(No Model.) 2 Sheets—Sheet 1.

C. M. FITCH.

ELECTRIC SWITCH FOR RAILWAYS.

No. 529,164. Patented Nov. 13, 1894.

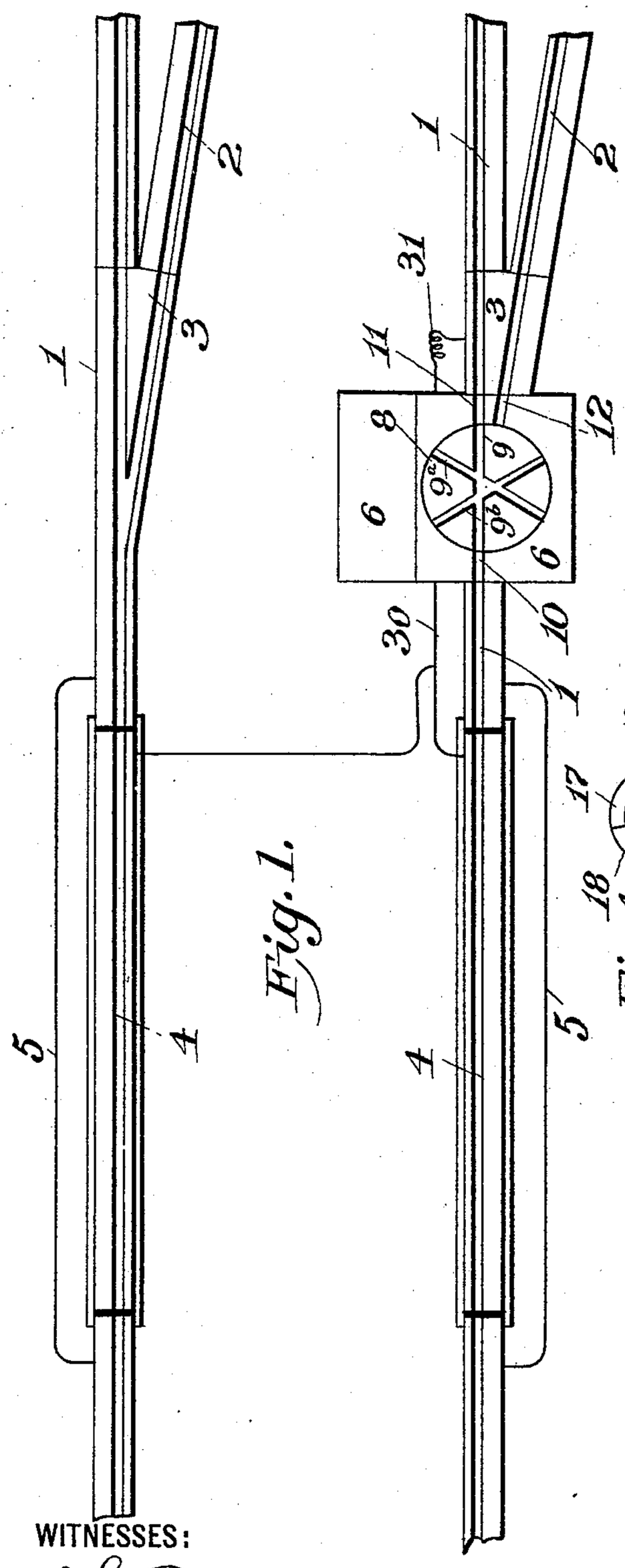

Fig. 1.

Fig. 4.

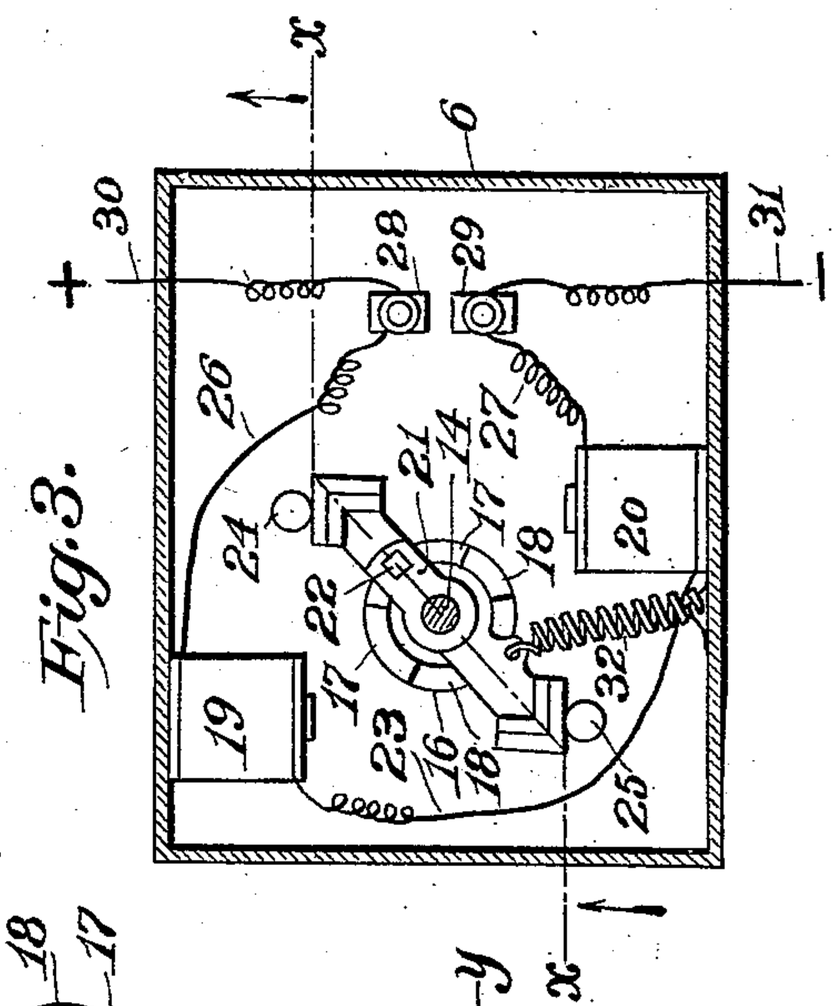

Fig. 3.

Fig. 2.

WITNESSES:

J. F. Finch

M. T. Longden.

INVENTOR

C. M. Fitch.

BY

J. M. Smith Jr.

ATTORNEY

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Fig. 5.

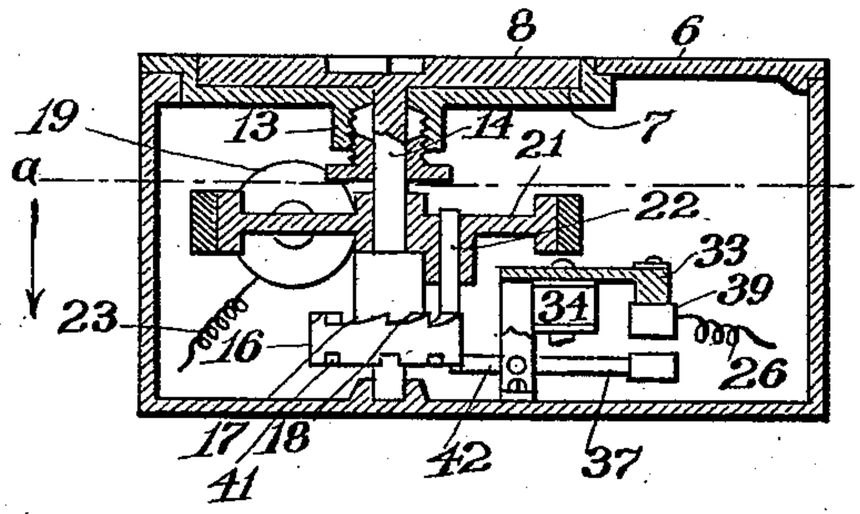


Fig. 6.

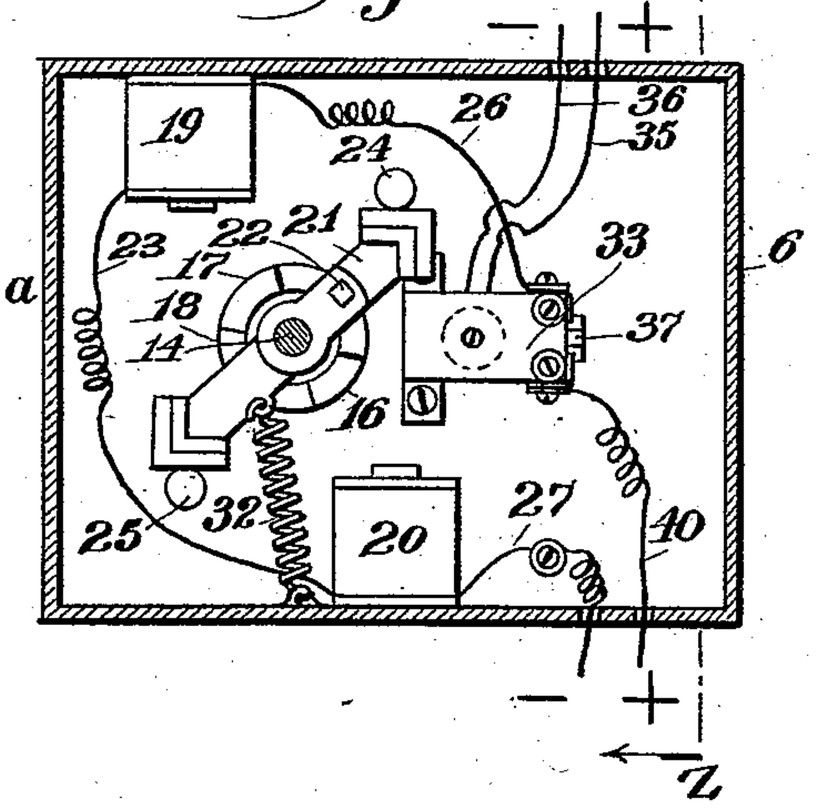


Fig. 7.

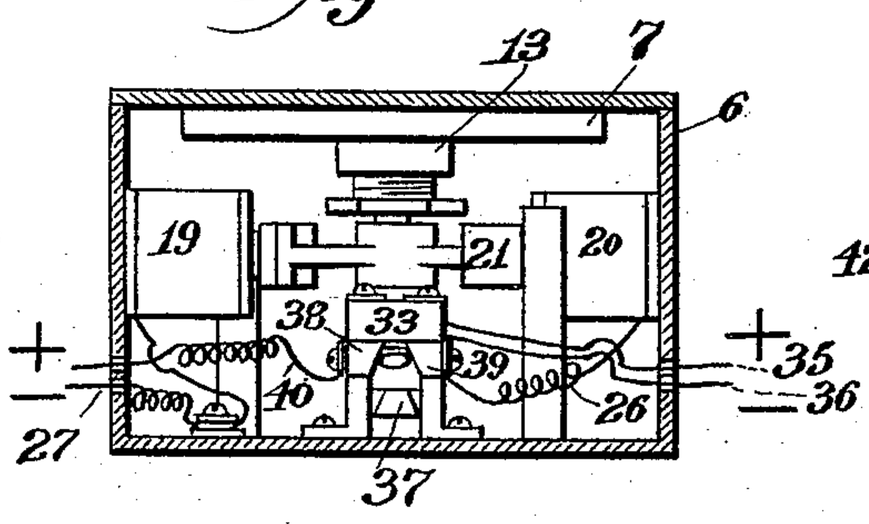
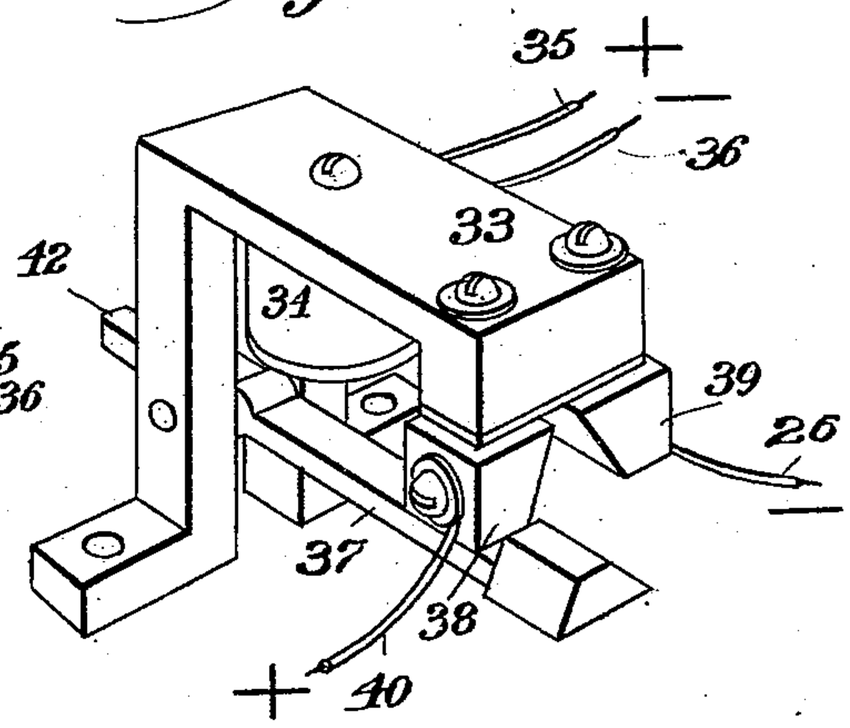


Fig. 8.



WITNESSES:

J. S. Finch

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INVENTOR

C. M. Fitch.

BY

J. M. Smith Jr.

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES M. FITCH, OF SOUTH NORWALK, CONNECTICUT.

ELECTRIC SWITCH FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 529,164, dated November 13, 1894.

Application filed November 18, 1893. Serial No. 491,337. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. FITCH, 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 Switches for Railways; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in electrical railway switches and is intended for use especially in instances where over head conductors are employed, such as are to be found in what is commonly known as the "trolley system."

The object of my invention is to provide a construction not likely to get out of order and very efficient in accomplishing the results aimed at.

With these ends in view, my invention consists in certain details of construction and combination of parts, such as will be hereinafter fully set forth and then particularly pointed out in the claims.

In the accompanying drawings, which form a part of this application, Figure 1, is a plan showing my improvement as it appears when in use, in connection with a short section of the railroad track, sufficient to illustrate my invention; Fig. 2, a section at the line *x*, *x*, of Fig. 3; Fig. 3, a section at the line *y*, *y*, of Fig. 2; Fig. 4, a detail plan of the ratchet disk; Fig. 5, a section similar to Fig. 2, but showing my improvement adapted for use in connection with the over head electrical current and independent of the rails; Fig. 6, a section at a line *a*, *a*, of Fig. 5; Fig. 7, a section at a line *z*, *z*, of Fig. 6; and Fig. 8, a detail perspective of the special device which I use in connection with my improvement, when I employ the over head current independent of the rails.

Similar numbers of reference denote like parts in the several figures of the drawings.

1, are the usual rails such as are common in all street railways, and 2, are diverging rails which branch out from the rails 1, and have at their junction with the latter the usual frogs 3. Immediately in front of the frogs and at any suitable distance therefrom, a short section 4 of the main rails 1 is insulated so as not to be within the electrical circuit with such rails, and on either side of these sections the rails are electrically connected by ordinary bond wires 5. In other words, a short section of the main line of rails is insulated from the latter, and these insulated sections are to be electrically connected with the switch device, the object of this construction being, of course, to prevent any operation of the switch except at the time when the wheels of the car are in contact with such sections. This is not new of itself, and in this respect the construction which I have hitherto described does not differ from prior devices.

I will now describe the means which I employ for automatically operating and guiding the car either straight along on the main line, or to switch the same on to the branch rails.

6 is a metallic box which is sunk in an excavation in the street at the point of one of the frogs 3, and in the upper face of this box is a circular shaped pocket 7 within which snugly fits a disk 8 in such a manner as to be capable of a free revolution, and within the face of this disk are grooves 9, 9^a, 9^b which extend from side to side of disk for the purpose presently explained.

The top of the box 6 is flush with the tread of the rails and of the frog, and within the face of this box, and on opposite sides of the disk 8 are short grooves 10, 11, which are a continuation of the grooves in the adjoining rails of the main line, there being also in the face of this box a similar groove 12, which is a continuation of the groove in the branch track 2. The grooves in the face of the rotary disk 8, are so located that they will alternately register and align with the sectional grooves of the main track and of the branch when such disk is continuously turned in one direction. As hereinbefore stated, this box is so located as to intercept the continuity of the rails at a point immediately in front of the frog, and from the foregoing description it will be readily understood that my invention comprises the advantages of a stationery frog with those of a plurality of movable frogs, without any liability of the clogging of the latter, owing to their continuous revolution within a closely conforming pocket.

At the bottom of the pocket 7, is an ordinary stuffing box 13, through which extends from the disk an axial shaft 14, the bottom of which is stepped within a hub 15, at the floor of the box. Rigidly mounted on this shaft is a horizontally disposed disk 16, having ratchet teeth 17, 18, in its upper face. The teeth 17 are longer than the teeth 18, and said long and short teeth are arranged alternately for the purpose presently explained.

19, 20, are electro-magnets of opposite polarity, which magnets are mounted within the box 6 and are arranged diagonally opposite to each other.

21 is an armature, loosely pivoted around the shaft 14, so as to be capable of a free movement therearound, and 22 is a pawl carried by said armature and capable of a free vertical gravity movement and adapted to engage with the teeth in the disk 16.

The extremities of the armature 21, are within the fields of magnets 19, 20, and such magnets are connected in electrical circuit through their coils by means of the wire 23.

26, 27, are wires which lead from the extremities of the magnetic circuits to posts 28, 29, rising from the bottom of the box 6, and 30, 31 are wires which extend respectively from said posts and are electrically connected to the sections 4, and the main rails 1.

The parts which I have heretofore described are used when it is desired to utilize the rails as a conductor for the electrical current in vitalizing these magnets, and I will now describe the operation of these parts.

As the car advances it will of course, have no effect on the operation of the switch until the wheels of the car come in contact with the insulted sections 4, which will be readily understood from the foregoing description. These sections are so near to the switching device and are of such limited length that the motorman has ample opportunity to discover whether the switch is properly set or not. For instance, if the car is not to be run on the branch rails and the switch is set right for continuous travel on the main line, it is not necessary to vitalize the magnets to operate the switch, and therefore the motorman, before the wheels of the car come in contact with section 4, shuts off the current from the car motor, thereby permitting the car to travel across these sections by its own impetus. On the other hand, if it becomes necessary to turn the switch in order to properly direct the line of travel of the car, the electrical curent is not shut off, and as soon as the car wheels come in contact with the sections 4, the magnets will be vitalized and armature 21 attracted thereby revolving the disk 8 through the medium of the pawl 22, and ratchet disk 16. The extent throughout which the armature revolves before it comes in contact with the attracting magnets would, if the ratchet teeth were all of the same length determine the arc throughout which the disk 8 must be revolved, but as this distance is not always the same, owing to the fact that the grooves in the face of the disk 8 are not equi-distant at their extremities, it becomes necessary to govern the revolutions of this disk that the extent of the revolution thereof will depened upon the location of such grooves, and I will now describe the means whereby this is effected. It will be observed that these grooves cross each other at points around the center of the disk which are equi-distant from such center and from each other, and that the longer extensions of these grooves beyond their crossing point are farther apart at their ends than the shorter extensions. It therefore becomes necessary to revolve this disk throughout a greater or less arc according to the location of the grooves with respect to the rail sections to be connected, and I have therefore utilized alternate long and short teeth on the disk 16, the difference between the length of the long and short teeth being in direct proportion to the difference between the two extremities of the crossing grooves in the disk 8. It will, of course, be understood that the disk 16, must be properly fixed on the shaft 14, in order that this proportion may bring about the result aimed at. For example, we will suppose that it is desired to operate the switch so that it will connect the main line with the branch rails. Referring to Fig. 1, and also noting that the disk 8 is always revolved in the direction indicated by the arrow, it will be seen that the groove 9, which is shown as connecting the sections of the main line, could not, when such disk is revolved be made to connect the main line with the branch rails. The succeeding groove 9^a therefore is to be utilized for this purpose and the disk must accordingly be turned throughout a distance sufficient to bring this groove from its position as shown in this figure to a point where it will align with the rails 1, 2, and therefore the pawl 22, must operate against the long teeth. Now, presupposing this groove 9^a last mentioned to be in alignment as set forth, it will be seen that the succeeding groove 9^b will have been brought to a position where its extremities will be separated from the main rail sections by a distance equal to that which separates the shortest extensions of the grooves beyond their crossing points, and therefore the next movement of the disk required to bring such groove 9^b into alignment with the main rail sections will not be so great as the former movement. Accordingly, when the armature is returned to a normal position by the action of the spring 32, in a manner clearly shown at Fig. 3, the pawl will be carried to a distance in the rear of the short teeth equal to the difference between the length of the short and long teeth so that it will be readily understood that when the magnets are again vitalized the armature will be moved throughout a predetermined distance without revolving the disk 16.

As soon as the car leaves the section 4, the current will be shut off from the magnets,

and the armature will, when the car has continued on and left the disk, be returned to its normal position by means of the spring 32. During this return movement of the armature, the pawl will ride over the top of the teeth and drop down by gravity behind succeeding teeth and in proper condition for continued operation.

24, 25, are stops which project from the floor of the box and serve to limit the motion of the armature so that the latter is always within the field of the magnets.

I have heretofore described my invention in connection with the rail current as the operating agent, and I have shown certain constructions and electrical connections simply for the purpose of affording a clear understanding of my invention. I do not, however, consider that I have made any invention in electricity properly speaking, and I do not therefore wish to be limited to any particular manner of utilizing the electric current for the vitalization of the magnets, nor do I wish to be limited to the employment of the rail current, since the overhead current may be used in the manner which I will now describe.

33 is a bracket secured inside the box 6 and having depending therefrom a magnet 34, the extremities 35, 36, of whose coil are electrically connected to the sections 4, and main rails 1, in the same manner in which the connections are made between the wires 30, 31, and said sections 4 and rails 1. I have not shown these extremities 35, 36, so connected, since it is not deemed necessary to do this as the constructions and arrangement shown at Fig. 1, are believed to be sufficient for this purpose. Pivoted within this bracket is an armature 37, within the field of the magnet 34.

38, 39 are blocks secured to the bracket but insulated therefrom in any ordinary manner, and to these blocks are respectively connected the overhead wire 40 and the wire 26, which latter, as before set forth, is one terminal of the magnetic circuit. The other terminal 27, of this magnetic circuit is grounded in any suitable manner. (Not shown.)

When the armature 37 is attracted by the magnet 34, the outer end of said armature will be brought into electrical connection with the blocks 38, 39, thereby closing the circuit through the magnets, and causing the latter to be vitalized by the current from the wire 40, whereby the armature 21 will be attracted by the magnets 19, 20, for the purpose hereinbefore explained.

On the lower face of the disk 16, notches 41 may be cut with which the heel end 42, of the armature 37 may engage when said armature is in its normal position. These notches must be located correspondingly with the teeth 17, 18, so that they will always occupy a predetermined position with respect to the part 42. When the device is in operation the parts are in position as shown at Fig. 5, and it will therefore be readily understood that this armature 37, will securely lock the disk 8, so that the latter cannot be tampered with. When armature 37 is attracted by the magnet 34, the heel end 42 will be withdrawn from the disk 16, thus releasing the latter and permitting it to be turned in the manner before set forth.

From the foregoing it will be clearly seen that I am enabled to use the overhead current for the operation of my improvement, but as before set forth, I do not wish to be limited to any particular manner of vitalizing the magnets 19, the gist of my invention in this respect resting in the broad idea or vitalizing these magnets at a predetermined time.

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

1. The combination of the main and branch tracks of a railway, the metal box sunken at the point of one of the frogs of the switch, the rotary disk journaled in said box to revolve in a horizontal plane flush with said tracks and provided with cross grooves in its face adapted to alternately register and align with said main and branch tracks when the disk is revolved continuously in the same direction, and instrumentalities permanently located in said box and operated through suitable electrical connections whereby said disk is revolved at predetermined times and throughout certain arcs and always in the same direction, substantially as set forth.

2. The combination with the main and branch tracks of a railway, a box sunken at the point where the branch tracks diverge and having its face flush with said tracks, the disk journaled within said box and having in its face grooves which extend across said disk from side to side and are capable of successively aligning with the main and branch-tracks alternately when the disk is continuously turned in one direction, a ratchet wheel moving in harmony with said disk, and a pawl adapted to engage with said wheel and carried by the armature of an electro-magnet, and means electrically controlled by the contact of the railway car wheels with the rails for operating said pawl and ratchet, substantially as set forth.

3. The combination of the main rails and branch rails, the box sunken in the road bed at the point where the branch rails diverge, the disk journaled in said box and having grooves which extend across the face of said disk from side to side and are adapted to successively align with said main and branch rails alternately when said disk is turned in one direction, the ratchet disk secured to the shaft of the disk 8 and having on its face teeth which are alternately long and short, according to the location of the grooves in the disk 8, the armature pivoted loose around said shaft and carrying the gravity pawl adapted to engage with said teeth, the magnets mounted within said box, and electric connections between said magnets and tracks

for controlling the vitalizing of the magnets whereby said armature may be attracted at pre-determined times, substantially as set forth.

4. The combination of the main and branch rails, the rotary disk having in its face grooves adapted to register with said rails, a ratchet disk moving in harmony with the first mentioned disk, devices electrically controlled and operated for revolving said ratchet disk, and automatically operated appliances electrically controlled for locking and unlocking the ratchet disk, substantially as set forth.

5. The combination of the main and branch rails of a railway, the rotary disk having in its face grooves adapted to alternately register with said main and branch rails when the disk is revolved continuously in the same direction, means independent of the railway car and operated through suitable electrical connections between the rails and the wheels of the car for automatically revolving said disk at predetermined times and throughout certain arcs and always in the same direction, and automatically operated appliances electrically controlled for locking the disk in position and for releasing the same, substantially as set forth.

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

CHARLES M. FITCH.

Witnesses:
F. W. SMITH, Jr.,
J. S. FINCH.