(No Model.) 2 Sheets—Sheet 1.

J. F. SMALL.

AUTOMATIC RAILWAY GATE.

No. 599,019. Patented Feb. 15, 1898.

Fig. 1.

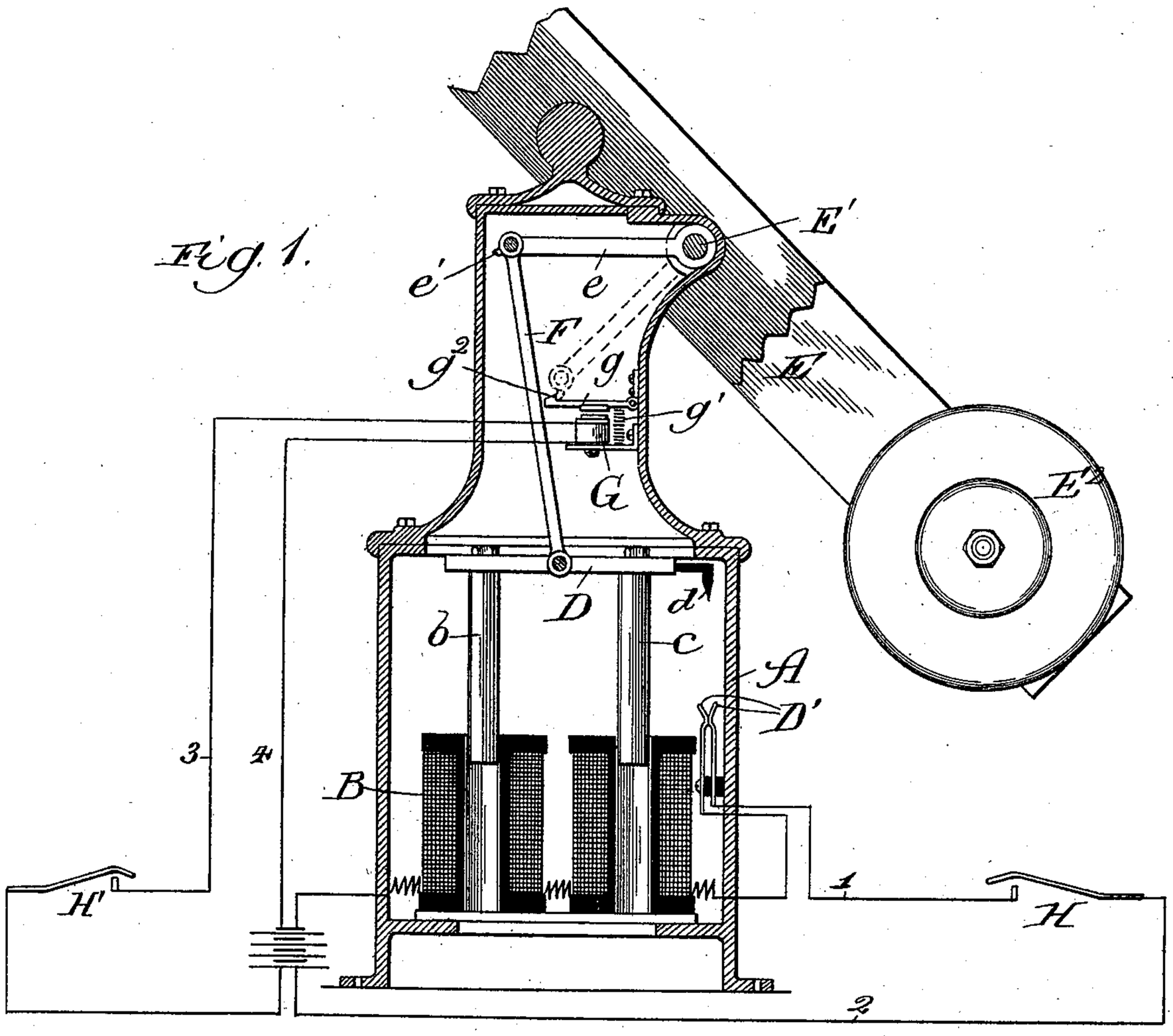
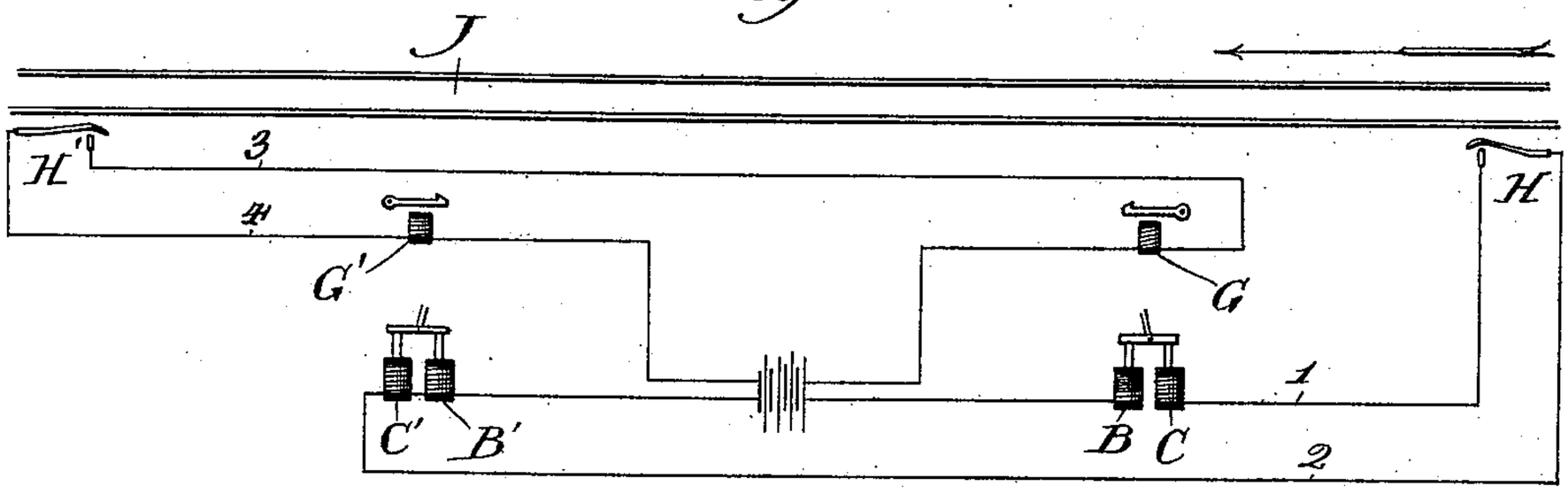


Fig. 2.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. F. SMALL.

AUTOMATIC RAILWAY GATE.

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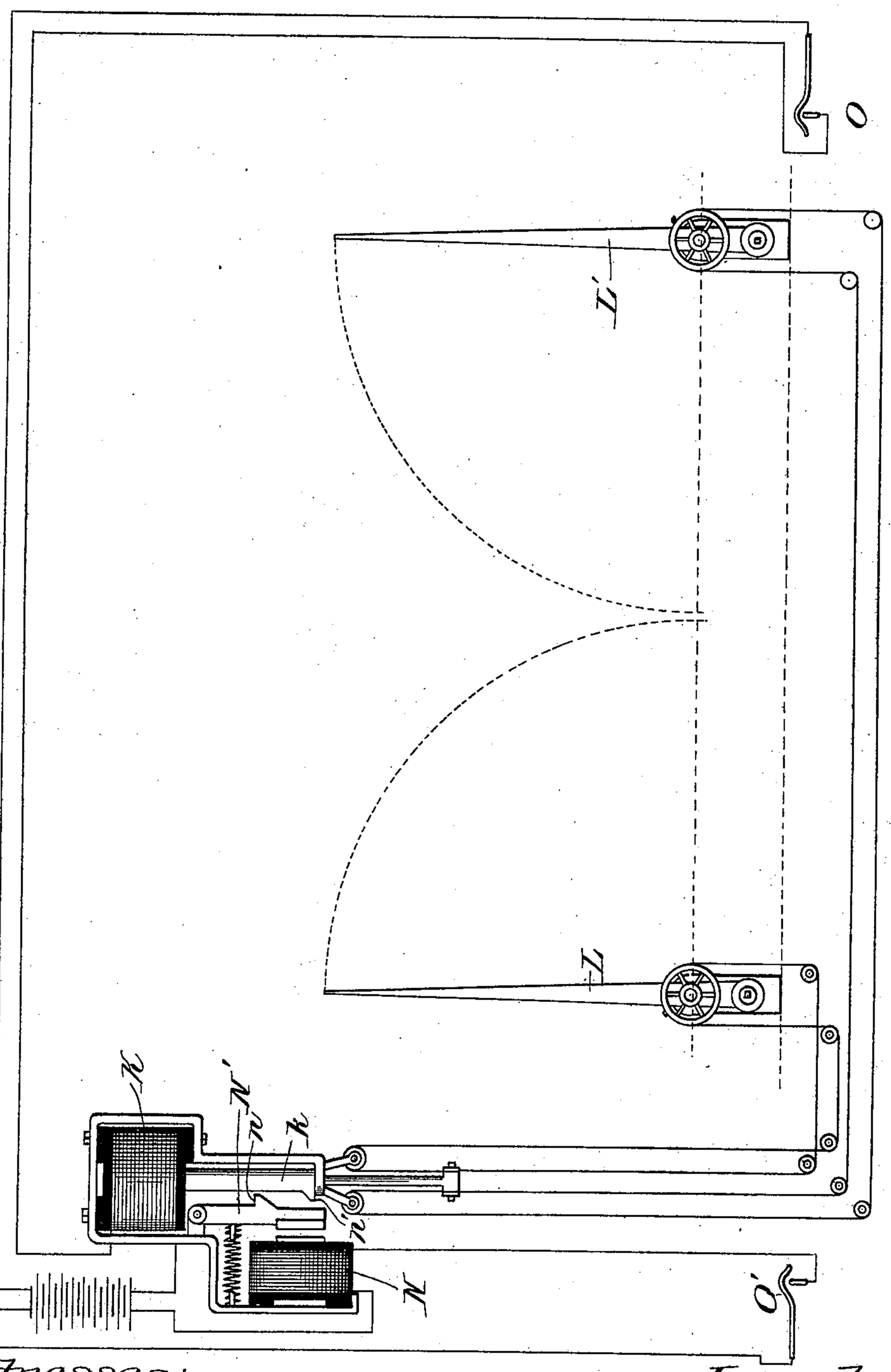

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN FRANCIS SMALL, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MARY E. H. RUTTER, OF SAME PLACE.

AUTOMATIC RAILWAY-GATE.

SPECIFICATION forming part of Letters Patent No. 599,019, dated February 15, 1898.

Application filed January 12, 1895. Serial No. 534,660. (No model.)

To all whom it may concern:

Be it known that I, JOHN FRANCIS SMALL, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Automatic Railway-Gates, of which the following is a specification.

My invention has particular reference and application to that class of railway-gates, preferably of the gravity type, designed to be automatic in action through the movements of the trains themselves upon the rails.

Speaking generally of my preferred construction, my invention consists in automatically-actuated electrical means connected to the gate-arms for lowering them against the force of a weight which tends to hold the gates in a normally upright position; and my invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a sectional view of a gate-post, showing my mechanism located therein; Fig. 2, a diagrammatic view of the electrical circuit and connections, and Fig. 3 a modification illustrating the use of one solenoid in a position extraneous of the gate-post and its connection with the gate-arms.

As a matter of common knowledge railway-gate arms are generally arranged in pairs on opposite sides of a street or crossing, and the mechanism connected to each gate-post is similar, so that in the present instance I will simply describe the application of my invention to one post and the same description will serve for and apply to all.

Preferably within a post A of the proper material, shape, and dimensions I mount a pair of solenoids B C, arranged either in multiple or series, as desired. A single powerful solenoid of the requisite strength may, however, be employed, although for practical reasons I prefer to use two, as shown. The solenoids are provided with cores *b c*, of a suitable size and material, which are secured to a common connecting piece or yoke D.

The gate-arm E belongs to that class which is overbalanced—that is to say, which is held normally in a substantially upright position by reason of a weight E^2 upon its short arm. The gate-arm is suitably mounted upon the post in any convenient manner—as, for instance, by a shaft E′, journaled on the post. Rigidly, though adjustably, secured to the same shaft is a rocking arm *e*. To the free end of this arm is pivoted a link F, which is also pivotally connected to the yoke D of the solenoid-cores, whereby any movement of the cores will be communicated to the frame and eventually to the gate-arm.

Within the post and preferably above the solenoid I arrange an electrically-controlled mechanism for holding the arm *e* in a downward position without the attractive aid of the solenoid. This mechanism consists of an electromagnet G, interposed in an electrical circuit, hereinafter to be described. Suitably pivoted at one of its ends and above the magnet is an armature *g*, which is kept in its normal position away from the core of the magnet by means of a compression-spring *g′* or equivalent device. The free end of the armature, as shown in the drawings, is provided with a catch or shoulder g^2, interposed in the path of the rocking arm *e*. Upon the end of this arm is a lug or projection *e′*, which in its downward stroke will be engaged by the shoulder g^2 and prevented from rising, as shown in dotted lines, Fig. 1. At the proper time the magnet G is excited and its armature attracted, thereby releasing the engaging parts. These movements will be hereinafter explained more in detail.

In Fig. 2 I have shown in diagram the circuit in which the solenoids and the magnet are interposed, whereby the gate-arms are operated automatically by the movements of the trains upon the rails. At suitable distances at either side of the railway-crossing and adjacent to the rail are placed ordinary circuit-closing devices H H′, operated by passing cars. In Fig. 2 are shown solenoids B C and B′ C′, located, respectively, on either side of the crossing. They are located in a circuit composed of conductors 1 and 2, which circuit is normally open, but established when the circuit-closer H is operated. The magnets G G′ are arranged in an independent normally open circuit composed of conductors 3 and 4 and provided with a circuit-closer H′.

As shown in Fig. 1, I prefer to employ a circuit-breaker for the solenoid-circuit which

consists of the usual flexible contact-points D′, which are arranged directly in the path of travel of a wedge *d*, of insulating material, which is attached to the yoke. In the downward movement of this yoke the wedge will enter between the contact-points and separate them, and thus break the circuit.

Assuming that a train is approaching the crossing upon the track J from the right, Fig. 2, the cars will contact circuit-closer H and complete a circuit through the solenoids, exciting the same. The cores will then be attracted or sucked into the solenoids, thereby operating the parts to draw the gate-arms downward over the crossing. When the arm *e* has been rocked to a sufficient extent, the armature of the electromagnets will engage the projection *e′*, whereby the gate-arm will be held in a normally horizontal position as long as such engagement continues. Meanwhile the wedge has broken the solenoid-circuit, so that the current is not used needlessly. After the train has cleared the crossing the circuit-closer H′ will be operated and a circuit completed through conductors 3 and 4, thereby causing the energizing of the electromagnets and attracting their armatures, so as to release the arm *e*. The weight upon the gate will then restore all the parts to their normal position.

In the foregoing I have described the construction of gate mechanism when operated in connection with a normally open circuit; but it will be understood that a normally closed circuit may be employed for operating a gate so balanced that its uninfluenced position will be down or over the crossing. The solenoids in such construction will act to keep the gate-arms upright, which action is practically the reverse of the open-circuit system.

I prefer to place the solenoids within the post itself, although it is obvious that they may be located elsewhere and proper connections run therefrom to the usual gate mechanism without departing from the spirit of my invention. I have shown such an arrangement in Fig. 3, wherein I employ, preferably, one powerful solenoid K, situated in a suitable housing in the neighborhood of the gates. This solenoid is provided with a core *k*, traveling in a suitable guide bearing or frame *k′*. The core is fastened or clamped at one of its ends to the usual system of cables running to the gate-arms L L′ and adapted to operate them in the well-known manner and as will be obvious from the drawings.

In proximity to the core I arrange an electromagnet N, provided with a pivoted armature N′. The latter is provided with a shoulder or projection *n*, arranged in the path of another projection *n′* on the core and adapted to engage the same. The magnet and solenoid are each located in its own independent normally open circuit, which is provided with ordinary circuit-closers O O′, although as to the modification as well the gate mechanism may be operated in connection with a normally closed circuit. The operation of this form is substantially the same as the one above explained and does not require detailed description.

While I have shown and described my gate mechanism as operated in an automatic manner by the movements of trains themselves, it will be understood that such mechanism may be advantageously actuated by a gate-tender by closing the circuit by hand. Consequently I do not limit myself to the automatic action except as pointed out and specified in some of the claims.

Although I have described more or less precise forms and details of construction, I do not intend to be understood as limiting myself thereto, as I contemplate changes in form, proportion of parts, and the substitution of equivalents as circumstances may suggest or render expedient.

I claim—

1. A railway-gate comprising a gate-arm normally held in an upright position, a solenoid interposed in a normally open circuit, a core, a connection between the core and gate-arm, whereby as the circuit is closed and the solenoid energized the core will be attracted to lower the gate-arm, an electromagnet interposed in an independent normally open circuit and provided with an armature normally adapted to engage the connection between the solenoid-core and gate-arm and hold the latter in a lowered position until the magnet is excited and the armature attracted, when the parts will be released.

2. In a railway-gate system the means for automatically operating the same through the movements of trains along the track, consisting, in combination with a gate-arm normally held in an upright position, of a solenoid interposed in a normally open circuit adapted to be closed by a train passing a point on the track on one side of a crossing, a core for the solenoid, an operating connection between the core and gate-arm whereby, as the train closes the circuit the gate-arm will be lowered, an electromagnet arranged in an independent circuit normally open at a point on the other side of the crossing, an armature normally adapted to engage the connection between the solenoid-core and the gate-arm and retain the latter in a lowered position until the train completes the electromagnet's circuit and thereby excites the magnet to attract the armature and release the gate-arm.

3. In a railway-gate, the combination of a gate-arm, means for retaining it in a normally upright position, an operating-arm secured to the gate-arm and provided with a lug or projection, a solenoid arranged in an electrical circuit and provided with a movable core, a link connection between the core and operating-arm, a catch adapted to engage the lug and retain the operating-arm in a downward position, electrically-controlled means for operating the catch mechanism to release the lug and circuit-closers automatically operated

by moving trains upon approaching a crossing guarded by the gate-arm, whereby as the circuit is completed the solenoid will be energized to attract and suck in the core and thereby lower the gate-arm.

4. A railway-gate comprising a gate-arm normally held in a substantially upright position, a solenoid interposed in a normally open circuit, a movable core for the solenoid, a connection between the core and gate-arm whereby as the circuit is closed the core will be attracted and the gate-arm lowered, mechanism independent of the solenoid for engaging and retaining the gate when lowered, a circuit-breaker and a point connected to the movable core for operating the circuit-breaker, whereby the circuit will be broken subsequent to the operation of the said gate-engaging mechanism.

5. A railway-gate comprising a gate-arm normally held in an upright position, an operating-arm *e* provided with a lug *e'*, solenoids B, C, arranged in an electrical circuit and provided with movable cores *b*, *c*, a yoke D connecting the cores, a link F pivotally connected to the operating-arm *e* and to the yoke, an electromagnet G arranged in an independent circuit, an armature *g* provided with a shoulder and interposed in the path of travel of the end of the operating-arm whereby the lug will be engaged by the shoulder and the gate-arm thereby held in a lowered position independent of the action of the solenoid, and circuit-closers automatically operated by moving trains for successively closing the solenoid-circuit and the electromagnet-circuit.

6. A railway-gate comprising a gate-arm, a solenoid, a movable core therefor, a connection between the core and gate-arm whereby as the core is moved the gate-arm will be lowered and electrically-controlled means for retaining the gate in such lowered position independent of the solenoid.

7. A railway-gate comprising a gate-arm, a solenoid, a movable core, a connection between the core and gate-arm, means for automatically energizing the solenoid upon the approach of a train, whereby the core will be attracted and the gate-arm lowered, and electrically-controlled mechanism independent of the solenoid for retaining the gate in such lowered position and automatically operated by a train after passing or clearing a predetermined point.

8. In a railway-gate, the combination of a gate-arm, a plurality of solenoids, movable cores therefor, a yoke connecting one end of the cores together, an operating-arm connected to the gate-arm, a link connecting the operating-arm to the yoke and separate electrically-controlled means for retaining the gate in a lowered position.

9. In a railway-gate, the combination of a gate-arm, a solenoid, a movable core therefor, an operating-arm *e* secured at one end to the gate-arm, a piece D secured to one end of the core, a link F connecting the free end of the arm *e* to the piece D and an electrically-controlled catch device for holding the gate lowered independent of the solenoid.

10. In a railway-gate, the combination of a gate-arm, a solenoid arranged in a circuit, a circuit-breaker therein, a movable core for the solenoid, a connection between the core and gate-arm, and a point of non-conducting material connected to the core and movable therewith, the point being adapted to actuate the circuit-breaker in its travel.

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