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AUTOMATIC SWITCH MECHANISM FOR ELECTRIC LOCOMOTIVES.

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1,049,686. Patented Jan. 7, 1913.

Fig. 1.

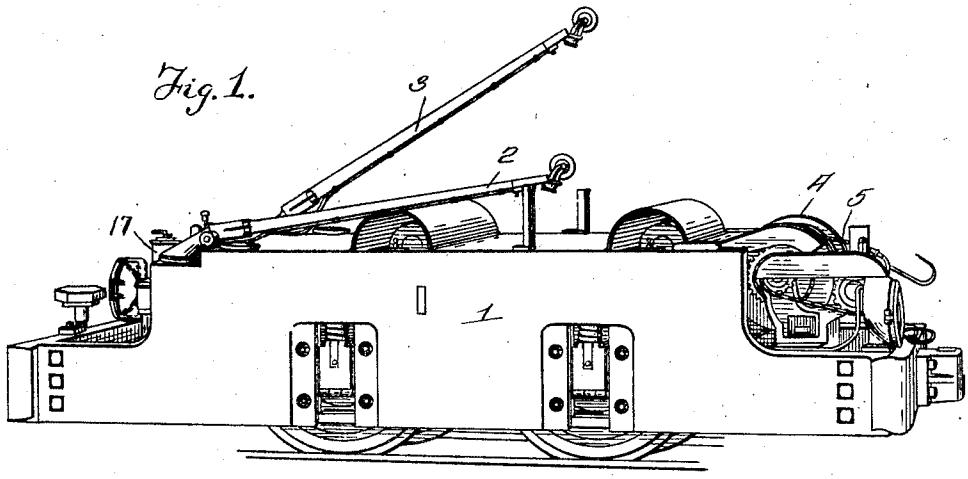


Fig. 2.

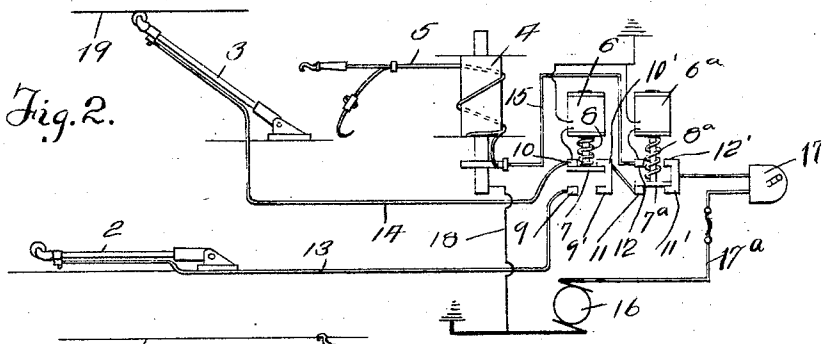


Fig. 3.

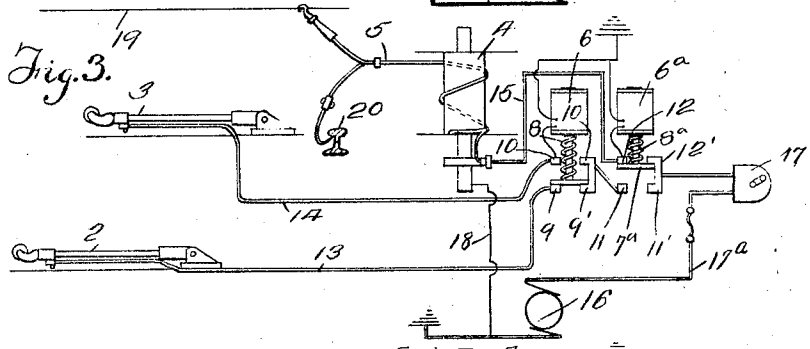
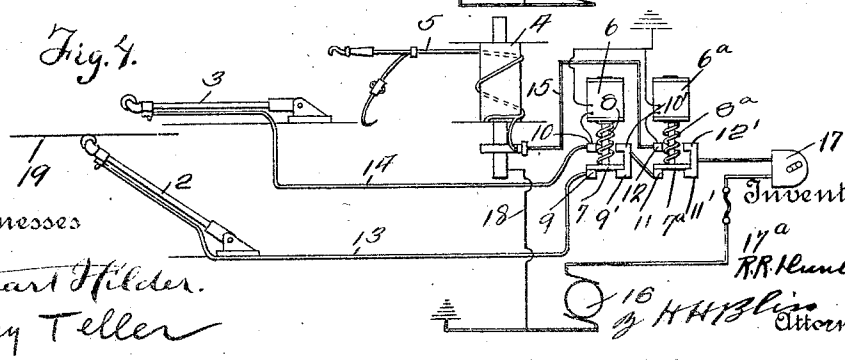


Fig. 4.



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AUTOMATIC SWITCH MECHANISM FOR ELECTRIC LOCOMOTIVES.

1,049,686. Specification of Letters Patent. Patented Jan. 7, 1913.

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To all whom it may concern:

Be it known that I, ROBERT R. DUNLOP, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Automatic Switch Mechanisms for Electric Locomotives, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to electric locomotives, and more especially to locomotives of the type in which use is made of a trolley mechanism for supplying current to the locomotive when it is on a track along which a trolley wire is strung, and of a cable reeling mechanism for supplying current to the locomotive when it is on a track not provided with a trolley wire. Locomotives of this class are commonly used in and about coal and similar mines. The side entries and rooms of these mines are usually provided with temporary tracks, but not with trolley wires, and the cable reeling mechanism is used when the locomotive is to enter one of these side entries or rooms. When a double conductor cable is used, one of the conductors is connected with the trolley wire in a main entry, and the other with the track which is bonded to provide a ground return. As the locomotive moves away from the point of attachment of the end of the cable, the cable is unwound from the reel. When the locomotive returns, the cable is automatically wound.

This invention relates especially to an improved circuit changing mechanism adapted to automatically connect the locomotive motor with either of two trolley mechanisms, or with the cable, in accordance with which of these devices is electrically energized, and to automatically disconnect and deënergize the current supplying devices (trolley mechanism or cable) which are not in use. In this way the locomotive operators and other workmen are protected from possible injury which might result from accidental contact with an energized current supplying device. A further and perhaps more important result of the deënergization of the current supplying devices which are not in use is the preventing of sparks which would occur in case an energized trolley were accidentally brought in contact with some external object such as the mine roof. In many mines explosive gases are met with and these would be fired by any sparks which might be formed. The main entries of a mine can usually be well ventilated and there is little danger of an explosion occurring from sparks caused at the trolley wire, but when the cable is in use and the locomotive is being run into a poorly ventilated side entry or room, it is very important that all possibility of sparks be eliminated.

Other points of novelty incident to my invention will be apparent from the following specification.

Of the drawings, Figure 1 is a perspective view of a locomotive of a type in connection with which my invention is adapted for use. Fig. 2 is a diagrammatic view of the electrical connections with one of the trolley mechanisms operative. Fig. 3 is a diagrammatic view of the electrical connections with the cable operative. Fig. 4 is a diagrammatic view of the electrical connections with the other trolley mechanism operative.

Referring to the drawings, 1 represents as a whole an electric locomotive which is provided with the trolley mechanisms 2 and 3 and with the cable reel 4 arranged to wind and unwind the cable 5. Either of the two trolley mechanisms can be used and two are provided in order that one may always be available at whichever side the trolley wire is located.

Referring to the switch mechanism diagrammatically indicated in Figs. 2, 3 and 4, 6 and 6^a represent two solenoids which are provided with cores at the outer end of which are armatures or contact bars, respectively indicated by 7 and 7^a. Coil springs 8 and 8^a serve to normally hold the bars 7 and 7^a in their outermost positions. 9 and 9′ indicate two electrical contacts adapted to be connected by the bar 7 when it is in outermost position. 10 and 10′ indicate another pair of contacts adapted to be connected by the bar 7 when it is in innermost position. It will be observed that the contacts 9′ and 10′ are permanently connected together. 11 and 11′ indicate two contacts adapted to be connected by the bar 7^a when in outermost position, and 12 and 12′ indicate two contacts adapted to be connected by the bar 7^a when in innermost position. It will be observed that the contacts 11′ and 12′ are permanently connected together. The trolley mechanism 2 is connected by

means of a suitable conductor 13 with one of the contacts 9 and 10 as, for instance, 9. The other trolley mechanism 3 is connected by means of a suitable conductor 14 with the other contact as, for instance, 10. One of the conductors of the cable is connected through a suitable conductor 15 with the contact 12 from which the bar 7^a is normally held separated by means of the spring 8^a. The contacts 9′ and 10′ are connected to the contact 11, and the contacts 11′ and 12′ are connected with the locomotive motor 16 by means of a suitable contact 17. The return from the motor is normally to the ground but, if desired, the cable may be provided with a return conductor to which the locomotive is connected by means of the conductor 18. Electrical connection is made from the contact 10 through the solenoid 6 to the ground, and a similar connection is made from the contact 12 through the solenoid 6^a to the ground.

In operation, let it be assumed that it is desired to supply current to the motor through the trolley mechanism 3. With this mechanism placed in contact with the trolley wire 19 in the usual way, a circuit to the ground is at once established through the solenoid 6. This solenoid, being thus energized, at once draws the bar 7 against the action of the spring 8 into the position shown in Fig. 2 to connect the contacts 10 and 10′, and thus complete the circuit through the motor. The bar 7 is maintained in the position shown so long as current is supplied through the trolley mechanism 3. It will be observed that, with the parts in this position, the trolley mechanism 2 and the cable 5 are entirely disconnected from the electrically energized parts and that there is therefore no danger to workmen from contact with them. When it is desired to supply current through the cable, one conductor of the cable is connected with the trolley wire, and if the cable is provided with a return conductor, this is connected with the rail 20, as indicated in Fig. 3. Electrical connection is at once established through the solenoid 6^a to the ground, and the bar 7^a is retracted against the action of the spring 8^a to connect the contacts 12 and 12′ and thus establish electrical connection through the motor 16. The parts are maintained in this position so long as the cable is energized. It will be observed that neither of the trolley mechanisms is electrically connected with the cable and that, therefore, no danger can result to an operator or workman from contact with them.

If it is desired to make use of the trolley mechanism 2, this is placed upon the trolley wire in the usual way, and communication at once established to the motor, no movement of the switches being necessary or possible in this case. It will be observed that here also the other trolley mechanism and the cable are entirely disconnected from the electrically energized parts of the apparatus.

What I claim is:

1. In an electric locomotive, the combination of a motor, a current supply conductor, two switches connected in series between the conductor and the motor, means for normally maintaining one switch open, means for normally maintaining the other switch closed, means controlled by the potential in the conductor for closing the first switch, a second current supply conductor, a third switch connected between the second conductor and the motor and means controlled by the potential in the second conductor for opening the second switch to disconnect the first conductor from the motor and for simultaneously closing the third switch to connect the second conductor with the motor.

2. In an electric locomotive, the combination of a motor, a current supply conductor, two switches connected in series between the conductor and the motor, means for normally maintaining the switch farther from the motor open, means for normally maintaining the switch nearer to the motor closed, means controlled by the potential in the conductor for closing the first switch, a second current supply conductor, a third switch connected between the second conductor and the motor and means controlled by the potential in the second conductor for opening the second switch to disconnect the first conductor from the motor and for simultaneously closing the third switch to connect the second conductor with the motor.

3. In an electric locomotive, the combination of a motor, two separate current supply conductors for the motor, a normally open switch between one conductor and the motor, means controlled by the potential in the said conductor for closing the switch, a second normally open switch between the second conductor and the motor, a third normally closed switch between the first switch and the motor, and means controlled by the potential in the second conductor for closing the second switch and for opening the third switch simultaneously with the closing of the second.

4. In an electric locomotive, the combination of a motor, three separate supply conductors for the motor each adapted to contact with a main current conductor such as a trolley wire, a system of switches interposed between the conductors and the motor, and automatically operating switch controlling means arranged for establishing to the motor electrical connection with any one conductor and for disconnecting from the motor all of the other conductors, when the said one conductor is in contact with the main conductor and is therefore at a relatively high potential and when the said

other conductors are not in contact with the said main conductor and are therefore at relatively low potential.

5. In an electric locomotive, the combination of a motor, three current supply conductors for the motor, the first of which is normally connected therewith, means controlled by the potential in the second conductor for disconnecting the first and connecting the second, and means controlled by the potential in the third conductor for disconnecting the first and second and connecting the third.

6. In an electric locomotive, the combination of a motor, a current supply conductor, a pair of switches one pole of each of which is connected with the motor, the other pole of one being connected with the conductor, means controlled by the potential in the conductor for opening one switch and simultaneously closing the other, two other current supply conductors, 2 and 3, a second pair of switches one pole of each of which is connected with the other pole of the other switch of the first pair, the other pole of one switch of the second pair being connected with one of the conductors 2 and 3 and the other pole of the other switch of the second pair being connected with the other of the conductors 2 and 3, and means controlled by the potential in one of the conductors 2 and 3 for opening one switch of the second pair and simultaneously closing the other.

7. In an electric locomotive, the combination of a motor, two separate trolley mechanisms, a conductor cable with a winding device, means for automatically connecting one trolley mechanism with the motor and disconnecting the other when the first said mechanism is in contact with a trolley wire and is therefore energized and when the second said mechanism is not in contact with a trolley wire and is therefore not energized, and means for automatically connecting the cable with the motor and disconnecting both of the trolley mechanisms from the motor when the cable is in contact with a trolley wire and is therefore energized and when the trolley mechanisms are not in contact with a trolley wire and are therefore not energized.

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

ROBERT R. DUNLOP.

Witnesses:
DUDLEY T. FISHER,
W. E. HAMILTON.