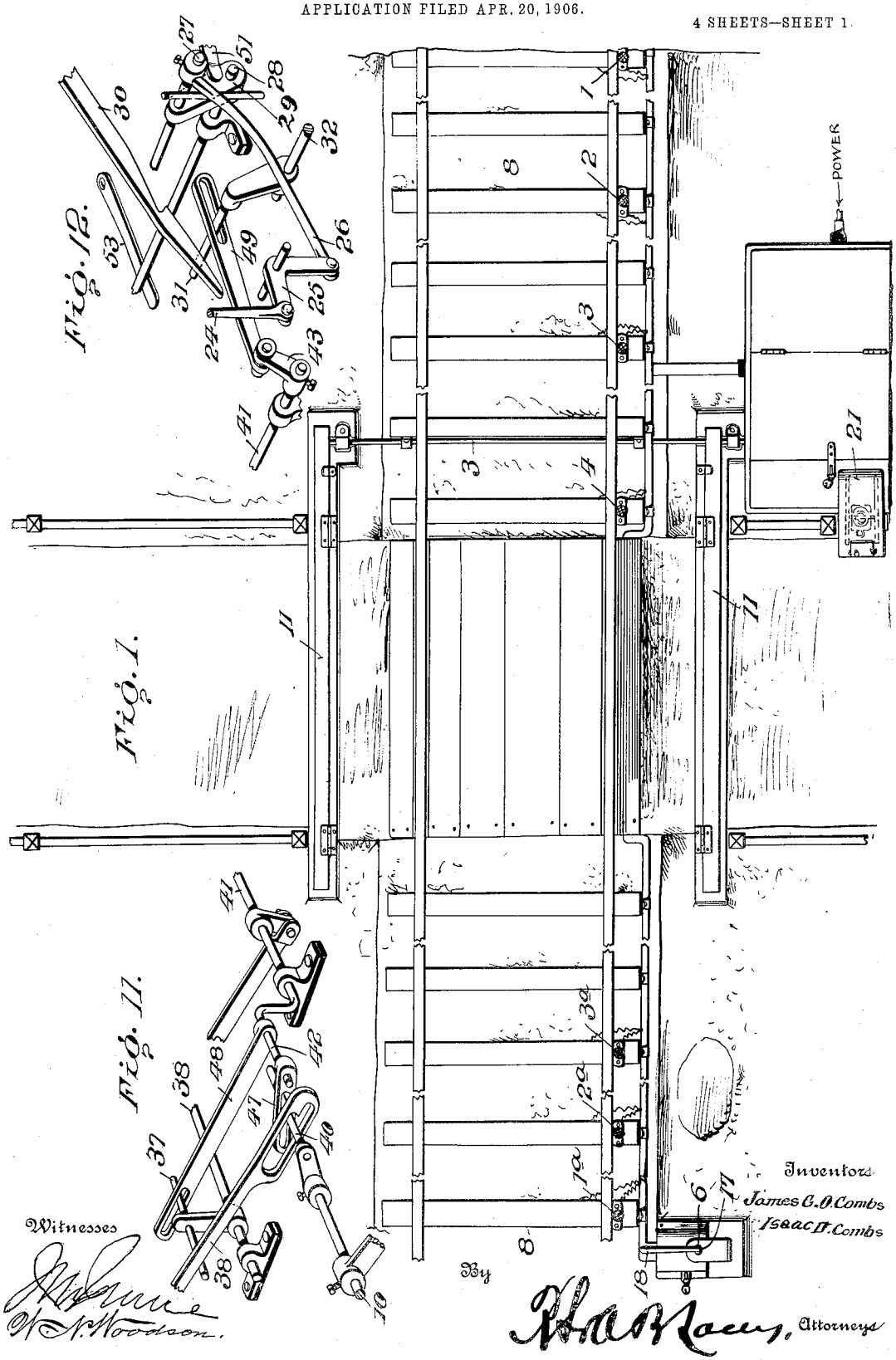
No. 836,243. PATENTED NOV. 20, 1906.

J. G. O. & I. D. COMBS.

ELECTRICALLY OPERATED RAILWAY SIGNAL AND GATE.

APPLICATION FILED APR. 20, 1906.

4 SHEETS—SHEET 1.



No. 836,243. PATENTED NOV. 20, 1906.

J. G. O. & I. D. COMBS.

ELECTRICALLY OPERATED RAILWAY SIGNAL AND GATE.

APPLICATION FILED APR. 20, 1906.

4 SHEETS—SHEET 2.

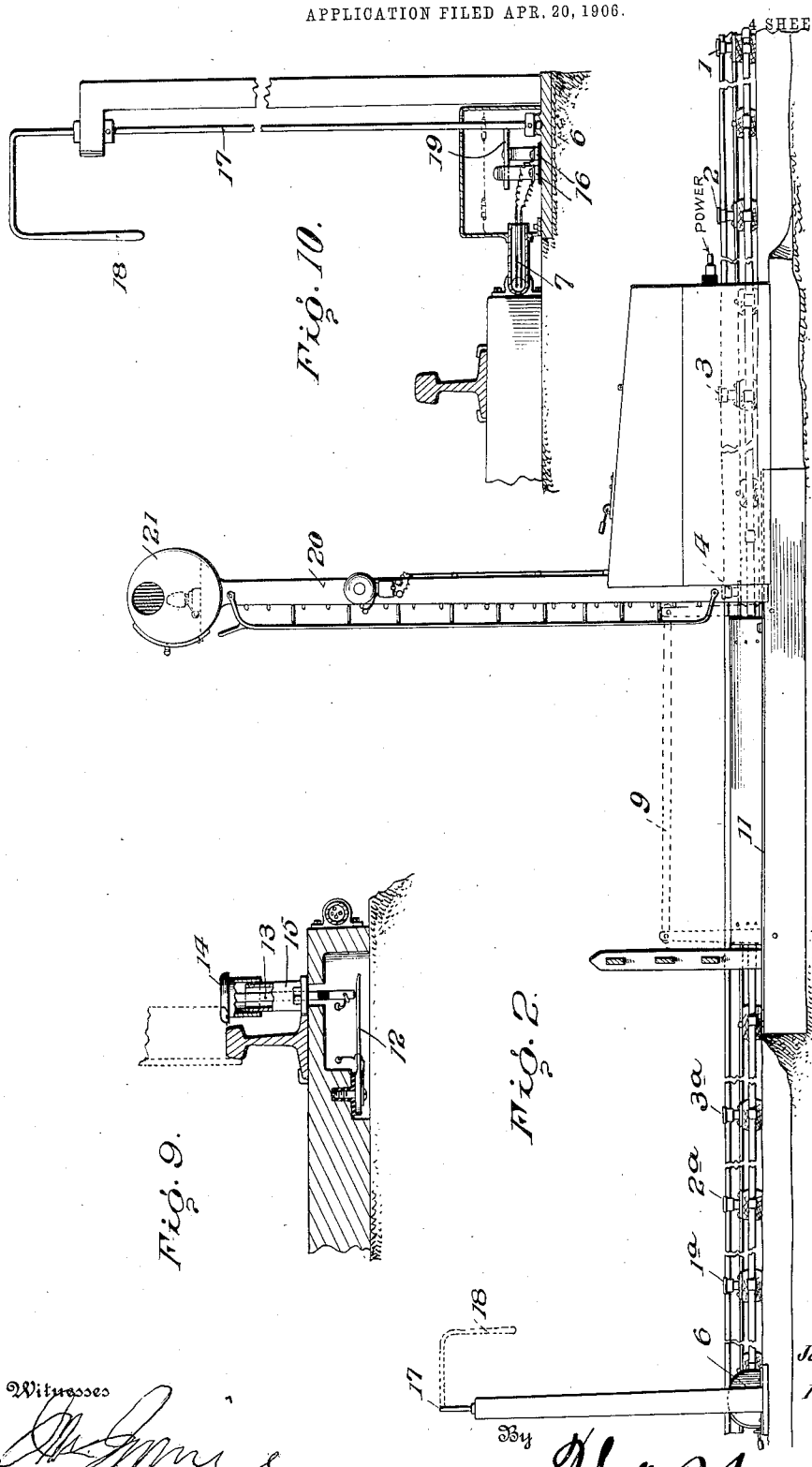


Fig. 10.

Fig. 2.

Fig. 9.

Witnesses

W. N. Woodson

Inventors

James C. O. Combs.

Isaac D. Combs.

By H. A. B. Lacey, Attorneys

No. 836,243. PATENTED NOV. 20, 1906.

J. G. O. & I. D. COMBS.

ELECTRICALLY OPERATED RAILWAY SIGNAL AND GATE.

APPLICATION FILED APR. 20, 1906.

4 SHEETS—SHEET 3.

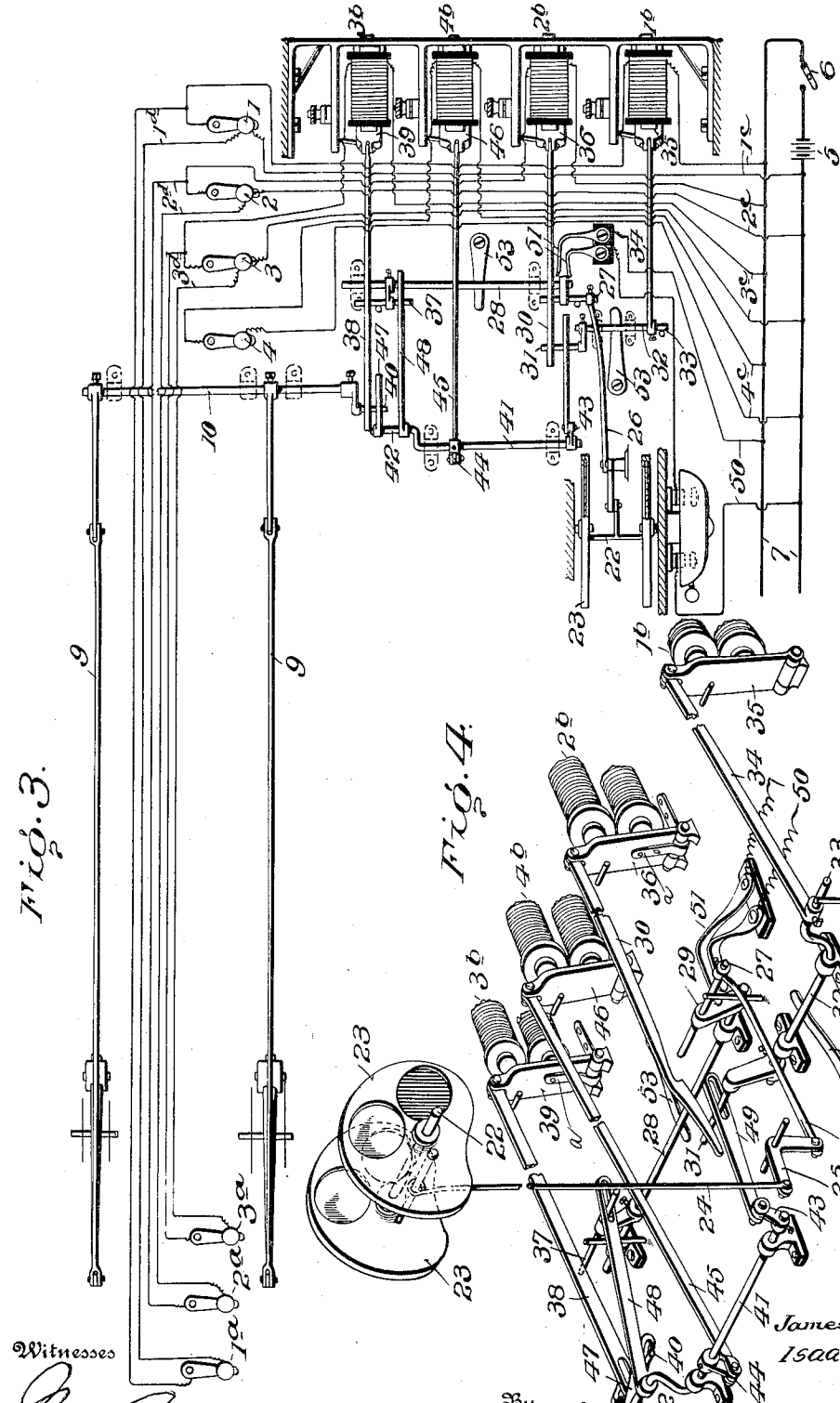


FIG. 3.

FIG. 4.

Witnesses

W. N. Woodson.

Inventors

James G. O. Combs.

Isaac D. Combs.

By H. A. Macy. Attorneys

No. 836,243. PATENTED NOV. 20, 1906.

J. G. O. & I. D. COMBS.

ELECTRICALLY OPERATED RAILWAY SIGNAL AND GATE.

APPLICATION FILED APR. 20, 1906.

4 SHEETS—SHEET 4.

Fig. 5.

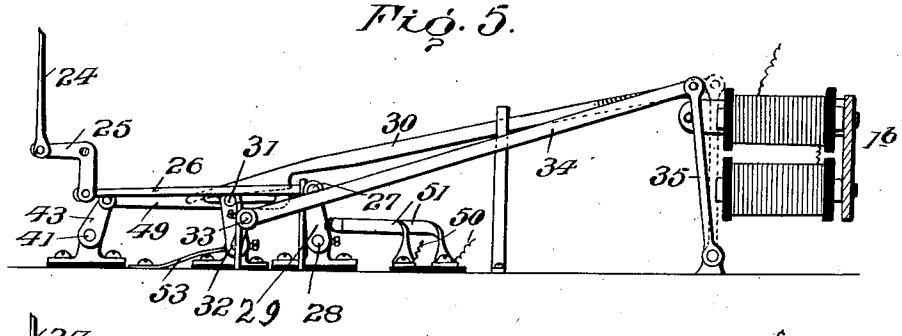


Fig. 6.

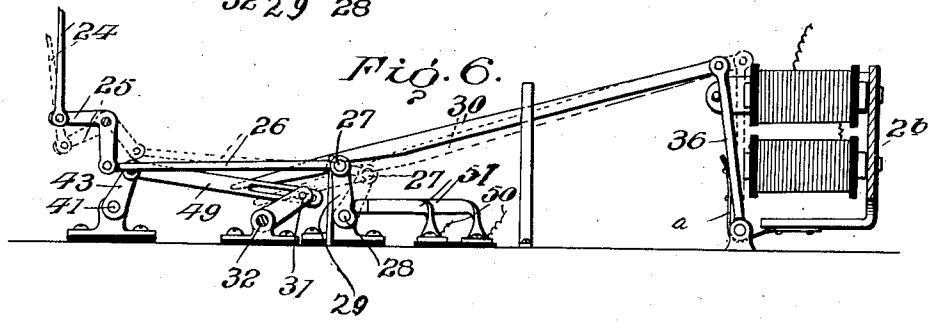


Fig. 7.

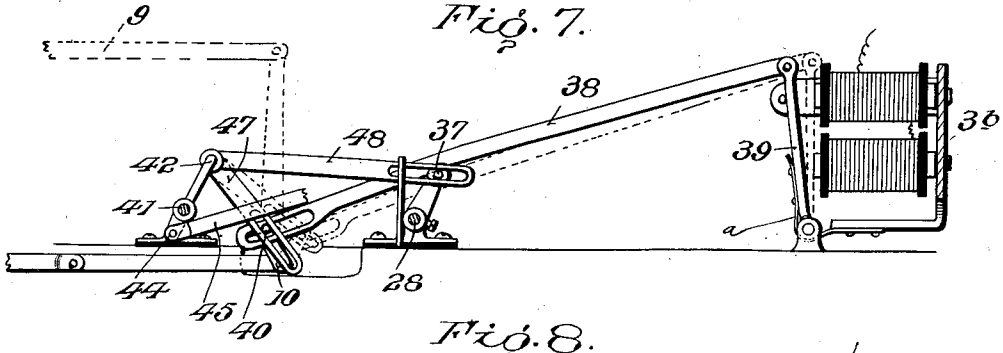
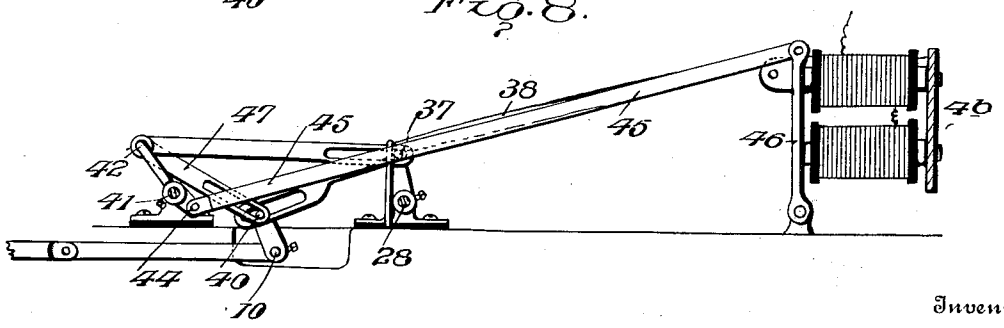


Fig. 8.



Witnesses

W. N. Woodson.

Inventors

James G. O. Combs.

Isaac D. Combs.

By Thacher, Attorneys

UNITED STATES PATENT OFFICE.

JAMES G. O. COMBS AND ISAAC D. COMBS, OF HAROLD, MISSOURI.

ELECTRICALLY-OPERATED RAILWAY SIGNAL AND GATE.

No. 836,243. Specification of Letters Patent. Patented Nov. 20, 1906.

Application filed April 20, 1906. Serial No. 312,874.

To all whom it may concern:

Be it known that we, JAMES G. O. COMBS and ISAAC D. COMBS, citizens of the United States, residing at Harold, in the county of Greene and State of Missouri, have invented certain new and useful Improvements in Electrically-Operated Railway Signals and Gates, of which the following is a specification.

This invention relates to safety appliances, such as signaling means and barriers, for railway-crossings or like dangerous places, the purpose being to provide novel actuating means for the safety appliances which are adapted to be electrically operated from any point or points in the length of the track from either approach and at any required distance from the crossing or like place to be safeguarded.

The mechanism embodies a gate, an alarm, a signal, separate electric circuits including electromagnets as actuators, operating means for the several parts, and a plurality of circuit-closers adapted to be successively operated to energize the electric actuators to effect movement of the different mechanisms.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which—

Figure 1 is a plan view of a railway-crossing equipped with safety appliances constructed in accordance with and embodying the essential features of the invention. Fig. 2 is a side view of the parts illustrated in Fig. 1. Fig. 3 is a diagrammatical view showing the several circuits, the electric actuators and the operating mechanisms. Fig. 4 is a detail perspective view of the signal, electric actuators, and operating mechanisms. Fig. 5 is a detail view of the primary or electric setting-actuator, showing the normal position of the parts. Fig. 6 is a view similar to Fig. 5 of the secondary or signal-operating electric actuator and the mechanism operated thereby. Fig. 7 is a view of the third or gate operating electric actuator and the mechanism operated thereby. Fig. 8 is a view of the fourth or resetting electric actuator and the mechanism set in motion thereby for restoring the working parts to normal position. Fig. 9 is detail view of a circuit-closer and its mountings and illustrating the manner of operating the same by the wheel of a moving train. Fig. 10 is a detail view of the switch for breaking the main circuit when it is desired to throw the safety appliances out of action to prevent their operation by a switch-engine, hand-car, or other vehicle not designed to operate the mechanisms. Fig. 11 is a detail perspective view of the gate-operating and the resetting mechanisms. Fig. 12 is a detail perspective view of the setting and the signal-operating mechanisms.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The invention is shown as applied to a single-track railway, although it may be adapted to a double-track railway by slight modifications, which will readily suggest themselves to the skilled artisan.

As indicated most clearly in Figs. 1 and 3, the approach to the crossing is protected at each side of the railway 8 by means of a gate 9, which may be of any pattern or make, said gates or protecting means being connected for simultaneous operation. A rock-shaft 10 extends beneath the rails of the track and has connection with the gates 9, so as to project the same into operative position or withdraw them to admit of unobstructed travel along the roadway when there is no immediate danger passing the crossing. The gates 9 are adapted to close into pockets provided at the sides of the track and closed by means of hinged covers 11, which are thrown upward when the gates are projected and which close automatically when the gates are withdrawn or folded.

At one side of the crossing and at different distances therefrom are arranged a series of circuit closers, the same being arranged to be operated by a convenient part of a train—such, for instance, as the wheels thereof—and for this purpose the circuit-closers are located adjacent to a rail of the track, as indicated most clearly in Figs. 1 and 9. The several circuit-closers may be of any construction, and being substantially alike a detail description of one will suffice for a clear understanding thereof. A contact-plate 12

constitutes one terminal of a circuit, and a spring-actuated pin 13 forms the other terminal. The plate 12 is preferably a spring to admit of its yielding according as the pin 13 is moved downward a greater or less distance by the wheels of the passing train. A cap 14 is fitted to the upper end of the contact-pin 13 and telescopes with the upper end of a tubular stud 15, fastened to the tie or other support. This construction prevents moisture passing into the part 15 and reaching the circuit-closing elements and interfering with their successful operation.

The circuit-closers at one side of the crossing are indicated by the reference-numerals 1 2, and 3, and the corresponding circuit-closers at the opposite side of the crossing are designated by the reference-numerals 1^a, 2^a, and 3^a. The circuit-closer 4, arranged at or near the crossing when operated effects a resetting of the parts and is actuated by trains passing in either direction. Electric actuators 1^b, 2^b, 3^b, and 4^b are included in electric circuits which are controlled by the respective circuit-closers, and such actuators preferably consist of electromagnets of proper strength to perform the function for which intended. The armatures or movable parts of the electric actuators are adapted to be connected in any manner with the respective mechanisms deriving movement therefrom. The armatures of the electric actuators 1^b and 4^b are dependent upon each other for positive movement, whereas the armatures of the electric actuators 2^b and 3^b are spring-actuated and are automatically returned to normal position by means of springs *a* when their respective electric actuators are devitalized, as by breaking of the electric circuit therethrough. The main circuit is indicated by the reference-numeral 7 and contains a current-generator 5 and a switch 6. The current-generator may be either a battery or a dynamo-electric machine, and the switch 6 is of such construction as to admit of its operation by the engineer or fireman of a switch-engine to break the main circuit when it is not desired to operate the safety appliances at the crossing. The several electric circuits, including the respective circuit-closers and electric actuators, are designated by the reference-numerals 1^c, 2^c, 3^c, and 4^c and by the reference-numerals 1^d, 2^d, and 3^d, the latter connecting the respective circuit-closers 1^a, 2^a, and 3^a with the corresponding circuits 1^c, 2^c, and 3^c. These several circuits are clearly indicated in the diagrammatical view, Fig. 3.

The switch 6, as illustrated most clearly in Fig. 10, comprises spring-contacts 16, a shaft 17, crank-handle 18, and arm 19, the latter projecting from the shaft 17 and adapted to come between the contacts 16, so as to close the main circuit or to be withdrawn from between said contacts to break the main circuit when it is not required to operate the safety appliances. The switch 6 is located at any convenient point to admit of breaking the main circuit when required, thereby permitting the shifting backward and forward of a switch-engine without setting the safety appliances and restoring the same to normal position. The crank-handle 18 extends within convenient reach of the engineer to admit of its ready operation from the engine while in motion.

The signaling means may be of any variety and, as illustrated, comprise a semaphore and an alarm, the semaphore embodying a light for observation at night and the alarm being of the type to be electrically operated. The signaling means, as shown, are mounted upon a post 20 at or near the crossing, so as to apprise persons of impending danger upon the approach of a train. The visual signal comprises a casing 21, secured to the upper end of the post 20 and provided in opposite sides with corresponding openings. A shaft 22 is suitably mounted within the casing and has secured thereto plates 23, in which openings are provided to receive plain and colored glasses, according to the system of signaling in vogue along the railway to be equipped with the invention. A rod 24 connects the plates 23 with one arm of a bell-crank 25, the other arm of said bell-crank being connected by a rod 26 with a crank-pin 27, fast to a rock-shaft 28. The crank-pin 27 projects through its supporting-arm 29, so as to extend from opposite sides of said arm. The projecting end of the crank-pin extends across the path of a hook 30, which is normally held out of engagement therewith by means of a crank-pin 31, fast to a rock-shaft 32, and which rock-shaft has a crank-arm 33 connected by rod or bar 34 with the armature 35 of the electromagnet or actuator 1^b. The hook 30 is connected to the armature 36 of the electromagnet or actuator 2^b, and its outer end normally rests upon the crank-pin 31, by means of which it is held away from the crank-pin 27. Upon energizing the electromagnet or actuator 1^b its armature 35 is attracted, thereby turning the rock-shaft 32 and withdrawing the crank-pin 31 from beneath the outer end of the hook 30, and permitting the same to rest upon the crank-pin 27, so that when the electromagnet or actuator 2^b is energized and its armature 36 attracted the hook 30 will engage with the crank-pin 27 and rock the shaft 28 and operate both the signal and the alarm. This latter operation will be more fully described hereinafter. A crank-pin 37 is fast to the rock-shaft 28 and normally supports a bar or rod 38, connected to the armature 39 or the electromagnet or actuator 3^b, and when the shaft 28 is turned the pin 37 is withdrawn from engagement with the part 38 or moved to a position to admit of the outer end of said bar or rod 38 falling, so that upon energizing the actuator or

electro-magnet 3^b its armature is attracted and moves the part 38 to effect operation of the gate or like part 9. A crank-pin 40, fast to the shaft 10, extends across the path of the part 38 and is adapted to be engaged by a catch or stop-shoulder thereof to admit of operation of the gate upon closing the circuit inclosing the actuator 3^b.

The resetting means for restoring the parts to normal position embodies a rock-shaft 41, having crank-arms 42, 43, and 44, the latter being connected, by means of a bar or rod 45, with the armature 46 of the electromagnet or actuator 4^b. A bar or rod 47 connects the crank-arm 42 with the crank-pin 40, the latter having a limited play in a slot of the part 47 to admit of rocking movement of the shaft 41 when the parts are in normal position without disturbing the same and also providing for proper movement of the gate-operating mechanism without producing any movement of the shaft 41. A bar or rod 48 also connects the crank-arm 42 with the crank-pin 37 and is provided with a slot to admit of said crank-pin having a limited movement for substantially the same purpose as the limited play of the crank-pin 40 in the part 47. A bar or rod 49 connects the crank-arm 43 with the crank-pin 31 and is slotted to receive said crank-pin and admit of the same having a limited movement for the same purpose as the play provided between the parts 48 and 47 and coöperating crank-pins 37 and 40. After the electromagnets 1^b, 2^b, and 3^b have been actuated to operate their respective mechanisms the crank-pins 31, 37, and 40 will occupy a position at one end of the slots of the respective connections 49, 48, and 47, so that upon energizing of the electromagnet 4^b and rocking of the shaft 41 the several crank-pins will be moved to restore the rock-shafts 32, 28, and 10 to normal position and at the same time returning the respective mechanisms and parts to an initial position.

The alarm-circuit is indicated by the reference-numeral 50, which includes a circuit-closer comprising the spring-contacts 51 and the arm 29, attached to the rock-shaft 28 and carrying the crank-pin 27. The arm 29 is either metallic or of such construction as to electrically connect the spring-arms 51 when the rock-shaft 28 is moved to set the signal and throw the gate-operating mechanism into position for actuation upon energizing the electromagnet 3^b. Normally the arm 29 is withdrawn from between the contacts 51; but when the signal-operating circuit is closed and the electromagnet 2^b energized the rock-shaft 28 is moved, thereby bringing the arm 29 between the contacts 51 and closing the alarm-circuit and at the same time setting the visual signal and bringing the parts of the gate-operating mechanism into working position. When the parts are restored to primal position by vitalizing the electromagnet 4^b, the alarm-circuit is broken by withdrawal of the arm 29 from between the contacts 51.

In the practical operation of the invention a railway equipped with safety appliances substantially as herein indicated is adapted to have the mechanisms operated in successive order as the train approaches the crossing from either direction. When the circuit-closer 1 or 1^a is operated, the electromagnet or actuator 1^b is energized and the rock-shaft 32 moved so as to withdraw the crank-pin 31 from beneath the hook 30 and admit of said hook resting upon the crank-pin 27, as indicated by the dotted lines in Fig. 5. When the train reaches a position to operate either the circuit-closer 2 or 2^a, the actuator or electromagnet 2^b is vitalized and moves the hook 30 and rocks the shaft 28, thereby setting the signal and the alarm and at the same time permitting the parts of the gate-operating mechanism to come into the coöperative relation by withdrawing the crank-pin 37 from beneath the part 38 to admit of the catch or shoulder of said part 38 engaging with the crank-pin 40 to throw the gate into position across the roadway upon energizing the electromagnet or actuator 3^b when the circuit-closer 3 or 3^a is operated. As the train reaches the crossing or passes by the same the resetting circuit-closer 4 is operated, thereby closing the circuit through the electromagnet or actuator 4^b, with the result that the rock-shaft 41 is moved and all the parts returned to normal position to be again actuated by the next train. To prevent a too rapid movement or overthrow of the rock-shafts 28 and 32, a brake 53 is applied to each and consists of a spring arranged to expend its force against the shaft, so as to retard the movement thereof.

Having thus described the invention, what is claimed as new is—

1. In safety appliances of the character specified, the combination of a gate, signaling means, operating mechanisms for the gate, the signaling means and for throwing the parts of said mechanism into coöperative relation, a series of electric actuators included in separate circuits, and independent circuit-closers for successively closing the circuits through the electric actuators whereby the several mechanisms are operated in rotation to set the mechanism to operate the signal and to project the gate into working position.

2. In safety appliances of the character specified, the combination of a gate, signaling means, operating mechanisms for the gate, the signaling means and for throwing the parts of said mechanism into coöperative relation, a series of electric actuators included in separate circuits, independent circuit-closers for successively closing the circuits

through the electric actuators whereby the several mechanisms are oparated in rotation to set the mechanism to operate the signal and to project the gate into working position, and a resetting mechanism embodying an electric actuator and circuit-closer for restoring the working parts to normal position.

3. In safety appliances of the character specified, the combination of a gate, operating mechanism therefor comprising parts normally disengaged, a signal embodying an electric circuit normally open, operating mechanism for the signal and for throwing the separate parts of the gate-operating mechanism into operative position, and a setting mechanism for throwing the signal-operating mechanism into proper coöperative relation for actuation at the proper time.

4. In safety appliances of the character specified, the combination of a gate, operating mechanism therefor comprising normally disengaged parts, a signal embodying an electric circuit, operating means for the signal and adapted to throw the disengaged parts of the gate-operating mechanism into working position and in turn comprising disengaged parts, and a setting mechanism for bringing the disengaged parts of the signal-operating mechanism into working condition, the several operating mechanisms being included in independent electric circuits embodying circuit-closers which are adapted to be operated in rotation.

5. In safety appliances of the character specified, the combination of a gate, operating mechanism therefor comprising normally disengaged parts, a signal, an electric alarm embodying a circuit-closer, operating means for the signal and alarm-circuit closer for throwing the disengaged parts of the gate-operating mechanism into operative position and in turn embodying normally disengaged parts, and a setting mechanism for bringing the disengaged parts of the signal-operating mechanism into coöperative position.

6. In safety appliances of the character specified, the combination of a gate, a signal, an alarm, a setting mechanism, operative mechanisms for the several parts including independent electric actuators and corresponding circuits, and two sets of circuit-closers for the respective circuits arranged upon opposite sides of the crossing to be actuated by a train approaching from either direction.

7. In safety appliances of the character specified, the combination of a gate, a signal, an alarm, a setting mechanism, operative mechanisms for the several parts including independent electric actuators and corresponding circuits, two sets of circuit-closers for the respective circuits arranged upon opposite sides of the crossing to be actuated by a train approaching from either direction, a resetting mechanism for restoring the parts to normal position embodying an electric actuator, circuit and circuit-closer, the latter being common to the aforesaid two sets of circuit-closers so as to close the resetting-circuit after either group or set of circuit-closers have been operated.

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

JAMES G. O. COMBS. [L. S.]
ISAAC D. COMBS. [L. S.]

Witnesses:
LOREN TURK,
J. R. MARSH.