(No Model.)

R. A. BALDWIN.

ELECTRIC RAILWAY SWITCH.

No. 529,011. Patented Nov. 13, 1894.

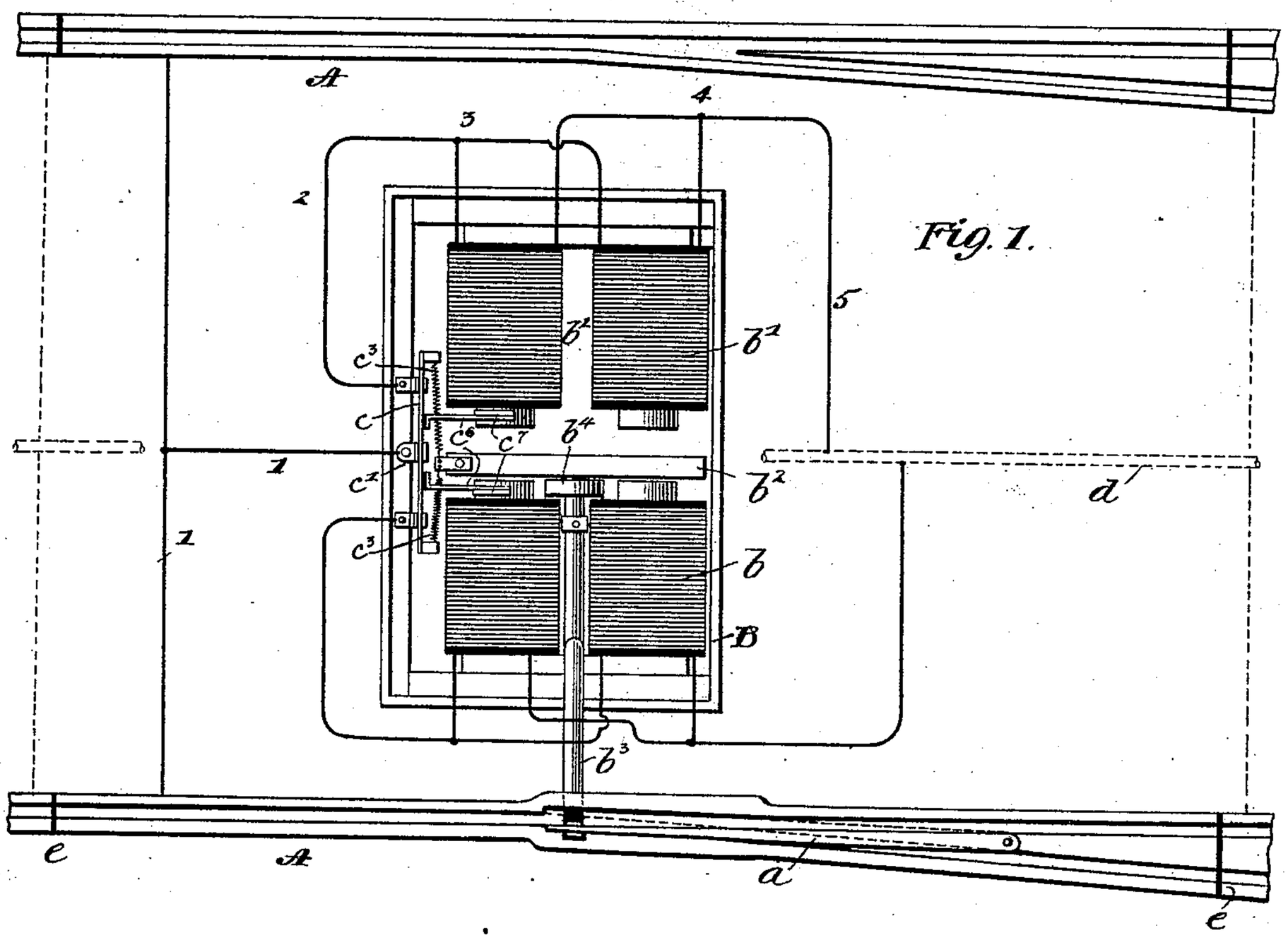
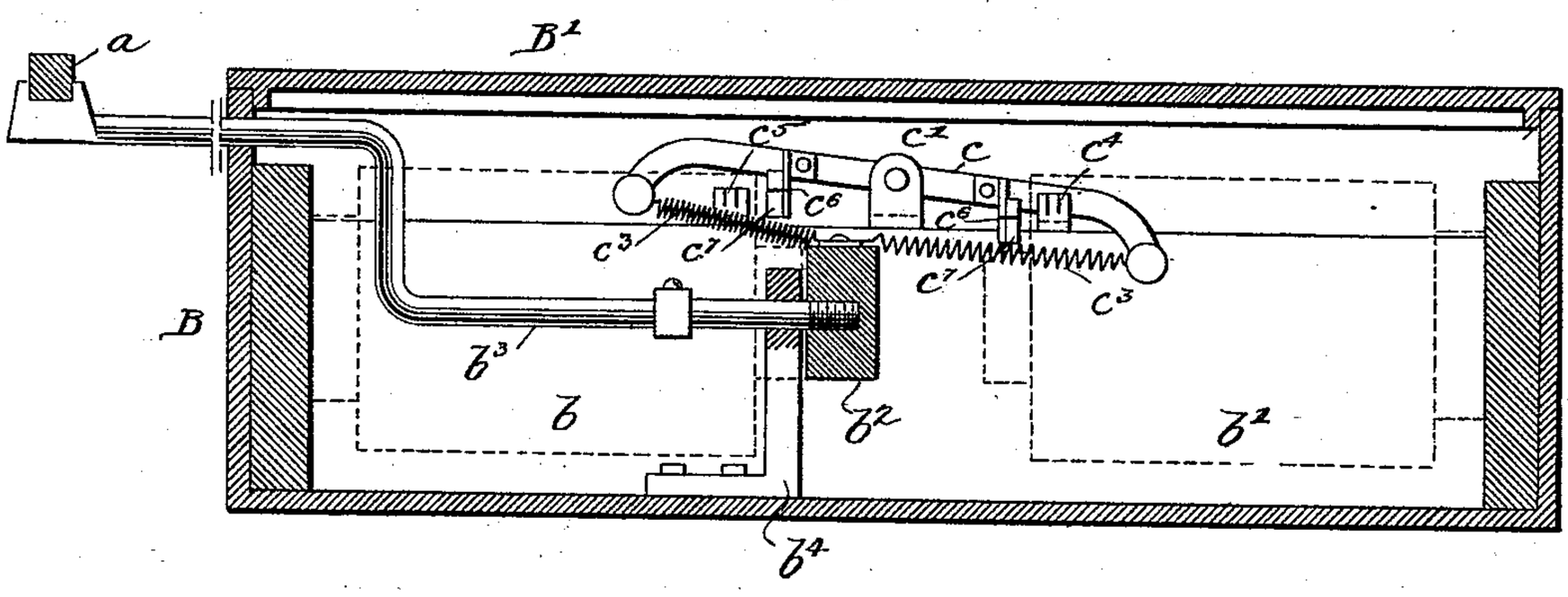


Fig. 1.

Fig. 2.



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ELECTRIC RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 529,011, dated November 13, 1894.

Application filed January 4, 1894. Serial No. 495,621. (No model.)

To all whom it may concern:

Be it known that I, ROLLIN A. BALDWIN, a citizen of the United States, residing at South Norwalk, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Electric Railway-Switches, of which the following is a full, clear, and exact description.

This invention relates to electro-magnetic switching apparatus for automatically moving the switch point of a railway track upon the approach of a car or train.

The object of the invention generally is the production of an apparatus which will be efficient in operation and will operate properly under the various conditions encountered in practice. Two electro-magnets are used, one to move the switch point in each direction. An automatically locking and unlocking circuit changer is provided which operates to hold the circuit of the operating magnet closed positively until the car has passed the switch and which then reverses and changes the circuit to the opposite magnet to be ready on the approach of the next car. The magnets are located in the ground or return circuit of the motors which propel the cars, the railway utilizing electricity as its means of propulsion. Every car throws the switch unless the switch is in the right position when the car approaches, in which case the current is cut off by the motor man on the vehicle and the car "coasts" or travels by its momentum over the switch.

The details of the invention will be described with reference to the accompanying drawings, in which—

Figure 1 represents a plan of a portion of an electric railway roadbed adjacent to a switch and showing the switching apparatus located in a box, the cover of which has been removed. Fig. 2 is a vertical section through the box containing the switching apparatus, the magnets being shown in dotted lines.

Referring to the drawings by letter, A A represent two rails of a track.

a is the switch point adaped to switch the cars from one track to another.

B is a box, preferably embedded in the roadway between the rails. It is provided with a cover B′. This box contains two double spool electro-magnets *b* and *b′* placed with their pole pieces facing each other, but with a space between them.

b^2 is a common armature for both magnets. To this armature is attached a reciprocating rod b^3 which passes out through an opening in the end of the box and is positively connected with the switch point *a*, as shown in Fig. 2. The outer end of the rod has its bearing in the end of the box and the inner end has its bearing in a bracket b^4. Inside of the box and arranged in a direction parallel to the axis of the magnets is a vibrating lever *c* pivoted between its extremities at the point *c′*. To each end of this lever is connected a spring c^3 which also is attached to the armature b^2. Under the ends of the lever are placed contact springs c^4 and c^5, only one of which is in connection with the lever at the same time. The lever also carries two arms c^6 which extend at right angles therefrom and carry at their outer extremities blocks of soft iron c^7, the blocks being in a position closely adjacent to the heads or pole pieces of the nearest magnet spools and are arranged so that when one end of the lever is down its corresponding block c^7 is in contact with the pole piece to which it is adjacent.

The circuits for operating this apparatus are arranged as follows: The return circuit of electric railway systems is usually through the rails and bond wires which join them, and the return conductor is here represented as a wire *d* shown in dotted lines, which is connected at intervals with both rails of the track. At the location where the switch point occurs a section of the rails of the track extending on each side of the rails of the switch is insulated from the line of the track by insulating material represented by *e*. At this section the regular return conductor *d* is continuous, but the return current takes a path through the magnets over the following circuits: The wire 1 leads from the insulated section of the rails to the pivotal point of the lever *c*. The path is then along the lever to one of the contact springs c^4 c^5 and then, for instance, by wire 2 to the point 3 where it branches and leads in two separate circuits

through the respective coils of the magnet b', connecting the two coils in parallel. The path of the current then joins at the point 4 and connects with the ground return wire by the conductor 5. The wires connecting the magnet b are similarly arranged, their circuit, however, being controlled by the contact spring c^5.

The position of the parts when the car is not on the insulated track section is shown in Fig. 2. In this position the spiral spring c^3 is holding its end of lever c down and in contact with the contact spring c^4. When the next car approaches and passes on to the insulated section of rails the return current from its motor flows over wire 1 to the pivotal point c', thence along the lever c to the contact spring c^4, thence by wire 2 through the magnet b', and finally by wire 5 to the return conductor d. This energizes magnet b' and its pole piece attracts and holds the soft iron block c^7, thus locking the lever c in contact with the spring c^4 and insuring continuity of the circuit through the magnet b' as long as the car is on the insulated section. Immediately, also, the armature b^2 is attracted and moved over against the poles of magnet b'. Thus motion is also imparted to the switch point a. The movement of the armature releases spring c^3 and stretches spring c^2, but the power of spring c^2 is not sufficient to overcome the attraction between the magnet pole and the soft iron block c^7, so that as long as magnet b' is energized lever c will remain in the position shown, notwithstanding the power exerted by spring c^2. As soon, however, as the car runs off of the insulated section and the magnet b' thereby becomes deenerized, spring c^2 exerts the power which has been stored in it and reverses the position of lever c, breaking contact with c^4 and making contact with c^5. The springs c^2 and c^3 are strong enough to move the lever, but not sufficiently strong to move the armature. When the next car runs on to the insulated section, the circuit will be through magnet b because of the reversed position of the circuit changing lever.

If a certain car finds the switch properly placed, the motorman, instead of running over the insulated section by the continued power of the motor, will shut off the current from the motor and allow the car to pass over by its inertia. Under this condition no current will flow through the magnets of the switching apparatus and the switch will remain in the position it was when the car approached. The object in putting the magnets "in parallel" is merely to reduce the resistance of the return circuit.

One of the advantages arising from the use of this apparatus is that it is not necessary that the switch point should move its full stroke at each operation, that is to say in case gravel or dirt should partially clog the switch point the magnets would pull the armature as far as it would go and the operation of the other mechanism would be the same as if a full stroke had been made. It is well understood that the switches often become clogged in this manner, but when they are moved partially the flange of the car wheel will throw them either to the full end of the stroke or sufficiently far to do the proper switching. The real function of the soft iron block c^7 is to prevent the vibration of the lever c and a consequent interruption of the circuit while the car is passing over the insulated section of rails. The magnetic attraction holds the lever down with a stronger force than is exerted by either of the springs c^2 c^3, but when the attraction ceases the force of the spring comes into play and changes the circuit.

Having thus described my invention, I claim—

1. The combination with a vibrating railway switch point, of two electromagnets adapted to move the same in opposite directions, a circuit changer acting automatically to change the path of the current from one magnet to the other, and a controller for the circuit changing device arranged to hold the circuit changer in a given position until the circuit is broken and then permit it to operate substantially as described.

2. An electric railway switching apparatus consisting of the combination of a switch point, a reciprocating rod attached thereto, an armature carried by said rod, two electro magnets adapted to move the armature in opposite directions, a pivoted lever arranged to make and break the circuits of said magnets respectively, springs connected to said lever and to the armature, arranged so that the movement of the armature in either direction will put one spring under tension and relax the other.

In testimony whereof I subscribe my signature in presence of two witnesses.

ROLLIN A. BALDWIN.

Witnesses:

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