W. K. HOWE.

ELECTRIC SIGNAL MECHANISM.

APPLICATION FILED MAY 28, 1910.

1,092,266.

Patented Apr. 7, 1914.

Fig. 1.

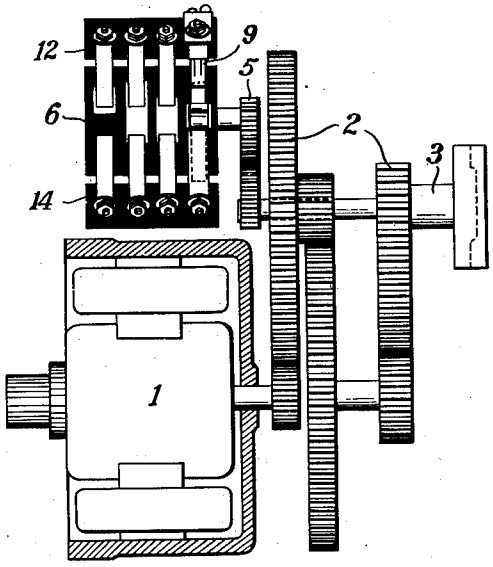


Fig. 2.

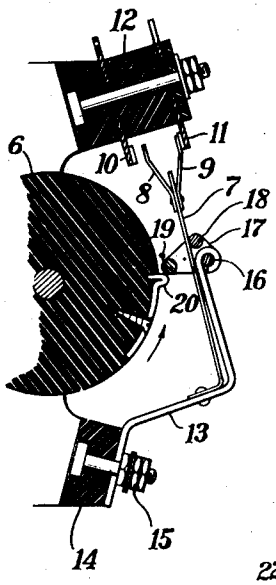


Fig. 3.

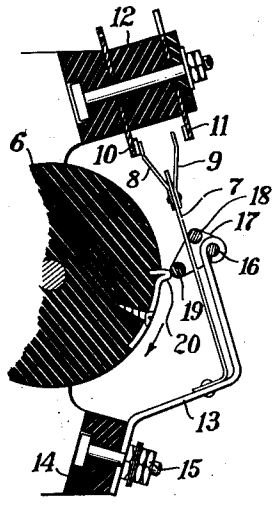


Fig. 4.

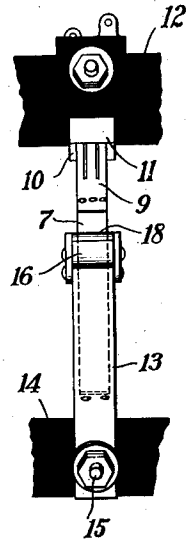
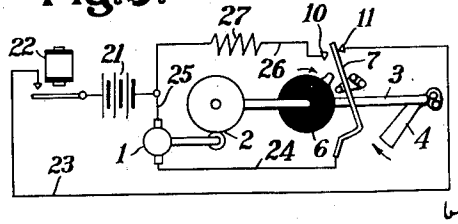


Fig. 5.



Witnesses:

E. W. Carroll

L. Thon

Inventor:

Winthrop K. Howe

by his attorneys

Osgood, Davis & Dorsey

UNITED STATES PATENT OFFICE.

WINTHROP K. HOWE, OF ROCHESTER, NEW YORK, ASSIGNOR TO GENERAL RAILWAY SIGNAL COMPANY, OF GATES, NEW YORK, A CORPORATION OF NEW YORK.

ELECTRIC SIGNAL MECHANISM.

1,092,266. Specification of Letters Patent. Patented Apr. 7, 1914.

Original application filed December 3, 1909, Serial No. 531,264. Divided and this application filed May 28, 1910. Serial No. 564,018.

To all whom it may concern:

Be it known that I, WINTHROP K. HOWE, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Electric Signal Mechanism, of which the following is a specification.

This invention relates to mechanism for operating electric railway signals, and it is particularly applicable to signals of the semaphore type. Such signals are usually arranged to be moved from danger position to clear position by means of suitable mechanism actuated by an electric motor, while being counterweighted or balanced so as to have a bias or tendency to return to danger position through the action of gravity. When a signal of this type is released from the action of its actuating mechanism it returns, therefore, automatically to danger position, and its movement is usually arrested in such position by means of coöperating stops applied to the semaphore casting and the casing or frame upon which the semaphore is pivotally mounted.

In order that the movement of the semaphore from clear position to danger position may be rapid and positive it is necessary to provide the semaphore with a strong bias to danger position. It is desirable, however, to prevent excessive jar and shock when the movement of the semaphore is arrested by the stops, and one object of the present invention is to provide improved means for accomplishing this result. To this end I employ the electric motor by which the semaphore is actuated as a brake for the semaphore during its return to danger position, by providing a short-circuit through the windings of the motor, and thus causing the motor to act as a generator while it is being rotated in a reverse direction owing to the movement of the semaphore in response to its bias. The idea of using the motor as a brake in this manner is not broadly new, but the novelty of the present invention consists in the provision of means by which the braking operation is controlled entirely at the semaphore-mechanism, and independently of external circuits or devices, so as to produce a self-contained apparatus with respect to this feature of operation, in combination with an arrangement by which the braking operation of the motor is not employed throughout the returning movement of the semaphore, but is controlled in such a manner that the semaphore is permitted to move at full speed in response to its bias during the greater part of its returning movement, while the braking action of the motor is employed to check this movement at a predetermined point before the stops operate to finally arrest the movement. Owing to this arrangement the semaphore is checked only when, and to the extent, necessary to prevent excessive shock at the end of the movement, and thus the movement of the semaphore as a whole is rapid and is performed in the minimum time consistent with smoothness of operation.

Other objects and features of the invention will be set forth in connection with the following description of the preferred embodiment of the invention.

In the accompanying drawings: Figure 1 is a partly-diagrammatic elevation of parts of a semaphore-mechanism embodying the present invention, including an electric motor, a train of gearing connecting the motor with the semaphore, and a circuit-controller by which the braking operation of the motor is controlled; Fig. 2 is a vertical section, on an enlarged scale, through the circuit-controller shown in Fig. 1, showing the position of its parts during movement of the semaphore from danger position to clear position; Fig. 3 is a view similar to Fig. 2, except that it shows the position assumed by the circuit-controller during the operation of the motor as a brake; Fig. 4 is an enlarged detail from Fig. 1, showing particularly the circuit-controller of Figs. 2 and 3; and Fig. 5 is a diagram illustrating the arrangement of the apparatus as a whole, together with its electrical connections.

The drawings illustrate the invention as applied to a well-known type of semaphore-mechanism, in which an electric motor 1 of any suitable form is connected, through reduction gearing, 2, with a shaft 3 which is employed to actuate the semaphore 4, either directly or through connection with an independent semaphore-shaft. The shaft 3 is also connected through segmental gears 5, with a circuit-controller which is employed in a well-known manner to control the vari-

ous circuits of the mechanism in accordance with the movements of the semaphore.

In addition to the usual elements of the circuit-controller, of which the electrical connections are not illustrated herein as they do not relate to the present invention, the circuit-controller of the present arrangement is provided with a device by which a short-circuit is closed through the motor at the time when the latter is to act as a brake in the manner hereinbefore described. To this end a resilient contact-finger 7 is mounted adjacent to the drum 6 of insulating material upon which the movable contact devices of the circuit-controller are carried. The contact-finger 7 is provided with contact springs 8 and 9 which coöperate with fixed contacts 10 and 11 mounted upon an insulating support 12. The contact-finger is fixed to a resilient arm 13, which is fixed on an insulating support 14 and provided with a binding post 15. The upper end of the arm 13 pivotally supports, at 16, a dog 17 provided with a pin 18 engaging the outer surface of the contact-finger 7. A second pin 19 is arranged in position to be engaged by a lug 20 fixed to the drum 6. During the movement of the semaphore to clear position, in the direction of the arrow in Fig. 2, the lug 20, in passing under the pin 19, acts to lift the dog, and this movement does not affect the contact-finger 7, since the pin 18 merely moves idly out of engagement with the finger. At this time the finger acts, by its resiliency, to maintain the contact-spring 9 in engagement with the fixed contact 11, this being the normal position of the device.

During the movement of the semaphore from clear position to danger position the lug 20 moves in the direction of the arrow in Fig. 3. During the first part of this movement the lug is above the pin 19, and the semaphore moves at full speed, the motor turning freely without resistance other than the friction in its bearings. At a predetermined point in the latter part of this movement, however, the lug 20 engages the pin 19 and swings the dog 17 downwardly, as in Fig. 3. This movement causes the pin 18 to press the contact-finger toward the drum 6, thereby disengaging the contacts 9 and 11 and causing the contact 8 to engage the contact 10. Before the semaphore movement is terminated, however, the lug 20 passes slightly beyond and disengages the pin 19, thereby releasing the contact-finger and allowing it to return to its normal position before the movement of the semaphore is finally arrested.

The electrical connections of the device above described are shown in Fig. 5. The motor is energized by a battery 21, through a circuit controlled by any suitable circuit-controller, such, for example, as the usual signal relay 22. The current passes from the latter through a wire 23, which may be the usual line wire, to the fixed contact 11, thence through the contact-finger 7 and through a wire 24 to the motor, returning to the battery through a wire 25. When the circuit above described is closed by the action of the relay 22 the motor acts in a direction to move the signal to clear position, and the signal is held in this position, either by the motor or by any other well-known means, until the circuit is opened by the relay 22. When the latter operation occurs, as shown in Fig. 5, the semaphore is returned by its bias to horizontal danger position. During the course of this movement the circuit-controller operates, as above described, to engage the contact-finger 7 with the fixed contact 10. This closes a short-circuit through the motor by way of the wire 24, the contact-finger 7, the fixed contact 10, a wire 26, and the wire 25. The motor then acts, as above described, as a generator to energize this circuit, and the reaction of the current in the motor resists the rotation of the armature and causes the motor to act as a brake and check the movement of the semaphore before it is arrested by the stops. As this braking action may be too severe where a short-circuit of no substantial resistance is employed, it is preferable to introduce in the wire 26 a certain amount of external resistance, which is indicated at 27 in Fig. 5.

This application is a division of my copending application, Serial No. 531,264, filed December 3, 1909.

I claim:—

1. Electric signal mechanism comprising a signal having a bias toward danger position, an electric motor connected with the signal to move therewith in its return movement in response to said bias, a circuit controller external to the signal mechanism, means connected with and actuated by said mechanism, and suitable connections whereby said motor is caused by said circuit controller to move said signal to a position other than the danger position and whereby the motor is short-circuited by said means, the elements which short-circuit the motor being distinct from the circuit controller, and being caused to short-circuit the motor during said return movement only and at a predetermined point in said movement.

2. Electric signal mechanism comprising a signal having a bias toward danger position, an electric motor connected with the signal to move therewith in its return movement in response to said bias, a circuit controller external to the signal mechanism, means connected with and actuated by said mechanism, and suitable connections whereby said motor is caused by said circuit controller to move said signal to a position other than the danger position and whereby the motor is short-circuited by said means,

the elements which short-circuit the motor being distinct from the circuit controller, and being caused to short-circuit the motor during said return movement only and during a portion only of said movement.

3. Electric signal mechanism comprising a signal having a bias toward danger position, an electric motor connected with the signal to move therewith in its return movement in response to said bias, a circuit controller external to the signal mechanism, means connected with and actuated by said mechanism, and suitable connections whereby said motor is caused by said circuit controller to move said signal to a position other than the danger position and whereby the motor is short-circuited by said means, the elements which short-circuit the motor being distinct from the circuit controller and normally inoperative, and being caused to short-circuit the motor after a portion of said return movement has been completed, and to open the short-circuit again before the completion of said return movement.

4. Electric signal mechanism comprising a signal having a bias toward danger position, an electric motor connected with the signal to move therewith in its return movement in response to said bias, a circuit controller external to the signal mechanism, means connected with and actuated by said mechanism, and suitable connections whereby said motor is caused by said circuit controller to move said signal to a position other than the danger position and whereby the motor is short-circuited by said means, the elements which short-circuit the motor being distinct from the circuit controller and inoperative to close the short-circuit during the movement of the signal to a position other than the danger position and being caused to short-circuit the motor at a predetermined point in the said return movement.

5. Electric signal mechanism comprising a signal having a bias toward danger position, a motor connected with the signal to move therewith in its return movement in response to said bias, a circuit controller external to the signal mechanism, means connected with and actuated by said mechanism, and suitable connections whereby said motor is caused by said circuit controller to move said signal to a position other than the danger position and whereby the motor is short-circuited by said means, said connections including a resistance device, the elements which short-circuit the motor being distinct from the circuit controller and being caused to form a short-circuit on the motor including the resistance device at a predetermined point in the said return movement.

6. Electric signal mechanism comprising a signal having a bias toward danger position, an electric motor connected with the signal to move therewith in its return movement in response to said bias, a circuit controller external to the signal mechanism, a circuit controller mechanically connected to and operating in unison with the signal, suitable connections whereby said motor is caused by said first mentioned circuit controller to move said signal to a position other than the danger position and whereby the motor is short-circuited by said second mentioned circuit controller, the second mentioned circuit controller which short circuits the motor being distinct from the first mentioned circuit controller and being caused to short circuit the motor during said return movement only and during only a portion of said movement.

7. In combination with a semaphore arm biased to stop position, an electric motor for driving said arm to clear position, a source of current for the motor, gearing permanently connecting the motor to said arm, whereby the motor is driven backward when said arm moves to stop position by gravity, means for holding said arm in clear position, normally open contacts connected to the terminals of said motor, normally closed contacts in the connection between the motor and its source of current, and means actuated by the semaphore arm for momentarily closing the first mentioned and opening the last mentioned contacts at a predetermined point in the movement of the arm toward stop position.

WINTHROP K. HOWE.

Witnesses:
MARY A. O'NEILL,
FARNUM F. DORSEY.