Sept. 10, 1935. E. D. BOISSELIER 2,013,947

REMOTE CONTROL FOR TOY ELECTRIC VEHICLES

Filed March 9, 1934 3 Sheets-Sheet 1

Fig. 1.

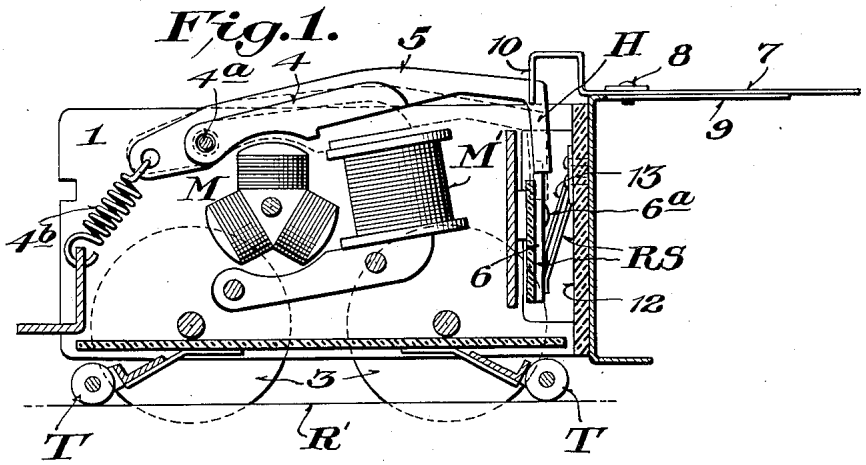


Fig. 2.

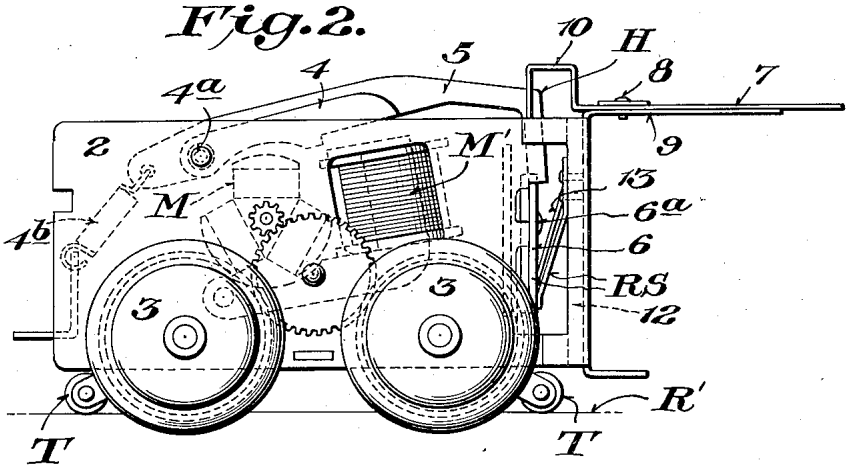
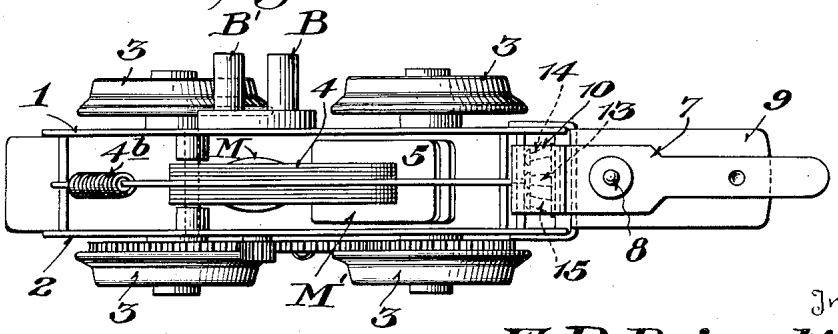


Fig. 3.



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REMOTE CONTROL FOR TOY ELECTRIC VEHICLES

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Fig.4.

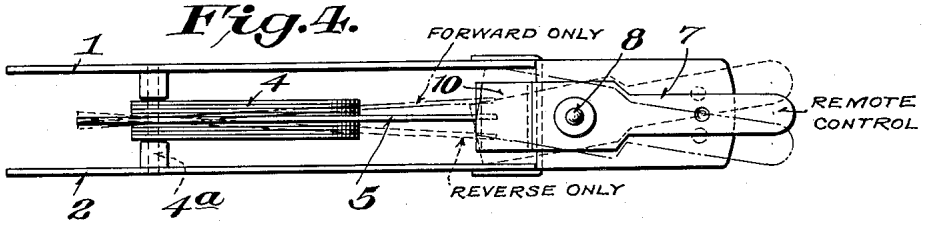


Fig.5.

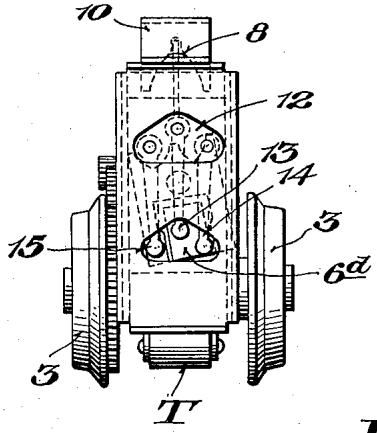


Fig.8.

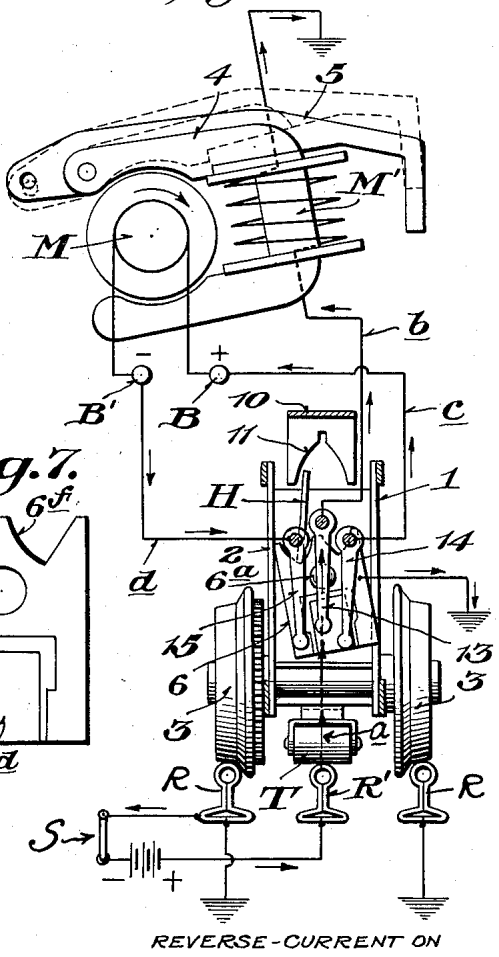


Fig.7.

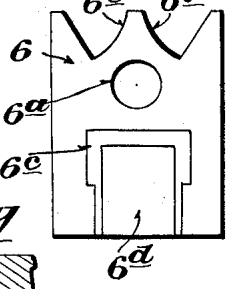
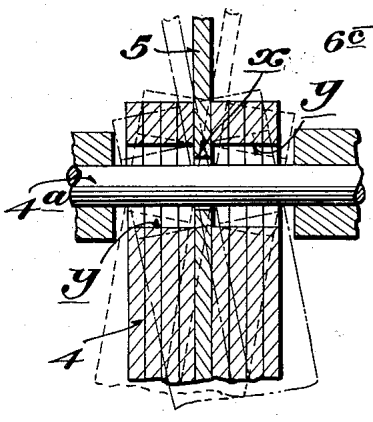


Fig.6.



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REMOTE CONTROL FOR TOY ELECTRIC VEHICLES

Filed March 9, 1934 3 Sheets-Sheet 3

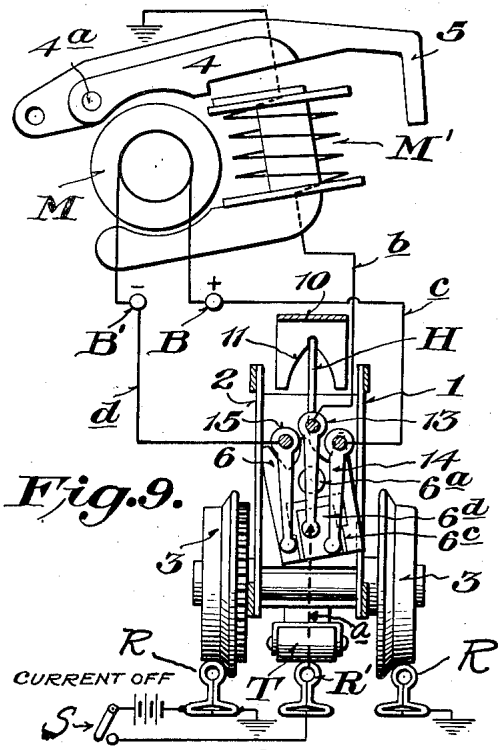

Fig.9.

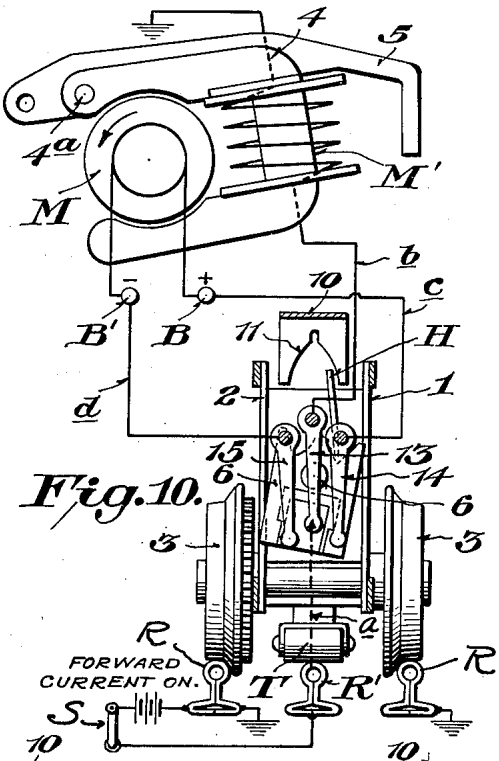

Fig.10.

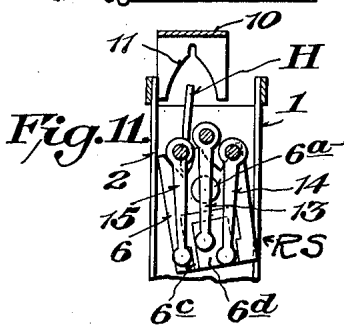

Fig.11.

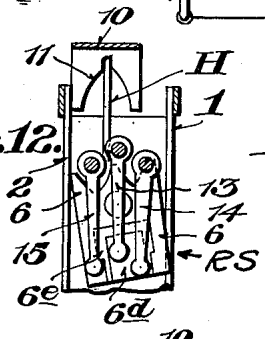

Fig.12.

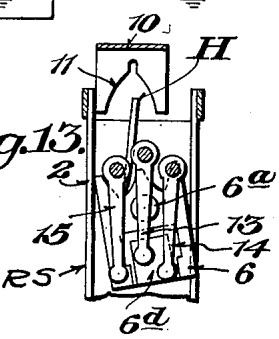

Fig.13.

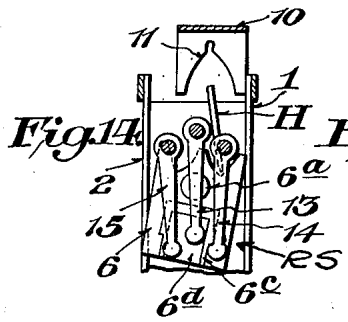

Fig.14.

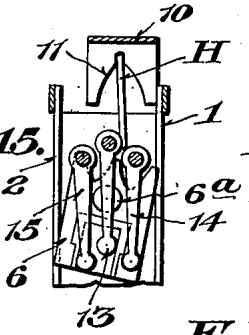

Fig.15.

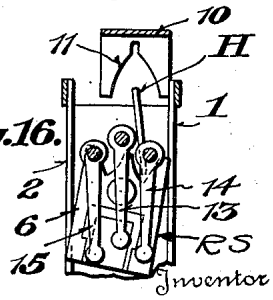

Fig.16.

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Patented Sept. 10, 1935

2,013,947

UNITED STATES PATENT OFFICE

2,013,947

REMOTE CONTROL FOR TOY ELECTRIC VEHICLES

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Application March 9, 1934, Serial No. 714,879

9 Claims. (Cl. 104—151)

This invention relates to toy electric locomotives, and more particularly to an improved remote control mechanism whereby the locomotive may be caused to move forward or backward by merely switching the current supply on and off.

A primary object is to provide a reversible motor of the split field type wherein movement of a part of the field will directly actuate a reversing switch, thereby eliminating the necessity of providing a special solenoid or coil and other accessories necessary thereto, and consequently effecting simplicity and economy in manufacture and assembly while insuring positive and reliable operation in service. Although locomotives have been heretofore proposed along the lines referred to, nevertheless, they do not involve a structure wherein the reversing switch is operated directly by a movable pole piece which forms part of the split field, but on the contrary employ means intermediate the movable part of the field and the switch, such as levers, pawls, ratchets, cams and the like which not only add to production cost but also provide more cause for failures in service. Moreover, prior devices do not provide for free movement of the movable pole piece under all conditions of use, namely alternate forward and backward movement of the locomotive, or forward only or reverse only, but propose in order to accomplish the two last named functions to lock the movable pole piece in place so that it becomes, in effect, no longer a movable switch actuator, but simply a part of the permanent field. This feature of locking the movable part of the field to accomplish movement in one direction only is undesirable because it requires two manual adjustments to effect forward movement only and two similar adjustments to effect reverse movement only. These two movements are first the locking down of the otherwise movable pole piece and second, the manual reversal of the current changing switch to change the polarity of the motor brushes. The present invention removes this objection by providing a single selector means that permits the movable part of the field to always move in response to field energization at all times, and the movement of the pole piece itself automatically effects change in the position of the switch to cause alternate reversal of the motor, or continuous forward or continuous backward movement of the car or locomotive, according to the setting of the selector means.

Accordingly, the invention has for one of its special objects a construction wherein the movable pole piece of the motor field directly engages the reversing switch thus imparting direct actuating force from the motor field to the switch, thereby insuring efficient operation and eliminating extra or intermediate parts.

Another object is to provide a selector for positioning and guiding the movable pole piece in its movement toward the switch whereby the operator may set the apparatus to move alternately forward and backward on successively opening and closing the motor supply circuit, or to move either forward or backward only as desired.

A further object is to provide a novel movable switch actuating pole piece having a plurality of laminations, one of which is projected or extended forward to provide a switch engaging head. Furthermore, the pole piece is provided with a novel pivotal mounting whereby it may move in a vertical as well as horizontal plane thereby to effect switch movement and also respond to the setting of the selector means.

With the above and other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawings and defined in the appended claims.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is a vertical sectional view of a motor embodying the present improvements.

Figure 2 is a side elevation thereof.

Figure 3 is a top plan view.

Figure 4 is a diagram illustrating the several positions of the selector.

Figure 5 is an end elevation of the propulsion unit involving the present improvements.

Figure 6 is a detail cross-sectional view on an enlarged scale showing the manner of mounting the movable pole piece for vertical and horizontal movement.

Figure 7 is a plan view of the oscillatable plate of the reversing switch.

Figures 8, 9 and 10 are diagrammatic views showing the circuits involved when the selector is set in its middle or remote control position, and respectively showing the current "on"—"off"—"on".

Figures 11, 12 and 13 are diagrammatic views illustrating the position of the selector and the reversing switch when the selector is set for reverse only.

Figures 14, 15 and 16 are diagrammatic views illustrating the position of the selector and the

reversing switch when the selector is set for forward only.

Similar reference characters designate similar parts in the several figures of the drawings.

According to the embodiment shown in the drawings the vehicle propelling unit comprises a frame including side plates 1 and 2 suitably held together in spaced relation and having the wheels 3 adapted to travel on the rails R—R of a track having a central conductor or third rail R'. The latter rail is shown as being connected to the positive side of a source of current and the wheel engaging rails are connected to the negative or ground side of the circuit which includes a master switch S. Although the source of current supply is shown as a battery, nevertheless, it will be understood that the invention is usually practised with a step down transformer connected to a standard house current supply line, and therefore the illustration is merely conventional.

The switch S is intended to control the supply of current to the track and through the trolley T to a reversible motor M mounted between the plates 1 and 2 of the frame. The armature of the motor is supplied with current by the brushes B and B' and the motor field includes a rigid piece 4—5 for directly engaging and actuating the oscillatable member 6 of the reversing switch RS as will presently appear more in detail.

The switch actuating pole piece 4 is pivotally mounted at one end on a support 4^a and is impelled in a counter-clockwise direction by a spring 4^b when the field magnet M' is de-energized. On the other hand when the master switch S is closed, the magnet is energized and the pole piece 4—5 is drawn downwardly. Successively opening and closing the master switch S therefore effects operation of the movable pole piece to move the shiftable part 6 of the reversing switch RS. The circuit connections will be later described, and with this preliminary description the particular novel features will now be discussed.

The switch actuating pole piece 4—5 which directly operates the oscillatable reversing switch plate 6, comprises a series of laminations of soft iron. One of these laminations, namely the central one, 5, is projected or extended beyond the laminations comprising the body 4 of the pole piece and is shaped to form a downwardly directed head H lying beyond the motor field. The rear end of the central lamination is provided with an opening x to receive the support 4^a and the adjacent laminations are formed with openings y of larger diameter so that the entire pole piece may shift or swing laterally or sidewise on the support as well as move vertically, or up and down. With this arrangement, it will be apparent that the head H of the pole piece may have a relatively wide arc or amplitude of movement thereby to permit the pole piece to be moved laterally to engage with the oscillatable plate 6 in the chosen manner. That is to say, the head of the pole piece is intended to engage the oscillatable plate 6 in such a way as to cause alternate reversing of the direction of travel of the vehicle on successively opening and closing the master switch S or cause it to move in one direction only according the position in which the head H is held by the manually set selector 7.

The selector 7 is preferably a lever frictionally pivoted at 8 on a bracket 9 carried by the motor frame and having a handle portion at one end while the opposite end 10 is forked or notched as at 11 to receive the head H. When the selector is set in the full line position shown in Fig. 4 the successive opening and closing of the master switch S will change the current through the motor due to alternately shifting the plate 6 and cause the vehicle to alternately move backward and forward. On the other hand, when the selector is moved to the right or left of the full line position in Figure 4 to either of the dotted line positions, the successive opening and closing of the master switch will cause movement of the vehicle backward or forward only as the case may be. The setting of the selector and consequently the position of the head H to accomplish successive forward and reverse movement of the vehicle is shown in Figures 8, 9 and 10. Figures 11, 12 and 13 show the position of the selector to cause the head H of the pole piece to engage the plate 6 to effect reverse movement of the vehicle only, and, similarly Figures 14, 15 and 16 show the position of the parts to effect forward movement only.

The reversing switch RS includes the plate 6 previously referred to and which is pivoted at 6^a to a metallic part of the motor frame which, of course, is in the ground side of the circuit due to the fact that the frame is grounded through the wheels 3 to the rails R—R. The plate 6 is preferably mounted on a piece of insulation 6^b and is cut away at 6^c to receive a metallic insert 6^d which is isolated and insulated from the body of the plate so that it may provide a "positive" contact as distinguished from what may be termed the "negative" contact of the plate, namely the body of the plate itself since it is grounded to the frame and therefore in the negative side of the circuit. The upper edge of the plate 6 is formed with substantially V-shaped notches the apices of which lie in planes at opposite sides of the pivot 6^a. The inner sides 6^e and 6^f of these notches provide downwardly divergent cam surfaces adapted to be alternately engaged by the head H of the pole piece 4—5 to shift plate from side to side, providing, of course, that the selector 7 is positioned at its middle setting. If the selector is set to either side of center, the head H will engage the same cam edge on successive downward movements and therefore refuse to move the plate, thereby causing movement in one direction only due to the fact that the current is not reversed unless the plate is oscillated or shifted.

The reversing switch also includes the insulation block 12 carrying a fixed central spring terminal 13 and the fixed side terminals 14 and 15. The central terminal may be termed "positive" because it is connected to the third rail R' through the trolley T and always engages the isolated positive contact 6^d of the plate. The side terminal springs 14 and 15 may be termed "brush" terminals since they are connected to the brushes B and B' respectively and may be alternately positive or negative according to whether or not they engage the "positive" contact 6^d or the "negative" body 6 of the plate.

As above indicated, the central terminal 13 is connected by wire a to the trolley T as indicated in Fig. 8 and also connected by wire b to the magnet M' of the motor field. The magnet is in turn grounded to the frame. The terminal 13 is furthermore, always in engagement with the positive contact 6^d of the oscillatable plate 6 in all positions of the plate. The terminal 14 is connected by wire c with brush B and terminal 15 is connected by wire d with brush B' and the brushes supply current to the armature of the motor in the usual way.

Assuming that the selector 7 is set at its middle position, for alternate forward and reverse, that is "remote control", reference may be made to Figure 8. From this figure it will be seen that the notch 11 of the selector is positioned centrally over the pivot 6^a of the plate 6, and with the current "on" due to the closing of the master switch S, the head H will be pulled and held down into the valley of the notch in the plate 6 having the cam face 6^e. This will cause the locomotive to move in a reverse direction, as long as the switch S is closed and the current will flow as follows:—From the source to the third rail R' and from thence to the trolley T. From the trolley, the current passes through wire *a* to center terminal 13 where it divides and goes to magnet M' through wire *b* and also to the contact 6^d of the shiftable plate 6. The brush terminal 14 picks up current from 6^d and passes it through wire *c* to brush B' from whence it passes through the motor armature and returns to brush B. From B the current passes over wire *d* to terminal 15 which is in engagement with the ground contact 6, namely the body of the oscillatable plate. The circuit is thus completed to the negative side of the source through the motor frame and rails R—R.

When the master switch S is opened, the current is cut off as shown in Fig. 9, and the magnet M' is disenergized. Thus the pole piece 4—5 is released to the pull of spring 4^b and the head H is positioned in the valley of the notch 11 of the selector. The reversing switch at this time occupies the position shown in Figure 9.

Suppose the circuit is again closed at master switch S. The magnet M' is immediately energized and pulls the pole piece 4—5 and consequently the head H down as shown in Figure 10. On this downward stroke of the head H the cam edge 6^f of the plate lies in the path of the head and the latter therefore shifts the plate 6 from the position shown in Figure 9 to the position shown in Figure 10. The polarity of the brushes B and B' is thus reversed and the vehicle will travel forward. The current to the armature is reversed due to the fact that terminal 14 is now in engagement with the grounded plate 6 while the terminal 15 is in engagement with the contact 6^d which is supplied with positive current by terminal 13.

Now, if the selector 7 is moved to either one of the dotted line positions shown in Figure 4, the pole piece 4—5 will be moved to one side or the other of its central remote control position. And, if the selector is moved to the position of reverse only the notch 11 thereof will assume the position shown in Figures 11, 12 and 13 until it is changed. When the parts are positioned as shown in these latter figures, the motor will continuously run in a reverse direction because each time the field magnet is energized by successive closings of the master switch, the pole piece 4—5 and its head H will move continuously into the notch of the plate 6 having the cam edge 6^e. In other words the head H cannot, in any downward stroke, pass to the other side of the zenith of the cam edges 6^e and 6^f to engage the edge 6^f.

If the selector lever 7 is moved to the position of forward only, the end 10 of the lever having the notch 11 will be positioned as shown in Figures 14, 15 and 16 and the downward strokes of the pole piece 4—5 and the head H will be directed against the cam edge 6^f. Since this action makes no change in the position of the plate 6 of the reversing switch RS, the motor will drive the vehicle continuously forward. Each time the current is cut off at the master switch, the field magnet is de-energized and the spring 4^b lifts the head H into the fork of the notch 11 and upon re-energization of the motor field, the side of the notch 11 which opposes lateral head movement will guide the head into engagement with the cam edge 6^f.

From the foregoing it will be apparent that the selector 7 is readily available to choose the desired type of operation in a simple and practical manner. Furthermore, the simplicity and sturdiness of the relatively few parts contributes to efficient and reliable operation which is essential in a toy of this type.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood, that changes in the form, proportion and minor details of construction may be resorted to, without departing from the spirit of the invention and scope of the appended claims.

I claim:—

1. In a toy locomotive, means responsive to remote control of the current supply to the armature and field of the electric motor of the locomotive to determine the latter's direction of travel; comprising, a shiftable switch for reversing the flow of current to the motor, a switch actuating pole piece constituting part of the motor field, said pole piece being pivotally mounted at one end and having its opposite end directly engageable with the switch, a spring for moving the pole piece away from the field coil when the latter is de-energized, and means for selectively setting the said pole piece with reference to the switch, whereby successive operating strokes of the pole piece due to successive energizations of the field magnet, will alternately reverse the motor or compel it to move in one direction only.

2. In a toy locomotive, means responsive to remote control of the current supply to the armature and field of the electric motor of the locomotive to determine the latter's direction of travel; comprising, a shiftable switch for reversing the flow of current to the armature of the motor, a switch actuating pole piece constituting part of the motor field, said pole piece being loosely mounted on its pivot whereby it may move vertically and laterally, a spring for moving the lever away from the motor field coil when the latter is de-energized, and means for selectively setting the free end of the pole piece which engages directly with the switch, whereby successive operating strokes thereof, due to successive energizations of the field magnet will alternately reverse the motor or compel it to move in one direction only.

3. In a toy locomotive, means responsive to the remote control of the current supply to the armature and field of the electric motor of the locomotive to determine the latter's direction of travel; including a pivot, an oscillatable switch member mounted thereon, a pivoted pole piece forming part of the motor field and having a switch engaging extension, said pole piece being loosely mounted on its pivot whereby the switch engaging extension may move in a vertical and horizontal direction, and selector means interconnected with the said extension of the pole piece for changing the relative position thereof

laterally with respect to the pivot of the oscillating switch member.

4. In a toy locomotive, means responsive to the remote control of the current supply to the armature and field of the electric motor of the locomotive to determine the latter's direction of travel; including, an oscillatable switch member, a loosely pivoted pole piece forming part of the motor field and having an actuating head in direct operative relation to the oscillatable switch, a spring for urging the pole piece away from the field magnet of the motor when the latter is de-energized, and a selector arm interconnected with the said head of the pole piece and adapted to shift the same laterally to one side or the other of the center of the oscillatable switch, or to center the same with reference thereto.

5. In a toy locomotive having a reversible electric motor including an armature and field, a reversing switch, an actuating pole piece therefor, a support for the pole piece, said pole piece forming part of said field and including a plurality of laminations one of which extends beyond the field of the motor directly to engage the switch, said laminations being provided with clearances at the point of said support, whereby pole piece and its extended lamination may move in a vertical or lateral direction on said support, a spring for urging the pole piece away from the field coil of the motor when the latter is de-energized, and a selector arm having a notch for receiving and guiding the free end of the extended lamination to set the same in a desired position with reference to the reversing switch.

6. In a toy locomotive having a reversible electric motor including an armature and field, a reversing switch, an actuating pole piece therefor, a support for the pole piece, said pole piece forming part of said field and including a plurality of laminations one of which extends beyond the field of the motor directly to engage the switch, said laminations being provided with clearances at the point of said support, whereby the pole piece and its extended laminations may move in a vertical or lateral direction on said support, a spring for urging the pole piece away from the field coil of the motor when the latter is de-energized, and a selector arm pivotally supported at its medial portion to provide a handle at one end and its opposite end being forked to receive the extended lamination of the pole piece whereby the latter may be set in a selected operating position with respect to the switch.

7. In a toy locomotive having a reversible electric motor including an armature and field, a reversing switch, an actuating pole piece therefor, a support for the pole piece, said pole piece forming part of said field and including a plurality of laminations, one of which projects forwardly and downwardly beyond the field of the motor directly to engage the reversing switch, said laminations at the point of said support being provided with clearances whereby the pole piece and its projecting extension may move in a vertical or lateral direction on said support, means for urging the pole piece away from the field coil of the motor when the latter is de-energized, and means for engaging with the forwardly and downwardly projecting end of the pole piece to position the same with reference to the reversing switch.

8. In a toy locomotive, means responsive to the remote control of the current supply to the electric motor of the locomotive to determine the latter's direction of travel; said means including a reversing switch comprising a pivoted oscillatable plate having positive and negative contacts, a fixed positive terminal and fixed brush terminals at each side thereof, said positive terminal and one of the brush terminals being adapted to engage with the positive contact of the switch while the other brush terminal engages with the negative contact thereof, cam edges formed on the switch, a switch actuating pole piece mounted for movement in a vertical and lateral direction and having its free end adapted for engagement with the said cam edges of the switch plate, said pole piece being operated to engage the plate when the motor field is energized, a spring for urging the pole piece away from the field when the latter is de-energized, and a selector member for positioning the switch engaging end of the pole piece with reference to the switch.

9. In a toy electric locomotive, a reversible electric motor, a reversing switch, a split field, one part of said field being movable in both vertical and horizontal directions and adapted to engage directly with the reversing switch, and selector means for maintaining the desired horizontal position of the movable portion of said field.

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