

L. A. HAWKINS.

SIGNAL.

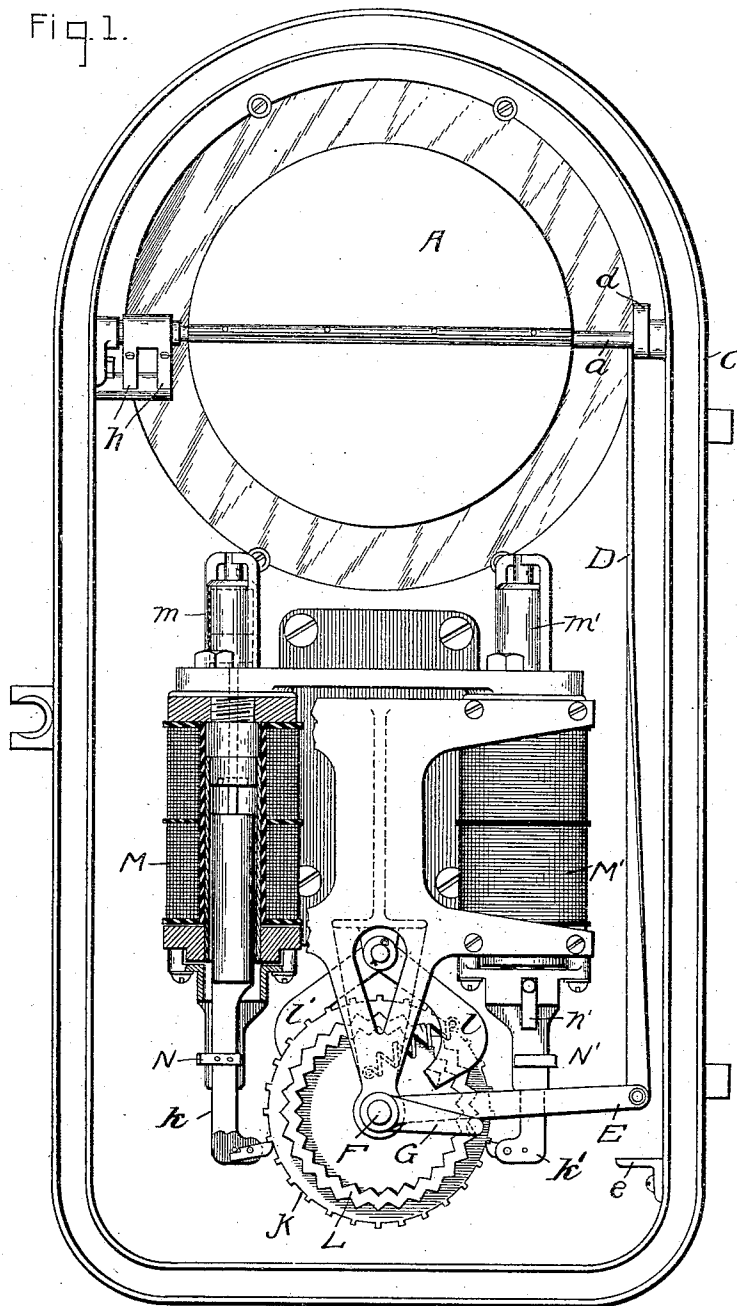
APPLICATION FILED DEC. 29, 1908.

941,144.

Patented Nov. 23, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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2 SHEETS—SHEET 2.

Fig. 2.

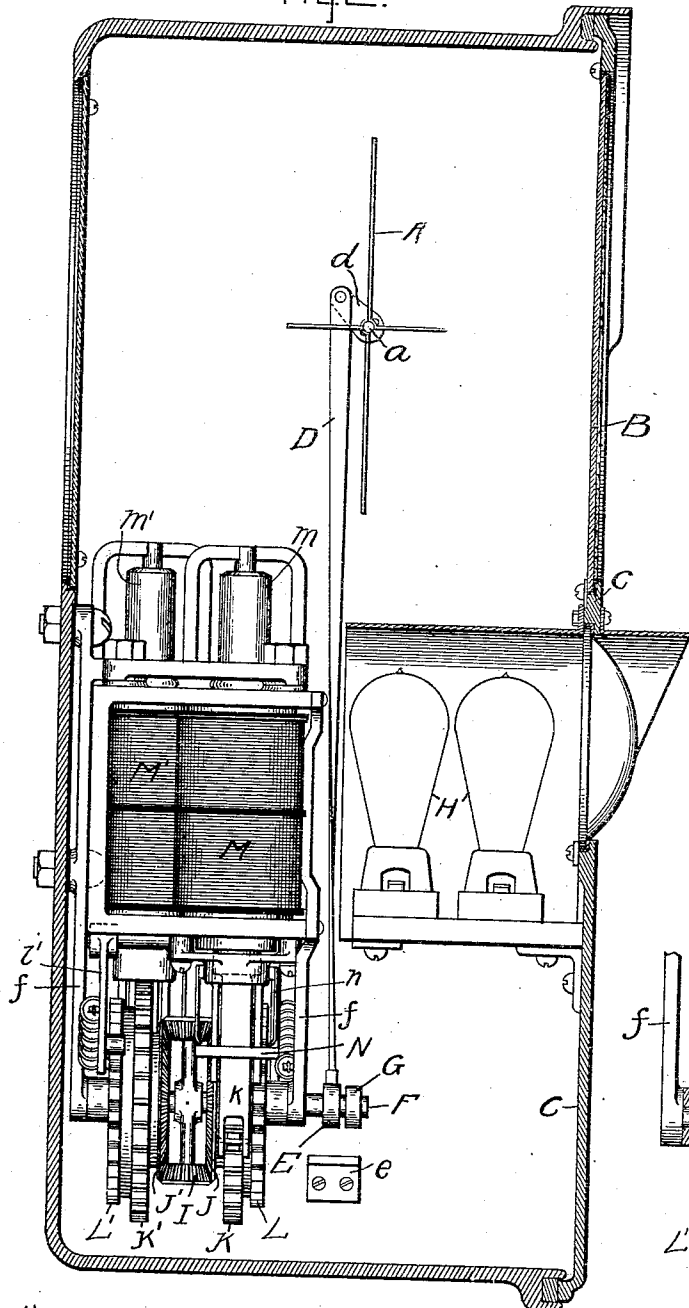


Fig. 3.

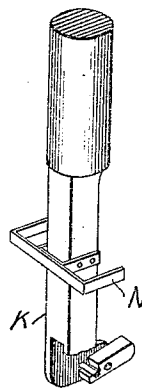
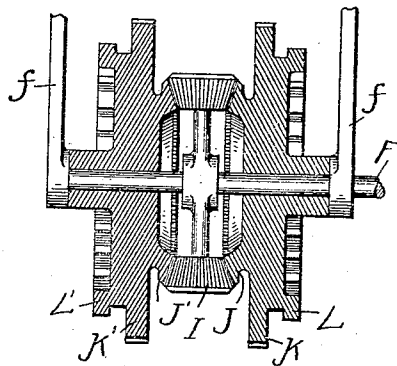


Fig. 4.



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UNITED STATES PATENT OFFICE.

LAURENCE A. HAWKINS, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SIGNAL.

941,144.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed December 29, 1908. Serial No. 469,768.

To all whom it may concern:

Be it known that I, LAURENCE A. HAWKINS, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Signals, of which the following is a specification.

My invention relates to permissive block signals for electrically operated roads of the type in which a plurality of cars traveling in the same direction may be admitted to a block; each of the cars as it enters being counted by the signal mechanism, which is so arranged that the signals are not cleared until the last car has left the block. Such a system is disclosed in my prior application, No. 404,211, filed November 29, 1907.

The object of my present invention is to provide a simple and reliable form of counting mechanism adapted for use in a signal system of this type.

The counting mechanism frequently employed in signal systems of this type comprises a ratchet-wheel and a pair of electromagnets provided with pawls for moving the mechanism step-by-step in opposite directions. These electromagnets are energized respectively when a car enters and leaves the block. A possibility of failure exists, unless special means are provided for guarding against it, because both counting-in and counting-out magnets operate on the same ratchet-wheel; so that if the counting-out magnet is energized by a car standing on the trolley contact connected with that magnet, the ratchet-wheel is locked by the magnet so that if a car enters the block at this time, the counting-in magnet is unable to move the ratchet so as to count the car in. Moreover, if the operating magnets, in addition to shifting the ratchet-wheel, close electric contacts when energized, it is ordinarily necessary to provide means such as a dash-pot for retarding the return movement of the magnet cores in order that the contacts may remain closed a sufficient length of time to enable the lamps or other devices connected to the contact to respond to current, and with certain types of trolley contacts, in which the circuits of the magnets may be made and broken momentarily several times, due to the jumping of the trolley wheel in passing over the contact, it is especially necessary to employ means for retarding the return stroke of the cores of the magnet in

order to prevent a plurality of operations of the ratchet-wheel by the magnet, when it should be operated once only. When such retarding means are provided, the operation of the ratchet-wheel by the other magnet may be prevented by the retarding device of the first magnet.

The object of my invention is to render the operation of each magnet wholly independent of that of the other, so that it may produce its proper effect when energized, regardless of whether the other magnet is energized or not.

My invention consists in providing a differential gear, one member of which controls the signal, and the other two members of which are operatively connected to the counting-in and counting-out magnets, respectively. With such a construction, the operation of each magnet is made independent of that of the other. The two magnets may operate simultaneously, without interference, when one car enters a block just as another is leaving it. Each of the two members of the gear connected to the magnets is moved, but the movements of these two members offset each other, as far as the third member controlling the signal is concerned, so that the third member remains unmoved, which is as it should be, since the number of cars in the block has not been changed.

My invention will best be understood by reference to the accompanying drawings, in which—

Figure 1 shows a front elevation, with the front of the casing removed, of a signal mechanism arranged in accordance with my invention; Fig. 2 shows a side elevation of the same; Fig. 3 shows a detail view of one of the ratchets; and Fig. 4 shows a cross-sectional detail view of the differential gears.

In the drawings A represents a disk or target, which is displayed behind a window B in the casing C. This target is carried on a spindle *a*, which is operated by a crank *d* and a connecting rod D. The lower end of this connecting rod is secured to a lever E loose on the shaft F and controlled by a second lever G, which is fast to the shaft F. When the lever G is in the position shown, the connecting rod D is held raised. When the shaft F and lever G are moved one step in a clockwise direction, lever E is allowed to drop into engagement with the stop *e*, so

that target A is rocked through ninety degrees and the indication changed. Contacts h may be placed on spindle a to control the lamps H, or other indicating apparatus.

5 The shaft F, which is carried in suitable supports f , carries near its center the member I of a differential gear fast to the shaft. The other two members of the differential gear, J and J', are loose on the shaft. These

10 two members carry ratchet-wheels K K' and star-wheels L L'. The ratchet-wheels K K' are engaged respectively by the pawls h and h' , which are actuated by the magnets M and M'. Spring-actuated pawls l and l' en-

15 gage the star-wheels L and L', so as to limit the movement of each ratchet-wheel to one step or tooth when its actuating magnet is energized. The cores of the magnets may be connected to dash-pots m and m' , which

20 permit free upward movement of the cores, but retard their return movement. The pawls h and h' may carry contacts N N', adapted to engage stationary contacts n and n' , when the magnets are engaged, to estab-

25 lish momentarily any indicating circuits which it may be desired to employ.

M is the counting-in magnet energized by each car entering the block. The first car entering the block, by energizing this magnet, shifts the ratchet K one tooth in a clock-

30 wise direction. This carries the member I of the differential gear in the same direction a distance equal to half that through which the ratchet K and gear member J move.

35 This causes lever G to move away from lever E, allowing the latter to drop onto the stop e . This produces the desired changes in the signal indications. A second car entering the block moves the lever G another step

40 in the same direction. While ratchet K and gear member J are being shifted by magnet M, the other gear member J' is held stationary by the star-wheel L' and spring-pressed pawl l' . When a car leaves the

45 block, the magnet M' is energized, shifting ratchet K' in a counter-clockwise direction a distance of one tooth, and moving the gear member I half that distance in the same direction, thereby returning the lever G to-

50 ward lever E. When the last car leaves the block, the lever G is returned to the position shown in Fig. 1, restoring the original signal indications.

It will be seen that the proper operation

55 of the mechanism is not affected, if both magnets are simultaneously energized by

cars entering and leaving the blocks at the same instant. Each ratchet-wheel is then moved by its magnet so that the two gear members J and J' are both shifted, but in 60 opposite directions. Gear member I and shaft F are consequently not shifted, so that the position of the signal controlling mechanism is not altered. This is the proper operation, since the number of cars in the 65 block is not changed.

I do not desire to limit myself to the particular construction and arrangement of parts here shown, but aim in the appended claims to cover all modifications which are 70 within the scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In combination, a differential gear, a signal controlled by one member of said 75 gear, a pair of electromagnets, and operative connections between the other two members of said gear and the two magnets respectively.

2. In combination, a differential gear, a 80 signal controlled by one member of said gear, a pair of electromagnets, and operative connections between the other two members of said gear and the two magnets respectively, comprising step-by-step devices 85 whereby one of said members is moved one step when either of said magnets is energized.

3. In combination, a differential gear, a signal controlled by one member of said 90 gear, a ratchet-wheel carried by each of the other members of said gear, a pair of electromagnets, and a pair of pawls actuated by the electromagnets respectively and actuating the ratchets respectively. 95

4. In combination, a differential gear, a signal controlled by one member of said gear, a ratchet-wheel carried by each of the other members of said gear, a pair of electro-magnets, a pair of pawls actuated by the 100 electromagnets respectively and actuating the ratchets respectively, and means carried by each ratchet for limiting its movement to a predetermined amount when its actuating magnet is energized. 105

In witness whereof, I have hereunto set my hand this 28th day of December, 1908.

LAURENCE A. HAWKINS.

Witnesses:

BENJAMIN B. HULL,
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