No. 712,723.

Patented Nov. 4, 1902.

C. M. ROSS, T. HALL & E. W. JOHNSON.

RAILWAY GATE.

(Application filed Dec. 12, 1901.)

(No Model.)

4 Sheets—Sheet 1.

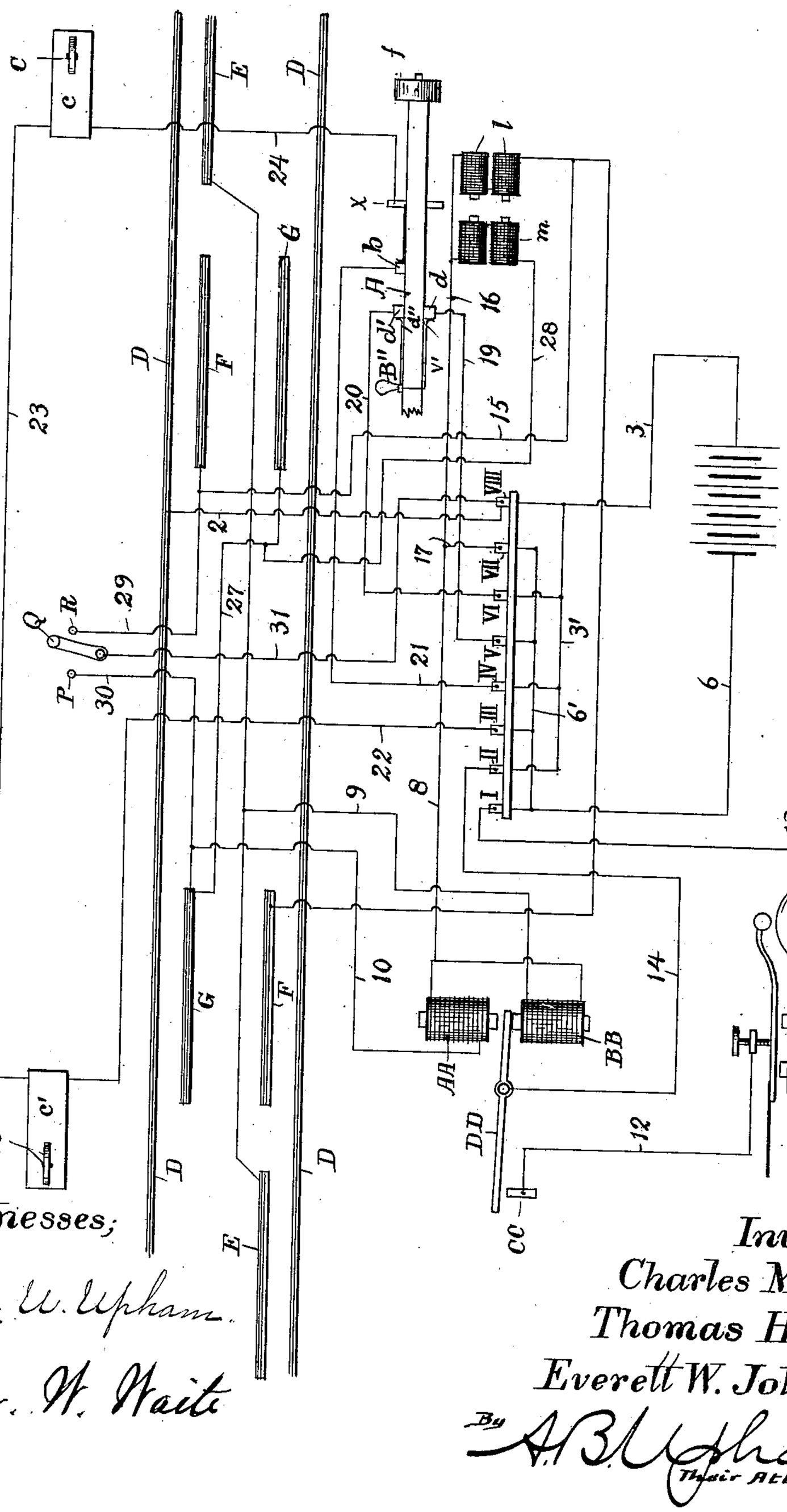

Fig. 1

Witnesses;

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E. W. Waite

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Charles M. Ross,
Thomas Hall,
Everett W. Johnson;
By A. B. Upham,
Their Attorney

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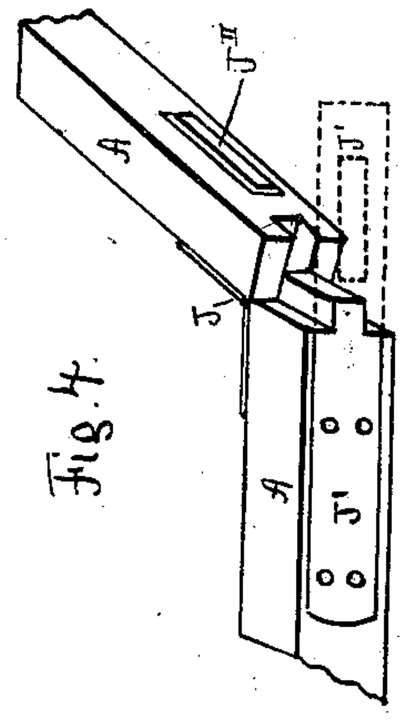

Fig. 4.

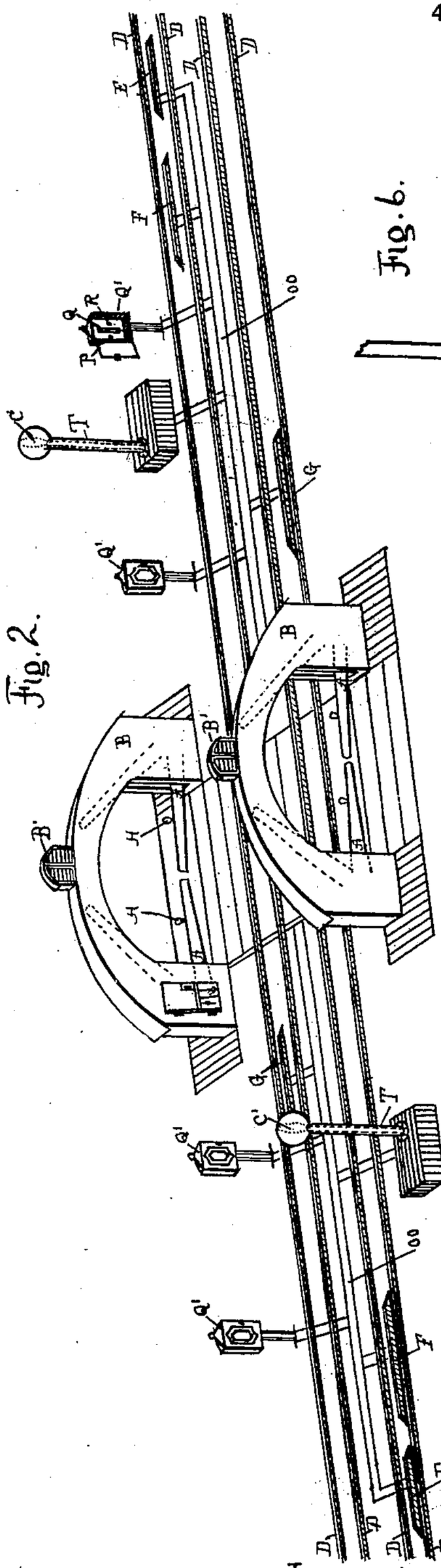

Fig. 2.

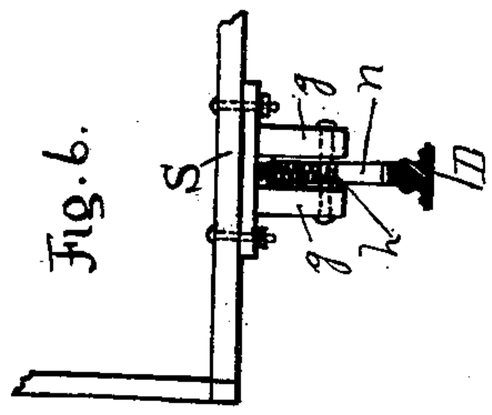

Fig. 6.

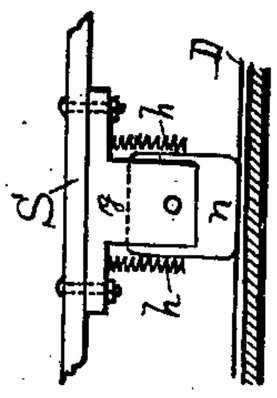

Fig. 5.

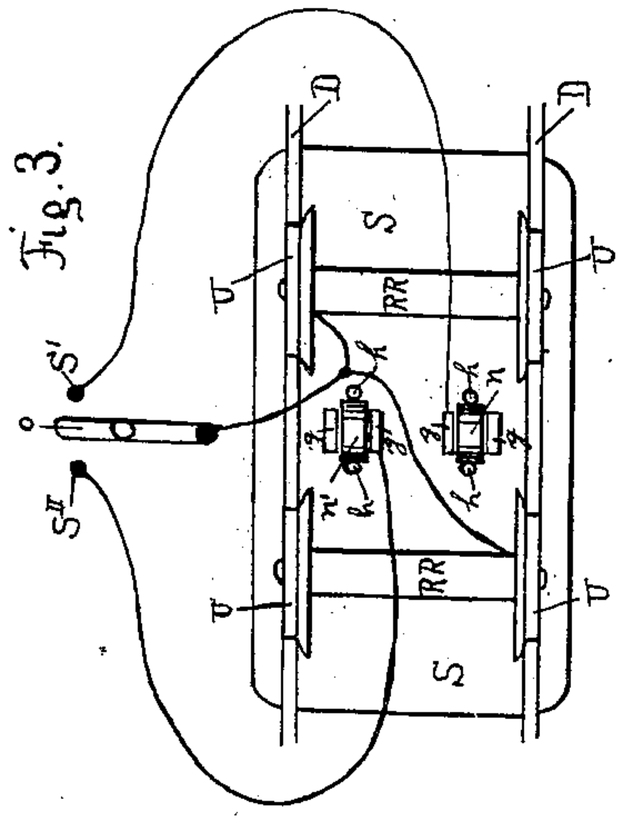

Fig. 3.

Witnesses:

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(No Model.) 4 Sheets—Sheet 3.

Fig. 7

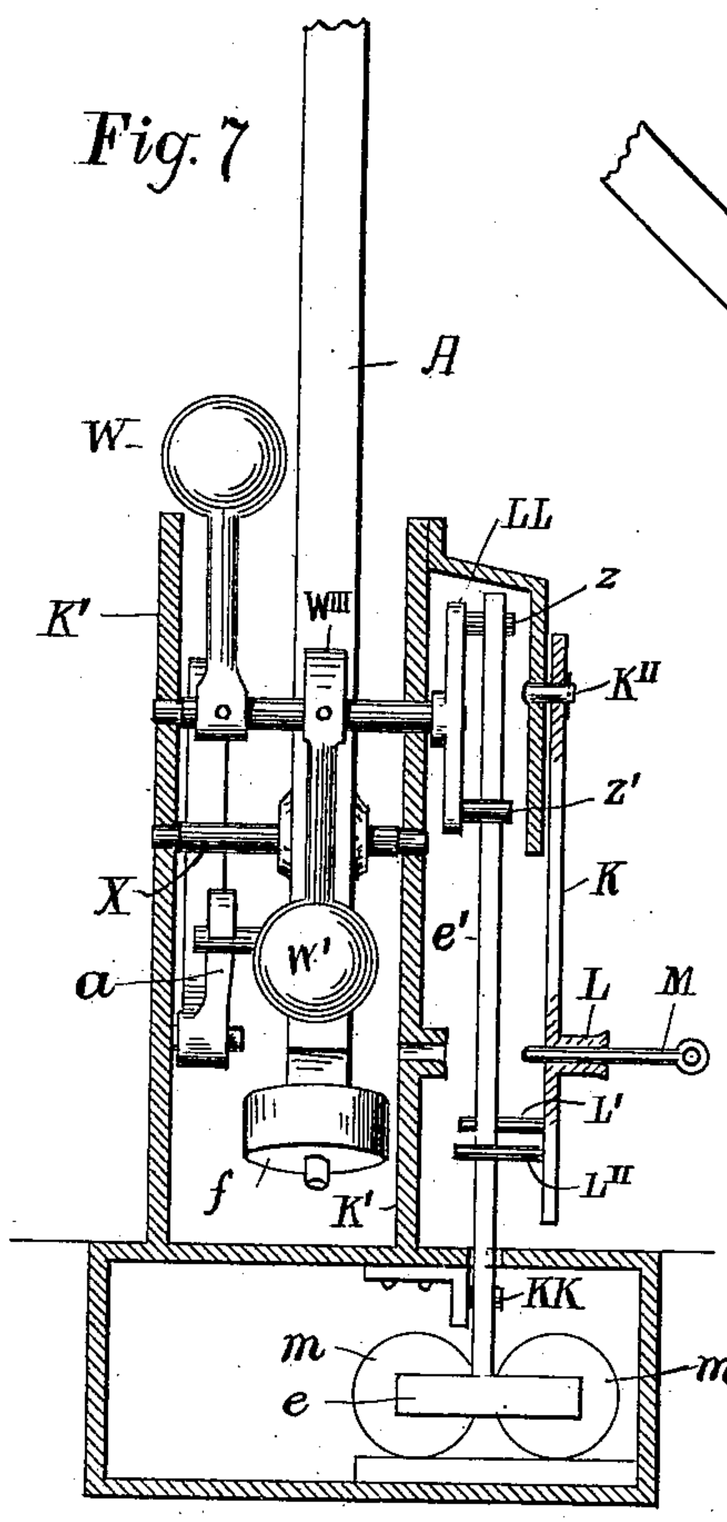


Fig. 8

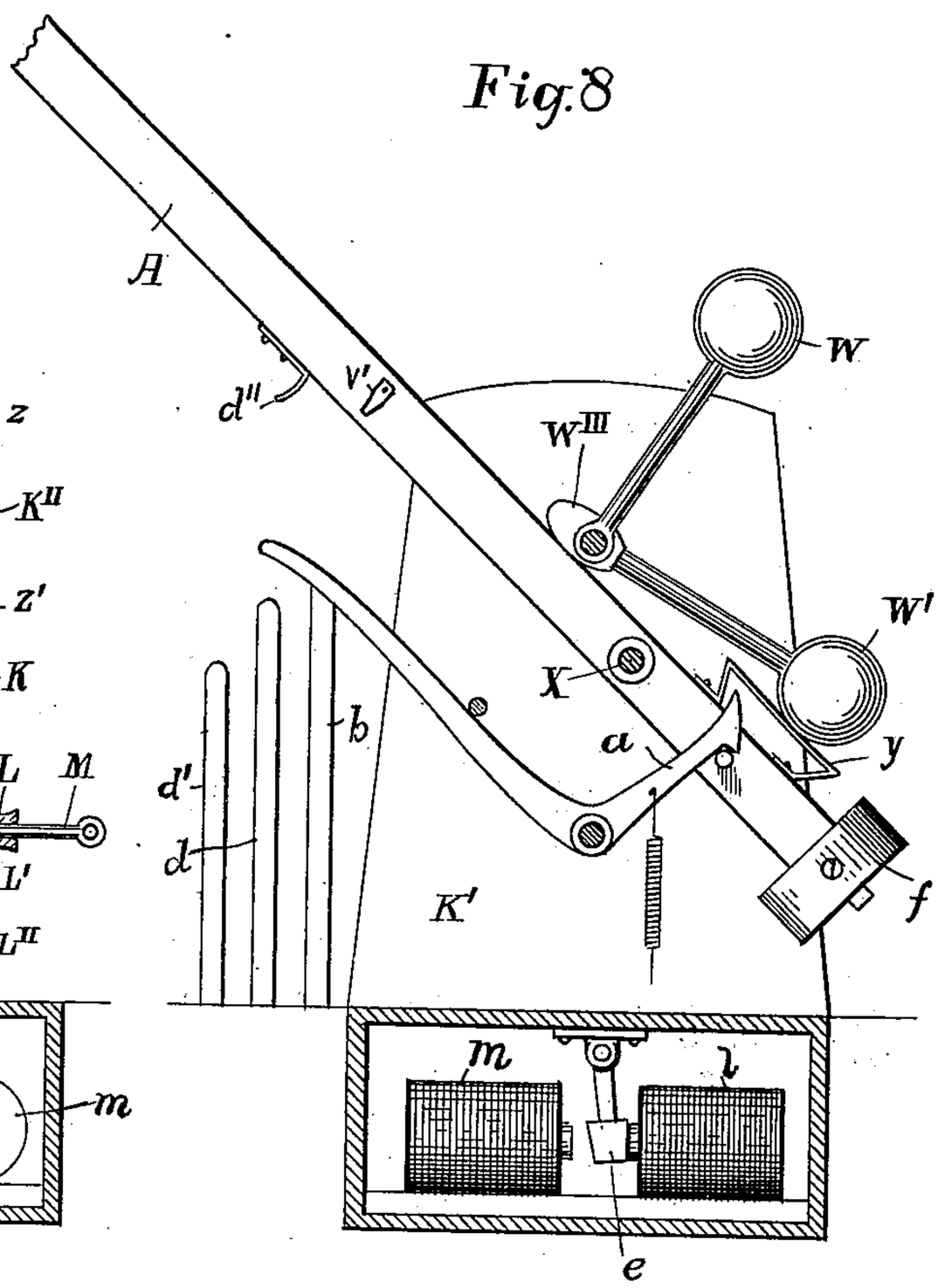
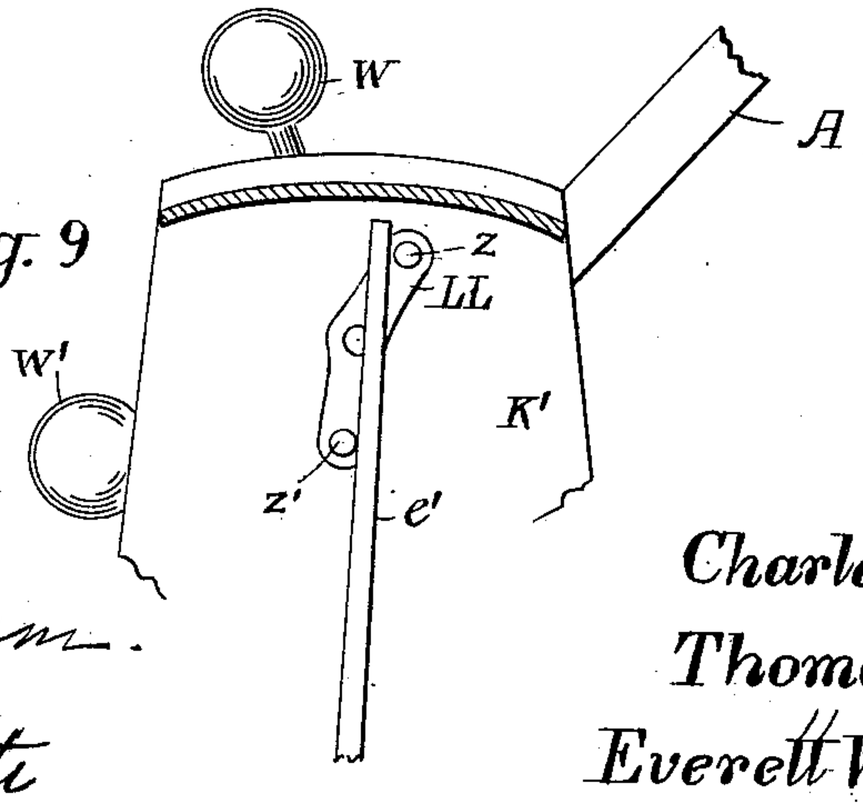


Fig. 9



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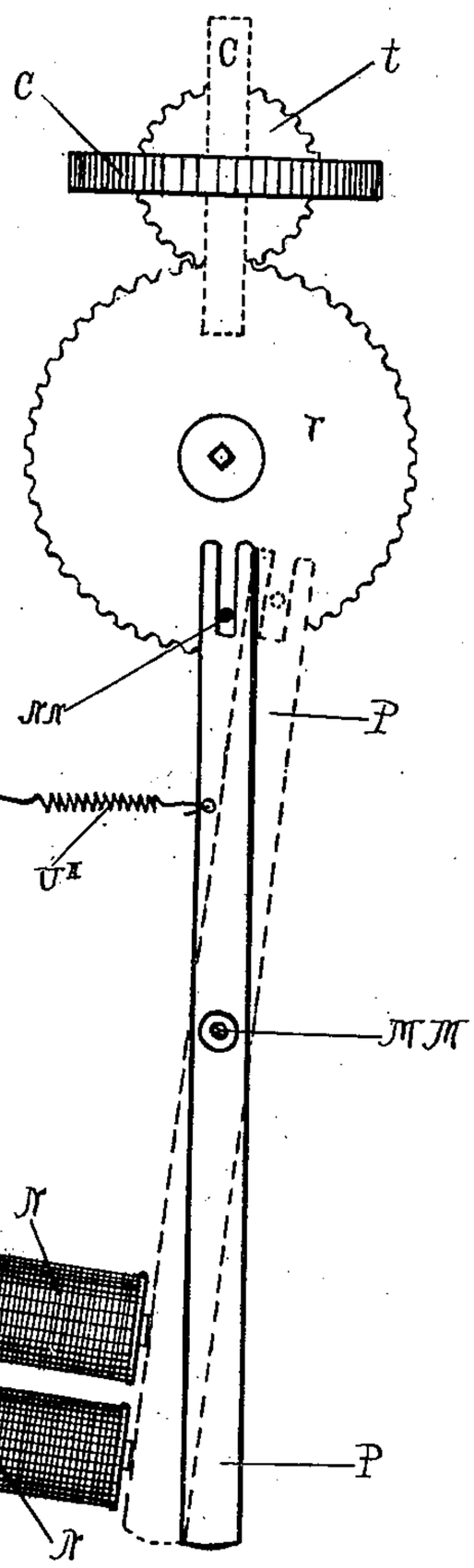
(No Model.) 4 Sheets—Sheet 4.

Fig. 10.



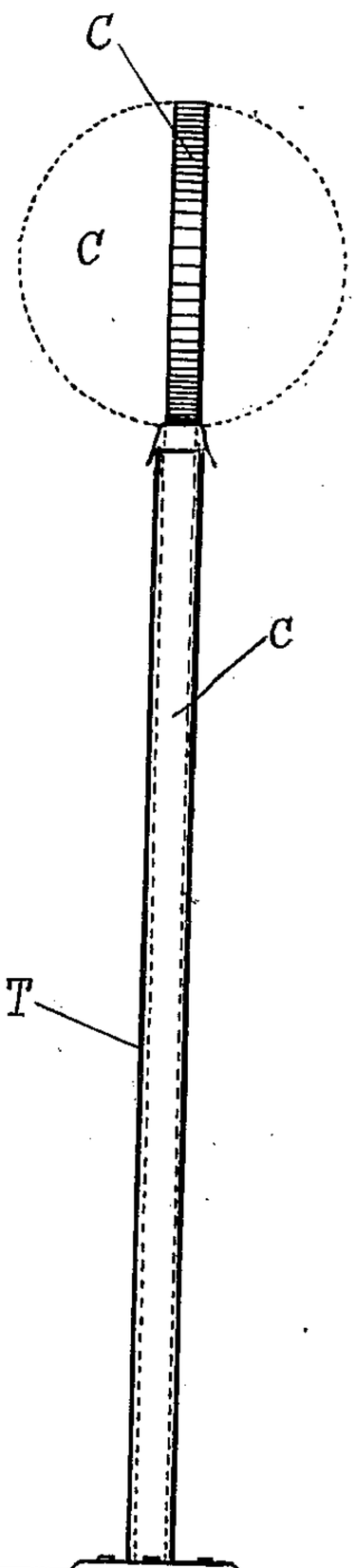
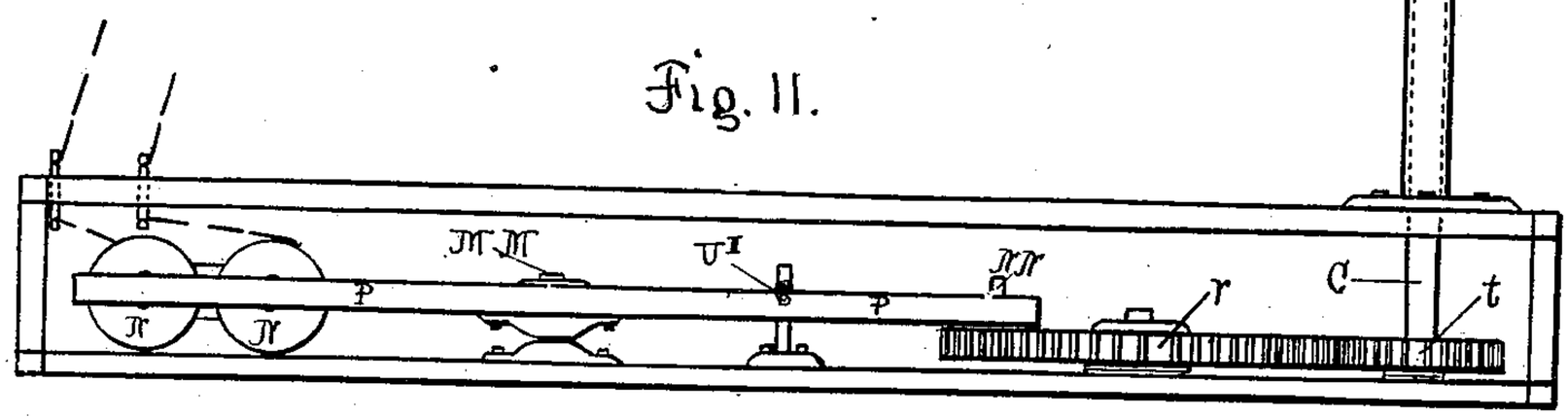


Fig. 11.



Witnesses.

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UNITED STATES PATENT OFFICE.

CHARLES M. ROSS, OF FALMOUTH, THOMAS HALL, OF AUBURNDALE, AND EVERETT W. JOHNSON, OF MEDFORD, MASSACHUSETTS.

RAILWAY-GATE.

SPECIFICATION forming part of Letters Patent No. 712,723, dated November 4, 1902.

Application filed December 12, 1901. Serial No. 85,721. (No model.)

To all whom it may concern:

Be it known that we, CHARLES M. ROSS, of Falmouth, in the county of Barnstable, THOMAS HALL, of Auburndale, in the county of Middlesex, and EVERETT W. JOHNSON, of Medford, in the county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Railway-Gates, of which the following is a full, clear, and exact description.

Our invention relates to improved means for electrically operating safety-gates at railway-crossings, the approach and departure of a train serving to automatically close and open the operating-circuits, such gates being designed either for ordinary crossings, electric-railway crossings, drawbridges, entrances to private residences or institutions, and other places where it is desired to have the crossing temporarily obstructed.

Our improvements pertain to the construction of the safety-gate itself and to the electric means for its operation, to means for enabling its operation to be either automatic or under the control of the engineer of an approaching train or capable of being operated either mechanically or electrically by some one near the gate, to means for notifying people near, either audibly or visually, of the approach of a train and the closure of the gate, and also to means whereby the failure of the gate to properly close gives warning to the approaching engineer.

Referring to the drawings forming part of this specification, Figure 1 is a diagrammatic plan view showing the method of wiring the electric apparatus comprising part of our invention. Fig. 2 is a perspective view of a railway-crossing provided with our gates and signals. Fig. 3 is a diagrammatic plan view showing the contact-brushes, switch, and wiring of a locomotive. Fig. 4 is a perspective view showing the joint in the gate-bar for permitting lateral flexure therein in cases of accident. Fig. 5 is a side view of one of the contact-shoes connected with a locomotive. Fig. 6 is a front elevation of the same. Fig. 7 is a sectional side elevation of the gate-operating mechanism. Fig. 8 is a rear elevation of the same with the back thereof removed. Fig. 9 is a detail view of a part of said mechanism. Fig. 10 is a plan view of the danger-signal and operating mechanism, and Fig. 11 is a side elevation of the same.

As shown in Figs. 1 and 2, the track-rails D have located between them at considerable distances from the crossing-gates A several contact-bars E, F, and G, which are designed to close the operating-circuits of the gates when touched by the contact-shoes *n* of a locomotive. (See Figs. 3, 5, and 6.) To insure that accumulations of snow and ice shall not cause the gates to unwarrantably close, we provide them with the housing B, (shown in Fig. 2,) upon the central arching top of each of which is a signal-light B′.

The construction of each gate is as follows: The bar A or "gate," as we call it, is pivoted upon the rod or shaft X, terminally supported in suitable bearings in the front and rear frame-pieces K′ K′. A counterweight *f* nearly, but not quite, counterbalances the gate A, so that the normal tendency of the gate is to drop to its horizontal and closed position. Fixed upon a shaft located above said rod or shaft X are two weighted arms W W′, the latter of which is located in the plane of the gate, while the other is wholly out of possible contact therewith. When the weighted arm W′ rests upon the short arm of the gate, the gate is wholly overbalanced and caused to remain in its raised and open condition; but when said weighted arm is moved up and away the gate drops by gravity into its closed position. To remove said weighted arm from the gate or to return it thereto, we fix upon the end of the shaft of said weighted arms a bar LL, having pins *z z′* projecting therefrom parallel with said shaft and equidistant therefrom. Between these two pins rises the upper end of the lever *e′*, which is pivoted at KK in the chamber below the gate-frame. Fixed to the lower end of said lever is an armature *e*, located between the poles of the two pairs of electromagnets *l* and *m*. When one pair of said magnets is strongly energized, the upper end of said lever is swung forcibly against one of the pins *z z′*, and thereby throws the weighted arms W W′ in a corresponding direction, while an energizing of the other pair of magnets produces in the same manner an opposite throw of said arms.

Hence when the magnets *m* are energized the weighted arm W′ is thrown up and away from contact with the weighted end of the gate, thereby permitting the latter to descend to its closed position. Similarly when the magnets *l* are energized the weighted arm W′ is thrown back upon the weighted end of the gate, and so causes the same to rise to its open position. While a single weighted arm W′ is sufficient to thus actuate the gate, we prefer the two weighted arms for two reasons—first, so that the weighted arm W′ will not require to be swung through so long an arc before gravity will hold it where thrown, and, second, that the weighted arm W may serve to release the gate from a lock which normally holds it in its raised position. Said lock consists of the latch *a*, pivoted to the gate-frame and drawn by the tension-spring *a′* into engagement with a pin projecting from the lower part of the gate. When the gate swings into its raised position, said pin is caught by said latch, and the gate is thereby held open; but when the weighted arms W W′ are swung over to release the gate of their weight the weighted arm W descends into contact with the upwardly-projecting end of the latch *a*, and thereby releases the gate therefrom. At the same time the gate, being relieved of the weight upon its shorter arm, sinks by gravity to its horizontal position.

To assist the gate in beginning its closing movement, we provide the inner end of the weighted arm W′ with a cam W‴, constructed to impart to the gate a slight initial swing when the weighted arms are raised from contact with the gate.

The shock of the weighted arm W′ upon the gate is relieved by means of the cushion *y*, formed of spring sheet metal, having its ends bent inward to form legs and fixed to the gate.

To enable the gate to be operated by hand at any time, we pivot the upper end of an arm K to a suitable bridge, fixed to the upper part of the frame-standard K′, providing the same with two pins L′ L″, projecting one each side of the lever *e′*. By giving said arm a strong swing in either direction said lever is given a corresponding sharp stroke, which acts through a pin *z* or *z′* to throw the weighted arms W W′ in the direction required.

It often happens that a freight or other train is forced to remain for a considerable length of time at a crossing or a wagon breaks down thereat. In such cases the gate is swung down by hand, if not already down, and a plug M inserted through the socket L into an eye in the standard K′ in order to lock the gate down and insure that the signals shall remain set at "danger."

Among the various signals associated with this gate are the electric lights B′, located on the gates themselves or on the housings thereof, as already referred to, electric lights located at considerable distances from the crossing as a warning to the engineer, and day-signals similarly located for the same purpose. Another signal is an electrically-operated gong located in the vicinity of the crossing. All these signals are actuated through electric currents switched thereto by the lowered position of the gate, as hereinafter set forth. We will first, however, describe the arrangement for electrically operating the gates.

For each railway-track there are six of the contact-bars E, F, and G, one set at each side of the crossing and far enough therefrom to permit of the gates being closed before the fastest train can reach the crossing. The two contact-bars F and G of each set are for the purpose of contacting with the shoe *n* of a locomotive, one being designed for transmitting a current to lower the gates and the other for raising the same. Hence when a train passes the crossing in one direction its shoe *n* contacts with the bar F, and so lowers the gates, and then contacts with the bar G and raises the same, while trains passing in the opposite direction contact also with bars F and G, and so similarly operate the gates. The object of the bars E is to insure that a train coming to the crossing and then backing away shall not leave the gates closed. This is done by having each bar E adapted to energize the gate-opening magnets *m*, with the result that when a train passes a crossing the bar E is first met and the gate-opening magnets energized; but as the gates are already open nothing results. Then the bar F is met and the gate lowered, so remaining until the train reaches the bar G at the other side of the crossing and raises the gate. Should now the train back away from the crossing before reaching said bar G, the gate would remain down until the bar E is met and the gate-raising magnets energized, inasmuch as the magnets energized through contact with the bar F could have no effect upon a gate already down.

The target-signals C C′ are designed to be operated by electric currents obtained through the closing of the gates and the energizing of electromagnets N. Said magnets act upon an armature-lever P, whose opposite end engages a pin NN on the large gear-wheel *r*. A one-half smaller gear *t*, meshing therewith and fixed on the shaft of said target, enables the energizing of said electromagnets to give said target a half-turn, while the spring U″ returns the target to its normal position as soon as said magnets are demagnetized.

The gong FF is rung by means of the electromagnets EE, energized whenever the switch-tongue DD is thrown over into contact with the pin CC, said tongue being operated by the opposing electromagnets AA and BB. When the magnet AA is energized, the tongue is switched to break the circuit, while the magnet BB completes the circuit. The arrangement of the wiring for these various circuits is as follows: The circuit is completed with the magnet BB last described by

the contact of the shoe *n* with bar E and of a wheel of the locomotive with rail D through the lead-wire 2 from said rail to the binding-post VIII, thence through the lead-wire 3 to the battery 5, thence to the binding-post VII, and from there through the wires 17 8 to the magnet BB, and back through the wire 9 to the contact-bar E. The magnet AA is energized and the gong rendered silent by current delivered thereto through the contact-bar G, wire 10, magnet AA, wires 8 17, binding-post VII, wire 6′ 6, battery 5, wire 3, binding-post VIII, wire 2, track-rail D, and through the wheel and shoe of the locomotive back to the contact-bar G. The gong-circuit, starting from the pin or contact-point CC, comprises the wires 12 13 and the windings of the magnets EE to the binding-post I, and thence through the wires 6, battery 5, wire 3 3′ to the binding-post II, the wire 14, and the switch-tongue DD.

The circuits for the energizing of the gate-operating magnets *l m* are as follows: The magnets *l* for closing the gate are in the circuit composed by the locomotive-wheel and shoe, the contact-bar F, the wire 15, binding-post VII, wires 16 17, and wire 6′ 6, battery 5, wire 3 to the binding-post VIII, thence through the wire 2 to the rail D and the locomotive-wheel U. The magnets *m* are located in the circuit comprising wires 27 28, wires 16 17, binding-post VII, wire 6, battery 5, wire 3, binding-post VIII, wire 2, track-rail D, brush *n*, and the cab-circuit.

The circuit of the electric signal-lamps B′ is closed by the contact of the pin V′ on the gate with the spring *d*, which is connected with the binding-post V by the wire 19, from thence through the wires 6 3 and battery 5 to the binding-post VI, and thence through the wire 20 to the post *d′* and spring *d″* to the pin V′.

The circuit of the signals *c c′* is closed by the contact of the gate A with the spring *b*, which is wired to said signals through the wire 21 to the binding-post IV, thence through wires 3 6 and battery 5 to the binding-post III, and thence through the wires 22, 23, and 24 to the standard K′, through the shaft X, and thus to the metal portion of the gate A.

In the cab of the locomotives we prefer to locate a switch O, of conducting material, and connected at one end with the wheels U. The contacts S′ S″ being wired up to opposite shoes *n*, the circuit passing can be reversed by swinging the said switch over from one contact to the other. We also design to locate switch-boxes Q′ at suitable points alongside of the tracks in the vicinities of the contact-bars F G, whereby the gates can be operated manually whenever required. These switch-boxes are provided with glass doors P and contain in each case a switch Q, arranged to engage either of two contact-points R in the same manner as the switch-tongue O, just described. The glass door P permits the switch to be reached and operated even if the men do not happen to have the door-key with them.

Each gate-bar A is formed with a laterally-swinging joint J (shown in Fig. 4) for the purpose of permitting any team to break through and escape from the track if suddenly caught thereon by the unexpected descent of the gate. This joint permits the gate to swing outwardly; but the gate is normally kept inflexible by means of a lock consisting of a sheet-metal strap J′, fixed to the lower section of the gate and having an elongated eye or slot near its other end adapted to engage the projection J″ on the swinging section of the gate. Under ordinary conditions this lock is sufficient to keep the gate-sections in alinement; but upon any such heavy strain as that of a team pressing against it from the direction of the tracks it will yield and permit the same to escape. This joint at the same time accomplishes a second function—that of warning the approaching train that the gate is not fully closed. This is done by the lack of balance between the gate and its counterweights and the consequent descent of the latter and the resultant setting of the signals at "danger." This is owing to the fact that the center of gravity of the gate being brought nearer the pivotal support thereof by the swinging section's lateral displacement the gate can no longer overcome the opposing pressure of the weights, but its lower section is immediately overborne and raised into the position taken when the gate is open in the usual manner.

The reference character OO in Fig. 2 designates the conduit in which are located the lead-wires from the various contact-bars E F and the signals and switches.

We claim—

1. A gate comprising a pivoted bar counterweighted to have a slight tendency to swing vertically in one direction, a rock-shaft, a weighted arm rigid with said shaft and constructed to rest upon said bar at the side of its pivotal point otherwise the lighter, two electromagnets, an armature located between the poles of said magnets, and connections between said armature and shaft constructed to rock the latter in one direction when one magnet is energized, and in the opposite direction when the other magnet is energized, substantially as described.

2. A gate comprising a pivoted bar counterweighted to have a slight tendency to swing vertically in one direction, a rock-shaft, a weighted arm rigid with said shaft and constructed to rest upon said bar at the side of its pivotal point otherwise the lighter, two electromagnets, an armature located between the poles of said magnets, an intermediately-pivoted lever carrying said armature at its shorter end, and crank-pins rigid with said shaft and constructed to be engaged by the upper end of said lever to rock said shaft in

one direction or the other in accordance to which magnet is energized, substantially as described.

3. A gate comprising a pivoted bar partially counterweighted, a cushion on its lighter end, and a weight constructed to swing on and off said cushion, such cushion comprising a resilient sheet-metal strip having its ends bent at an angle with respect to the central part thereof to form legs, and these legs secured to the gate, substantially as described.

4. A gate comprising a pivoted bar partially counterweighted, a lock normally holding said bar raised, a weight constructed to be swung on and off said bar, and means operated by said weight when swung off said bar to disengage said lock therefrom, substantially as described.

5. The combination with the vertically-swinging partially-counterweighted gate, of the rocking shaft having the weighted arm normally resting upon the counterweighted end of said gate to keep the latter open, and a cam carried by said shaft and contacting with the gate at a point beyond its pivotal support with respect to said weight; said cam being constructed to give the gate an initial impulse to close when the weighted arm is swung out of contact with the gate, substantially as described.

6. The combination with the vertically-swinging counterweighted gate, of the swinging counterweighted arm for normally retaining the gate in one position, a magnetically-oscillated lever constructed to operate said weighted arm, a dependent swinging arm immediately in front of said lever and having an eye therein, supporting framework for said parts having a socket in line with said eye, means binding said dependent arm and lever to move together, and a pin constructed to be introduced through said eye and into said socket and to thereby hold the parts inoperative, substantially as described.

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

CHARLES M. ROSS. [L. S.]
THOMAS HALL. [L. S.]
EVERETT W. JOHNSON. [L. S.]

Witnesses:
T. P. MACKINNEY,
HENRY H. LEPPER.