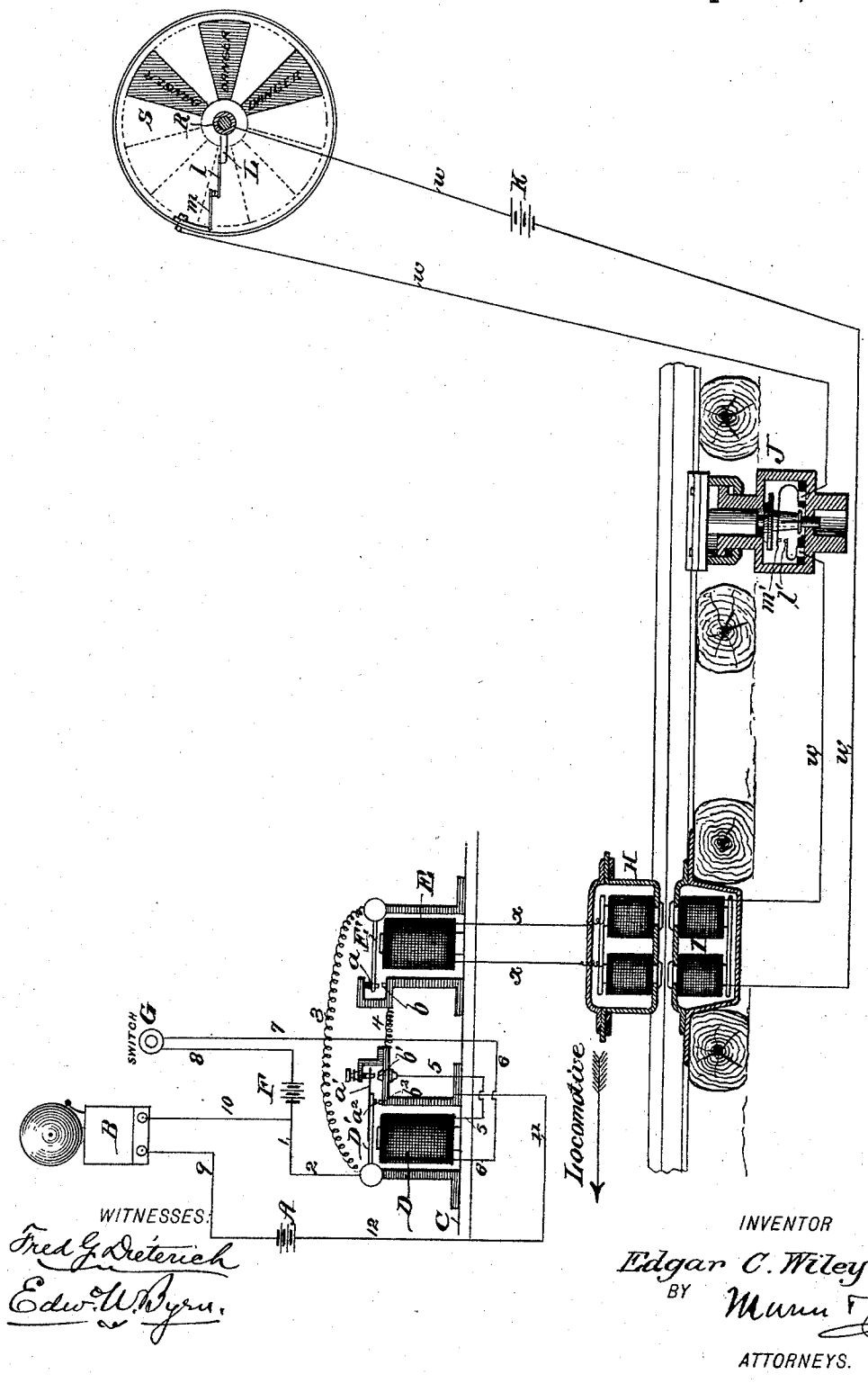
(No Model.)

E. C. WILEY.

ELECTRIC CAB SIGNAL FOR RAILWAYS.

No. 526,598. Patented Sept. 25, 1894.



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ELECTRIC CAB-SIGNAL FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 526,598, dated September 25, 1894.

Application filed January 31, 1894. Serial No. 498,609. (No model.)

To all whom it may concern:

Be it known that I, EDGAR C. WILEY, of Bristol, in the county of Sullivan and State of Tennessee, have invented a new and useful Improvement in Electric Cab-Signals for Railways, of which the following is a specification.

My invention is in the nature of an improved electric cab signal for railways.

It relates to that form of cab signals in which an alarm bell is carried upon the locomotive and has a local battery and circuit connections operated by induction through inducing magnets placed along the road bed, an example of which may be seen in the patent already granted me, dated February 6, 1894.

My present invention is designed to employ an ordinary make-and-break-circuit type of alarm bell; to supplement the inherent weakness of a relay operated by induction and only for a moment in the passage of the train; and to save waste in the battery power used for energizing the inducing magnets.

To these ends it consists in the special construction and arrangement of the circuits, batteries, and their connection with the various mechanical parts, as will be hereinafter fully described with reference to the drawing, in which the figure is a diagram view showing on its left the devices carried by the locomotive, showing at the bottom the devices along the road bed, and on the right hand side their connection with a visual signal or other circuit closing device along the line.

I will first describe the devices and circuits carried by the locomotive.

A is a battery, and B is an alarm bell of the ordinary make-and-break-circuit type which is actuated by the current from the battery A.

E is a relay magnet whose office is to close a supplementary bell circuit and operate the alarm bell whenever an electrical impulse is received in the same. Such electrical impulse is transmitted through the circuit wires $x\,x$ from the electro magnet H which is carried by the locomotive in such close proximity to the road bed as to come within the inductive influence of the inducing magnet I. This impulse in the relay E is only momentary, and as the attraction of its armature E′ is, at best, weak, and the latter is likely to be loosened by the jolting of the locomotive, I do not rely upon the armature for directly closing the alarm bell circuit, but use it only for closing another supplementary circuit which through a supplementary electro magnet and battery closes and strongly holds the circuit of the alarm bell closed against all contingencies that would be likely to interfere with it. D is this supplementary electro-magnet, and F is the supplementary battery. This magnet D has an armature D′ with a flat spring a', which upon the descent of the armature is adapted to strike the contact point b' first and establish the supplementary circuit, and then, upon the further descent of said armature, brings the contact point a^2 against contact point b^2, and establishes the alarm bell circuit. To render this more clear, we will suppose that the locomotive has passed one of the inducing magnets I. Induction in the magnet H on the locomotive causes an electrical impulse through wires $x\,x$ in relay magnet E. This feeble and momentary impulse draws down the armature E′ but lets it go again after the engine has passed the inducing magnet. When, however, its armature descended, in response to this induced electrical impulse, contact point a on armature E′ temporarily touched contact points b, which were the open terminals of the supplementary battery F, and the current therefrom flowed first through the following path: 1, 2, 3 armature E′ through contact points a and b to 4, 5, 6, 7, switch G, and 8, to the other pole of the supplementary battery. This circuit in its path through 5, and 6 it will be seen energized supplementary magnet D and attracted armature D′, closing contact a' upon b' first, and afterward a^2 upon b^2, and although the circuit of the supplementary battery F was broken at a and b immediately after it was made, it was nevertheless closed at a' b' before it was thus broken, and the current of this supplementary battery F now flows through the following path: 1, 2, D′, a', b', 5, 6, 7, switch G, and 8. The full power of the supplementary battery F now holds its contacts points a' b' closed to maintain its circuit; and also maintains closed the contact points a^2 b^2 which are the terminals of the alarm bell circuits; the current in which circuit flows from battery A through wire 9,

bell B, wires 10 and 2, armature D′, through contacts a^2 b^2, and through wires 11 and 12 to the other pole of the battery A. It will therefore be seen that, the feeble and momentary impulse produced by induction serves to bring into play the strong and constant supplementary battery circuit and magnet D, which establishes and holds closed with certainty the bell circuit and continues the alarm until the proper precautions to avoid danger have been taken.

To energize the inducing magnets I constantly it will be clearly understood that there would have to be ordinarily a battery with a closed circuit and constantly active, and this would cause the battery to run down so rapidly that it would last but a few days, which would involve a large outlay and constant attention. I have devised means for use in connection with the before described apparatus, whereby the battery which energizes the inducing magnet is an open circuit battery, and is only closed by the contingency of immediate danger, and for this purpose I place the battery of the inducing magnet in a circuit which forms a part of any signal system, and which circuit is closed by the movement of a visual signal, or semaphore arm, set to danger, or by a relay, and then in this same circuit with this inducing magnet and its battrey I place a circuit closer operated by the mechanical passage of the locomotive, so that if a visual danger signal is set by any electric system, and the engineer fails to note it, or is asleep, he will be alarmed by the bell on his engine, but the local battery of the inducing magnets will be on an open, instead of a closed, circuit and instead of lasting a few days it will last for years without attention. That is to say, the local battery circuit which acts on the inducing magnets is never closed except in the immediate contingency of danger, and only involves a very short interval of use of the local battery.

K is the local battery of the inducing magnets I. The circuit wires *w w* of this battery run from the inducing magnet to a visual signal which may be of any type, such as a disk with radial markings of different color, or a semaphore arm, or any other. I show a disk with radial markings which is oscillated with its hollow shaft R to show one color for danger and another when the road is clear. On the oscillating shaft R of this disk is fixed a tappet arm L bearing a spring contact *l* which in the danger position of the signal touches a spring contact *m* fixed in stationary relation to the frame work. The two contact points are one set of terminals of the circuit wires *w w*, and contact is closed through these points by the adjustment of the visual signal to danger, and is broken at all other times. Along the road bed, a little past the visual signal, the circuit of local battery K is broken at another point by the interposition of a circuit closer J which acts to close the circuit by the mechanical passage of the train.

The particular form of the circuit closer forms a part of another application for a patent, filed the same date with this, and need not be more particularly described than to simply state that it is normally open and is mechanically closed by the momentary passage of the train.

If now a train moving in the direction of the arrow passes the signal S set to danger, and the engineer has taken no note of the same, he will still be advised by the alarm bell on his engine, for when his train passes the circuit closer, the circuit of the local battery K will be closed both through the contacts *l m* of the visual signal, and at *l′ m′* of the circuit closer J in the road bed, and inducing magnets I will be energized to influence the alarm bell in the cab as before described. If the signal S is not set to danger *l* and *m* are out of contact and the closure at *l′ m′* in the road bed cannot close the local battery circuit. The value of the circuit closer J in connection with the circuit closer in the visual signal will be understood, when it is remembered that as the danger signal S is being constantly set by the system in use along the line, the local battery K would be held on a closed circuit a good part of the time, which would involve a rapid waste, but with the circuit closer J, the setting of the visual signal S does not involve any use or wear upon the local battery at all, but only in the contingency that the visual signal is past by unobserved, and danger is imminent, when the temporary closure of the battery circuit at J gives the alarm in the cab without any appreciable waste of battery power.

Instead of using a visual signal S to close the local circuit of battery K, it is obvious that the armature of a relay placed in any line might be used in the same way to produce the same result.

With reference to the inductive action of the magnet I upon H, I would state that the exposed pole ends of I in passing the exposed pole ends of H (both being arranged vertically or at right angles to the direction of movement) act by magnetic induction, and not by current induction as would be the case if the cores of both were horizontal (in which latter case the current in the upper coil would be induced by the turns of the wire in the lower coil passing in close longitudinal relation to the former). In my case this magnetic induction presents great advantages. The current in the vertical inducing magnet I is converted into magnetism of its core, which by magnetic induction magnetizes the core in the vertical coil above it. This magnetism in turn is converted back into an electric current in the coils surrounding the core, and this closes the local or bell circuit on the engine as before described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A cab signal consisting of an alarm bell

and battery circuit, electro magnets operated upon by induction from extraneous and stationary inducing magnets, a relay in the induced circuit having an armature with terminal contacts, and a supplementary battery, magnet, and circuit, the said circuit being closed by the induction relay through the supplementary electro-magnet, and the said supplementary magnet being provided with an armature bearing two sets of terminal contacts, one set being for the continuance of the supplementary circuit through the supplementary magnet, and the other set being for the closure of the bell circuit substantially as for the purpose described.

2. The combination with induced electro-magnets on a car, and approximating inducing magnets arranged along the line; of a normally open local circuit and battery for said inducing magnets, having two sets of terminals, one of which is closed through a visual signal, or its described equivalent, and the other of which is closed by a mechanical circuit closer operated by the passing train substantially as shown and described.

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Witnesses:
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