No. 828,014. PATENTED AUG. 7, 1906.

R. A. BALDWIN.

ELECTROMAGNETIC RAILWAY SWITCH.

APPLICATION FILED JULY 17, 1903.

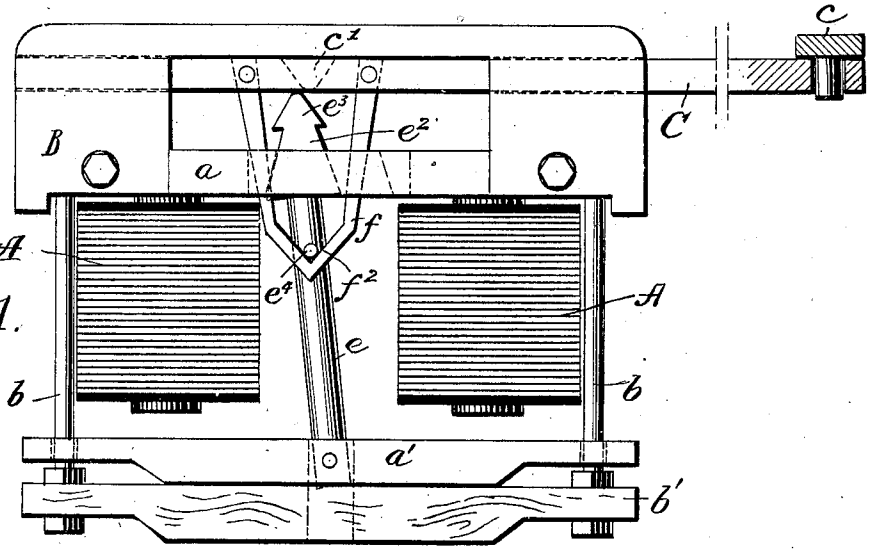

Fig. 1.

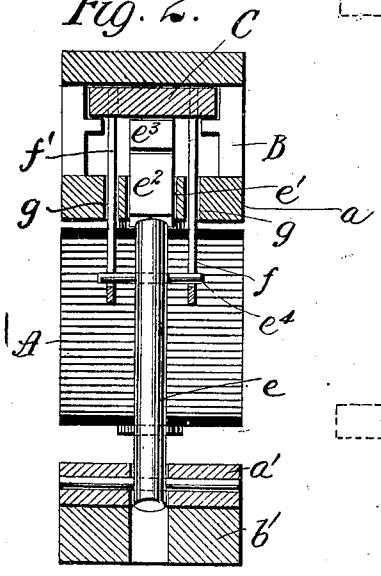

Fig. 2.

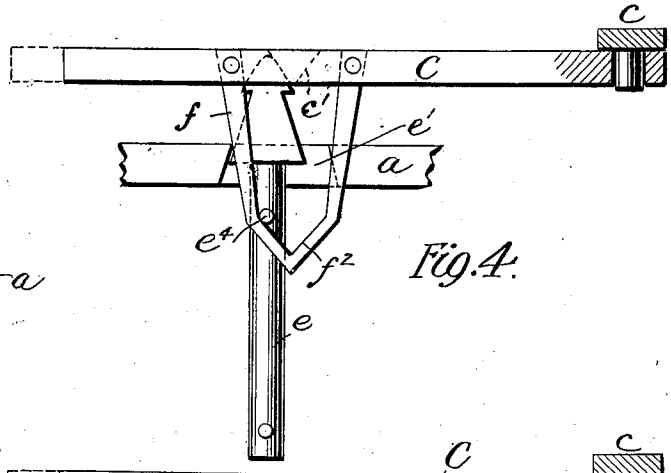

Fig. 4.

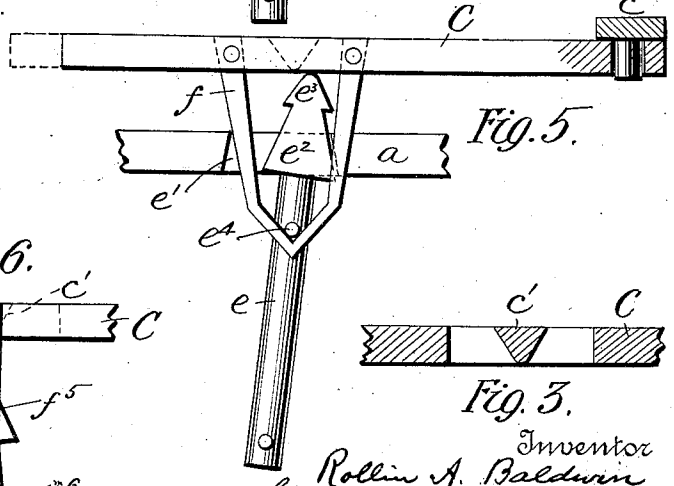

Fig. 5.

Fig. 3.

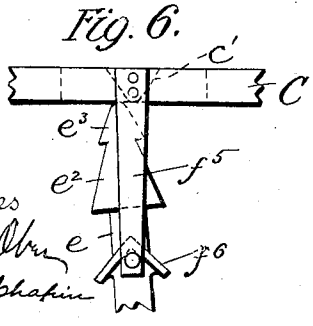

Fig. 6.

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UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC RAILWAY-SWITCH.

No. 828,014. Specification of Letters Patent. Patented Aug. 7, 1906.

Application filed July 17, 1903. Serial No. 165,929.

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 Electromagnetic Railway-Switches, of which the following is a full, clear, and exact description.

This invention relates in general to electromagnetic apparatus for imparting a reciprocating or to-and-fro motion to a movable body, such as a railway-switch point, a signal-arm, or sign.

The invention is herein described in connection with a railway-switch point, as this is one of the best examples of its use.

The object of the invention is to move the switch-point first in one direction and then in the other with a single magnet, both motions being performed positively by the magnet and not, as in some cases heretofore proposed, in one direction by the magnet and in the other direction by a spring. To accomplish this action, it is necessary to adjust or set the mechanism through which the motion is transmitted to the switch after each movement thereof in such a way that the next movement will be in the reverse direction.

In Letters Patent of the United States No. 610,016, issued to me August 30, 1898, I have shown and described a switch-operating mechanism capable of moving the switch in both directions positively by a single electromagnet, and for adjusting or setting the mechanism after each movement of the switch I describe two springs acting oppositely upon one of the connecting elements between the armature and the switch-point and so arranged that the tension of one of them will be increased while that of the other will be diminished with each operation of the switch, and after the said operation the spring in which the power is stored acts to do the adjusting or setting for the next operation.

The object of the present invention is to furnish a substitute for the springs which will be less liable to get out of order and more certain in its action.

My invention therefore consists in providing rigid mechanical devices, such as cams and abutments, to accomplish the adjusting, setting, or shifting of the parts of the apparatus after each operation thereof, all of which will be fully described in detail hereinafter and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of my improved apparatus. Fig. 2 is a vertical section thereof, showing parts in elevation. Fig. 3 is a detail of the bar to which the reciprocating motion is imparted. Figs. 4 and 5 are details showing the operation of the mechanism, and Fig. 6 is a partial detail showing a modification of the invention.

A indicates an electromagnet, preferably of the horseshoe type, its back yoke being indicated by *a* and its armature by *a'*. The magnet is rigidly supported in a frame B, to which the back yoke is bolted and from which depend two rods *b b*, which pass loosely through the armature and constitute a guide for the motion thereof and are secured to a cross-piece *b'*, upon which the armature normally rests within attractive distance of the poles of the magnet. Above or beyond the back yoke and mounted in a suitable guideway in the frame B is a bar C, to which reciprocatory motion is to be imparted. This bar extends out through one side of the frame to any suitable distance and makes a suitable connection with the device *c*, which may be the point of a railway-switch, a signal-arm, or any other device to be moved in the manner described. For the sake of description we will assume the device to be a railway-switch point. It will be understood, however, that the primary function of the apparatus is to move the bar C and that the connections leading from this bar may be of any character to suit the conditions or requirements.

Pivotally attached to the middle of the armature *a'* is a thrust-rod *e*, extending through an opening *e'* in the middle of the back yoke *a*. This opening is an elongated slot permitting the rod to swing on its pivot a limited extent. The ends of the openings are inclined at equal angles, and two sides of the rod which face these inclines are correspondingly inclined, forming a partial wedge e^2 on the rod. It will be seen that if the rod is resting against one end of the slot when the armature is lifted the rod will be caused to

swing on its pivot. Above the wedge e^2 the rod is furnished with an arrow-head e^3, forming the extremity of the rod. The sides of this arrow-head are adapted to engage with a wedge-shaped projection c', formed on or in the bar C. When the armature is in its normal position remote from the poles of the magnet, the point of the arrow-head e^3 is immediately below and slightly to one side of the point of the projection c', as shown in Figs. 1 and 5. It will now be seen that if the armature is lifted the wedge e^2 and arrow-head e^3 will respectively engage the back yoke a and the projection c' on opposite sides, and since the back yoke is stationary and the bar C movable the latter will be caused to slide by reason of the cam action and the movement will continue until the armature is stopped against the poles of the magnet. When the armature is again lowered to its normal position, the arrow-head e^3 drops back to a position below the point of the projection c'. It will now be seen that if the bar C is to be moved in the opposite direction at the next operation the point of the arrow-head e^3 must be shifted or set to the other side of the point of the projection c' in order that the arrow-head may act upon the other inclined face of the projection. The devices for accomplishing this are the particular subject of the present invention.

The bar C carries two yokes f and f', which project downward through slits g in the back yoke a and on each side of the rod e. The lower ends of these yokes are formed with V-shaped seats f^2, the apexes of which are in a vertical line below the point of the projection c'. The rod e carries a cross-pin e^4, extending forward and rearward and resting in the V-shaped seat f^2 of each of the yokes f. The position of this pin and that of the seats f^2 is such that when the pin is in the seat the point of the arrow-head e^3 must be to one side or the other of the point of the projection c'. It may be remarked here that one of the yokes f and a pin projecting into it will serve the purpose fairly well; but two yokes are used to obtain symmetry of action.

The operation may now be described in full. Assuming the parts to be in the position shown in Fig. 1, if a suitable current of electricity is passed through the magnet the armature a' will be lifted and the thrust-rod forced upward, causing the opposite sides of the wedge e^2 and the arrow-head e^3 to engage the inclined surfaces on the back yoke and bar C in the manner before described and force the bar over to the right into the position shown in Fig. 4. It will now be seen that the lifting of the rod e and the lateral movement of the yokes f has brought the pin e^4 to the upper end of one of the inclines of the seats f^2. The magnet now being deënergized, the armature falls, carrying rod e with it, and the pin e^4 being guided by the inclined side of the seat f^2 finally comes to rest at the apex of the seat immediately beneath the point of the projection c', as shown in Fig. 5. In this movement the point of the arrow-head e^3 is necessarily shifted to the opposite side of the point of the projection c', since the lateral travel of the arrow-head is greater than that of the pin. If now the magnets are again energized, the rod e in lifting engages with the opposite side of the projection c', causing the bar C to be moved in the opposite direction, and as this bar again carries the yokes f with it the pin e^4 will be acted upon by the opposite side of the inclined seat f^2, and the rod e in lowering will be again shifted to the position shown in Fig. 1. Thus it will be seen that each motion of the bar C is accomplished positively by the magnet and that the shifting necessary to accomplish this is obtained without the use of springs or other unreliable devices.

In Fig. 6 I have shown a modification of the shifting mechanism which, in fact, is a mere reversal of the form described, since pin e^4 is carried by the yoke or an equivalent arm f^5, and the V-shaped seat is formed upon or carried by the rod e, as indicated at f^6. In this case the pin-head necessarily acts upon the under side of the seat; but the same result is accomplished as before and in exactly the same manner. The cam and pin therefore become corresponding surfaces located upon the bar and rod for accomplishing the desired shifting of the parts.

Having described my invention, I claim—

1. The combination of a bar having two opposite motions, an electromagnet, an armature therefor and an element moved by said armature on its forward stroke, said bar and element having corresponding cam-surfaces whereby the movement of the element will cause the bar to move, a V-shaped cam-surface and a projection operating against the same, one of which is carried by the bar and the other by said element, the projection being adapted to engage with one side or the other of the cam-surface when the armature makes its back stroke, to shift the relative positions of said element and bar, for the purpose set forth.

2. The combination of a movable bar provided with a wedge-shape projection, a thrust-rod adapted to bear against the sides of said projection to move the bar in the direction of its length, a V-shape cam-surface and a projection operating against the same, one of which is carried by the bar, and the other by the rod, the projection being adapted to engage with one side or the other of said cam to shift the position of the rod, so that it will bear against a particular side of the wedge-shape projection.

3. The combination of a movable bar provided with a wedge-shaped projection, a thrust-rod pivoted at one end and having a

wedge-shaped head at the other adapted to engage alternately with the opposite sides of the wedge-shaped projection, a V-shaped cam and a projection adapted to engage therewith, one being carried by the bar and the other by the rod whereby a movement of the bar and a movement of the rod will serve to swing the rod on its pivot, for the purpose set forth.

4. The combination of the electromagnet, its armature and back yoke, a thrust-rod pivoted to the armature and passing through an opening in the back yoke, a bar arranged parallel to the back yoke and provided with a wedge-shaped projection the opposite sides of which are adapted to be alternately engaged by the end of the rod to move the bar in opposite directions, a V-shaped cam attached to the bar and a pin attached to the rod and projecting between the arms of the car, substantially as described.

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

ROLLIN A. BALDWIN.

Witnesses:
JAMES PAUL,
VICTOR W. FERRIS.