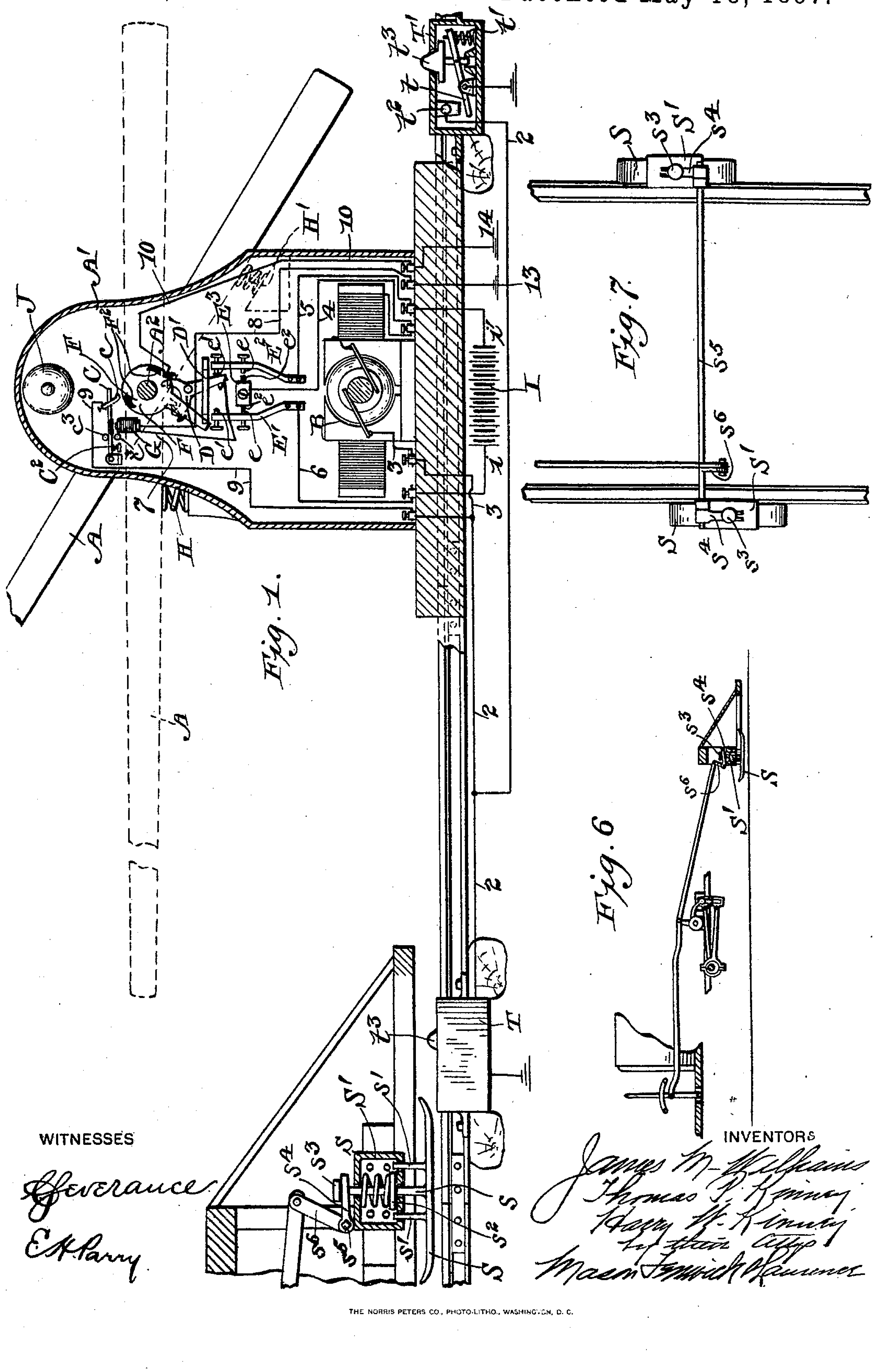
(No Model.) 2 Sheets—Sheet 1.

J. M. WILLIAMS & T. P. & H. W. KINNEY.

AUTOMATIC ELECTRIC GATE.

No. 582,889. Patented May 18, 1897.



WITNESSES

G. Severance
E. H. Parry

INVENTORS

James M. Williams
Thomas P. Kinney
Harry W. Kinney
by their Attys
Mason Fenwick & Lawrence

(No Model.) 2 Sheets—Sheet 2.

J. M. WILLIAMS & T. P. & H. W. KINNEY.

AUTOMATIC ELECTRIC GATE.

No. 582,889. Patented May 18, 1897.

Fig. 2.

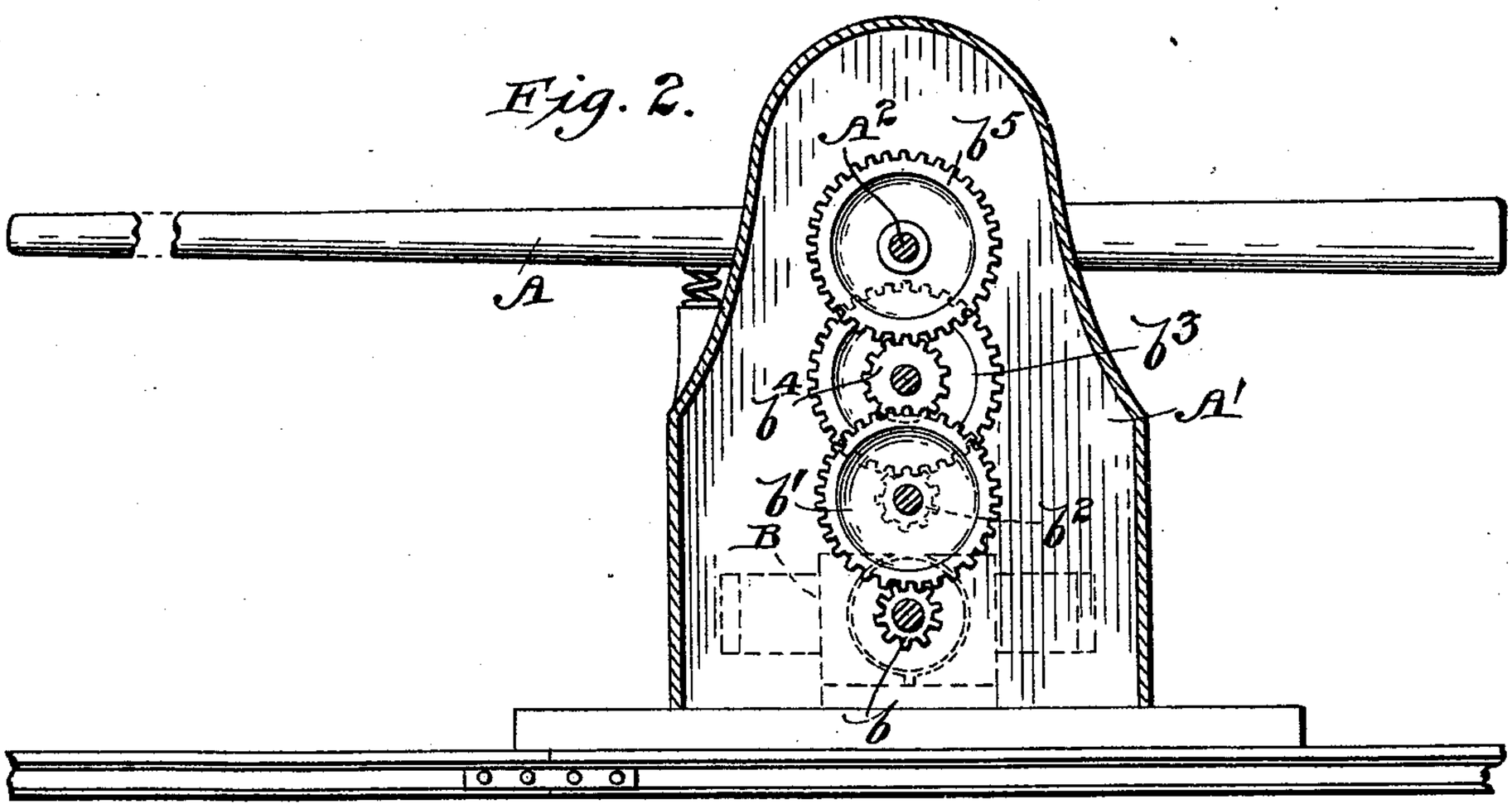


Fig. 3.

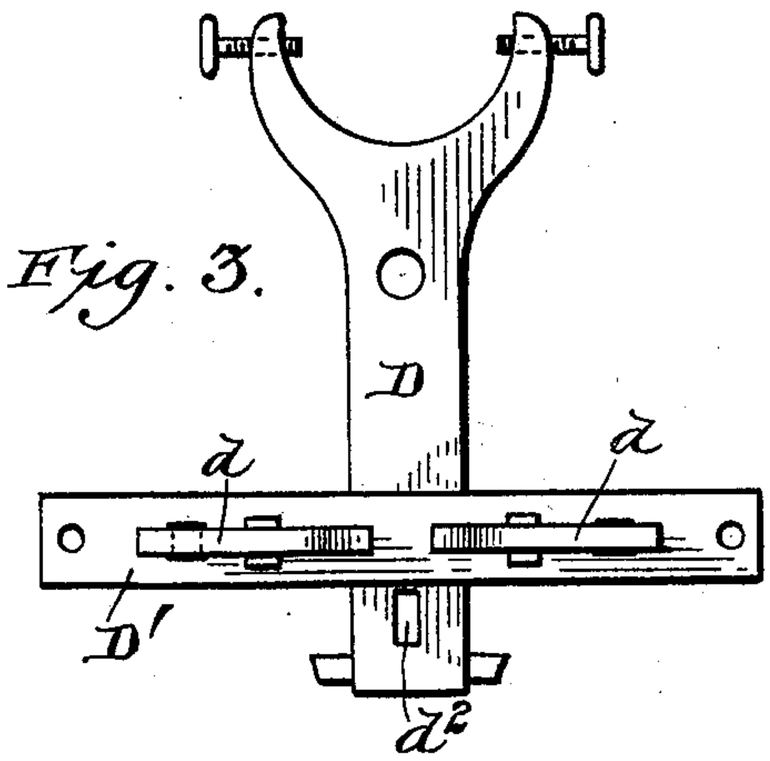


Fig. 4.

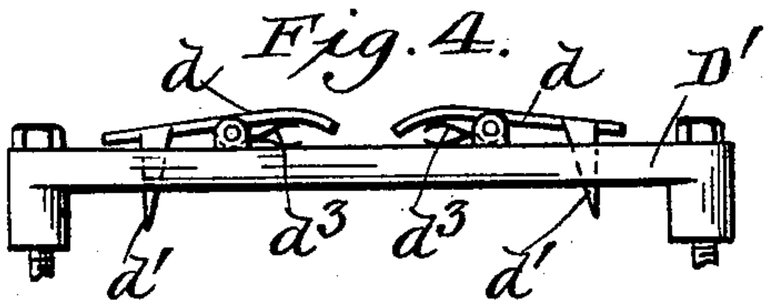
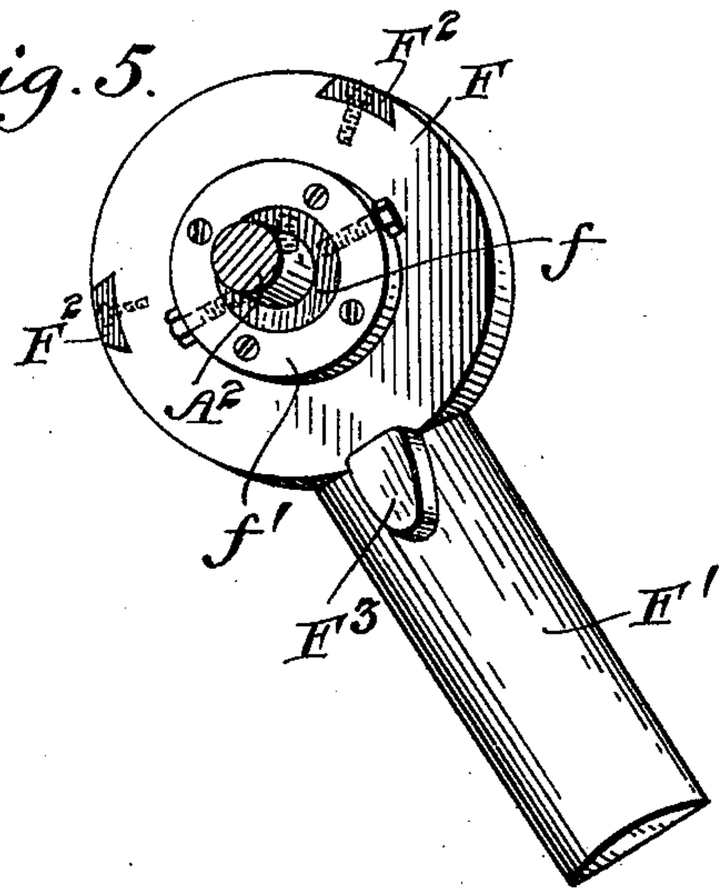


Fig. 5.



WITNESSES

E. Everance.
E. H. Parry

INVENTORS

James M. Williams
Thomas P. Kinney
Harry W. Kinney
By their Attys
Mason Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

JAMES M. WILLIAMS AND THOMAS P. KINNEY, OF DANVILLE, AND HARRY W. KINNEY, OF LYNCHBURG, VIRGINIA, ASSIGNORS OF ONE-FOURTH TO JAMES A. HENDERSON, OF DANVILLE, VIRGINIA.

AUTOMATIC ELECTRIC GATE.

SPECIFICATION forming part of Letters Patent No. 582,889, dated May 18, 1897.

Application filed August 18, 1893. Serial No. 603,154. (No model.)

To all whom it may concern:

Be it known that we, JAMES M. WILLIAMS and THOMAS P. KINNEY, of Danville, county of Pittsylvania, and HARRY W. KINNEY, of Lynchburg, county of Campbell, State of Virginia, citizens of the United States, have invented certain new and useful Improvements in Automatic Electric Gates; and we 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.

Our invention relates to improvements in gates for railway-crossings, and more particularly to that class of gates which are adapted to be operated by electricity and controlled automatically by the rolling-stock of the railway.

It consists in a railway-gate comprising an electric motor connected therewith, an electrical generator in circuit with the motor, track instruments in the circuit controlling the motor-circuit, a magnet and an armature controlling the circuit-closing brush, and a commutator coöperating with said brush and arranged to move with the gate-shaft, the commutator holding the motor-circuit closed during the movement of the gate-shaft.

It also consists in certain other novel constructions, combinations, and arrrangements of parts, all of which will be hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 represents a vertical sectional view of our improved railway-gate, showing the electrically connected and operated parts. Fig. 2 represents a vertical sectional view upon another plane, disclosing the mechanical connection between the gate and the electric motor. Fig. 3 represents a detail view of the pole-changing fork. Fig. 4 represents a detail view of the catches for said pole-changing fork. Fig. 5 represents a detail view of the circuit-breaking disk. Fig. 6 represents a detail view showing the connection between the shoes and the reversing-lever of the locomotive, and Fig. 7 represents a detail view showing the arrangement of the shoes on both sides of the locomotive.

In the drawings, A represents a railway-gate of the usual construction pivotally mounted upon a hollow standard or housing A′.

B represents an electric motor; C, an armature; G, a magnet controlling it; F, a circuit-breaking disk; T T′, track instruments, and S shoes secured to a locomotive.

The gate A is provided with a supporting-shaft A^2, passing through the housing A′ and having suitable bearings therein. The electric motor B of ordinary construction is secured to the base of the housing A′ interiorly thereof and is provided with a pinion *b*. The pinion *b* meshes with a gear-wheel *b′*, provided upon its shaft with a pinion b^2, which meshes with another gear-wheel b^3, also provided with a pinion b^4 upon its shaft. This pinion b^4 meshes with a gear-wheel b^5, secured to the shaft A^2 of the gate A. The shafts carrying these intermediate gears and pinions find suitable bearings in the housing A′. By the use of this connecting-gearing for communicating movement to the gate from the motor B the said motor B can be permitted to revolve with its usual speed and yet impart the desired comparatively slow motion to the gate A.

The gate A is limited in its movement by coil-springs H and H′, mounted upon suitable shoulders or projections upon the housing A, said springs also performing an important function in the operation of the device, as will be hereinafter further described. A storage battery I is located either beneath or near the base of the housing A′ for supplying an electric current to operate the herein-described mechanism.

Two springs E′ and E^2 are secured in the housing A′, their free upwardly-extending ends carrying contacting points *e* and *e′*, respectively. Between these springs is located a fixed contact E^3, provided with contacting points e^2 e^2 on its opposite ends, which are adapted to be brought into touch with the contacting points *e e*, as will be hereinafter described. The contacting points *e′ e′* are adapted to be struck by the contacting end of a forked pole-changing lever D, pivotally mounted in the housing A′.

Catches *d* are pivotally mounted upon a

cross-bar D′, secured to the housing, the angular ends d' of said catches extending through apertures in said bar D′ and adapted to engage an aperture d^2 in the lower end of the lever D to retain said lever at either extremity of its vibratory movement. The opposite ends of said catches are held away from the cross-bar D′ by interposed springs d^3.

Upon the shaft A^2 is secured a metallic disk F. In order to insulate said disk from the shaft A^2, a ring f of suitable insulating material is secured to the said shaft, and to this insulating-ring is secured a collar f' of any suitable material. The disk F is then attached to the collar f', preferably by screws. In the periphery of the disk F are dovetailed or otherwise secured insulating-blocks F^2 F^2. Said insulating-blocks may also be further secured by countersunk screws.

The disk F is provided with a downwardly-extending projection F′, preferably flat upon one side and semioval upon the other, and a boss F^3 is formed upon said projection F′, adjacent to the periphery of the disk F. The boss F^3 is in position to engage the forked end of the lever D, so that when the gate is operated and the disk F moved in consequence the boss will move the lever D from its contact with one of the springs, say E′, to the other spring E^2. Now the springs E′ and E^2 are respectively connected by wires 6 and 5 with the negative and positive poles i i' of the battery I. The contact E^3 is connected with the motor by the wire 4. When the contacting end of the lever D engages one of the springs, it forces it out of contact with the contact E^3, at the same time permitting the other spring to make such contact. In this simple manner the current is changed in direction through the motor for making it operate in one direction or the other for opening or closing the gate A. As the disk F revolves with the shaft A^2 the projection F′ thereof engages with its semioval side the catches d, retracting them from engagement with the aperture d^2 in the lever D and permitting said lever to be quickly moved to the opposite position. A magnet G is also mounted in the housing A′ and connected by wires 7 and 8 with the lever D and the ground 13, respectively. This magnet when energized by the electric current is adapted to attract an armature C, pivotally mounted in the housing and limited in its movement by suitable stops c^3 c^3. The armature C is normally held away from the magnet G by a coil-spring C^2 and carries on its swinging end a brush c, adapted to engage the periphery of the disk F when the said armature is attracted by the magnet. The brush c is connected with a wire 2 from a distant track instrument by a wire 9 and serves the purpose of preserving the circuit through the motor until the gate has been opened or closed. A wire 3 also connects the motor with the wire 2, and a wire 10 connects the disk F with the ground 14. A mechanically-operated alarm-bell J is suitably connected with the operative mechanism of the gate A.

The track instruments for starting the operation of the gate consist of distant boxes T T, placed on either side of the gate the required distance up the tracks, and of home boxes T′ T′, placed near the gate, on either side of the same. The distant boxes T T and the home boxes T′ T′ are identical in construction and comprise boxes of cast-iron or other suitable material provided with external lugs on either end for support and spiking to the ties. Each box is provided internally with a pivotally-mounted lever t, connected with the ground by a suitable wire. One end of the lever t is normally held up by a spring t', while the opposite end is adapted to engage a contact t^2, connected with the wire 2. The lever t carries a depressor-piece t^3, pivoted to the same between the spring t' and the pivotal point of the lever t. These boxes are placed so that the depressor-pieces t^3 will be near the level of the cow-catcher of a locomotive, say about three inches above the top of the rail and sufficiently far from the rail to avoid the flanges of the wheels.

In order that the locomotive passing over the road may be adapted suitably to engage the depressor-pieces t^3 of the boxes T T T′ T′, each one is provided with a pair of spring-pressed shoes S, one on each side, preferably of wrought-iron, having vertical stems s and guides s' s', one on either side of said stems. The stems s pass through hollow boxes S′, adapted to be secured to the locomotive, preferably to the truck-frame just behind the cow-catcher. Coiled springs of suitable strength surrounding the stems are interposed between the tops of the boxes and collars s^2, secured to the stems s for normally depressing the same. The stems s extend above the boxes S′ and are provided at their ends with heads or projections s^3, adapted to be engaged by arms s^4 upon either end of the rock-shaft s^5, suitably mounted upon the locomotive. A lever-arm s^6, attached to the shaft s^5, may be connected with the reversing-lever of the engine, so that when the locomotive is traveling forward the shoe on the right of the same will be lowered to engage the depressor-piece t^3, while the shoe on the other side of the locomotive will be raised out of operative position. The opposite dispositions of the shoes will be consequent upon the reversal of the lever and the traveling backward of the locomotive. This alternate movement of the shoes S is brought about by arranging the arms s^4 so as to extend upon opposite sides of the rock-shaft s^5 in such a manner that when one is raised the other is lowered.

If it is not desired to connect the shoe-operating mechanism with the reversing-lever of the locomotive, it may be connected with a suitable operating-lever of its own.

The operation of the herein-described mechanism is as follows: When a locomotive

equipped with shoes S approaches a distant box T, depressing the pieces t^3, a circuit is made by wire from ground to lever t and contact t^2 to wire 2, causing current from battery to pass through motor from wire 3 to wire 4, through contact E^3 and spring E′ to wire 6, through negative pole of battery to wire 5, through spring E^2, lever D, wire 7, through magnet-spools G, to wire 8, to ground 13, causing magnet G to attract armature C, forcing contact of brush c with disk F, thus forming a short circuit from wire 6, through battery to wire 5, to spring E^2, lever D, through magnet G, to disk F, through armature-brush c, through wires 9 and 3, to motor, to 4 and 6, to battery again. The gate will then wind upward or open and the current will be preserved and exerted on the motor till the brush c of the armature C touches the insulating-block F^2 of the disk F, breaking short circuit at the brush c. The motor will of course cease to operate until another circuit is started and completed. At this point the rebound of the springs H or H′ becomes of importance, for the spring H will force the gate-arm slightly upward, leaving the armature-brush c in proper position to form contact with the disk F upon the depression of the depressor-pieces t^3 of the home box T′.

It will be observed that the boss F^3 on the disk F will have forced the forked lever D to E′ at the same moment that the armature-brush c ran upon the insulating-block F^2, thus placing the positive pole into circuit and changing direction of the current and leaving the gate in condition to wind up or open at the proper time.

When the locomotive passes the home box T′ and operatively engages the same, the circuit will be made through the wire from the ground, lever t, to wires 2 and 3, through motor, to 4, to E^3, to E^2, wire 5, to positive pole, through battery to wire 6, lever D, through wire 7, to magnet-spools G, through 8, to ground, to wire 10, causing armature C to make contact by brush c with disk F, forming short circuit, as before. The gate will then be wound up or opened until brush c runs on insulating-block F^2, breaking circuit. The boss on disk F will have forced the lever D from E^2 to contact at E′, breaking circuit at E^3 at the moment the brush c ran on the insulating-block F^2, and the rebound of the gate caused by the spring H′ will have left brush c in position for contact with disk F upon the next depression of the apparatus in the distant box T.

It will be seen from the aforegoing that by the mechanism described a gate is provided, automatic in its action, which can be opened at any desired distance from the said gate, either singly, in pairs, or in groups, by locomotives running either forward or backward, and requires only attention at intervals, to the battery. It should be understood, however, that it is not desired to be limited to the use of a battery, for it is evident that other sources of electricity, when convenient, can be as easily and effectively used without departing from the spirit of this invention.

When the gate is closed by an approaching train, it remains closed until the train reaches the gate, regardless of the length of time elapsing between the passing of the distant box and the reaching of the home box. The gate will also remain open indefinitely until another train approaches. It will also be observed that the device uses very little electricity, only employing it when opening and closing. Where batteries are used, they may be charged at terminal electric stations at long intervals, perhaps months, this, of course, depending upon the number of trains run. Where the shoes S are connected with the reversing mechanism of the locomotive, the attention of the engineer is not necessary to the operating of the gates; but if it is desired the gates can be operated at the will of the engineer by providing the shoes S with a special lever in the cab, as hereinbefore mentioned.

It will be noted that the parts are simple and easily repaired at small cost and can be applied by laborers of ordinary intelligence and that a grounded circuit is preferably used.

The mechanical alarm-bell is adapted to be rung when the gate is closing or opening.

Having described this invention, what we desire to secure by Letters Patent is—

1. A railway-gate comprising an electric motor connected therewith, an electrical generator in circuit with the motor, track instruments in a circuit controlling the motor-circuit, a magnet and an armature controlling a circuit-closing brush, and a commutator cooperating with said brush and arranged to move with the gate-shaft, the commutator holding the motor-circuit closed during the movement of the gate-shaft, substantially as described.

2. A railway-gate comprising an electric motor connected therewith, an electrical generator in circuit with the motor, track instruments in a circuit controlling the motor-circuit, a magnet and an armature controlling a circuit-closing brush and a commutator cooperating with said brush, comprising a metallic disk mounted upon the shaft of the gate so as to move therewith and insulating-blocks, secured to said disk, in such a manner as to adapt the commutator to hold the motor-circuit closed during the movement of the gate-shaft, substantially as described.

3. A railway-gate comprising an electric motor connected therewith, an electrical generator in circuit with the motor, means for completing a circuit controlling the motor-circuit, a magnet and an armature controlling a circuit-closing brush, and a commutator coöperating with said brush, comprising a metallic disk provided with insulating-

blocks mounted upon the shaft of the gate so as to move therewith, the commutator holding the motor-circuit closed during the movement of the gate-shaft, and mechanically-operated means actuated by the movement of said commutator for changing the poles and reversing the electrical current through the motor, substantially as described.

4. A railway-gate comprising an electric motor connected therewith, an electrical generator in circuit with the motor, means for closing and preserving the circuit through the motor, means for breaking said circuit and a pole-changing device adapted to be operated by the circuit-breaking device, and comprising a fixed contact connected directly to the motor by wires, two springs provided with suitable contacts and connected respectively to the two poles of the electrical generator and a pivoted lever, adapted to make contact with the springs alternately and hold them out of contact with the fixed contact, substantially as described.

5. A railway-gate comprising an electric motor connected therewith, an electrical generator in circuit with the motor, track instruments in a circuit controlling the motor-circuit, a magnet and an armature controlling a circuit-closing brush, a commutator coöperating with said brush and arranged to move with the gate-shaft, and springs for limiting the movement of the gate, and adapted by their rebound to set the commutator in position to be operatively engaged by the said brush, substantially as described.

6. A railway-gate comprising an electric motor connected therewith, an electrical generator in circuit with the motor, track instruments in a circuit controlling the motor-circuit, a magnet and an armature controlling a circuit-closing brush, a commutator coöperating with said brush and arranged to move with the gate-shaft, the commutator holding the motor-circuit closed during the movement of the gate-shaft, springs connected with the poles of the motor-circuit, a lever operated by the commutator, and adapted to engage the springs alternately for changing the direction of the electrical current, catches for holding said lever in its alternate positions, and means for releasing the lever from the catches when desired, substantially as described.

7. In a railway-gate, the combination with electrically-operated means for closing and opening said gate, track instruments for starting the operation of said means, of contacting devices comprising guide-casings attached to the locomotive, vertically-sliding shoes for engaging the track instruments and springs in the said casings for exerting a constant pressure upon the said shoes and a lever connected to said shoes for raising or lowering them alternately, substantially as described.

8. In a railway-gate the combination with electrically-operated means for closing and opening said gate, of track instruments for starting the operation of said means, contacting devices comprising guide-casings attached to the locomotive, vertically-sliding shoes for engaging the track instruments having vertical stems or studs adapted to slide in said guide-casings, a lever connected to one of said stems upon each shoe whereby the engineer may raise or lower the said shoes alternately and springs for exerting a constant downward pressure upon said shoes, substantially as described.

9. In a railway-gate, the combination with electrically-operated means for closing and opening said gate, of track instruments for starting the operation of said means, adjustable shoes for engaging the track instruments on both sides of the locomotive, a rock-shaft for engaging both shoes, and connection with the reversing mechanism of the locomotive, whereby one shoe is raised and the other lowered and vice versa, to correspond to the backward or forward movement of the locomotive, substantially as described.

In testimony whereof we affix our signatures in presence of witnesses.

JAMES M. WILLIAMS.
THOMAS P. KINNEY.
HARRY W. KINNEY.

Witnesses to James M. Williams and Thomas P. Kinney:
W. O. JOHNSTON,
W. H. ALLEN.
Witnesses to Harry W. Kinney:
J. B. NOWLIN,
CHAS. W. PRICE.