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COMPLETE SPECIFICATION

Improvements in the Remote Control of Electric Motors Operating Toy Locomotives and the like

We, SOCIÉTÉ INDUSTRIELLE DE
FERRBLANTERIE, a limited company
organised under the laws of the French
Republic, of 39, Boulevard Beau-
marchais, Paris, Seine, France, do here-
by declare the nature of this invention
and in what manner the same is to be per-
formed, to be particularly described and
ascertained in and by the following state-
ment:—

This invention relates to apparatus for
the remote control of a toy locomotive or
the like, driven by an electric motor and
provided with an electromagnetically
operated reversing switch, of the type
comprising a distant controller which is
operable in two alternative modes to stop
the locomotive, viz. (a) in a mode which
reduces the voltage applied to the loco-
motive to a minimum value sufficient to
stop the motor without operating the re-
versing switch so that when the motor is
restarted the locomotive will travel in the
same direction and (b) in a mode which
breaks the circuit to the locomotive so
that, when the circuit is re-established,
the reversing switch will be operated to
reverse the locomotive.

An apparatus of the above type has
been proposed in which the motor is
energised from the track and has a fixed
magnet with single winding through
which current is passed in one or the
opposite direction according to the posi-
tion of the reversing switch, and in which
the controller has two switches, one of
which is operable to reduce the voltage
applied to the aforesaid minimum value
and the other of which is operable to
break the circuit to the locomotive.
According therefore as to which of the
two controller switches is operated, the
locomotive will start again in the same
direction or in the reverse direction.

The invention provides an apparatus of

the above type, in which the field magnet
of the motor is provided with two alter-
native windings, one serving for forward
and the other for reverse operation of the
motor, and in which the reversing switch
serves, according to its position, to sup-
ply current to one or the other of the two
windings.

In a preferred form of the invention
the locomotive is energised from the track
and the controller has but a single switch
which is movable to alternative stopping
positions, in one of which the voltage
supplied to the track is reduced to a value
insufficient to operate the motor but suf-
ficient to prevent operation of the revers-
ing switch and in the other of which the
supply to the track is interrupted, so that
the reversing switch will be operated, by
re-energization of the electromagnet, when
the voltage supply to the track is
resumed.

The mechanical system for operating
the reversing switch may be of any appro-
priate type. It is only necessary that it
should be capable of directing the cur-
rent alternately to one or the other of the
field windings of the motor, each time an
electrically controlled movable member is
shifted, for example the armature of an
electromagnet.

The accompanying drawing shows dia-
grammatically one form of apparatus
according to the invention. In the
drawing:—

Fig. 1 shows the controller, which in-
cludes a supply transformer and an
associated switch arm and contact studs,
and

Fig. 2 shows the motor and associated
reversing device on the locomotive.

In these figures, a transformer, con-
nected for example to a 110 volt supply
and having a primary winding 1 and a
secondary winding 2, supplies current to

[Price 2/-]

the track 3 through a switch comprising a wiper-arm 4 rotating on a pivot 5 and a number of contact studs 6—9 providing different speeds of operation. On opposite sides of this bank of studs are arranged two other studs, 10 and 11, serving respectively for stoppage without reversal, and for stoppage with reversal. So long as the wiper-arm 4 is moving over the studs 6 to 9 and 10, it remains, by means of its tail, in contact with a conducting strip 12 in series with the track circuit, but it leaves said strip when it moves on to the stud 11. When the wiper-arm engages stud 10, for stoppage without reversal, the current supplied by the secondary of the transformer passes through the resistance 13 and the voltage across the track is lowered to about 5 volts. This reduced voltage is likewise applied to the track when the switch arm 4 is moving from one to another of the studs 6—9 and is positioned between an adjoining pair of studs 6—9.

The motor of the locomotive has a field magnet provided with two windings 14—15, serving respectively for forward and for reverse operation, which windings are connected to two contacts 16, 17, one or other of which is connected to the return line 30, according to the position occupied by a switch member 19 actuated by a rocking pusher finger 20. The armature of the motor (not shown) is disposed between contacts 31, 32 and contacts therewith by means of brushes. When therefore the switch member 19 occupies the position shown in Fig. 2 current passes from the track brush 18 through the forward winding 14 to the return line 30. When, however, the switch member 19 is moved about its pivot 24 into contact with the contact 17, the circuit is completed through the reverse winding 15 instead of the forward winding 14.

The finger 20 is pivoted at 25 to a slide 26 which is supported for endwise sliding movement by a guide (not shown) which is urged to the right, as seen in Fig. 2, by a spring 21, and which coacts with an armature 22.

The operation of the reversing device is as follows:—

Assuming that the reversing device is in the position shown in Fig. 2, when the wiper-arm 4 is on the stud 10, the current flowing through the winding 14 is too weak to drive the motor of the locomotive and the same remains stationary, but said current is sufficient to hold the armature 22 in the position A (incontinuous lines). When the wiper-arm 4 is moved on to the stud 6, the current no longer flows through the resistance 13, so that its voltage is raised to about 10 volts; the motor

begins to operate and the locomotive starts in the forward direction since the switch member 19 is on contact 16.

The studs 7, 8 and 9 give higher voltages which enable higher speeds to be obtained.

When the wiper-arm 4 is moved on to the stud 11, the current is cut off, which has the effect of stopping the flux in the electromagnet 23, and the spring 21 is able to move the slide 26 to the right and therefore the armature 22 to the position B shown in chain-dotted lines, Fig. 2.

As soon as the wiper-arm is again moved on to any of the studs 6—10, the current will again flow through the track and the electromagnet 23 attracts the armature 22, which pushes the slide 26 to the left. While the slide 26 was withdrawn to the right, the spring 21 brought the pusher 20 into alignment with the slide, and as the armature 22 returns the slide 26 to the left the pusher 20 engages the upper of two notches 29 in the switch member 19, thereby rocking it anti-clockwise away from contact 16 and into contact with the contact 17 which supplies the reverse winding 15 of the field magnet. Reversal of operation is thus obtained.

Thus, if the wiper-arm 4 is moved from one of the studs 6 to 9 on to the stud 10, the train stops, but starts again in the same direction when said wiper-arm is again moved on to one of said studs.

When, on the other hand, the wiper-arm 4 is moved on to the stud 11, the electromagnet 23 is de-energised and the slide 26 can move to the right, reversing the position of the switch member 19 as it returns on re-energisation of the electromagnet 23. As the finger 20 is returned by the spring 21 into alignment with the slide 26 each time the electromagnet 23 is de-energised, it alternatively coacts, on re-energisation of the electromagnet, with the upper and lower notches 29 of the switch member 19 to change the position of the switch member.

It should be observed that the stud 11 (stoppage with reversal) is adjacent the stud 9 (maximum voltage stud). The switching from the stud 11 to the stud 9, which causes the armature 22, slide 26, finger 20 and switch-member 19 to operate, is effected under the most advantageous conditions, i.e. with the maximum potential difference, producing a strong attraction of the armature. Satisfactory operation is thus definitely obtained.

The apparatus according to the invention has the following advantages:—

1. Reliability of operation. Further—

more, owing to the provision of two field windings, only one contact is necessary in order to obtain the reversal, which is a considerable advantage over the double contact of the normal reversing devices.

2. The stability of the direction of operation is ensured by the fact that only a very low voltage, less than 5 volts, is required to hold the armature of the reversing device in position.

3. So long as the wiper-arm of the transformer remains on the studs 6—10, stoppage and operation, at various speeds, in a predetermined direction are obtained. The change of the direction of operation is only obtained by moving the wiper-arm on to the stud 11.

4. The construction of the device is remarkably simple since it comprises, in all: the electromagnet and its movable parts, a transformer and associated wiper-arm, and a small 30-ohm resistance.

5. The bulk of the reversing gear proper can be reduced to approximately the following dimensions: $40 \times 15 \times 20$ mm., hence the possibility of using it in a miniature 00-gauge locomotive or driving coach.

6. The fact of retaining a current of low voltage in the track, even while the locomotive is stationary, makes it possible to add to the network accessories of which the operation is permanently ensured, save simply for the small current breaks which occur at each change of direction of operation. This fact can be exploited with advantage for luminous accessories such as lamp standards, signals, projectors, and the like, or for any other kind of accessories.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Apparatus of the type specified for the remote control of a toy locomotive or

the like driven by an electric motor, in which the field magnet of the motor is provided with two alternative windings, one serving for forward and the other for reverse operation of the motor, and in which the reversing switch serves, according to its position, to supply current to one or the other of the two windings.

2. Apparatus as claimed in Claim 1, in which the locomotive is energised from the track and in which the controller has but a single switch which is movable to alternative stopping positions, in one of which the voltage supplied to the track is reduced to a value insufficient to operate the motor but sufficient to prevent operation of the reversing switch and in the other of which the supply to the track is interrupted, so that the reversing switch will be operated, by re-energisation of the electromagnet, when the voltage supply to the track is resumed.

3. Apparatus as claimed in Claim 2, in which the switch arm has two contacts, one moving over a continuous contact strip and the other movable over a series of spaced contact studs providing for different track voltages, the first contact supplying, when it is in contact with the strip and the second contact is out of engagement with the contact studs, the aforesaid reduced track voltage through a resistance which is rendered inoperative when the second contact contacts with a contact stud and the first contact being movable off the strip to break the supply circuit to the track.

4. Apparatus for the remote control of a toy locomotive driven by an electric motor substantially as described herein with reference to the accompanying drawings.

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[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1

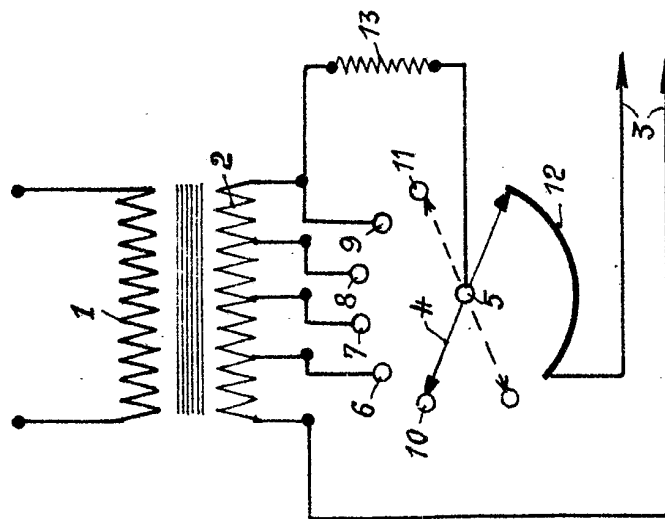


Fig. 2.

