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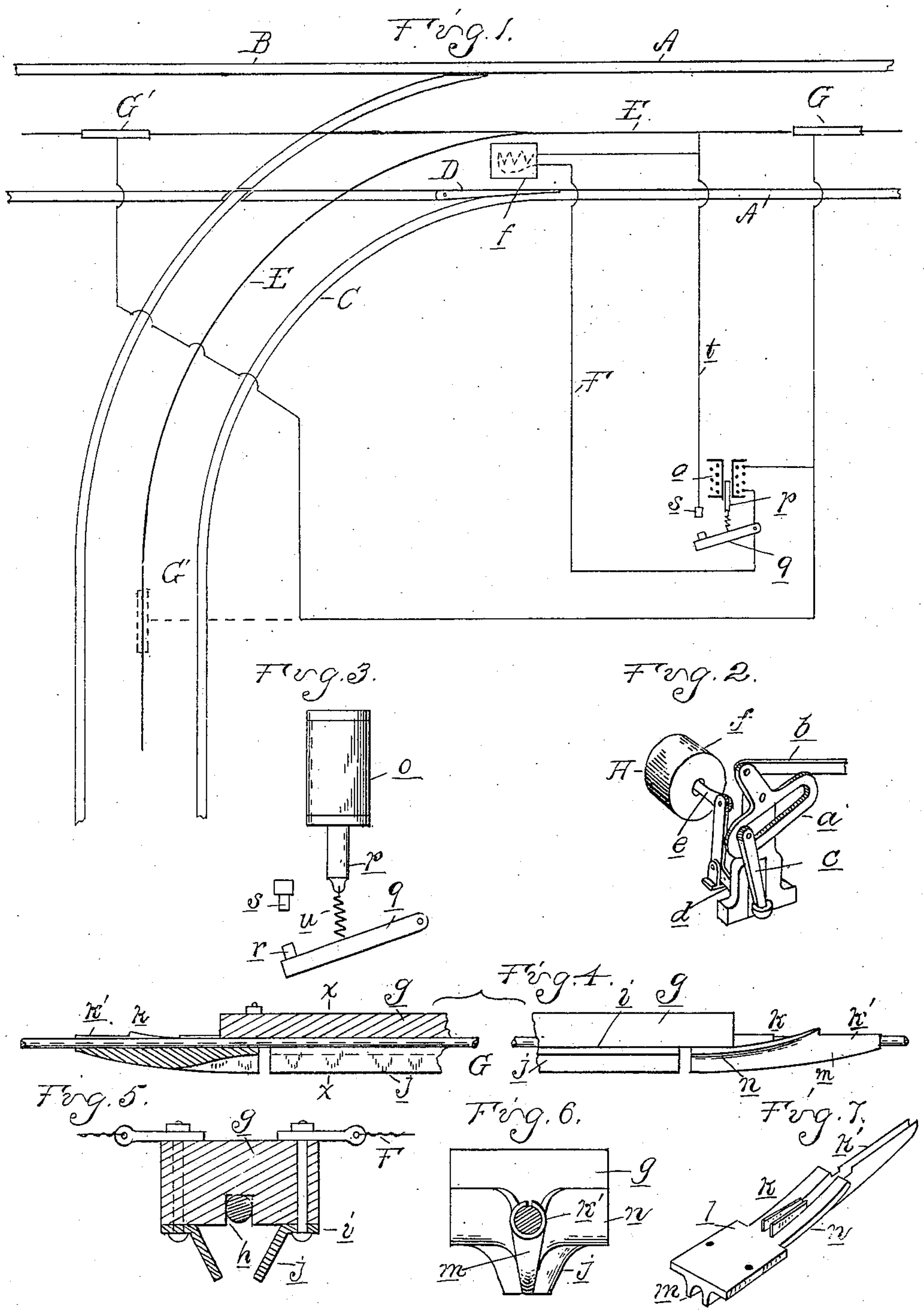
F. A. RUFF.

SWITCH OPERATING MECHANISM.

(Application filed Nov. 22, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

FREDERICK A. RUFF, OF DETROIT, MICHIGAN.

SWITCH-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 659,454, dated October 9, 1900.

Application filed November 22, 1898. Serial No. 697,180. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK A. RUFF, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Switch-Operating Mechanism, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to electric-railway switches of that class in which the switch-operating circuit is closed through an insulated section of the trolley-conductor and the motor-circuit on the car.

The invention consists in the peculiar construction of the insulated section; further, in the means employed for maintaining one of the branches of the switch normally closed, so that cars may pass thereon without any attention on the part of the motorman to the condition of the switch; further, in the peculiar construction of the controller for guarding the switch-operating magnets, all as more fully hereinafter described and claimed.

In the drawings, Figure 1 is a diagram plan of a railway-switch to which my device is applied. Fig. 2 is a diagram perspective view of the alternately-reversing operating mechanism. Fig. 3 is an elevation of the controller. Fig. 4 is a sectional elevation of the insulated conductor-section. Fig. 5 is a cross-section thereof on line $x\ x$. Fig. 6 is an end elevation of said insulated section, and Fig. 7 is a perspective view of one of the end approaches.

A is the main track, leading to the switch.

B and C are the branch tracks beyond the switch.

D is the movable rail or switch-point, and E is the trolley wire or conductor.

The switch-point D is operated by electro-magnetically-actuated mechanism H, which is so constructed that it will alternately throw said point in opposite directions. This mechanism forms no part of my present invention and may be of any suitable construction; but in Fig. 2 of the drawings I have shown it as comprising a walking-beam lever *a*, connected by the link *b* to the switch-point, the pitman *c* having a traveling connection at its upper end with said beam and its lower end resting on a lever *d*, which is connected to the movable core *e* of a solenoid *f*, all so arranged that when an electric current is passed through the solenoid it will cause the lever *d* to raise the pitman *c* and tilt the walking-beam *a*, and when the solenoid is deënergized the pitman will travel by gravity to the opposite end of the beam into a position to tilt it in the opposite direction upon a subsequent actuation. The solenoid *f* is included in an electric connection F, which leads from the live trolley-wire or other source of electrical energy to an insulated section G of the trolley-wire, the latter being of the following construction.

g is a strip of insulating material, preferably wood, which on its under side is provided with a longitudinal groove *h*, adapted to receive the trolley-wire. On each side of this groove is secured a conductor-plate *i*, preferably secured by screws or bolts to the insulator-strip and adapted to contact with the flanges of the trolley-wheel when passing thereunder. These plates are provided with downwardly-extending guide-flanges *j*, preferably inclining inwardly, but leaving sufficient space between the two to permit of the passage of the trolley-wire. At each end of the strip is detachably secured an approach *k*, preferably formed of a metallic strip having a groove on its upper side to receive the trolley-wire and thin flanges *k'* on each side thereof adapted to be turned over the wire and form the securing means for the section. At its inner end each approach is provided with a plate *l*, adapted to be bolted or otherwise detachably secured to the insulator-strip *g* in line with but separated from the conductor-plates *i*.

m is a central rib at the inner end matching with but separated from the flange *j* on the plates *i* and tapering therefrom to the trolley-wire at its outer end.

n represents inclined side flanges which lead from the plate *l* outward and upward and form the runways for directing the flanges of the trolley onto the conductor-plates *i*. The section G thus constructed may be readily placed at any point to the trolley-wire by first placing the insulator-strip *g* over the wire which enters the slot between the flanges *j* and engage with the groove *h* in the strip. The approaches *k* are then secured to the ends of the strip with the trolley-wire lying in the grooves therein, after which the thin flanges k' are bent around the wire and secure the section in position. To hold the section G from turning around the trolley-wire, stay-wires are secured to each side thereof, and these wires I utilize for forming the conductor F.

In the construction of electric-switch-operating devices of the class to which mine belongs difficulty has been experienced in providing operating-electromagnets that will work equally well under all conditions. This is because the current passing through the conductor F varies greatly in quantity or amperage from time to time, due to the varying demands of the car-motor which is included in the same circuit. Thus if the car when traveling at a uniform speed passes over the insulated section G a certain quantity of current will pass through the circuit F; but if the car should stop on or just before reaching the section G and should then pass over it while getting under headway the quantity of current passing through the circuit would be greatly increased. A switch-operating magnet constructed to work under these varying conditions of current would be an expensive and cumbersome thing, and, moreover, when used with a large current would exert such a power as to endanger the rest of the mechanism. So to avoid the difficulty I place in circuit with a switch-operating magnet constructed to operate with the minimum current a second or controller magnet capable of safely carrying the maximum current and adapted to cut out said switch-operating magnet when the current becomes excessive. This controller preferably comprises a solenoid O, the movable core p of which is connected to the switch-lever q, carrying the contact r and adapted when operated to move said contact against the contact s and close the shunt t around the switch-magnet. Inasmuch as the controller must operate under the varying conditions of current above mentioned, the force with which the contacts r and s are thrown together also varies, and the difficulty here arises that with a heavy current there is danger of breaking the contacts, which are preferably formed of carbon. To overcome this I employ a check or retarding spring u for the switch-lever, which prevents the sharp blow of one contact against the other, and this spring I preferably interpose between the movable core p and the lever g, as shown in Fig. 1.

The operation of electric switches of this description is well known, and I shall therefore only briefly describe the operation of mine as follows: When the switch is to be thrown, no attention is required from its motorman, as when the trolley passes the section G it will establish a circuit through the conductor F, which will operate the mechanism H and move the switch-point D. If, however, the switch is in the proper position, it is necessary for the motorman to shut off the current before the trolley reaches the section G and while passing thereby, although it is not necessary to stop the car. It frequently happens that railway-switches are placed at points where the majority of cars passing travel over one branch, while only an occasional one passes on the other branch. For such conditions I have devised an arrangement by which no attention as to the position of the switch is required by the motorman of the cars passing over either line. To effect this result I place beyond the switch on one of the branches a second insulated conductor-section G', similar to the section G and electrically connected therewith.

In Fig. 1 I have shown the section G' in full lines as placed on the branch B and in dotted lines as on the branch C, its position depending upon which of said branches is the more traveled one. Supposing the majority of the cars pass over the section B, the switch-point D is normally in a position to direct the cars on the branch C; but as each of the main-line cars passes over the section G it will throw the point into a position to direct the car on the branch B, and upon passing the section G' will restore the point again to its normal position. Thus the motormen on the cars passing over the main branch pay no attention to the switch, while those on the less-traveled branch uniformly shut off the motor in passing section G, and are thus directed onto the branch C without the necessity of observing the position of the point.

It is obvious that the opposite arrangement might be employed in which the main-line motormen would uniformly shut off their motors in passing the section G, while those on the branch line would run over the section with the current on.

What I claim as my invention is—

1. An insulated trolley-conductor section, comprising an insulator-strip grooved in its under side to receive the trolley-wire, conductor-sections secured to said strip on opposite sides of said groove adapted to contact with the flanges of the trolley and inclined approaches detachably secured to the opposite ends of said strip in line but out of contact with said conductor-sections, and forming the means for securing said insulated section to the trolley-wire.

2. An insulated trolley-conductor section, comprising an insulator-strip grooved on its under side to receive the trolley-wire conductor-sections secured thereto on opposite sides of said groove, and inclined approaches grooved on top to receive the trolley-wire and detachably secured to opposite ends of said insulator-strip in line but out of contact with said conductor-sections.

3. An insulated trolley-conductor section, comprising an insulator-strip grooved on its under side to receive the trolley-wire, conductor-sections secured to said strip on opposite sides of said slot, each having a downwardly-projecting guide-flange on its inner side, and inclined approaches adapted to be

secured to the trolley-wire, detachably secured to opposite ends of the said insulated section in line, but out of contact with said conductor-sections and having central ribs in line with said guide-flanges, and tapering down at their ends to the wire.

4. In an electric-railway switch, the switch-operating magnet and a controller-magnet in series connection therewith, adapted to close a shunt around said switch-operating magnet when the current exceeds a predetermined strength, in combination with an insulated section of the trolley-conductor to which one terminal of said series connection is attached, and the car-motor and its controlling rheostat and switch.

5. In an electric-railway switch, the combination with the switch-operating magnet of a controller-magnet in series connection therewith adapted to close a shunt around said switch-operating magnet when the current exceeds a predetermined strength, said controller comprising a solenoid and movable core, a switch-lever connected to said core and a check or retarding spring for the purpose described.

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

FREDERICK A. RUFF.

Witnesses:
JAMES WHITTEMORE,
HARRY SMITH.