No. 712,754. Patented Nov. 4, 1902.

R. A. BALDWIN.

RAILWAY SIGNAL.

(Application filed Dec. 9, 1901.)

(No Model.)

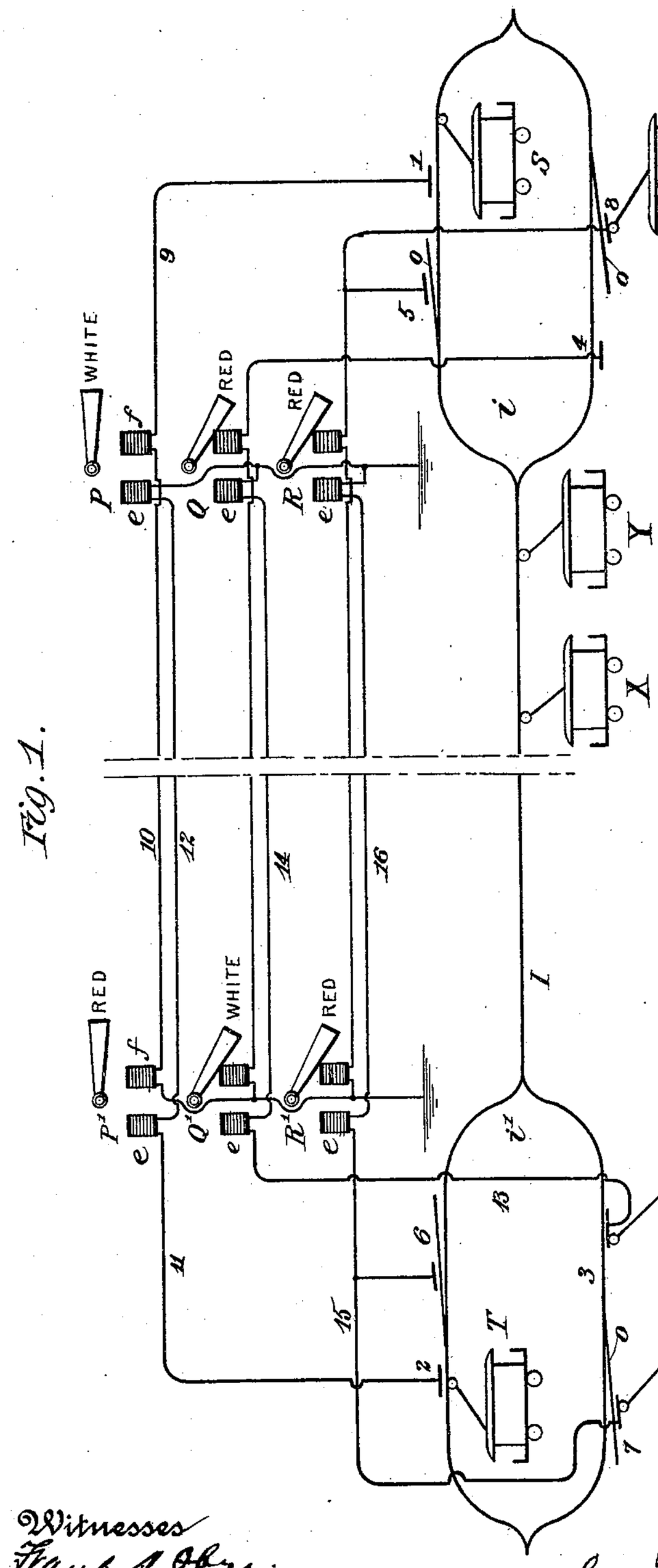

Fig. 1.

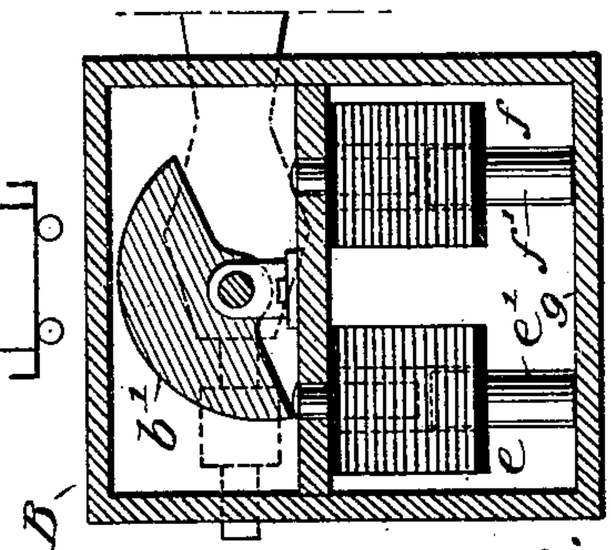

Fig. 2.

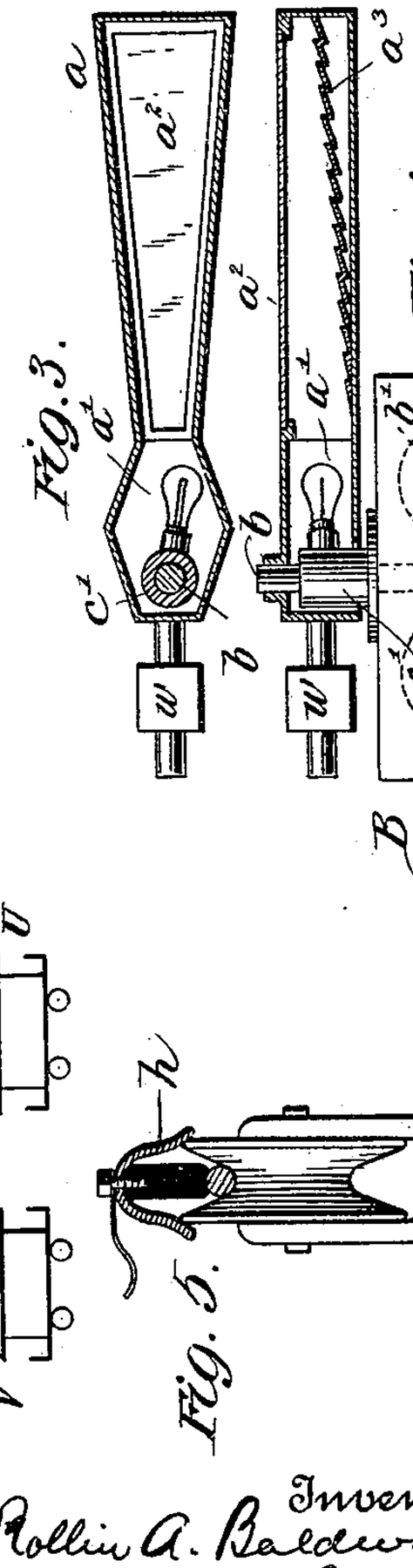

Fig. 3.

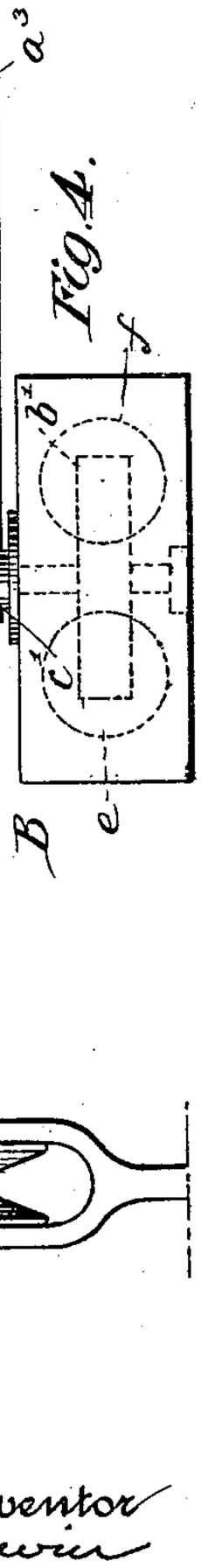

Fig. 4.

Fig. 5.

Witnesses
Frank L. Otis
Waldo M. Chapin

Inventor
Rollin A. Baldwin
By his Attorneys
Mue & Rosenbaum

UNITED STATES PATENT OFFICE.

ROLLIN A. BALDWIN, OF SOUTH NORWALK, CONNECTICUT.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 712,754, dated November 4, 1902.

Application filed December 9, 1901. Serial No. 85,188. (No model.)

To all whom it may concern:

Be it known that I, ROLLIN A. BALDWIN, a citizen of the United States, residing at South Norwalk, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Railway-Signals, of which the following is a full, clear, and exact description.

This invention is an automatic system of railroad-signals designed especially to protect single-track roads and to meet the requirements of trolley and other roads where it is sometimes desirable to allow more than one car to be in a block at the same time and yet protect them all.

The invention comprehends the apparatus and circuits hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a diagram of the circuits of one block of the system. Fig. 2 is an elevation of the signal-moving magnets. Fig. 3 is a view of the signal-arm or semaphore with the front removed. Fig. 4 is a section of the semaphore and plan of the box containing the mechanism for moving it, and Fig. 5 is a detail of the circuit-controller.

The semaphore used in my improved system, although not claimed herein, is illustrated in Figs. 3 and 4, wherein the same consists of an elongated box or tube a, hung on a shaft b and having at its axial end an enlarged chamber a' to accommodate an electric lamp c. The lamp is fixed to a boss c', surrounding the axis b, and does not move with the arm. Immediately behind the lamp is a reflector which projects the rays of light through the hollow arm. In the front of this arm is a transparent face a^2, which extends nearly its full length, and back of this is arranged a corrugated reflector a^3, upon which the rays of light from the lamp are reflected outward through the glass front and at right angles thereto. The glass front may be translucent in order to make an even surface of light, and, if preferred, the glass front may be substituted by a series of prisms, such as are used in lighthouse-lanterns to receive the rays of light directly and throw them outward at right angles to the plane of the arm. An arm constructed in this manner is adapted for two or more positions, and its advantage is that at night it will serve both as a "position" and as a "color" signal, while in the daytime it will serve as a position-signal. The enlarged chamber at the base of the arm is to permit it to move to its angular position without interfering with the lamp; but obviously the lamp might be made to move with the arm, if it be so desired. The weight of the arm should be counterbalanced by a weight w in the usual manner.

The shaft b passes into a box B, wherein it is provided with suitable bearings, and carries a semicircular disk or plate b', through the center point of which the shaft passes. Beneath this disk are mounted two independent electromagnetic coils e and f, respectively, in the form of solenoids, their cores being indicated by e' and f' and normally resting below the magnets upon a suitable support g. These cores are in the plane of the disk b', and when one of the coils is energized by the passage of current through it the core is pulled upward, strikes the under side of the disk and tilts it until its other side rests upon or nearly upon the head of the other core. If the other coil is then energized, the position of the disk is reversed. In this manner the position of the semaphore is shifted.

In order that the circuits of the several magnets may be closed automatically by the trolley, I mount a short length of metallic hood h above the wire and insulated therefrom in a position where the trolley-wheel will come in contact with it at the same time it is passing over the neighboring portion of the trolley-wire. This delivers current from the wire through the wheel to the hood, and from the hood a conductor is led to the signal.

Referring now to Fig. 1, the trolley-wire I of a single-track road is illustrated. It is branched at intervals into loops i and i', where the turnouts of the track occur. The distance between any two turnouts is usually a block in the signal system, one of the blocks being illustrated in the figure. At each station or turnout I locate three or more signals, two of which are for cars going in the two directions, while the third and any others that may be used are special signals, as will be hereinafter described. Each signal mechanism consists of the two magnets e and f and the semaphore a. The signal P at one end

of the block is electrically connected with the signal P′ at the other end. Likewise signal Q is connected with Q′, and R is connected with R′. Signals P and P′ are of different colors—say, white and red. Signals Q and Q′ are also of different colors, but reversed with respect to the first two—that is, red and white. Signals R and R′ are both red. These colors are obtained at night by colored glass and in the daytime by the color of the paint on the frame of the arm. The contacts *h* are adjusted to the trolley-wire at each turnout, each side of the loop having one of the contacts, as indicated at 1, 2, 3, and 4. In addition to this there are special contacts for the special signals, (indicated by 5, 6, 7, and 8.) These special contacts instead of being applied to the main trolley-wire are applied to spurs *o*, which branch from the main trolley-wire on each side of the loop.

The operation is as follows: When no car is on the block, all signals are down or in the safety position. Car S on entering the block will close a circuit from contact 1 through the wire 9, magnet *f* of the signal P, wire 10, magnet *f* of the signal P′, and ground. This will throw both signals P and P′ to the danger position. Signal P, being white, will indicate to another car following the first that the car ahead is moving away from it and that it can, if necessity demands, cautiously follow without danger of a head-on collision. Signal P′, however, being red, indicates to a car approaching from the opposite direction—say at U—that the car on the block is approaching and the block is not to be entered under any circumstances. When the first car S reaches the point T, a circuit is closed from contact 2, through wire 11, magnet *e* of signal P′, wire 12, and magnet *e* of signal P, to ground, thus causing the semaphores to move to the safety position and showing the block to be clear. Another car following S can then enter the block and perform the same operation, or a car at U can enter the block from the opposite direction, in which case a circuit will be closed from contact 3 by wire 13, magnet *e* of signal Q′, wire 14, magnet *e* of signal Q and to ground. This would throw the white signal Q′ and the red signal Q to "danger" and protect the car U in the same manner that car S was protected, as before described. Thus the signals P and P′ are for cars traveling in one direction, while Q and Q are for cars traveling in the opposite direction, the color of the signal in either case showing the other cars the direction in which the car in the block is moving. In case one car immediately follows another onto the block at such a short distance as to be always in sight of each other, the cars can proceed in safety through the block, the first one setting and dropping the signals in the same manner as before described, the second car not interfering with the signals, because it would merely energize the same magnets the second time, and their solenoids would not have any effect on the disk. If, however, one or two cars, as X and Y, are in the block but out of sight of a car at V and the latter found it necessary to proceed onto the block, following the others, the motorman V would know that cars X and Y were moving away from him by the fact of the white signal at Q′, and then, for his own protection, he would shift the trolley from the main line onto the spur *o* and proceed cautiously. Car V would thus close a circuit from contact 7 by wire 15 to magnet *e* of signal R′, wire 16, magnet *e* of signal R to ground. A red signal would therefore be set at each end of the block in addition to the white and red signals set by the car Y. Thus after car Y and its follower X have left the block and dropped the signals Q and Q′, car V would still be protected by its own red signals. The special signals are both red or of the same color as those signals which indicate that the car is approaching the end of the block where the signal is located, so that no other car will enter the block under any circumstances until car V is out. The peculiar shape of the disk holds the signal in any position to which it has been set by the magnets, because the center of gravity is transferred to the opposite side of the center each time the disk is shifted. In case a circuit gets out of order during the passage of a car over the block the signal will remain at "danger" until repairs are made. In trolley systems cars follow each other on such short headway that injury to the circuits or apparatus is not liable to take place in the short intervals when no car is on a block. Hence the safety of the system is assured.

Having described my invention, I claim—

1. In a railway-signal, the combination of a signal-arm, a disk or plate pivoted at the middle of one edge and adapted to move the arm, and two solenoids whose armatures are adapted to strike the plate on opposite sides of its pivot to thereby oscillate it, substantially as described.

2. In a railway-signal, a circuit extending from one end of a block to the other, a signal at each end comprising an arm and two electromagnets, one magnet of each signal being included in said circuit, and a second circuit including the other two magnets, substantially as described.

3. In a railway-signal, a circuit extending from one end of a block to the other, a signal at each end comprising an arm and two electromagnets, one magnet of each signal being included in said circuit, a second circuit including the other two magnets, and means whereby a car will automatically energize one circuit when it enters the block, and energize the other circuit when it leaves the block, substantially as described.

4. In a signal system, for trolley-railways, the combination of the main or trolley conductor, a signal-circuit, a spur-conductor and a contact device applied to the spur and con-

nected with the signal-circuit, whereby the trolley will control the latter, substantially as described.

5. In a block-signal system for trolley-railways, the combination of the main or trolley conductor, two signal-circuits extending the length of a block, signal-magnets in said circuits at each end of the block, spurs from the trolley-conductor at each end of the block, and circuit-controllers applied to the spurs and controlling the respective circuits, substantially as described.

6. In an automatic block-signaling system, a block provided at each end with a signal automatically set by the cars or trains and indicating the direction of movement of a car or train in the block, in combination with other signals located at the respective ends of the block and adapted to be operated by a second car or train following the first into the block but giving no indication of the direction of movement of the said second car.

7. In an automatic block-signaling system, an electric circuit including a signal at each end of the block, means whereby a car entering the block will automatically set said signals, a second electric circuit including two other signals at the respective ends of the block and manually-controlled devices operated on the passage of a second car for setting the said second set of signals.

8. In an automatic block-signaling system, an electric circuit including a signal at each end of the block, means whereby a car entering the block will automatically set said signals, a second electric circuit including two other signals at the respective ends of the block, an electric-railway conductor, a spur therefrom at the entrance of a block, a circuit-closer applied to said spur and controlling the said second electric circuit, an electric car and a trolley adapted to coöperate with the spur when desired.

In witness whereof I subscribe my signature in presence of two witnesses.

ROLLIN A. BALDWIN.

Witnesses:
JACOB M. LAYTON,
JAMES PAUL.