

June 5, 1934.

E. D. BOISSELIER

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REVERSING SWITCH FOR TOY ELECTRIC LOCOMOTIVES

Filed March 4, 1932

2 Sheets-Sheet 1

Fig. 3.

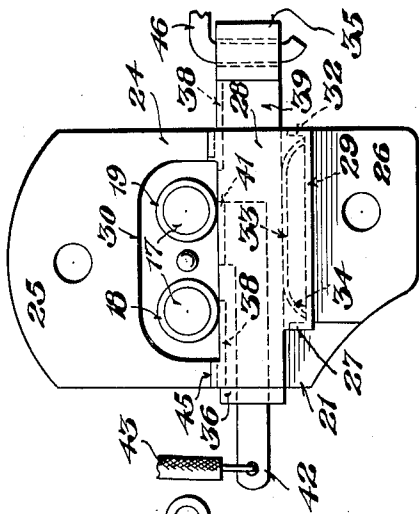


Fig. 4.

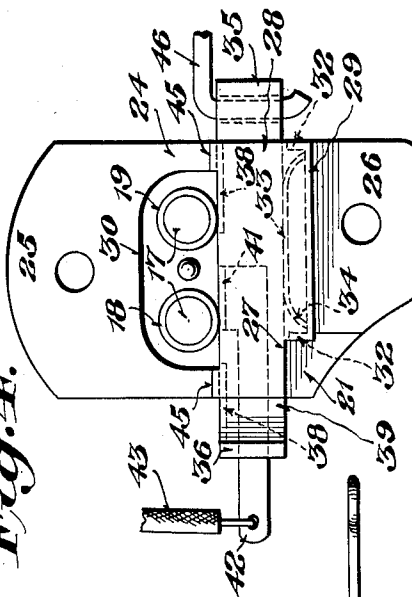


Fig. 1.

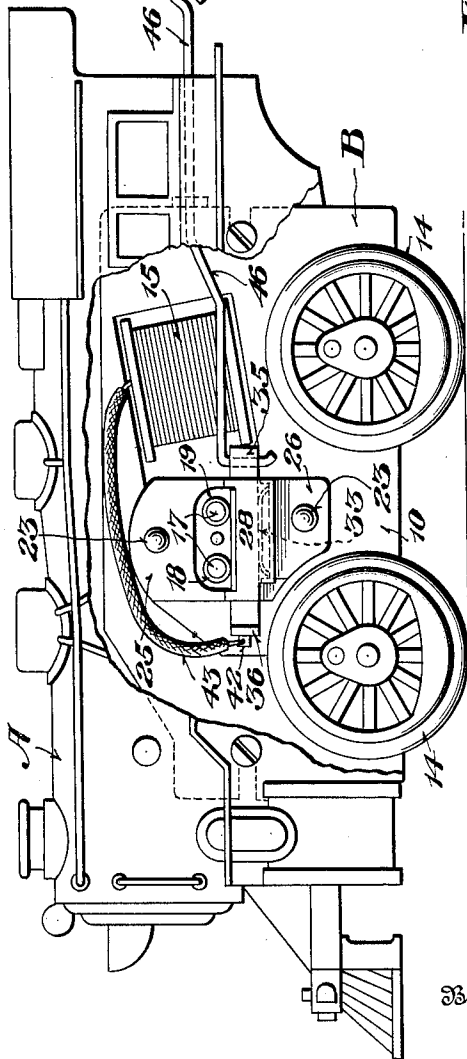
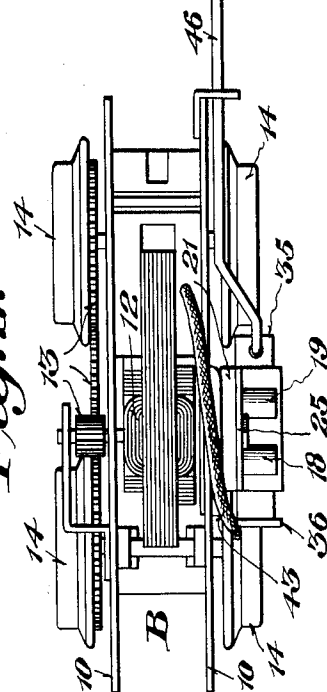


Fig. 2.



Inventor

E. D. Boisselier,

D. P. Wachter

Attorney

June 5, 1934.

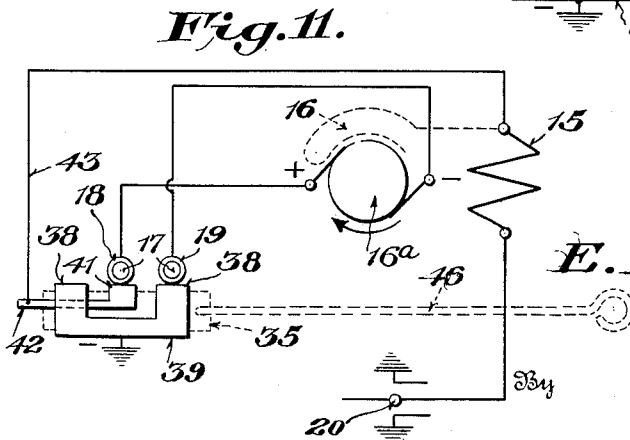
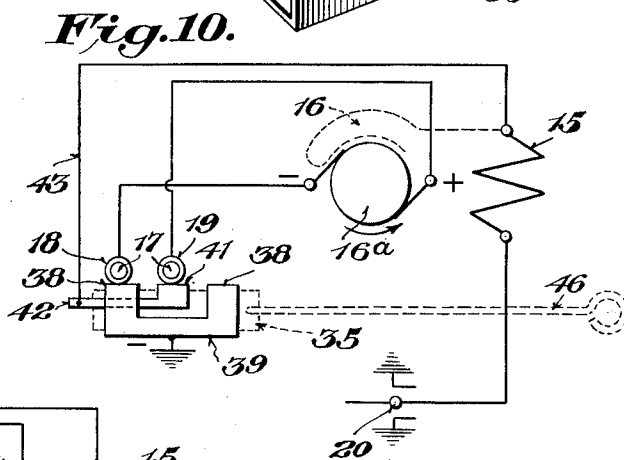
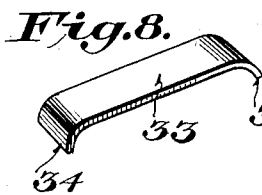
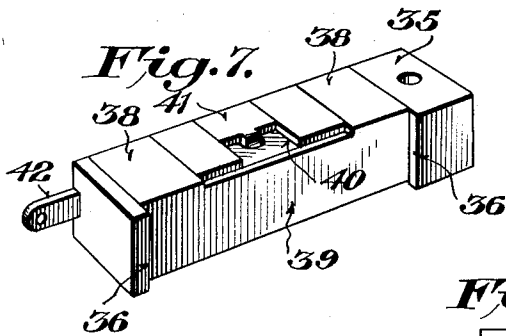
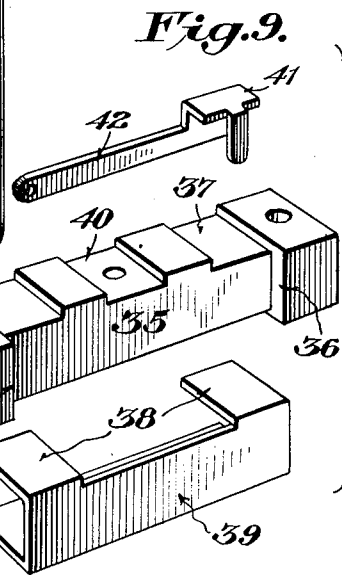
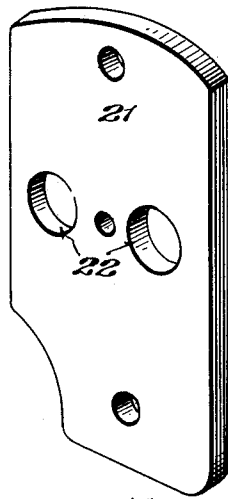
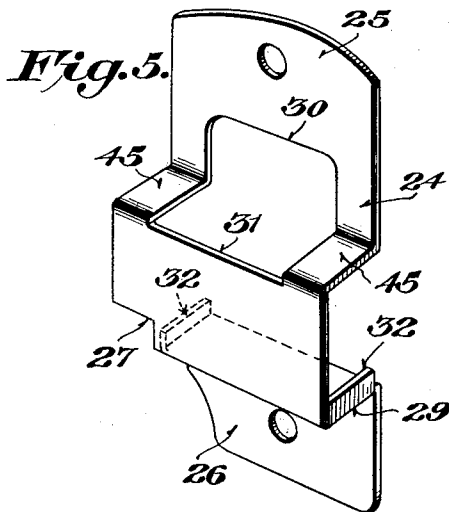
E. D. BOISSELIER

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REVERSING SWITCH FOR TOY ELECTRIC LOCOMOTIVES

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2 Sheets-Sheet 2



Inventor

E. D. Boisselier,

D. P. Wolhaupter
Attorney

Attorney:

UNITED STATES PATENT OFFICE

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REVERSING SWITCH FOR TOY ELECTRIC
LOCOMOTIVESEarl D. Boisselier, Chicago, Ill., assignor to
American Flyer Mfg. Co., Chicago, Ill., a cor-
poration of Illinois

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9 Claims. (Cl. 172-36)

This invention relates to electric switches, and has particular reference to an electric switch which is especially adapted for use on toy locomotives of the type having motors which are reversible by reversing the direction of flow of the operating current thereto, and which is operable to reverse the direction of flow of the current, thereby to reverse the direction of travel of the locomotive.

A special object of the invention is to provide a practical, reliable switch of the general character mentioned the parts of which may be economically manufactured and assembled, and which, in its assembled form, embodies a design which is particularly adapted for convenient installation in toy locomotives of known types substantially without alterations thereto.

Another object of the invention is to provide a switch of the character mentioned in which the switch contacts are constituted by the brush holders of the motor and in which the movable element of the switch cooperates directly with said brush holders, whereby undesirable wiring connections between the switch contacts and the motor brushes are avoided.

With the foregoing and other objects in view, which will become more fully apparent 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.

In the drawings, wherein like characters of reference denote corresponding parts in the different views:—

Figure 1 is a side elevation of a toy locomotive equipped with a motor reversing switch constructed in accordance with a practical embodiment of the invention, parts being broken away to more clearly disclose the underlying structure.

Figure 2 is a plan view of the motor unit of the toy locomotive showing the switch embodied in said unit.

Figures 3 and 4 are enlarged front elevations of the switch showing its two operative positions, respectively.

Figure 5 is a perspective view of the switch casing.

Figure 6 is a perspective view of the insulating switch base.

Figure 7 is a perspective view of the movable switch element.

Figure 8 is a perspective view of the switch spring.

Figure 9 is a perspective view showing the parts of the movable switch element in separated relation; and

Figures 10 and 11 are diagrammatic views showing the connections of the switch with a motor and a source of current and illustrating respectively, the two operative positions of the switch.

In Figure 1 of the drawings is illustrated one well known type of toy electric locomotive with which the present reversing switch is particularly adapted for use. This locomotive, designated generally as A, is inclusive, in accordance with common practice, of a motor unit, designated generally as B, which unit, also in accordance with common practice, is inclusive of a wheeled frame having spaced side plates 10, 10 between which is mounted the motor 11, the armature 12 of which is connected by gears 13 with the wheels 14. Thus, rotation of the armature in one direction is effective to produce forward movement of the locomotive, while rotation of the armature in an opposite direction is effective to produce backward movement of the locomotive, as is obvious.

As illustrated, the motor 11 is of a well known type inclusive of a field winding 15, the usual pole pieces one of which is indicated at 16, and a commutator 16^a with the end of which cooperates a pair of brushes 17, 17 contained within a pair of laterally spaced brush holders in the form of metallic tubes 18 and 19 through which the current flows to and from the brushes. The trolley 20 of the locomotive (see Figs. 3 and 4) is connected with one terminal of the field winding 15. Consequently, if the other terminal of the field winding is connected with the tube 18 and if the other tube 19 is grounded, a circuit will be completed by which current is caused to flow in one direction through the armature and rotation of the armature in one direction will result. On the other hand, if the second mentioned terminal of the field winding is connected with the tube 19 and if the tube 18 is grounded, a circuit will be completed by which current is caused to flow in an opposite direction through the armature and reverse rotation of the armature will result. The present switch involves a novel construction embodying a contact connected with the second mentioned end of the field winding 15 and a pair of grounded contacts, said contacts being carried by a slidable member for cooperation with the tubes 18, 19 so that in one position of the member the first mentioned contact engages the tube 18 and one of the pair

of grounded contacts engages the tube 19 to complete the circuit to produce rotation of the armature in one direction, and in another position of said member the first mentioned contact engages the tube 19 and one of the pair of grounded contacts engages the tube 18 to complete the circuit to produce rotation of the armature in the opposite direction.

Referring particularly to the specific embodiment of the switch illustrated in the present instance, it will be observed that the same is inclusive of a base 21 of suitable insulating material having a pair of laterally spaced holes 22 formed therethrough to accommodate the brush holder tubes 18 and 19, which tubes may either be secured within said holes to be disposed in proper relation to the motor commutator when the switch is operatively mounted on the motor frame, or may be mounted in any other suitable manner to extend through the holes 22 when the switch is mounted in its operative position on the motor frame. In either instance the outer end portions of the tubes project beyond the outer face of the base 21 as illustrated in Fig. 2 of the drawings, the said base being secured against the outer face of one of the motor frame plates 10 by means of rivets, bolts or other suitable fasteners 23 which serve also to secure a switch casing 24 against the outer face of the base.

The switch casing 24 is formed from a blank of sheet metal which is suitably bent to shape and which includes top and bottom portions 25 and 26, respectively, which are disposed in a common plane, and an intermediate, outwardly directed channel-like formation 27 which is open at its inner side and closed at its outer side and bottom by walls 28 and 29, respectively. This casing is disposed with the portions 25, 26 thereof engaged against the outer face of the base 21 whereby the inner, open side of the channel formation 27 is closed by said base, and, as shown and as previously stated, the fasteners 23 serve to secure said casing against said base as well as to secure both the base and the casing to the motor frame, whereby the casing is grounded through the motor frame to one of the track rails. The top portion 25 of the casing is cut away as indicated at 30 to accommodate the brush holder tubes 18 and 19, while the top wall of the channel formation 27 is cut away as indicated at 31 for a purpose which will presently appear.

As will be observed by particular reference to Fig. 5 of the drawings, tongues 32 are bent upwardly from the ends of the bottom wall 29 of the channel formation 27 of the switch casing to provide at the bottom of said channel formation a pocket for the reception of a leaf spring 33, while by reference to Fig. 8 of the drawings it will be observed that said spring comprises a flat strip having its end portions directed downwardly as at 34 to rest on the bottom wall 29 of the channel formation thus to support the medial portion of the spring spaced above said bottom wall, the tongues 32 serving to prevent endwise movement of the spring out of the channel formation as is obvious.

The spring 33 constitutes a yieldable support for a block 35 of suitable insulating material which is disposed within the channel formation 27 for longitudinal sliding movement between the two operative positions shown in Figs. 3 and 4, the said block being of a width corresponding substantially to the width of the chan-

nel formation and being provided at its ends with suitable shoulders or stops 36 for engagement with the ends of the wall 28 to limit its sliding movement in both directions.

In the top side of the block 35, near each end thereof, is formed a recess 37 and in these recesses are disposed contact plates 38, 38, the top faces of which are disposed preferably flush with the top face of the block. Preferably the plates 38, 38 are electrically connected together and to a common ground, but they may be separate from each other and may have separate grounds. However, for convenience and economy in manufacture and assembly, the said contact plates preferably are formed as ears at the ends of the upper side of a channel member 39 as illustrated in Fig. 9 of the drawings, which channel member is formed as shown so that the front and bottom flanges thereof engage the front and bottom faces of the block 35 when the ears 38 are disposed in the recesses 37, whereby the ears are grounded through the spring 33 to the switch casing and through the connections of the latter with the grounded motor frame.

Between the recesses 37, 37 the top side of the block 35 is formed with another recess 40 to receive a third contact plate 41 which, like the plates 38, 38, preferably is disposed flush with the top face of the block. As illustrated in Fig. 9, the plate 41 preferably is constituted by a laterally extending ear at the inner end of a strip 42, which strip is seated in a groove or channel in the inner side face of the block 35 and projects beyond one end of said block where it is electrically connected by a flexible conductor 43 with the second mentioned terminal of the motor field winding 15.

If desired, but not necessarily, a tongue 44 may be provided on the contact plate or ear 41 to be received in an opening in the block 35 to assist in holding said plate or ear in assembly with said block, in which connection it will be noted by particular reference to Fig. 7 of the drawings that the plate or ear 41 is of less width than the block whereby it is effectively insulated from the contact plates 38, 38.

The brush holder tubes 18, 19 are disposed with their under sides in the cut-out portion 31 of the top of the channel formation 27 either flush with or slightly below the under faces of the webs 45 at the ends of said channel formation constituting the top wall thereof, whereby the spring 33, which acts to urge the block 35 constantly upwardly, maintains the top side of said block engaged firmly against said tubes.

While any suitable means may be provided for shifting the block 35 between its aforementioned two operative positions shown in Figs. 3 and 4, a practical means for this purpose comprises a rod 46 connected at its forward end with the rear end of the block and extending rearwardly through the locomotive with its rear end portion exposed within or at the rear of the cab of the locomotive for manual manipulation.

In view of the foregoing description considered in connection with the drawings, and particularly by reference to Figs. 10 and 11 thereof, it is believed that the operation of the switch will be manifest. By pulling on the rod 46 the block 35 may be moved to its rearmost position as determined by engagement of the stop or shoulder 36 at the front end of the block with the front edge of the casing wall 28, in which position of said block, as shown in Figs. 3 and 10, the middle contact plate 41 underlies and engages

the brush holder tube 19 and the front contact plate 38 underlies and engages the brush holder tube 13. Thus, the direction of flow of the current will be from the trolley 20 through the field winding 15, through the contact plate 41 to the tube 19 and the related brush 17, through the motor commutator and armature winding, and thence to ground through the tube 18 and the front grounded contact plate 38, which will produce rotation of the motor in one direction. On the other hand, by pushing on the rod 46 to slide the block 35 to its limit of movement in a forward direction, as determined by engagement of the stop or shoulder 36 at the rear end of the block with the rear edge of the casing wall 28, the contact plate 41 will underlie and engage the brush holder tube 18 and the rear contact plate 38 will underlie and engage the tube 13. Thus, the direction of flow of the current will be from the trolley 20 through the field winding 15, through the contact plate 41 and the tube 18 and the related brush 17, through the motor commutator and armature winding, and thence to ground through the tube 15 and the rear grounded contact plate 38. In other words, the direction of flow of the current obviously will be reversed, whereby the direction of rotation of the motor will be reversed. Consequently, by the simple expedient of simply pulling or pushing on the rod 46 the locomotive may be made to travel in either a forward or backward direction.

Obviously, the invention in its broader aspects might readily be embodied in a structure in which the block 35 is stationary and the contacts or tubes 18 and 19 movable.

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 combination with a pair of motor brush holders, a member mounted for sliding movement between two operative positions, and a row of three contacts carried by said member for direct cooperation with said brush holders, the middle contact of said row being disposed for engagement with one of the brush holders when the member is in one operative position and for engagement with the other brush holder when the member is in its other operative position, and the two end contacts being disposed so that when the member is in either operative position one of them engages the brush holder not engaged by the middle contact, the two end contacts of the row being adapted for connection with one side of a circuit and the middle contact being insulated from said end contacts and adapted for connection with the other side of the circuit.

2. The combination as set forth in claim 1 in which yieldable means supports the slidable member and urges the same against the brush holders.

3. The combination as set forth in claim 1 in which a casing is provided with which the slidable member is slidably mounted, and in which the slidable member is provided with stop formations for engagement with the casing to predetermine its two operative positions.

4. In combination with a pair of motor brush holders, a member mounted for sliding movement, and contacts carried by said member for direct

cooperation with said brush holders to complete a circuit therethrough, said contacts being disposed to direct the current through the brush holders in one direction when the slidable member is in one operative position and to direct the current through the brush holders in an opposite direction when the member is in another operative position, said member being mounted for straight line sliding movement to shift the contacts relative to the brush holders.

5. In a toy locomotive, in combination with the motor unit thereof comprising a frame inclusive of a side plate and a motor mounted in said frame and inclusive of a pair of brush holders, a switch casing mounted on said side plate, a member mounted in said casing for sliding movement between two operative positions, and a row of three contacts carried by said member, the middle contact being connected with a source of current and being disposed for direct engagement with one of the brush holders when the member is in one operative position and for direct engagement with the other brush holder when the member is in its other operative position, and the two end contacts being grounded and disposed so that one of them directly engages the brush holder not engaged by the middle contact when the member is in either of its two operative positions.

6. In combination with a pair of motor brush holders, a member mounted for straight line longitudinal sliding movement and constantly engaged with both brush holders, and contacts carried by said member for connection with a source of current and for direct cooperation with said brush holders by straight line longitudinal movement of said member to control the flow of current through the motor.

7. In a toy locomotive, in combination with the motor unit thereof comprising a frame and a motor inclusive of a pair of brush holders, a switch base of insulating material mounted on said frame, the brush holders extending through said base beyond the outer side thereof, a casing disposed against said base and having a channel formation, a block slidably mounted within said channel formation, a spring within said channel formation urging said block against said brush holders, and a row of three contacts carried by said block for direct engagement with said brush holders, the middle contact being disposed for engagement with one of the brush holders when the block is in one position and for engagement with the other brush holder when the block is in another position, and the two end contacts being disposed so that one of them engages the brush holder not engaged by the middle contact when the block is in either position, the middle contact being insulated from the end contacts and adapted for connection with one side of a source of current and the two end contacts being adapted for connection with the other side of the source of current.

8. The combination as set forth in claim 7 in which the two end contacts of the block are connected with each other and with their related side of the source of current through the casing.

9. The combination as set forth in claim 7 in which the channel formation of the casing is provided with a pocket accommodating the spring and holding the same against endwise movement.

EARL D. BOISSELIER.