(No Model.) 3 Sheets—Sheet 1.

E. ZAREMBA.

OPERATING DEVICE FOR BRIDGE GATES.

No. 489,113. Patented Jan. 3, 1893.

Fig. 1

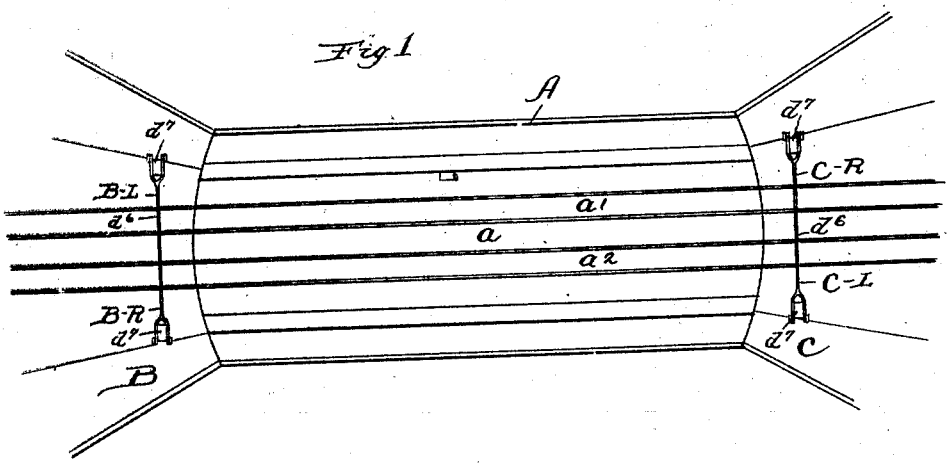
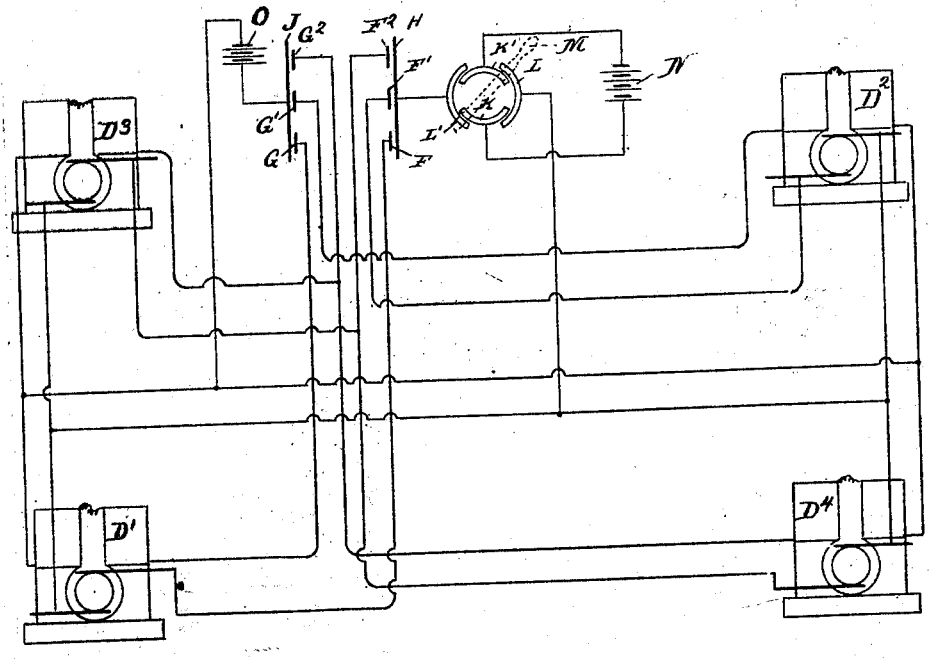


Fig. 2



Witnesses:
Lew. C. Curtis
A. W. Munday

Inventor:
Edward Zaremba
By Munday, Evarts & Adcock
His Attorneys.

(No Model.) 3 Sheets—Sheet 2.

E. ZAREMBA.

OPERATING DEVICE FOR BRIDGE GATES.

No. 489,113. Patented Jan. 3, 1893.

Fig. 3.

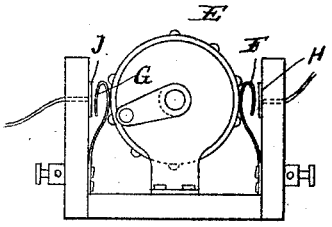


Fig. 6.

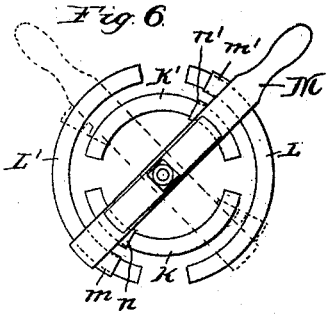


Fig. 4.

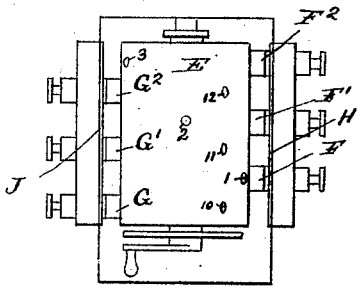


Fig. 5.

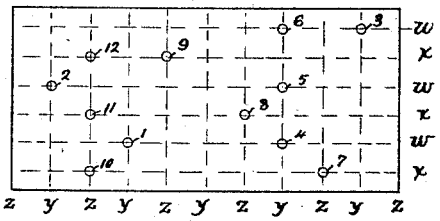


Fig. 7.

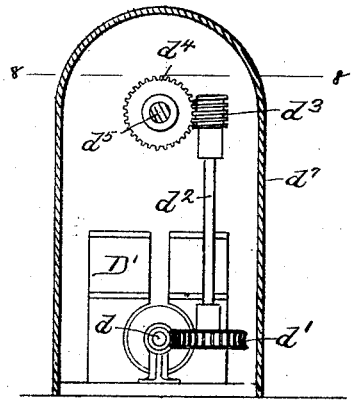
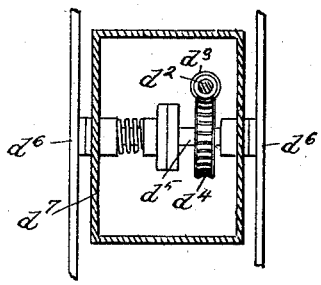


Fig. 8.



Witnesses:
Lew. C. Curtis
A. W. Munday

Inventor:
Edward Zaremba
By Munday, Evarts & Adcock,
His Attorneys.

(No Model.) 3 Sheets—Sheet 3.

E. ZAREMBA.

OPERATING DEVICE FOR BRIDGE GATES.

No. 489,113. Patented Jan. 3, 1893.

Fig. 9.

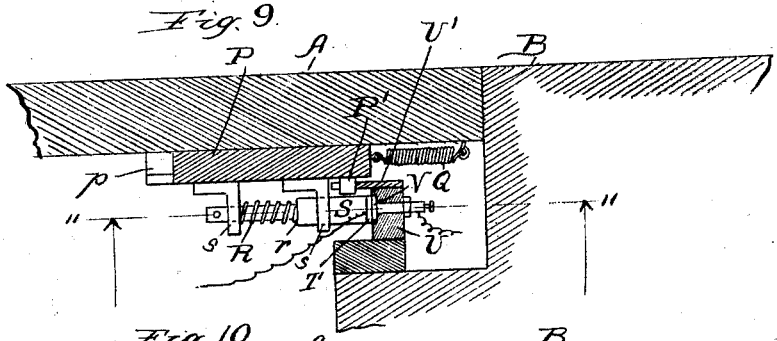


Fig. 10.

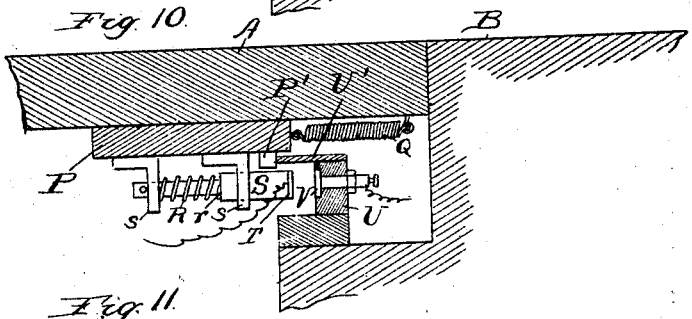
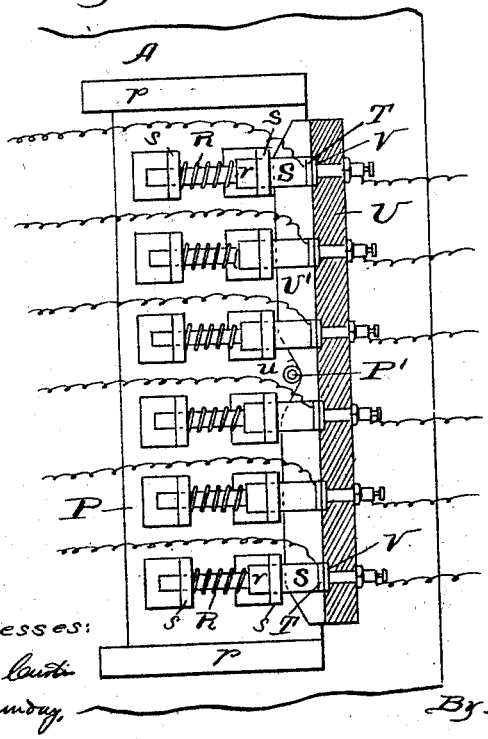


Fig. 11.



Witnesses:
Lew. C. Coutts
A. W. Munday.

Inventor.
Edward Zaremba
By Munday, Evarts & Adcock.
His Attorneys.

UNITED STATES PATENT OFFICE.

EDWARD ZAREMBA, OF CHICAGO, ILLINOIS.

OPERATING DEVICE FOR BRIDGE-GATES.

SPECIFICATION forming part of Letters Patent No. 489,113, dated January 3, 1893.

Application filed March 5, 1892. Serial No. 423,835. (No model.)

To all whom it may concern:

Be it known that I, EDWARD ZAREMBA, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Operating Devices for Bridge-Gates, of which the following is a specification.

This invention relates to means for operating the gates employed to shut off travel upon bridges when the latter are required to be opened. By preference I employ in my invention two gates at each approach, one at each side of the roadway, and provide each with a separate motor whereby it may be opened and closed. These motors are electrically controlled by the bridge tender through the medium of a switch and a current reverser located upon the bridge, and suitable electrical connections. The latter are preferably formed in part of corresponding contact devices so located at the end of the bridge and at the abutments that when the bridge is closed they will be in contact and complete the various circuits whereby the gate motors are energized.

The invention consists in the novel combinations of parts and devices, and in the novel construction of the several parts hereinafter set forth.

In the accompanying drawings Figure 1 is a plan of a bridge provided with my invention; Fig. 2 is a diagram of the electric circuits; Fig. 3 is an end elevation and Fig. 4 a plan of the switch device; Fig. 5 is an extended surface view of the switch cylinder; Fig. 6 is a plan of the current reverser; Fig. 7 is a vertical section of one of the gate posts; Fig. 8 is a section of same on line 8—8 of Fig. 7; Figs. 9 and 10 are sectional views showing the abutment connections for the electrical conductors, and Fig. 11 is a section on the line 11—11 of Fig. 9.

In the drawings A represents an ordinary turn bridge having a roadway a, which for the sake of clearness in distinguishing the right and left sides of the roadway is shown as provided with two railway track lines a' a^2.

B and C are the abutments of the approaches at either side, the former being guarded by gates B R and B L, and the latter by gates C R and C L. The gates designated in part by the letter R are in both instances placed over the right hand side of the roadway and those marked with L over the left hand side. The gates have motors D′, D², D³, and D⁴, one for each gate, which are preferably electric motors of any approved construction, and each motor is adapted to operate a worm shaft d meshing with the gear d' upon shaft d^2 carrying the worm d^3 meshing with the gear d^4 upon the journal d^5 carrying the arms d^6 which support the gate and which are oscillated upon said journal in the usual manner. The motor and gearing may be inclosed in a suitable box or post d^7 which may also support the journal of the gate arms.

The gates are intended to be operated in the following order: Supposing the bridge about to be opened, the bridge tender first lowers one of the right hand gates and then the other. When all teams have passed off the bridge and everything is clear, the two left hand gates are closed simultaneously, and these gates are preferably so connected so that a single move of the switch will energize the motors of both. The roadway is now completely protected, and the bridge opened. While the bridge is open, the switch and reverser are properly adjusted so that as soon as the electrical connections between the switch and the gate motors are restored by the closing movement of the bridge, such movement causing contact between the contact points upon the bridge ends and those at the abutments, the motors are all set in operation in a reverse direction and made to lift all the gates together. The electrical construction by which these results are obtained is substantially the following: Upon the bridge I provide a switch device and current reverser, the former consisting of a rotatable cylinder E of non-conducting material and armed with studs or projections adapted to operate the keys hereinafter mentioned, the studs being so located as to enable the bridge tender by turning the cylinder to bring the proper keys into action to secure movement in the order described by the gates. This cylinder is mounted between two rows of spring keys F F′ and F² and G G′ G², the first series of keys being located in and controlling the armature circuits of the motors, and the other series being similarly located and serving the same purpose

with reference to the field coil circuits. These keys are each adapted to be depressed by the projections of the switch cylinder, so as to make an electrical junction with the adjacent contact plates H or J, there being one such plate for each row of keys. This part of my invention is more fully described in a subsequent part of this specification.

The construction of reverser which I prefer consists of two pairs of conducting plates, each in the form of an arc of a circle, and one pair K K′ being arcs of a smaller circle than the other pair L L′ and placed within the latter as shown. Supported on a center within these circles is a swinging lever M, carrying two pairs of brushes *m n* and *m′ n′*, each pair adapted to establish an electrical connection between one of the outer plates and one of the inner plates at a point diametrically opposite the connection made by the other pair of brushes between the other parts of the reverser. To reverse the current the brush lever is turned on its center so as to bring the outer brushes *m* and *m′* each in contact with the other one of the outer plates K or K′. In other words, supposing the position of the lever shown at Fig. 6 in the full lines to be the position occupied by it when the gates are to be opened, in order to reverse the current preparatory to closing the gates the lever is moved to the position shown by broken lines in the same figure. The plate K of the reverser is connected to the positive pole of a battery N and plate K′ to the negative pole thereof, as shown. The plate L′ is electrically connected to the contact plate H of the switch. A second battery O (which however is not necessarily present if the resistance of the armature and the field coil circuits is properly balanced,) is connected at its positive pole to the contact plate J of the switch.

The keys of the switch are electrically connected as shown by the diagram given at Fig. 2, as follows: Key F to one terminal of armature circuit of motor D′ of gate B R. Key F′ to one terminal of armature circuit of motor D^2 of gate C R. Key F^2 to one terminal of armature circuit of motor D^3 of gate B L. Key F^3 to one terminal of armature circuit of motor D^4 of gate C L. Key G to one terminal of field circuit of motor D′ of gate B R. Key G′ to one terminal of field circuit of motor D^2 of gate C R. Key G^2 to one terminal of field circuit of motor D^3 of gate B L. Key G^3 to one terminal of field circuit of motor D^4 of gate C L. This includes one terminal of each armature and of each field circuit. The other terminals of the armature circuits are all connected and lead to plate L of the reverser, and the other terminals of the field circuits are all connected and lead to the negative pole of battery O.

The surface of the switch cylinder is shown in extenso at Fig. 5, and in order that the disposition of the studs therein may be understood the following explanation will be helpful: The studs are adapted to depress the spring keys in a certain order, to the end that the electrical connections may be made to the gates in the order in which they are to be closed, and since gate B R is closed at one point of time, gate C R at a later period, gates B L and C L at a still later or third period, and all four gates are raised at a fourth or last period, making four periods of operation, it follows that there must be provided four sets of studs for the armature circuits and four sets for the field circuits. The spring keys are arranged so that they occupy different planes transverse of the cylinder, and hence the studs for operating the armature keys are arranged in the circumferential lines *w*, and those for operating the field keys are arranged along similar lines *x*.

In addition to the four periods of operation there is also one of rest, viz: when the gates are not in use, and hence the surface of the switch cylinder is divided into ten equal longitudinal divisions, five for the armature circuits indicated by lines *y*, and five for the field circuits indicated by the lines *z*. The various studs for the armature circuits are therefore located as follows: the one operating key F at 1, for key F′ at 2, for key F^2 at 3, and for all said keys and employed in opening the gates at 4, 5 and 6. The studs for the field circuits are located, for key G at 7, for key G′ at 8, for key G^2 at 9, and for all said keys when opening the gates at 10, 11 and 12. When the apparatus is at rest, either open or closed, the vacant longitudinal lines are opposite the keys and all circuits are broken.

In order to obviate all necessity for carrying the electrical connections between the switch and the motors under water, those connections are all preferably made with make and break contacts located upon the bridge ends and the abutments, so that such connections may be separated each time the bridge is opened and reunited each time the bridge is closed. The construction which I have devised and prefer for these connections is the following: A movable block P is provided with ways *p* upon the under side of each end of the bridge and with one or more springs Q drawing the block outward or toward the abutment. This block carries six spindles S, each provided with bearings *s* and with a spring R confined thereon between one of the bearings and the shoulder *r* of the spindle, the spring exerting its pressure toward the abutment. Each spindle has also a contact plate T upon its outer end, the same being in electrical connection with the switch. Upon each abutment is a stationary board U in which are supported the metallic plates V, suitably connected to the motors, and one for each spindle, and to the top of this board is attached a guide plate U′ projecting toward the bridge and having a center recess *u*. Against the outer edge of this recess the roller P′, carried by block P, is held when the bridge

is closed, or nearly so, by the tension of spring Q, the roller lying within the recess when the bridge is fully closed, and allowing the block to move toward the abutment and bring about active contact between the spindles and the plates V, and thus completing the various circuits. When the bridge moves the guide plate forces the block P back and separates the contacts T and V so that the circuits are all broken, and remain thus until the bridge closes. This construction prevents any friction between the contacts during the movements of the bridge. The springs upon the spindles automatically adjust the latter and maintain them in operative position at proper times. Fig. 9 shows the position of the block P and its spindles when the bridge is closed, and Fig. 10 shows the electrical connections severed, the bridge being partly open.

The operation of my device is substantially as follows:—Supposing the reversing lever to be in the position given in full lines at Fig. 6, the current from battery N will flow from the positive pole of that battery to plate K of the reverser, thence through the brush to plate L', thence to the switch and from there to the motors as the latter are connected to the switch by the revolution of the cylinders E. From the motors the current returns through the electrical connection to the plate L of the reverser, thence through the brush and plate K' back to the battery. If the reverser lever be moved to the position given in dotted lines, then the current will flow from the positive pole of the battery to plate K, brush, plate L, motors, switch, plate L', brush, plate K' and back to battery, thus giving a reverse current. When the reverser lever is held vertically the circuit is broken by reason of the lack of contact by the outer brushes with plates L and L' and the motors are stationary. Either the current through the armature or field coils could be made reversible. I use a reversible current in the armatures. If now the bridge tender turns the cylinder E of the switch, so that stud 1 will depress key F and stud 7 depress key G, this causes a current to flow from the positive pole of battery O to plate J through key G and wire to the field coil of motor D', and back through the wire to the negative pole of said battery. If the reversing lever stands toward the right, a current flows from battery N through the reverser, plate H, key F and thence by wire connections through the armature of said motor D' and back to plate L and thence into the battery. If the lever be moved to the left the current is reversed. In this manner the motor D' works in either direction independently of the others. If the bridge tender now gives the switch cylinder a one-fifth revolution, the studs 2 and 8 will depress keys F' and G' respectively, and the current will flow from battery O through key G' and the wire connections to the field coil of motor D^2 and thence back to the negative pole of said battery. Also a current from battery N will pass through the reverser, plate H, key F' to the armature of said motor and back from the armature to the reverser and battery or the reverse of this, according to the position of the reversing lever. With another one-fifth revolution of the cylinder E, the keys F^2 and G^2 are depressed, giving a current from battery O through G^2 to the field coils of motors D^3 and D^4 and from thence back to the negative pole of the battery. Also a current passes from battery N through the reverser, plate H, key F^2 to the armatures of both said motors and back therefrom to the reverser and battery, or the reverse of this according to the position of the reversing lever. With the next one-fifth revolution of the switch cylinder, the studs 4, 5 and 6 depress all the armature keys and the studs 10, 11 and 12 depress all the field keys and thus establish circuits including all the motors and energizing them to open the gates. The speed of the motors should be reduced by a suitable spur or worm gearing to about three revolutions per minute and a friction clutch upon the shaft of the gate arm will take care of any extra motion of the motors. By disconnecting the gearing the gates can be operated by hand.

It is obvious that many features of my invention are capable of use at railway crossings and other places where moving bridges are not employed, and hence I do not wish to be limited in my claims to a turn bridge except where such bridge is specifically made an element of the subject matter claimed.

I claim:—

1. The combination with a turn bridge and its approaches, of a gate or gates guarding each approach, motors for operating said gates, a switch upon the bridge for controlling the electric currents whereby the motors are set in operation, an electric generator and electrical connections between the switch and motors, substantially as specified.

2. The combination with a turn bridge and its approaches, of a gate or gates for guarding each approach, motors for operating said gates, a switch and current reverser upon the bridge for controlling the electric currents whereby the motors are set in operation, an electric generator and electrical connections between the switch and motors, substantially as specified.

3. The combination with a turn bridge and its approaches, of a gate or gates guarding each approach, motors for operating said gates, a switch upon the bridge for controlling the electric currents whereby the motors are set in operation, an electric generator, and electrical connections adapted to make and break the circuits between the switch and motors, substantially as set forth.

4. The combination with a turn bridge and its approaches, of a gate or gates guarding each approach, motors for operating said gates, a switch and current reverser upon the bridge for controlling the electric currents whereby the motors are set in operation, an

electric generator and electrical connections adapted to make and break the circuits between the switch and motors, substantially as set forth.

5. The combination with the turn bridge and its gate motors, of the switch upon the bridge consisting of the cylinder having studs, the spring keys and the contact plates, the keys and plates being electrically connected in the circuits for setting the motors in operation, substantially as set forth.

6. The combination with a gate motor and its armature and field circuits, of a switch consisting of a rotatable cylinder having a pair of studs upon its surface, a pair of keys located one in the armature circuit and one in the field circuit, and each adapted to be engaged by one of said studs, and contact plates located one in each of said circuits and in proximity to said keys so as to act therewith in completing the respective circuits, substantially as specified.

7. The combination with a gate motor and its armature and field circuits, of a switch consisting of a rotatable cylinder having a pair of studs upon its surface, a pair of keys located one in the armature circuit and one in the field circuit and each adapted to be engaged by one of said studs, and contact plates located one in each of said circuits and in proximity to said keys so as to act therewith in completing the respective circuits, said studs and keys being relatively arranged so as to insure the simultaneous completion of both circuits, substantially as specified.

8. The combination with a plurality of gate motors and their respective armature and field circuits, of a switch consisting of a rotatable cylinder having upon its surface a separate pair of studs for each motor, a separate pair of keys for each motor, and contact plates also located in said circuits and acting with the keys to complete the same, one of each pair of said keys being located in the armature circuit, and the other in the field circuit of the motor, and each pair thereof being also adapted to be simultaneously depressed by the studs upon the cylinder corresponding to the same motor, substantially as specified.

9. The combination with the turn bridge, the gates and the motors for the gates, of electrical devices under the control of the bridge tender for setting said motors in operation, the circuit connections between the bridge and the motors having make and break contacts, substantially as set forth.

10. The combination of the movable block P carrying contact plates upon the bridge, devices for moving said block and the abutment contact plates, with the electrical connections between the bridge and the motors, substantially as set forth.

11. The combination with the bridge and the several gates guarding the approaches, of a separate motor for each gate, a switch upon the bridge for controlling the electric currents whereby the several motors are set in operation, an electric generator and electric connections between the switch and motors, substantially as specified.

12. The combination with the bridge and the several gates guarding the approaches, of a separate motor for each gate, a switch and reverser upon the bridge for controlling the electric currents whereby the several motors are set in operation, an electric generator and electric connections between the switch and motors, substantially as specified.

13. The bridge, the gates B R and B L guarding one approach, gates C R and C L guarding the other approach, a motor for each of said gates, circuits controlling said motors, and a switch on the bridge whereby the motors of the right hand gates may be first energized and those of the left hand gates be subsequently energized, substantially as specified.

EDWARD ZAREMBA.

Witnesses:
H. M. MUNDAY,
EDMUND ADCOCK.