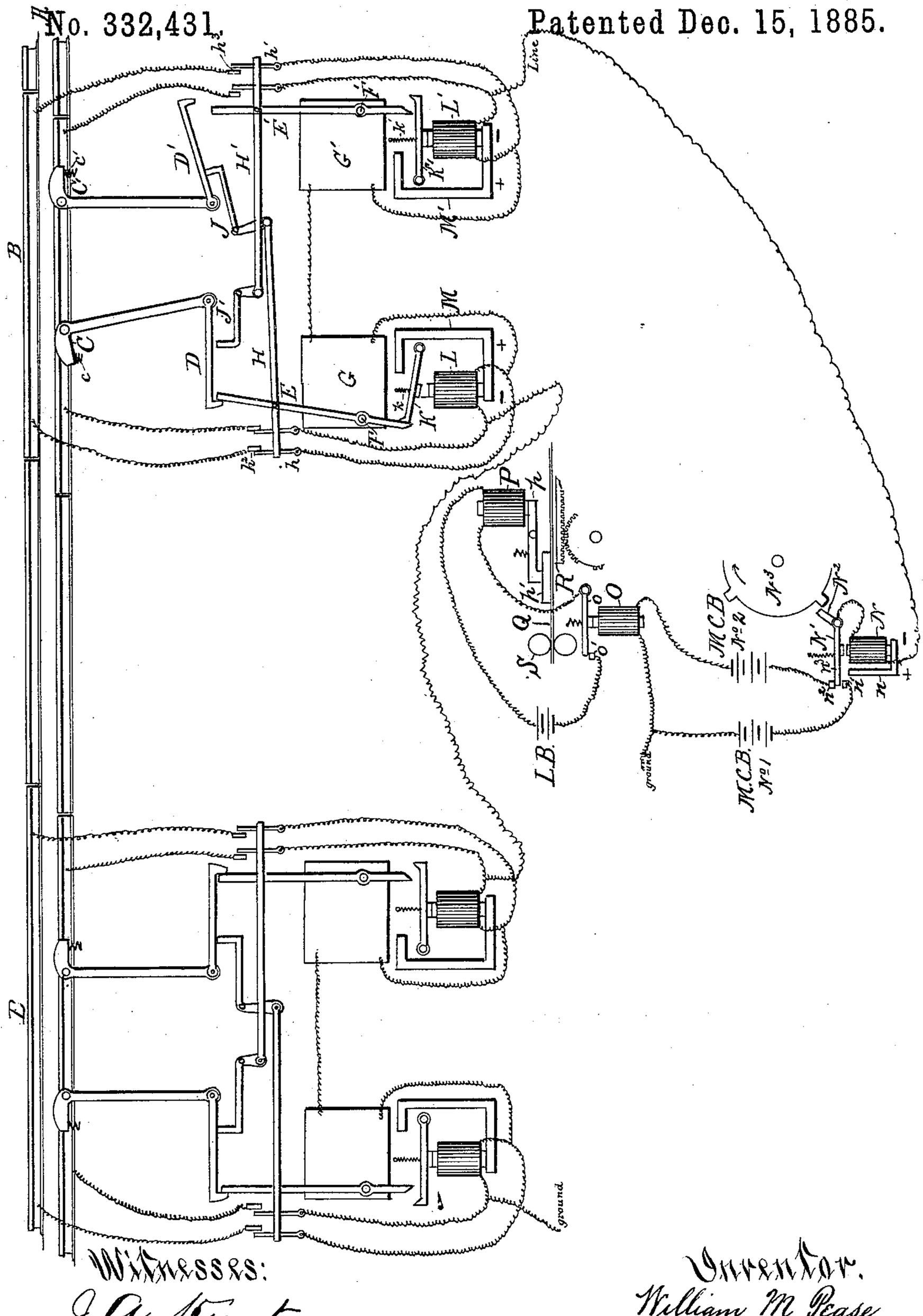
(No Model.)

W. M. PEASE.

RAILWAY SIGNAL.

No. 332,431. Patented Dec. 15, 1885.



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WILLIAM M. PEASE, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO LENOX SIMPSON, OF SAME PLACE.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 332,431, dated December 15, 1885.

Application filed April 24, 1884. Serial No. 129,072. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. PEASE, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful System of Automatic Electric Railroad-Train Reporting, of which the following is a full, clear, and exact description.

In the system of train-reporting now in use telegraph-operators situated at various stations along the road report to the main office the time at which each train passes. Upon this information the movements of the various trains upon the road are regulated and controlled. The expense incident to the employment of operators at very frequent intervals renders the proper and perfect development of this system impracticable, and the impossibility of regulating to a standard the time-pieces at the different stations, as well as the not infrequent willful misreporting of the time at which the trains passed, renders the information received at the main office often incorrect.

It is the object of my improved system to remedy these defects and to provide means whereby each moving train may at short intervals automatically report to the main office its position upon the road. I attain this object by the means hereinafter set forth.

The accompanying drawing represents a diagram of the various electrical circuits employed, the connections of the various wires, and such portions of the operating mechanism as are necessary to a correct understanding of my system.

Detail drawings and descriptions of said mechanism will be found in Letters Patent issued to me, No. 312,503, and dated February 17, 1885, and No. 313,614, dated March 10, 1885.

In this application I will describe my system as applied to a road having a single line of track. The application to a double-track road requires merely such changes as are perfectly obvious.

A is a railroad-track, in which insulated sections B are formed corresponding in number with the blocks into which the road is divided. These insulated sections are of such length as that during the passage of a train at least one pair of wheels will be at all times upon said section. To one of these insulated rails I pivot two levers, C C'. One extremity of each of these levers extends normally a short distance above the top of the rails, and the other extremity is fulcrumed to the side of the rail. Under the free extremity of each lever is a spring, *c c'*, which, after the passage of a wheel over said lever, returns the latter to its normal position. Said springs are constructed of sufficient strength to prevent the levers from being depressed by the weight of a hand-car. Connected by rods with the pivoted extremities of said levers are hooks D D'. The latter are pivoted or hinged to said connecting-rods at their inner extremities and adapted at their outer ends to hook over the tops of bars E E'. These bars are carried by shafts F F', which form the winding-stems of electrical alarm-boxes G G'. Said boxes (shown in Letters Patent No. 313,614, dated March 10, 1885) are substantially similar to those used for fire-alarms, in which the winding-stem, after being turned, must be released before the clock-work is set in operation. The lower extremities of the bars E E' extend some distance beyond the shafts F F', and between said shafts and the upper ends are secured transverse bars H H'. The outer extremities of each of the latter carry (insulated from them) two switch-levers, *h h'*, connected by wires with magnets, hereinafter described, and the inner extremities are pivoted to the depending arms of bell-crank levers J J'. In juxtaposition to the switch-levers *h h'* are fixed contact-points h^2 h^3, each pair connected by wires with the two insulated rails. The upper extremities of the bell-crank levers rest against the under sides of the before-mentioned hooks D D'.

The operation of this mechanism is as follows: When the lever C is depressed by the wheel of a passing car, the lever D is drawn inwardly and the top of bar E is forced to the right, while at the same time the alarm-box G (through the medium of shaft F) is wound up. Simultaneously the bar H is drawn to the right, carrying with it switch-levers *h*, until the latter are held in contact with points h^2. Bar H also imparts motion to crank J, and the latter lifts the hook D' from the top of bar E', thus preventing any movement of the lever

C′ affecting said bar E′. If, on the other hand, the lever C′ is first depressed, the mechanism marked with prime (′) letters will be operated, and the lever D be thrown out of engagement with the bar E.

Beneath the lower extremities of the bars E E′ are armatures K K′, whose inner ends are hinged or pivoted, and whose outer ends are adapted to normally rest beneath and a little outside of the lower ends of bars E E′. Secured to the tops of the armatures are springs *k k′*, whose tendency is to draw said armatures upward and cause their outer ends to fall within the paths of the lower ends of bars E E′. The outer ends of the armatures are upwardly and outwardly beveled and the extremities of bars E E′ beveled in an opposite direction, the effect being to allow the extremities of the bars to slide outwardly over the ends of the armatures. Beneath said armatures are situated electro-magnets L L′. The coils of said magnets are connected on the one hand with the line-wire and on the other with the alarm-boxes. Each coil is also connected with a pair of the before-mentioned switch-levers. By this construction it will be seen that when the lever C is depressed, first, the box will be wound up and the switch-levers *h* be brought in contact with points h^2, and, second, that the magnet L will be short-circuited, the current will pass through the insulated rails, and the armature K be released and made to lock the bars F, E, and J and the alarm mechanism. It will furthermore be seen that as long as a single pair of wheels remain upon the insulated section this lock will continue, until, finally, when the train has passed, the magnet L will resume its position in the circuit, the armature K be drawn downward, and the alarm mechanism be liberated.

The magnets L L′ are polarized, in the ordinary manner, by the permanent steel magnets M M′ (shown in the drawings as L-shaped,) and can consequently only affect the armatures K K′ when a particular character of current (say positive) is passing over the line.

At the receiving end of the line-wire and connected with same is a polarized magnet, N, of ordinary construction, and similar in character and arrangement to magnets M M′. Above magnet N is a pivoted armature, N′, whose outer extremity is adapted to move between two fixed contact-points, n' n^2. This armature also is provided with a spring, n^3, adapted to force it in contact with the point n^2 when magnet N is de-energized. A wire connects the armature with one end of the magnet-coil. Said armature is also provided, near its pivoted end, with an arm, N^2, which lies within the path of cogs carried by a wheel, N^3. The latter, at certain intervals, revolves and forces the outer extremity of the armature into contact with point n'. The point n' is connected with one pole of main-circuit battery No. 1, M C B No. 1, as described, (to correspond with the rest of the system this would be the negative pole,) and the point n^2 is connected with the opposite pole (positive) of main-circuit battery No. 2, M C B No. 2. The free pole of battery No. 1 is connected with the earth, and the free pole of battery No. 2 is connected with the coil of an electro-magnet, O. The opposite end of the coil of said magnet is connected with the earth. Above said magnet is a hinged armature, *o*, whose outer extremity—when the magnet is energized—is in contact with a fixed point, *o′*. A spring is attached to the armature adapted to carry the latter away from contact with point *o′* when released. Said contact-point *o′* is connected with one pole of a local battery, L B, while the other pole of said battery is connected with the coil of an electro-magnet, P, the free end of said coil being connected with armature *o*. Beneath magnet P is fulcrumed an armature, *p*, whose outer extremity is provided with a spring to hold it up, and bears a plate, *p′*, adapted to force down a ribbon of paper, Q, when the magnet is energized. Beneath the ribbon of paper is a bar provided with a stylus-point, R. The ribbon is given a constant timed movement by rolls *s*, actuated by a clock. (Not shown.)

I wish it to be distinctly understood that the magnets L L′ N are of ordinary construction, and that the form of the permanent steel magnets M M′ *n* is of no special importance, and forms no part of this invention. Said magnets L L′ N are polarized in such manner as to be energized by the first or normal current, and unaffected by the second or reporting current.

The operation of the system is as follows: The circuit existing when the reporting mechanism is not in operation extends from one pole (in the arrangement described the negative) of main battery No. 1 to point n', thence through armature N′ to magnet N, thence to magnet L′, thence to alarm-box G′, thence to alarm-box G, thence to the coil of magnet L, thence to the next block of the system, and so on to the end of the line, where it is grounded. When a passing train depresses one of the levers, as C, the alarm mechanism is wound up and locked in the manner already described. When the last pair of wheels has left the insulated section, the circuit (through the track, wheels, and axles) is broken by the motion of the train, which removes the wheels and axles from the rails of the said insulated section and the alarm mechanism released. When the circuit-breaking wheel of the alarm-box (see Letters Patent No. 313,614) makes the first break in the current, the armature N′—being no longer held down by magnet N—is drawn by the spring n^3 into contact with point n^2. This disconnects battery No. 1 from the line and throws battery No. 2 in the circuit. The latter (being connected at the opposite pole to battery 1) sends a positive current over the line, instead of the negative one just broken. The polarized magnet N, being incapable of

energization by a positive current, the armature N′ remains in contact with the point n^2. The magnets L L′, being also polarized to be incapable of energization by a positive current, release their armatures, which are thereupon drawn upward by springs k k'. At the same time that the positive circuit is established the magnet O is energized and its armature drawn down. This throws the local battery into play, energizes the magnet P, and raises armature p. The latter depresses plate p', and the ribbon Q is thereby pressed upon point R and marked. Each time the circuit is broken by the alarm mechanism this operation is repeated until the number of the block (represented by the alarm-box) is shown upon the ribbon. One end of the armature p is connected with the starting device of the mechanism of which the wheel N^3 forms a factor, as shown in concurrent application marked C, and when the armature is first moved said mechanism is set in motion. Said mechanism is adapted to run—after each start—a sufficient time to allow a single report to be made, and said wheel N^3 in said time makes a quarter-revolution. The cogs of said wheel are so disposed that one of them before the mechanism ceases to run strikes the arm N^2 of armature N′, and causes the outer end of said armature to come in contact with point n'. Battery No. 1 is thus brought into action and the system is ready for a new report.

If while a report is being received a train should pass over any of the other sections, the positive circuit being on the line, all the locking-armatures are released. Consequently the ends of the bars E or E′ would slide over the ends of the armatures, and then be locked in place. No one of the alarm-boxes could report until the first report was ended. Afterward the reports would come in in the order with which the trains left the insulated sections. So, if two or more trains were upon different insulated sections, the effect would be the same—each report would come in its turn.

It will be understood from the aforegoing description that it matters not whether the current normally existing be negative and the circuit afterward sent over the line-wire be positive or the reverse. The only requirement is, that the permanent magnets be arranged to cause the electro magnets to release their armatures during the time the second circuit remains closed. It will also be apparent that, owing to the fact that only small sections of the track are ever in the circuit, and then only while a train is passing over said sections, little opportunity is given for waste of electricity. For the same reason, if one or more of the sections should be completely covered with water, there is little loss and no interference with the operation of the system, since when the sections are in circuit the electricity will choose the best conductor, which would be the track, wheels, and axles.

Having thus described my invention, what I claim is—

1. The combination, with the alarm mechanisms G G′, provided with levers E E′, of the armatures K K′, polarized magnets L L′, polarized magnet N, armature N′, contact-points n' n^2, having connection with the negative and positive poles, respectively, of batteries, and a line-wire, substantially as described, whereby when the negative current is broken by the circuit-breaking wheel of the alarm mechanism first put in operation a positive current will be established over the line, and such mechanisms as are wound up while said first mechanism is reporting will be locked, for the purposes set forth.

2. The combination, with the alarm mechanisms G G′, provided with levers E E′, armatures K K′, polarized magnets L L′, polarized magnet N, armature N′, contact-points n' n^2, batteries, and line-wire, of the intermittently-revolving toothed wheel N^3, substantially as described, whereby the normal current is reestablished, for the purposes set forth.

3. The combination, with the alarm mechanism G′, armature K′, polarized magnet L′, line-wire, polarized magnet N, armature N′, contact-points n' n^2, batteries, magnet O, armature o, contact-point o', printing-magnet P, and local battery connected with said point o' and magnet P, substantially as described, whereby when the normal current is broken the printing-magnet P is energized, for the purposes set forth.

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