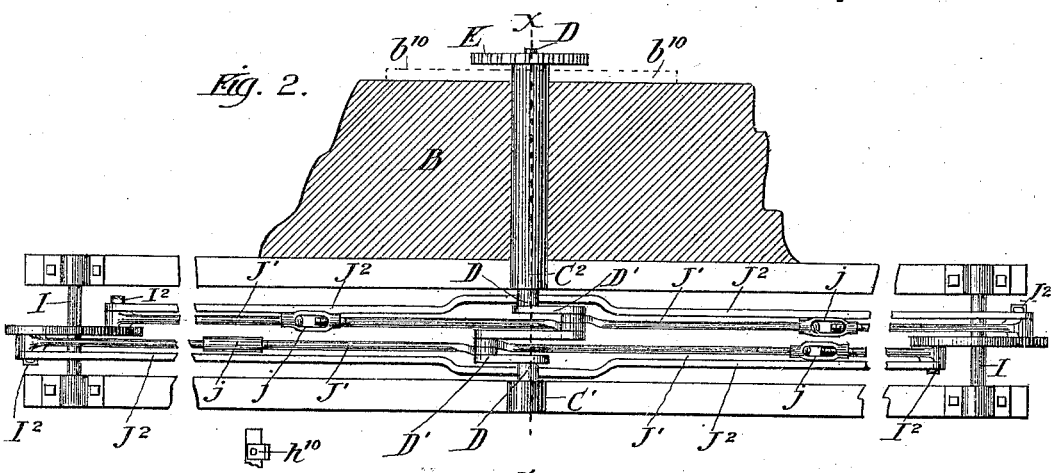

Fig. 6.

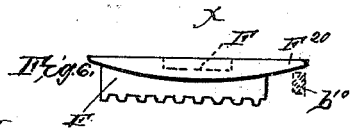

Fig. 3.

Fig. 5.

Witnesses:
Frank J. Blanchard
Frances W. Baker

Inventor:
Emanuel Petru
Joseph Zidek
By Chas. S. Burton
Attorney.

UNITED STATES PATENT OFFICE.

EMANUEL PETRU AND JOSEF ZIDEK, OF CHICAGO, ILLINOIS.

BRIDGE-GATE.

SPECIFICATION forming part of Letters Patent No. 344,855, dated July 6, 1886.

Application filed March 29, 1886. Serial No. 196,929. (No model.)

To all whom it may concern:

Be it known that we, EMANUEL PETRU, a citizen of the United States, and JOSEF ZIDEK, a subject of the King of Bohemia, both residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Bridge-Gates, which is fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof, wherein—

Figure 1 is a sectional elevation of our gate and its actuating mechanism. Fig. 2 is a plan of the same. Fig. 3 is a vertical section through the line *x x* on Figs. 1 and 2. Fig. 4 is a reverse plan of the actuating-segment on the bridge. Fig. 5 is a detail elevation of a modified form of the segment-bar and its connection with the bridge. Fig. 6 is a detail front elevation showing same part as seen in Fig. 4.

A is the bridge.

B is the abutment terminating the roadway to which the bridge pertains.

C is a frame or bracket, preferably of cast-iron, suitably secured upon a foundation rigid with the abutment B, underneath the roadway. The bracket C has two horizontal journals, C′ and C^2, for the crank-shaft D, the latter, C^2, being a long and strong sleeve or arm, which extends through the abutment B to the water-side face thereof. It is preferably cored out through the greater part of its length, having bearings only at the ends for the shaft D.

Between the journals C′ and C^2 the shaft D is bent to form two diametrically-opposite equal cranks, D′ D′, and at the outer end, beyond the abutment B, it has secured to it the gear-wheel E.

To the under side of the frame of the bridge A is secured the segment-rack F, which has the same number of teeth as the gear-wheel E, and meshes with it as the bridge swings. It is secured at such position on the bridge that when the latter is in line with the roadway the middle point of the rack is engaged with the gear-wheel.

At each side of the roadway are located the upright rigid posts G G, and at their upper ends are pivoted the vertically-oscillating gate-bars H H, which have the short heels or lever-arms H′ H′ extended outside the pivots, respectively. As shown and preferred, the heels H′ H′ are at an angle with the main bars of the gates, and therewith form bell-crank levers.

Below the roadway, preferably near and outside of the longitudinal vertical plane of the posts G G, suitably journaled on bearings rigid with the abutment B, are the rock-shafts I I, having crank arms or wheels with crank-wrists, as follows, viz: I′ I′, connected by the links J J to the lever-arms H′ H′, respectively, and I^2 I^2, diametrically opposite, (though some variation from this exact relation may be allowed,) connected, respectively, to the opposite cranks, D′ D′, of the shaft D by equal links J′ J′. The cranks I^2 I^2 are a little longer than the cranks D′ D′, and the links J′ J′ are a little greater in length than the distance between the shafts D and I, less the difference in the lengths of the cranks I^2 and D′, by means of which a full revolution of the shaft D and its cranks will rock but not fully revolve the shafts I I, and the links J′ J′ never are the line of the centers of the shafts.

From each crank-wrist of the crank-shaft D, it will be seen, there extend two links—one to the nearer crank-wrist of the rock-shaft I, which is on the opposite or farther side of the shaft D, and one to the farther wrist of the rock-shaft I, which is on the same or nearer side of the shaft D. This arrangement of cranks and links causes the revolution of the shaft D to rock the shafts I in opposite directions. The same result is attained by means of the links J^2 J^2, which connect the crank-wrist of one of the shafts I with the oppositely-situated crank-wrist of the other shaft I. Said links J^2 are bent so as to pass outside of the cranks of the shaft D. It is preferred to use both means, for a reason which will hereinafter appear.

The operation of this mechanism so far as hitherto explained would be as follows: Starting with the bridge open, the shaft D placed with its cranks horizontal, the gates H H extended horizontally across the roadway, and their heels or lever-arms H′ H′ slightly inclined outward from the vertical line, the wrists of the cranks I′ standing somewhere in the upper outer quadrant of their orbit, if the bridge is swung to bring the rack F into en-

gagement with the gear-wheel E, the resulting rotation of the wheel, its shaft D, and the cranks thereof will cause the rock-shafts I I, by means of their crank-arms I′ I′ and the links J J, to rock the gates H H, lifting them up and swinging them over until they stand upright over their pivots on the posts G G. This motion will begin slowly, while the cranks D′ D′ are passing the center, and will in like manner cease slowly as the said cranks approach the center again. It is desirable that the gates should remain fully closed until such time as they may safely be opened, and then be opened as promptly as possible. In order, therefore, to utilize the rotation of the cranks D′ D′ for the purpose of actuating the gates only through that part of their revolution which will give the most prompt and rapid action—viz., the quarter midway between the "center" or "dead" points—we provide all the links J′ J′, and preferably, also, the links J J, with slip-joints *j*, the play of which must first be taken up before the gates will receive any motion, and make the heels or lever-arms H′ H′ of such length with relation to the length of the crank-arms J′ that the gates H H will reach a vertical position by the time the cranks D′ D′ have passed, say, forty-five degrees beyond their vertical position. At that point the gates overbalance outward and depress the ends of the lever-arms H′ H′, and restore the slack to the slip-joints of the links J J, so that the further forty-five degrees of the revolution of the cranks D′ D′ will be effective only in taking up that slack again. Obviously the presence of the slip-joints *j* in the links J′ J′ tends to diminish their adaptation to actuate the rock-shafts I I by pushing on the crank-arms, but does not diminish their adaptation to perform that function by pulling; and herein is a reason for providing the two cranks I^2 I^2 on each of said rock-shafts I, because thus connection may be made with both the cranks D′ D′, so that there is always one crank and link in position to pull on a crank of the rock-shaft, and no dependence need be placed on the pushing-link. Ease of action and the minimum strain on the rock-shafts will, however, be secured if the two opposite cranks I^2 I^2 on each rock-shaft shall be actuated simultaneously in opposite directions—one by pulling and the other by pushing—and this is effected by the long and rigid links J^2, connecting, as hereinbefore described, the wrists of the cranks I^2 I^2 on each shaft I with the wrists of oppositely-situated cranks I^2 I^2 on the other shaft I. While the bridge is in line with the roadway, the segment-rack F, being engaged with the gear-wheel E, prevents any displacement of the parts of the mechanism by force applied to the gates H H. When the bridge is open to traffic, the cranks D′ D′ are in horizontal line with the shaft D, and the links J′ J′ are approximately in line with them; but one of the links from each rock-shaft lies a little below that horizontal line, and the other lies equally above it, so that force applied to the gates to lift them after taking up the slack in the several links will be exerted through one of the links J′ in a direction tending to rotate the shaft D in one direction, and through the other link from the same rock-shaft in a direction tending to rotate said shaft in the other direction; and these opposite tendencies counterbalancing each other makes it impossible to rotate said shaft D from the position with its cranks horizontal by means of any force applied to the gates H when they are closed across the roadway.

In order that the vertical play of the bridge on its supports may not prevent the segment-rack F coming into engagement properly with the gear-wheel E, we mount said rack on the end of a spring-bar, F′, which is secured to the bridge by bolts toward the end of the bar farthest from the rack, and provide the rack with a flange, F^2, which extends into a nose, F^{20}, at each end of the rack, and on the outer face of the abutment B there is secured at each side of the gear-wheel E a sloping ledge of the nature of a cam, to engage the nose F^{20} of the flange F^2, and thereby guide the rack into engagement with the gear-wheel. The spring and possible play of the bar should of course be equal to the possible vertical play of the bridge. The bar F′ may be hinged to the bridge and held up in a loop or staple, being allowed the necessary play, instead of being rigidly secured and acting as a spring. Such a modification is shown in Fig. 5. The usual signals—flag or light—may be carried by the gates H H, or either of them. As illustrated, a flag, K, is carried by one of the gates, and a lamp, K′, is carried by the other. The gates lap side by side when swung down across the roadway, and one of them is provided with a pendent foot-piece, H^{10}, which swings into vertical position when the gate is horizontal and supports the free end of the gate at proper height from the ground. The same bar or gate which carries the foot H^{10} has a lateral stop, h^{10}, onto which the other bar falls, and by which it is supported.

We claim—

1. In combination, the revolving shaft D, the rock-shaft I, the former actuated by the bridge and the latter actuating the gate, and the links which connect the crank-arms of said shafts, having the slip-joints *j*, substantially as and for the purpose set forth.

2. In combination, the revolving shaft D, the rocking shaft I, the two opposite crank-arms of the revolving shaft, and the two crank-arms of the rocking-shaft, connected, respectively, by equal links having slip-joints, substantially as and for the purpose set forth.

3. In combination, the revolving cranked shaft D, the two rocking crank-shafts I I, a link connecting a crank-arm of the revolving shaft with a crank-arm of one of the rocking shafts, and a link from said crank-arm of the

rocking shaft to an oppositely-situated crank-arm of the other rocking shaft, substantially as set forth.

4. In combination, the vertically-swinging gate closing the roadway, a rock-shaft, I, below the roadway, ultimately actuated by the bridge and having a crank-arm, I′, and a link from said crank-arm to the gate, having a slip-joint, substantially as set forth.

5. The revolving shaft D, a rocking shaft, I, the vertically-swinging gate H, and the links which connect the crank-arms of one shaft to the crank-arms of the other shaft, and the link which connects a crank-arm of the rocking shaft to the gate, all said links having slip-joints, combined substantially as and for the purpose set forth.

6. The revolving shaft and the opposite cranks, the rocking shafts and their opposite crank-arms, two on each shaft, the links which connect the cranks of the revolving shaft with the cranks respectively of the rocking shafts, all having slip-joints, and the links which connect the crank-arms respectively of one rocking shaft with the oppositely-situated crank-arms of the other rocking shaft, combined substantially as and for the purpose set forth.

In testimony whereof we have hereunto set our hands, in the presence of two witnesses, at Chicago, Illinois, this 23d day of March, 1886.

EMAN. PETRU.
JOSEF ZIDEK.

Attest:
JOHN TRANTINA,
CHAS. S. BURTON.