(No Model.) 2 Sheets—Sheet 1.

W. W. SALMON.

ELECTRIC SIGNAL APPARATUS.

No. 526,415. Patented Sept. 25, 1894.

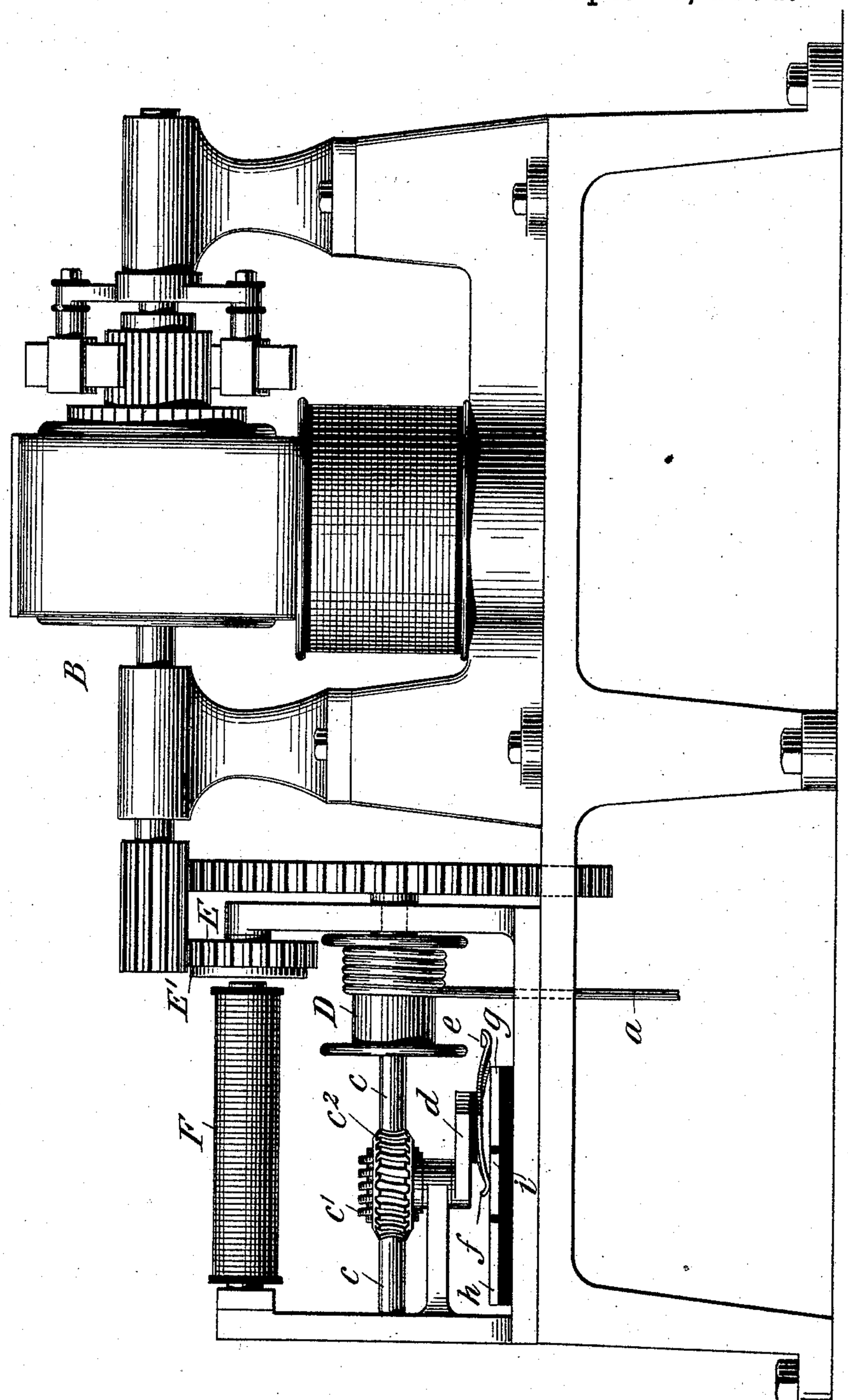

Fig. 1.

Witnesses
C. E. Ashley
Nicholas M. Goodlett Jr

Wilmer W. Salmon Inventor
By his Attorneys
Witter & Kenyon

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Fig. 1.

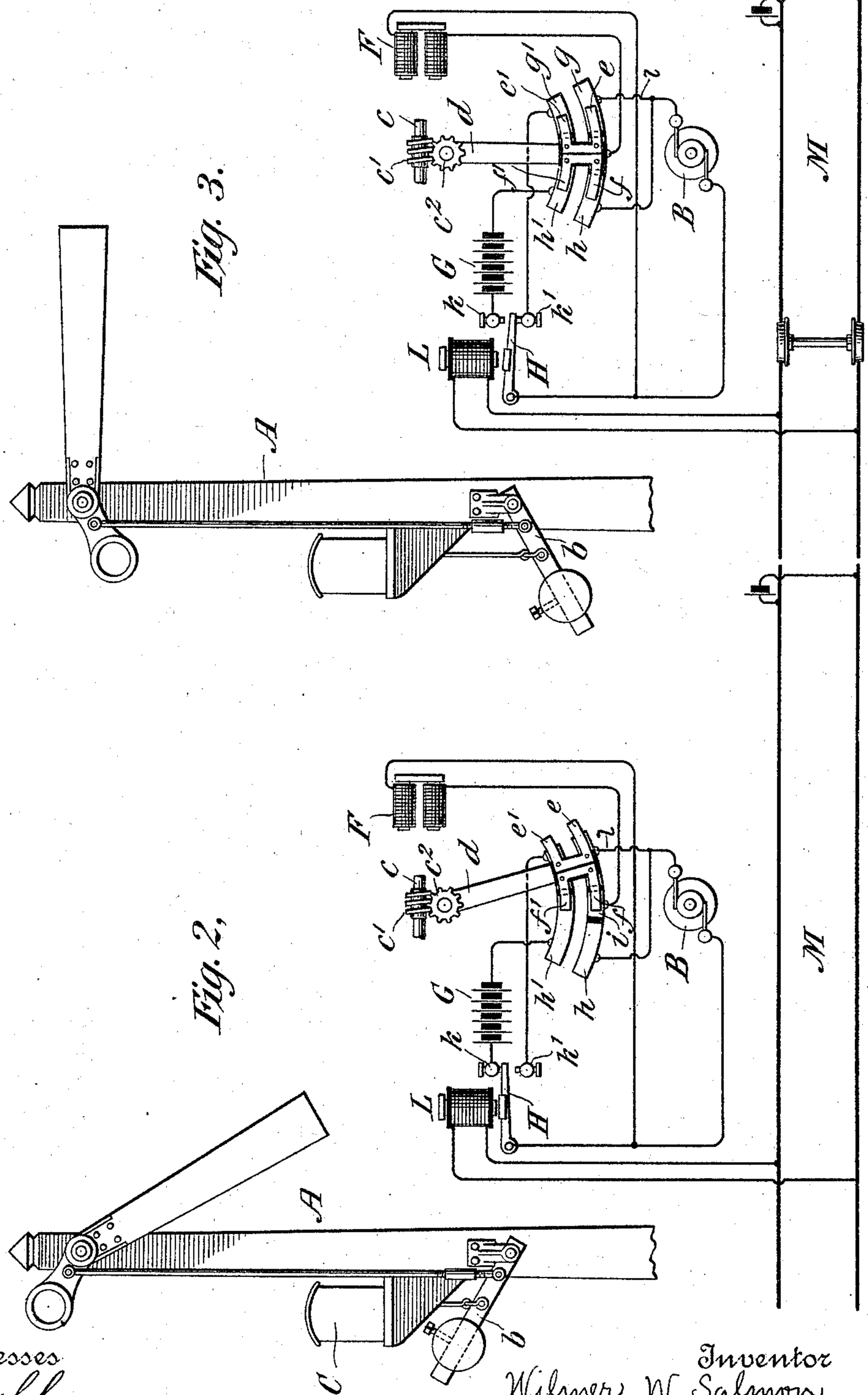

Fig. 2.

Witnesses
C. E. Ashley
Nicholas M. Goodlett Jr

Inventor
Wilmer W. Salmon
By his Attorneys
Witter & Kenyon

UNITED STATES PATENT OFFICE.

WILMER W. SALMON, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE HALL SIGNAL COMPANY OF MAINE.

ELECTRIC SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 526,415, dated September 25, 1894.

Application filed February 1, 1894. Serial No. 498,720. (No model.)

To all whom it may concern:

Be it known that I, WILMER W. SALMON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Signal Apparatus, of which the following is a specification.

My invention relates to electrically operated signals adapted for use on railways, and especially of that class designed to be automatically operated upon the passage of a train.

It has for its object to provide an effective and economical means for operating the signal.

The invention comprises a motor, a device to be moved thereby, and means for retarding the moving parts when they have completed a predetermined movement. In the present embodiment of my invention, which as shown in the drawings is applied to a railway signal, a magnetic brake is employed to retard the movement in one direction and a cushion circuit, or circuit in which the motor is made to act as a generator, is employed to retard the movement in the opposite direction, both being thrown into operation just before the signal has completely assumed its indicating position.

Referring to the drawings, in which corresponding parts are indicated by similar characters, Figure 1 is a side elevation of a motor provided with a brake and suitable gearing for operating the signal. Fig. 2 is a diagram of the motor, the brake and their controlling circuits, showing also a side elevation of a signal all in normal condition. Fig. 3 is a diagram of the parts shown in Fig. 2, but showing them in their condition after the signal has assumed its second condition indication.

The signal A, as shown in the drawings, is of the exposed position type and stands normally at safety. It is provided with the ordinary weight and levers by which the semaphore blade is made to assume danger position when subjected to the action of gravity alone. A motor B of any suitable type, inclosed in a box C, mounted on the signal post or otherwise conveniently located, is operatively connected to the signal preferably by means of a winding drum D and cord *a*. The drum is geared to the shaft of the motor and the free end of the cord is connected to the weighted lever *b*, so that when the cord is wound on the drum the weighted lever *b* is elevated and the semaphore blade lowered to safety. Operatively connected to some moving part of the motor or signal, which as shown in the drawings is the drum shaft *c*, is a circuit controller comprising an arm *d* provided with two pairs of contacts *e e'* and *f f'* and five fixed corresponding contacts *g*, *g'*, *h*, *h'* and *i*. The pair of contacts *e e'* are electrically connected and insulated from the pair of contacts *f*, *f'* which are also electrically connected, the contacts *e* and *f* sweeping over the insulated contacts *g*, *h* and *i*, and the contacts *e'* and *f'* sweeping over the insulated contacts *g'* and *h'*. The arm *d* is suitably geared to the shaft *c*, as by a worm *c'* on the shaft and a pinion c^2 on the arm. When these contacts are in their normal positions as shown in Fig. 1, the contacts *i* and *h'* are bridged by the contacts *f* and *f'*, and the contacts *e e'* are out of touch with the contacts *g*, *g'* and *h*; and when the arm is moved to the left the contacts *h* and *h'* are bridged by the contacts *f* and *f'*, the contacts *g* and *g'* being bridged by the contacts *e* and *e'*. Geared to the motor shaft is an idle pinion E, carrying a disk E' of magnetic metal and opposite this disk is a brake magnet F, adapted when energized to attract the disk and operating to prevent its rotation and thus to stop the motor and winding drum. The motor operating circuit includes the battery G, the contacts *h* and *h'* and an armature H and its contact *k* which is connected to the contact *h'*. The brake magnet is included in a circuit which also includes the battery G, the contacts *i*, *h'* and the armature H and its contact *k*. The cushion circuit, or the circuit in which the motor is included when it acts as a generator, includes the armature H and its contact *k'*, which is connected to the contact *g'*, and also the wire *l* connected at one end to the contact *g* and at its other end to the same side of the motor as the contact *h'*. The armature H is adapted to close with each of the contacts *k* and *k'*, the armature being preferably controlled, as shown, by a magnet L, operated by any convenient circuit. When the signal is to be automatically operated

upon the passage of a train this circuit may be of any convenient type, whether it includes the rails of the track or not, or whether it is normally open or normally closed. The preferred type of circuit, and which is shown in the drawings, is a normally closed circuit including the rails M of a track. The magnet L being therefore normally energized, operates normally to close the contacts H and *k*. The armature H′, with its contacts *k* and *k′* may be called the primary controlling means for the brake, motor and cushion circuits, and the arm *d* with its contacts may be called the secondary means for controlling these circuits.

In the normal condition of the circuits and the signal it will be observed that the motor circuit is open at *h*, *h′* and closed at H, *k*; that the brake circuit is closed at *i*, *h′* by the contacts *f*, *f′*, and is also closed at H, *k*, the brake magnet being therefore energized; that the cushion circuit is open at the contacts *g*, *g′* and at the contacts H, *k′*; and that the signal is held in safety position against gravity by the brake magnet.

The operation is as follows: When a train passes the signal A at safety, located near the entering end of the rails M, and passes on to these rails, it shunts the magnet L, breaking the brake circuit at *k* and closing the contacts H, *k′* of the cushion circuit. The signal is therefore free to rise to danger behind the train. As the signal rises it unwinds the drum, revolving the motor shaft, which turns freely, and moves the arm *d* to the left. When the motor shaft and drum have completed a predetermined movement, viz., just before the signal has reached the limit of its upward movement, the contacts *h*, *h′* are bridged and the contacts *g g′* are bridged. The closing of the contacts *g g′* completes the cushion circuit through the branch *l*, as shown in Fig. 3, and as the motor shaft with its armature is now revolving the motor is transformed into a generator, and the inductive resistance thus created serves to retard the signal, thus preventing injury to the moving parts of the apparatus, which would be otherwise caused by a too sudden stoppage of the semaphore blade. When the train passes off the rails M, the magnet L is again energized, which breaks the cushion circuit at *k′* and closes the motor circuit at *k*, the contacts *h* and *h′* having been already closed as explained. The motor therefore drives the drum D to wind up its cord, thus lowering the signal to safety, and moves the arm *d* to the right. When the motor shaft and drum have completed a predetermined movement, viz., just before the signal has reached the limit of its downward movement, the contacts *e e′* leave the contacts *g g′* and the contacts *f f′* break the bridge established between the contacts *h h′* and establish a bridge between the contacts *i*, *h′* thus breaking the motor circuit and closing the brake circuit again and energizing the magnet F to retard the signal. It will be observed that by this arrangement the brake is utilized to retard the signal just before it reaches its normal position and alone to hold the signal in this position, the motor being energized only when the signal is moved to normal position. If the motor were included in the brake circuit when the signal is in normal position, its resistance would necessitate more cells for the battery G than are required by the arrangement described.

Various changes in the form and arrangement of the mechanism and in the arrangement of the circuits could be easily suggested by any one skilled in the art, without departing from the spirit of my invention. For example, the motor circuit instead of being broken when the brake circuit is energized to retard the downward movement of the signal as shown in the drawings, might be left unbroken with the brake circuit shunting the motor. While I have shown my invention as applied to a signal circuit it is of course to be understood that it may be applied to other devices as well.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of an electric motor, an operating circuit and a cushion circuit therefor, and a device to be moved by the motor, said circuits so operatively connected with the moving parts that when they have completed a predetermined movement the cushion circuit is energized to retard the moving parts, substantially as set forth.

2. The combination of an electric motor, an operating circuit, and a cushion circuit therefor, a device to be moved by the motor, and a brake and circuit therefor, said circuits so operatively connected with the moving parts that when they have completed a predetermined movement in one direction the cushion circuit is energized to retard them and when they have completed a pre-determined movement in the other direction the brake circuit is energized to retard them, substantially as set forth.

3. The combination of an electric motor, an operating circuit and a cushion circuit therefor, and a device to be moved by the motor, said circuits so operatively connected with the moving parts that when they have completed a pre-determined movement under the mechanical operation of the motor, the cushion circuit is energized to retard the moving parts, substantially as set forth.

4. The combination of an electric motor, an operating circuit and a cushion circuit therefor, a device to be moved by the motor, and a brake and circuit therefor, said circuits so operatively connected with the moving parts that when they have completed a predetermined movement in one direction under the mechanical operation of the motor, the cushion circuit is energized to retard the moving parts, and when they have completed a pre-determined movement in the opposite direction the brake circuit is energized to

retard the moving parts, substantially as set forth.

5. In an electric signaling apparatus, the combination of a signal normally held against an opposing force in one position of indication, a motor, intermediate mechanism connecting the motor shaft with the signal, a normally de-energized cushion circuit for the motor, and means for releasing the signal when in its normal condition which when operated permits the signal to move to another position of indication, the cushion circuit being energized to retard the signal after it has completed a predetermined movement, substantially as set forth.

6. In an electric signaling apparatus, the combination of a signal normally held against an opposing force in one position of indication, a motor, intermediate mechanism connecting the motor shaft with the signal, a normally de-energized cushion circuit, a brake and circuit therefor, normally energized to hold the signal in its normal position, and means for releasing the signal when in its normal position which when operated permits the signal to move to another condition of indication, the cushion circuit being energized to retard the signal after it has completed a predetermined movement, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILMER W. SALMON.

Witnesses:
L. THOMAS,
RICHARD DEVENS.