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APPARATUS FOR OPERATING SWITCHES

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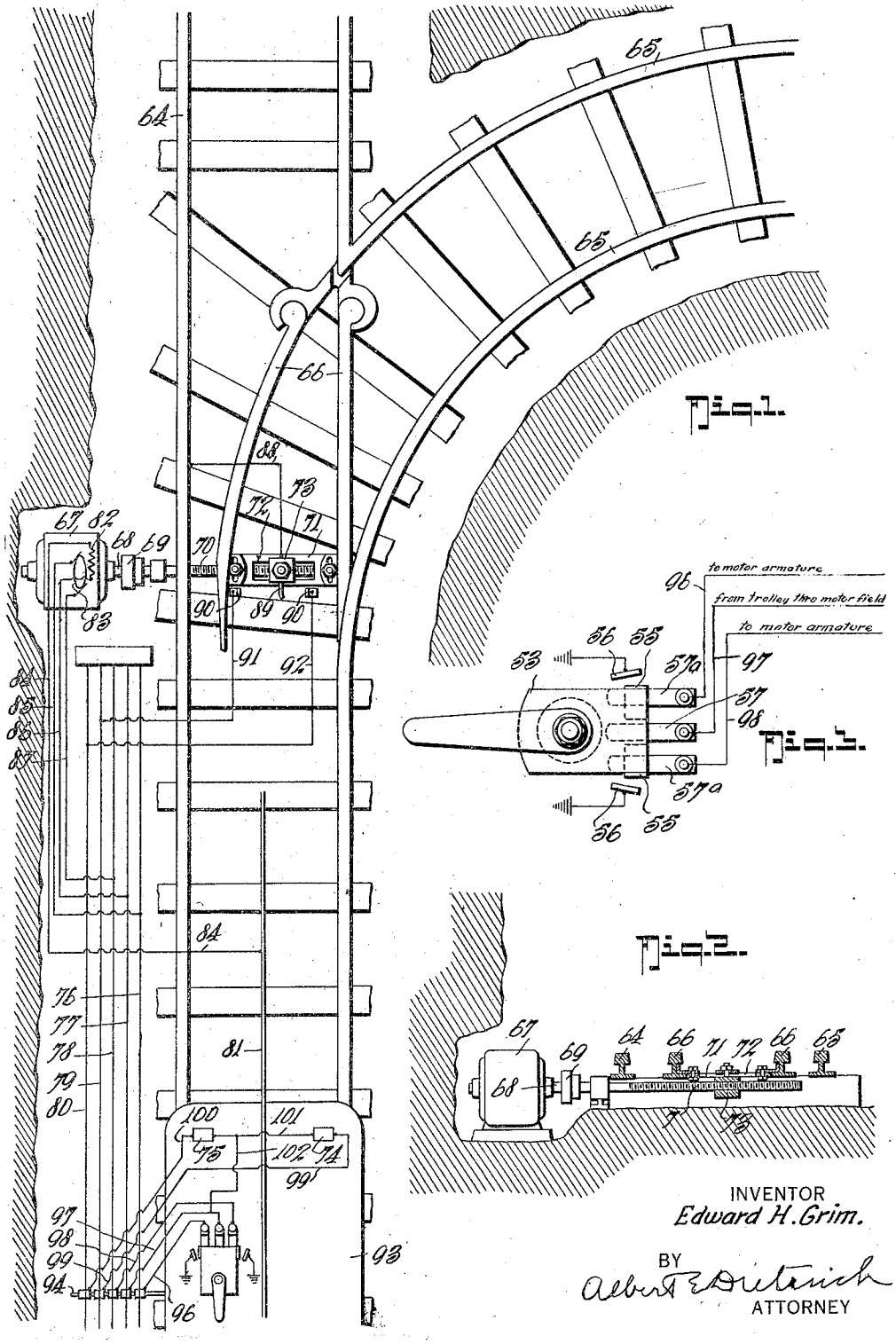


Fig. 1.

Fig. 3.

Fig. 2.

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APPARATUS FOR OPERATING SWITCHES.

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To all whom it may concern:

Be it known that I, EDWARD H. GRIM, a citizen of the United States, residing at Dott, in the county of Mercer and State of West Virginia, have invented certain new and useful Improvements in Apparatus for Operating Switches, of which the following is a specification.

The invention resides in the provision of apparatus for controlling and indicating the movement of switches such as are employed in mining operations and for movable elements of similar nature.

Primarily the invention has for its object to provide an apparatus of the class described which is of simple and relatively inexpensive construction and in which the parts are so constructed and correlatively arranged as to effect the desired movement of the mine switches in a safe and positive manner and whereby the operation of the said moving elements may be effected from a distance.

In its more detailed nature, the invention has for its object the provision of electrically controlled means for operating switches to permit the passing thereover of the ore conveying cars, means mounted on the traveling cars whereby the operating means may be caused to function at the will of the operator riding on the cars and at any desired distance from the particular switch, and means mounted on the traveling car and in view of the operator thereof for indicating the position of the distant switch to be operated.

The invention further has for its object to provide electrically controlled and operated apparatus of the type stated in which the operating parts are driven by an electric motor, in which provision is made for preventing overloading of the motor during its operative function, in which the parts are so arranged as to permit a period of free operation of the motor before strain of actual operation is imposed thereupon, and wherein the parts are so designed and arranged as to effect a positive locking of the elements to be moved to their various positions.

With the above and other objects in view the invention resides in those novel details of construction, combination and arrangement of parts, all of which will be fully described and then be specifically pointed out in the appended claims, reference being had to the accompanying drawing, in which:

Figure 1 is a diagrammatic plan view of my invention.

Figure 2 is a cross section taken across the switch at the interval of the operating screw.

Figure 3 is an enlarged plan view of the contact switch.

In the drawing, my invention is illustrated as operatively applied within a mine passage and as especially adaptable for controlling switches therein. In the drawing 64 indicates the straight trackway, 65 the curved trackway cooperative therewith and 66 the switch or movable element adapted to be shifted from one position to the other by action of the motor with the application of the peculiar mechanism of my invention.

The motor is indicated at 67 and the drive shaft 68 thereof is joined by a friction slip clutch connection 69 with the operating shaft portion 70 which is properly threaded at the desired pitch.

The individual parts of the movable switch element 66 are joined by the cross plate 71 which is provided with a longitudinal slotway 72 for providing a lost motion connection for the operating nut 73 provided with an internally threaded bore for accommodating the threaded portion of the operating screw 70.

In this form the locomotive 93 may be provided with a pair of indicating signals or lights, as indicated at 74 and 75 which, for example, may be red and green lights, one to indicate the clear position of the track and the other to indicate the danger position or open switch.

In this form of the invention a set of circuit contact wires are also provided parallelly adjacent the trackway 64, and in the drawings, see Figure 1, these wires are indicated as 76, 77, 78, 79 and 80.

The trolley wire is indicated at 81, the motor field is designated at 82 and the motor armature winding is designated at 83. One terminal of the motor field 82 is in electrical communication with the trolley wire 81 through the medium of the wire 84 and the other terminal of the motor field is in electrical communication through the wire 86 with the wire 77 which parallels the trackway. The terminals of the armature winding are in electrical communication with the

wires 76 and 78 which parallel the trackway 64 through the medium of the wires 85 and 87 respectively.

As shown best in Figure 3 the switch block 52 has a pair of contacts 55 to close the circuit between pairs of contacts 57—57ª or between a motor armature contact 57ª and the adjacent grounded contact 56 accordingly as the lever 42 is moved in one direction or the other. Thus, it will be readily apparent by reference to Figure 1 that as the switch is moved to one side or the other from its neutral or switch de-energized position the motor will be energized and caused to operate in a direction in accordance with the side to which the switch block was moved through the various wires just described in like manner, as hereinbefore described in detail in connection with the door operating mechanism.

For providing for the proper energization of the signals 74 and 75 the operating nut 73 is ground connected, as at 88, to one of the track rails 64. The operating nut 73 is also provided with a contacting finger 89 which is adapted to engage at either of its limits of lateral movement with a pair of contacts 90, each of which cooperates with the respective one of the indicating signals 74—75 above referred to. One of the contacts 90 is joined by a wire 91 with the wire 79 which parallels the trackway and the other of the contacts 90 is joined through the medium of the wire 92 with the remaining wire 80 which parallels the trackway.

In this form of the invention, the contact making bar 94 is provided with a suitable number of contacting plates to correspond with the number of wires paralleling the trackway, that is, five and the one of these contacts which is adapted to engage the wire 76 is joined by a wire 96 with one of the contacts 57 of the switch contact mechanism. The one of these plates which is adapted to slidably engage the wire 77 is connected by the wire 97 with the centrally disposed one of the contact blades 57, the one adapted to slidably engage the wire 78 is joined through the medium of the wire 98 with the remaining one of the contact blades 57, the one thereof which is adapted to slidably engage the wire 79 is joined through the medium of the wire 99 with one terminal of the indicating signal 74, and the one thereof which is adapted to slidably engage the wire 80 is joined through the medium of the wire 100 with the terminal of the indicating signal 75. The remaining terminals of each of the indicating signals 74 and 75 are joined together by a cross wire 101, and this cross wire 101 is in turn electrically connected, through the medium of the wire 102, with the wire 97 which connects with the centrally disposed contact 57 and the wire 77 which parallels the trackway 64.

It will be readily apparent, by reference to Figure 1, that when the switch mechanism has been moved to the position indicated in that figure and with the contact block 73 over in position for having its contact fingers engage the contact 90 farthest to the right in that figure, and the contact making arm 94 raised, that a complete electric circuit will be made such as will energize the particular signal 75 through the ground connection and the wire 88, through the block 73, the finger 89, that particular contact 90, its connecting wire 92, the wire 80, the wire 100, through the signal 75, the short portion of the cross overwire 101 between the light 75 and its connection with the wire 102, through the wire 102, the wire 98, the wire 77, the wire 85, through the field 82 of the motor and through the wire 84 to the trolley wire 81. By reference to the said figure, it will be observed that when the operating nut 73 is in its opposite position the light 74 will be brought into play in the same manner as above indicated and through its respective wiring circuit.

By reason of providing this threaded operating shaft for moving the movable element, either switch or doors, it will be readily apparent that the said element is held locked at either limit of its movement and in fact at any portion of its movement if it should be desired to open the doors partially which, however, is not the case in the preferred operation of the system disclosed.

Also by providing the element shifting means with a lost motion feature it will be readily understood that the motor is given a chance to properly pick up speed before the strain of actual operation, incident to the moving of the movable element, is placed upon the motor.

It is obvious that to operate the switch to a car moving from opposite directions, it is only necessary to duplicate the wiring arrangement at the opposite sides of the switch.

This application is a division of my application for patent filed June 20, 1923, Serial No. 646,731.

From the foregoing description, taken in connection with the accompanying drawings, the complete construction, operation and advantages of my invention will be clear to those skilled in the art to which the invention appertains.

What I claim is:—

1. In mine switch operating systems, the combinations with the switch to be opened or closed, of an electric motor for opening and closing the same, electric circuit controlling means on a mine car for effecting the action of said motor as the car approaches

the switch, a straight line screw shaft connection between the motor and the switch including a slip clutch spliced thereinto and a means for permitting lost motion whereby the motor will be permitted to pick up before moving the said switch, and signaling instrumentalities including signals on the mine car and signal operating devices associated with the switch to be opened and closed, for indicating the particular position of the said switch.

2. In mine switch operating systems, the combination with the switch to be opened or closed, of an electric motor for opening and closing the same, electric circuit controlling means on a mine car for effecting the action of said motor as the car approaches the switch, a set of fixed circuit contacts connected with said motor, a movable contact on a mine car adapted to be moved into engagement with said fixed circuit contacts as said vehicle passes same to effect connection between said circuit contacts and said motor to operate the same at the will of the operator, a straight line screw shaft connection between the motor and the switch including a slip clutch spliced thereinto and a means for permitting lost motion whereby the motor will be permitted to pick up before moving the said switch, and signaling instrumentalities including signals on the mine car and signal operating devices associated with the switch to be opened and closed, for indicating the particular position of the said switch.

3. In mine switch operating systems, the combination with the switch to be opened or closed, of an electric motor for opening and closing the same, electric circuit controlling means on a mine car for effecting the action of said motor as the car approaches the switch, and signaling instrumentalities including signals on the mine car and signal operating devices associated with the switch to be opened and closed, for indicating the particular position of the said switch.

4. In mine switch operating systems, the combination with the switch to be opened or closed, of an electric motor for opening and closing the same, connections between said electric motor and said switch including means to lock the switch to its open or closed position, electric circuit controlling means on a mine car for effecting the action of said motor as the car approaches the switch, and signaling instrumentalities including signals on the mine car and signal operating devices associated with the switch to be opened and closed, for indicating the particular position of the said switch.

5. In mine switch operating systems, the combination with the switch to be opened or closed, of an electric motor for opening and closing the same, electric circuit controlling means on a mine car for effecting the action of said motor as the car approaches the switch, connections between said electric motor and said switch including a lost motion device to permit the motor to pick up before moving the said switch and including means to lock the switch to its open or closed position, and signaling instrumentalities including signals on the mine car and signal operating devices associated with the switch to be opened and closed for indicating the particular position of the said switch.

EDWARD H. GRIM.