

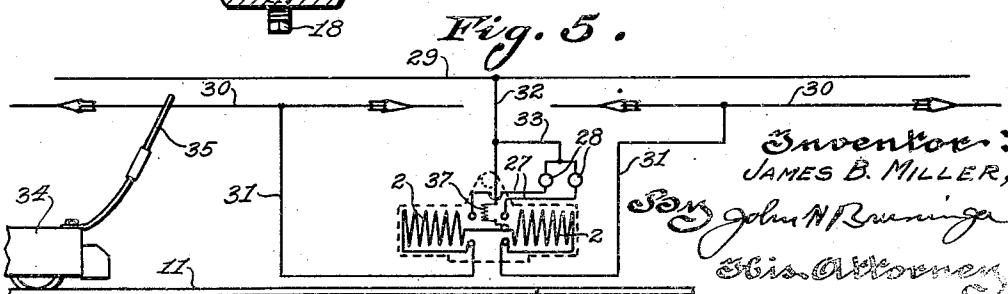
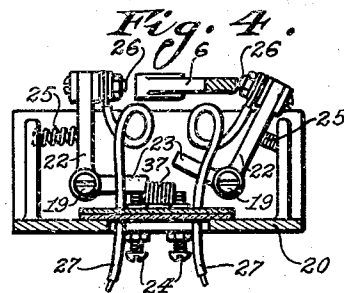
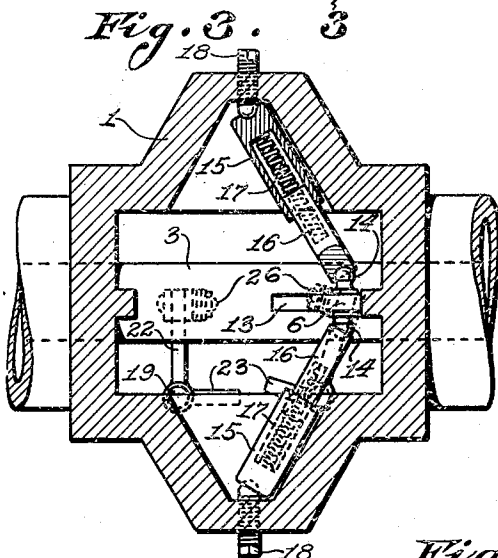
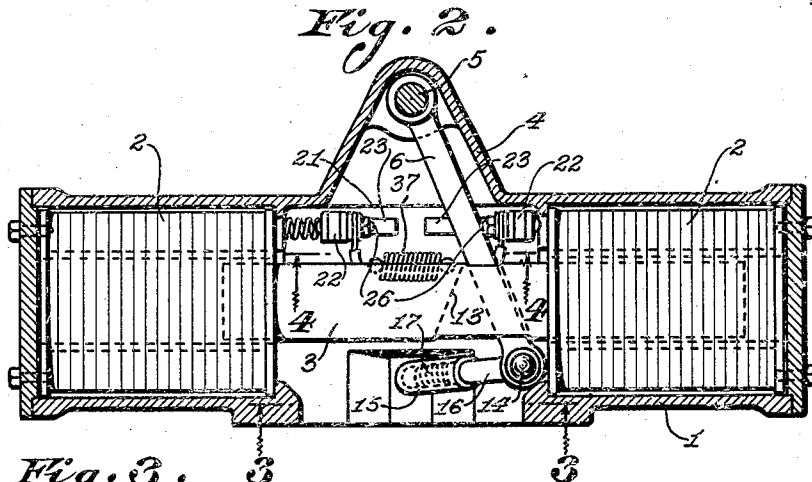
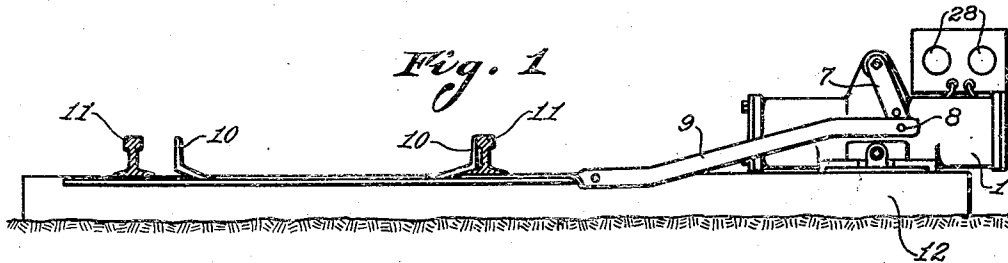
April 19, 1932.

J. B. MILLER

1,854,521

SWITCH THROWING DEVICE

Filed Feb. 5, 1930



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UNITED STATES PATENT OFFICE

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SWITCH THROWING DEVICE

Application filed February 5, 1930. Serial No. 427,914.

This invention pertains to devices for operating track switches electrically. It is intended more particularly, for use in mines and similar places, the application being such that the operator of a train of cars can operate the switch as his train approaches or leaves the switching point.

One of the objects of this invention is to provide a switch-throwing device which may be operated simply by momentarily closing an electrical circuit and which will operate reliably to throw the switch as desired.

Another object is to provide such a device which is easily manipulated but which is securely locked in either position.

Another object is to provide improved locking means for such a device.

Another object is to provide such a device which will indicate at all times the position of the track switch and which will indicate when the switch is not operating properly.

Further objects will appear from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a side view of a switch-throwing device embodying this invention, showing its application to a track switch.

Fig. 2 is a vertical longitudinal section of the device shown in Fig. 1.

Fig. 3 is a partial section taken on line 3—3 of Fig. 2.

Fig. 4 is a detailed section taken about on line 4—4 of Fig. 2; and

Fig. 5 is a diagram of the circuit connections, showing one method of operating the device in accordance with this invention.

Referring to the drawings, 1 designates a casing which is generally cylindrical in shape and provides a housing for a pair of solenoids 2. The solenoids 2, are mounted in axial alignment with one another in the casing. Mounted for sliding movement axially within the solenoids, 2, is a plunger 3. The plunger 3 is long enough so that when completely embedded in one of the solenoids, it will span the gap between the two and reach a short distance into the other solenoid. Accordingly, if either solenoid is excited by an electric current, the plunger will be forcibly drawn into that solenoid. Accordingly, the

plunger may be moved in one direction or another according to which of the solenoids, 2, is excited.

The casing 1 is provided with a lateral offset 4, in which is pivoted on a shaft 5, a switch operating arm 6. The arm 6 is fixed to the arm 5 which passes through the wall of the casing and has secured to its outer end a lever 7 pivoted at 8 to a link 9 which is connected to operate the switching points 10. As shown in Fig. 1, the device may be mounted beside the track 11 on a pair of extra long ties 12.

The plunger 3 has a transverse perforation 13 through which the arm 6 extends. The lower end of the arm 6 beyond the plunger 3 is provided on each side thereof, with a rounded button 14. Each button 14 is engaged by a toggle member comprising a pair of telescoping hollow elements 15 and 16. These elements are arranged to telescope one within the other and a spring 17 is housed within them so as to yieldingly resist telescoping action. The other end of each toggle member bears against the rounded end of an adjusting screw 18 which extends through the wall of the casing 1 so as to be adjustable from outside of said casing. By means of the screws 18, the pressure exerted by the toggle members can be adjusted.

It will be seen that the action of these toggle members is to lock the arm 6 yieldingly at either end of its stroke. In order to move the arm 6, it is necessary to compress both springs 17 until the end of the arm has moved past the dead-center position, after which these springs will operate to force the arm to the end of its stroke.

Pivoted at 19 on a bracket 20 removably mounted in an opening 21 in the rear side of the casing is a pair of bell crank levers 22, each having an arm 23 adapted for engagement with an adjusting screw 24 under pressure of a spring 25. Each of these bell crank levers carries an electrical contact 26 insulated from the bell crank itself, but in contact with a conductor 27 leading out of the casing. By means of the bell cranks 22 adjustable by the screws 24, the contacts 26

may be positioned so as to be engaged by the arm 6 just before the latter reaches the end of its stroke.

The conductors 27 may be connected, each to one of a pair of signal lamps 28, mounted in a suitable box which may be mounted on the casing 1 as illustrated in Figure 1. By means of the contacts 26, the arm 6 operates to ground one or the other of the lamps 28 according to the position of said arm. These lamps will be of different colors so as to indicate the position of the switch points 10. These lights 28 may be located at any point other than at the switch itself, so as to render the same visible to the operator in ample time before reaching the switch.

The circuit arrangements are shown in Fig. 5. In this figure, the track is shown at 11 and a trolley wire at 29. Mounted near the trolley wire on each side of the switching point is an insulated section of trolley wire 30. The sections 30 may be spaced from the switching point a sufficient distance to allow the train operator to recognize the position of the switch from the color of the signal lamps 28 and to operate the switch, if necessary, in time to permit his train to pass thereover. The sections 30 are connected by conductors 31 one to each of the solenoids 2. A conductor 32 runs from the trolley wire 29 to a point between the two solenoids 2. A conductor 33 also runs from the trolley connection to both of the lamps 28.

The operation of the device is as follows: A train 34 approaching a switching point, the operator observing the lamps 28, notes by the color of the lamp lighted that the switch is not set as he wants it. He, therefore, takes a metallic bar or rod 35 provided with a suitable insulated handle and grounded on the frame of the locomotive, and touches this bar to the section 30 as he passes. This operates to ground the conductor 31 and the corresponding end of the appropriate solenoid 2. This solenoid attracts the plunger 3 which is drawn into the solenoid and thereby swings the arm 6 on its pivot. During the movement of the arm 6, the toggle members are telescoped so as to compress the springs 17 until the dead-center position is passed after which these springs assist in forcing the arm to the end of its stroke. This movement causes the lever 7 to shift the link 9 so as to move the switching points 10 against the other rail 11.

As the arm 6 begins its stroke, the bell crank 22 turns on its pivot until the arm 23 engages the screw 24. At this point the circuit to the contact 26 is broken and the corresponding lamp 28 is extinguished. Just as the arm 6 completes its stroke, it makes contact with the other contact 26 so as to light the other lamp 28.

In order to avoid the possibility of burning out the coils 2 by leaving them in the

electrical circuit too long, a coil 37 is connected in series with the solenoid circuit. The coil 37 is made of a conductor small enough so that it will be destroyed before the solenoids themselves suffer damage. Accordingly, if the parts should stick or if, for any reason, the current should be left on the solenoids 2 for any length of time, the coil 37 would be burned out thereby protecting the solenoids.

It will be seen that this invention provides a thoroughly reliable switch-throwing device. The arrangement whereby the arm 6 passes through the plunger 3 provides a positive engagement which can not be deranged. Accordingly, the force of the solenoids is applied directly to the arm 6. The toggle members act equally on both sides of the arm and at equal angles therewith. Accordingly, the effort of these toggles is balanced and there is no tendency to force the arm to one side or the other out of its normal path. The tension of these toggle members can be adjusted so that an exact balance may be obtained. The housing of the spring within the toggle members serves to protect that spring and thereby insure reliable operation.

The signal lights serve to indicate at all times the position of the switching points. The contacts 26 may be adjusted by the screws 24, which adjustment may be made from the outside of the casing, so as to engage the arm 6, just before it reaches the end of its stroke. Accordingly, if this arm should be prevented for any reason from reaching the end of its stroke the signal light would not be lighted. Therefore, in case of accident to the switch or if for any reason the switching points are not moved into full engagement with the rail, the light will not be lighted. This serves as a warning to the train operator that all is not right since under normal condition a light of one color or the other should be displayed. Having both lights out, therefore, constitutes a danger signal which will warn the operator to stop and investigate.

While this device has been described as a unitary combination, it will be understood, that certain features or sub-combinations may be used by themselves without the rest of the combination and the use of such features or combinations is contemplated by this invention and is within the scope of the appended claims.

It is further obvious that various changes may be made, within the scope of the appended claims, in the details of construction without departing from the spirit of this invention; it is to be understood, therefore, that this invention is not limited to the specific details shown and/or described.

Having thus described the invention, what is claimed is:

1. A track-switch throwing device, comprising, a solenoid, a movable plunger there-

for, a switch operating arm pivoted laterally of said plunger and in engagement therewith, and balanced toggle means for locking said arm.

5 2. A track-switch throwing device, comprising, a solenoid, a movable plunger therefor, a switch operating arm pivoted laterally of said plunger and in engagement therewith, and a pair of balanced yielding toggle
10 members adapted to lock said arm.

3. A track-switch throwing device, comprising, a solenoid, a movable plunger having a perforation, a switch operating arm pivoted laterally of said plunger and passing
15 thru said perforation, and means for locking said arm.

4. A track-switch throwing device, comprising, a solenoid, a movable plunger having a perforation, a switch operation arm pivoted laterally of said plunger and passing
20 thru said perforation, and balanced toggle means for locking said arm.

5. A track-switch throwing device, comprising, a solenoid, a movable plunger having a perforation, a switch operating arm pivoted laterally of said plunger and passing
25 thru said perforation, a pair of balanced yielding toggle members adapted to lock said arm.

6. A track-switch throwing device, comprising, a solenoid, a movable plunger therefor, a switch operating arm pivoted laterally of said plunger and in engagement therewith, and a signal contact positioned to be engaged
30 by said arm.

7. A track-switch throwing device, comprising, a solenoid, a movable plunger therefor, a switch operating arm pivoted laterally of said plunger and in engagement therewith, and an adjustable signal contact positioned to be engaged by said arm.
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8. A track-switch throwing device, comprising, a solenoid, a movable plunger therefor, a switch operating arm pivoted laterally of said plunger and in engagement therewith, and adjustable signal contacts positioned to be engaged by said arm at opposite
45 ends of its travel.

9. A track-switch throwing device, comprising, a solenoid, a movable plunger therefor, a switch operating arm pivoted laterally of said plunger, a signal contact positioned to be engaged by said arm, and means for locking said arm at the end of its travel.
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10. A track-switch throwing device, comprising, a solenoid, a movable plunger therefor, a switch operating arm pivoted laterally of said plunger and in engagement therewith, adjustable signal contacts positioned to be engaged by said arm at opposite ends of its travel, and means for locking said arm at opposite ends of its travel.
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11. A track-switch throwing device, comprising, a casing, a solenoid therein, a movable plunger for said solenoid a switch op-
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erating arm pivoted laterally of said plunger and engageable therewith to be operated thereby, a signal contact positioned to be engaged by said arm, and means for adjusting said contact from the outside of said casing.
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12. A track-switch throwing device, comprising, a casing, a solenoid therein, a movable plunger for said solenoid, a switch operating arm pivoted laterally of said plunger and engageable therewith to be operated thereby, a signal contact positioned to be engaged by said arm, means for adjusting said contact from the outside of said casing, and a signal light connected with said contact.
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13. In a device of the character described, having a solenoid and an operating arm actuated thereby, and a pair of toggle members for locking said arm, each comprising a pair of telescoping thrust elements having a spring therebetween, said members engaging said arm in balanced relation.
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14. In a device of the character described, having a solenoid, and an operating arm actuated thereby, and a pair of toggle members for locking said arm, each comprising a pair of telescoping thrust elements having a spring between said elements and housed within one of them, said members engaging said arm in balanced relation.
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15. A track-switch throwing device, comprising, a solenoid, a movable plunger therefor, a switch operating arm, pivoted laterally of said plunger and in engagement therewith, balanced toggle means for locking said arm, and a destructible conductor in the circuit of said solenoid.
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16. A track-switch throwing device, comprising, a casing, a solenoid therein, a movable plunger for said solenoid, a switch operating arm pivoted in said casing laterally of said plunger and movably engageable therewith, means for operatively connecting said arm outside of said casing with a track-switch, and balanced means adapted to yieldingly lock said arm at opposite ends of its travel.
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17. A track-switch throwing device, comprising, a casing, a solenoid therein, a perforated movable plunger for said solenoid, a switch operating arm pivoted in said casing laterally of said plunger and movably engaged in the perforation thereof, means for operatively connecting said arm outside of said casing with a track-switch, and balanced means adapted to yieldingly lock said arm at opposite ends of its travel.
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18. A track-switch throwing device, comprising, a casing, a solenoid therein, a movable plunger for said solenoid, a switch operating arm pivoted in said casing laterally of said plunger and movably engageable therewith, means for operatively connecting said arm outside of said casing with a track-switch, balanced means adapted to yieldingly
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lock said arm at opposite ends of its travel, and means for adjusting the balance of said last means.

19. A track-switch throwing device, comprising, a casing, a solenoid therein, a movable plunger for said solenoid, a switch operating arm pivoted in said casing laterally of said plunger and movably engageable therewith, means for operatively connecting said arm outside of said casing with a track-switch, and signal contacts engageable with said arm at opposite ends of its travel.

20. A track-switch throwing device, comprising, a casing, a solenoid therein, a movable plunger for said solenoid, a switch operating arm pivoted in said casing laterally of said plunger and movably engageable therewith, means for operatively connecting said arm outside of said casing with a track-switch, signal contacts engageable with said arm at opposite ends of its travel, and means for adjusting said contacts.

21. A track-switch throwing device, comprising, a solenoid, a movable plunger having a perforation, a switch operating arm pivoted laterally of said plunger and passing through said perforation, and balanced locking means engaging said arm beyond said plunger.

22. A track-switch throwing device, comprising, a solenoid, a movable plunger having a perforation, a switch operating arm pivoted laterally of said plunger and projecting through said perforation, and a pair of yielding toggle members engaging the projecting end of said arm to lock the same.

23. A track-switch throwing device, comprising, a solenoid, a movable plunger having a perforation, a switch operating arm pivoted laterally of said plunger and projecting through said perforation, a pair of yielding toggle members engaging the projecting end of said arm to lock the same, and adjustable pivots for said toggle members.

In testimony whereof I affix my signature this 26th day of October, 1929.

JAMES B. MILLER.

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