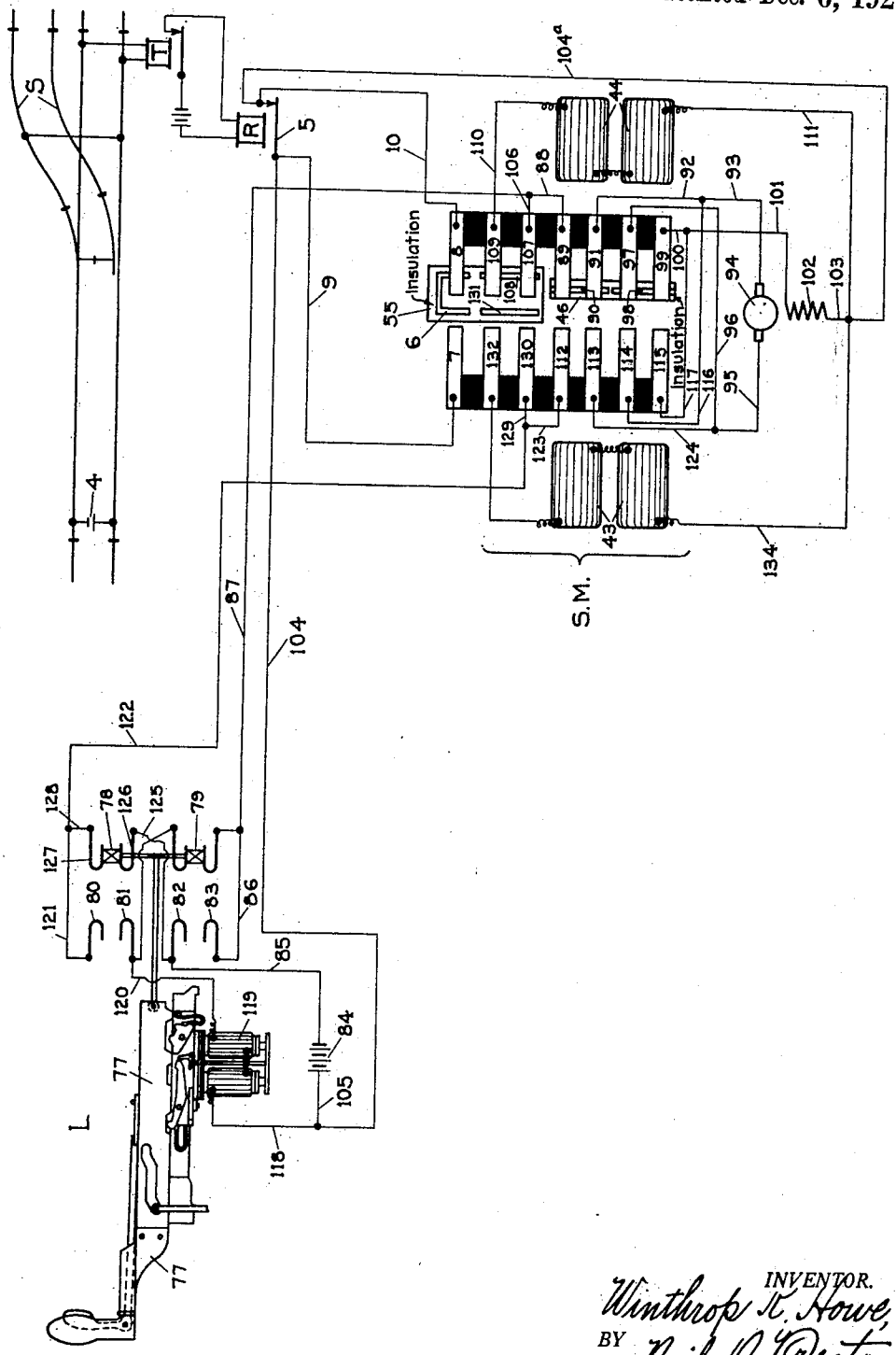
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DETECTOR LOCKING FOR POWER INTERLOCKING SYSTEMS.

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DETECTOR-LOCKING FOR POWER-INTERLOCKING SYSTEMS.

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To all whom it may concern:

Be it known that I, WINTHROP K. HOWE, a citizen of the United States, and resident of the city of Rochester, in the county of Monroe and State of New York, have invented a new and useful Improvement in Detector-Locking for Power-Interlocking Systems, of which the following is a specification.

This invention relates to power interlocking systems for railroads, and more particularly to a system of detector locking for preventing the throwing of switches under trains.

It is essential that some provision should be made in power interlocking systems so that a switch may not be thrown under a train or directly in front of it. This may be accomplished in one way by breaking the operating or controlling circuits for the switch machine, or switch and lock movement, through contacts of a track relay, or a repeater relay, controlled by the usual detector track circuit associated with the switch, so that when a train enters or stands upon this detector track circuit, the switch cannot be thrown. With such an arrangement, however, it may happen that the train will enter the detector track circuit just at the time the switch is being operated, with the result that the switch may be left unlocked or in mid-stroke by reason of the fact that the entrance of such train instantly stops the operation of the switch machine. Such a thing happening might be extremely unsafe and dangerous; and under such circumstances it would be better to have the switch complete its movement, if it has started to operate, rather than have it unlocked or in mid-stroke.

In view of these considerations, one object of this invention is to devise a simple arrangement of circuits and controlling devices such that the operation of the track relay of the detector track circuit is coördinated with the operation of the switch machine in such a way that the dropping of the track relay will prevent the switch machine being operated, if it is at that time in either the normal or reverse position, but will not prevent the switch machine completing its operation, if such operation had commenced before the track relay dropped.

Other detail features and advantages of the invention will appear more fully hereinafter, and the novel features of the invention will be pointed out in the appended claims.

In describing my invention reference will be made to the accompanying drawing, which illustrates in a simplified and diagrammatic manner the parts and circuits associated with a switch machine and its controlling lever, together with the devices and circuits constituting my improved system of detector locking.

In disclosing my invention, I have illustrated it applied to a well known system of electric interlocking, such as disclosed, for example, in my prior Patent 1,288,595, dated December 24, 1918. The construction of the switch machine and the manner of its operation from a lever in the tower, together with the various circuit controllers and operating circuits, are fully explained in my prior patent; and consequently, it will be sufficient for a clear understanding of the present invention to explain the general scheme of operation of those parts directly associated with the improvement constituting my present invention. For convenience the parts and circuits shown on the accompanying drawing have been given the same reference characters used on the drawing of my prior patent, so that by referring to said patent the operation of the entire system may be readily understood.

The switch S associated with the switch machine S. M. is indicated conventionally; and in a similar manner I have illustrated the usual detector track circuit, comprising the track battery 4 and track relay T. In the particular arrangement shown, the track relay T controls the repeater relay R; but this is optional. As explained in my prior patent above mentioned, the circuit controller of the switch machine includes a contact block 55, which is moved mechanically from its existing extreme position to its midde or intermediate position during the initial unlocking movement of the switch machine, and which remains in that position until the switch machine has completed its cycle of operation and is again fully locked, whereupon said contact block will be automatically shifted to its other extreme position.

This contact block 55 of the switch machine is provided with an additional contact piece 6, which is arranged to bridge or electrically connect contact fingers 7 and 8, when said contact block is in the middle position.

The front contacts of the relay R are included in the main common return connection 104—104ª of the switch machine. When the contact block 55 is in the middle or intermediate position, these front contacts of the relay R are shunted by conducting path comprising conductor 9, contact spring 7, contact piece 6, contact spring 8, and conductor 10. Thus, before operating current can be supplied to the switch machine, it is necssary to have either: (1) the relay R energized, or, (2) the switch machine at an intermediate point in its cycle of operation.

The operation of my system of detector locking will be readily apparent to those skilled in the art with only a brief explanation. With the various parts in the normal position, as shown on the accompanying drawing, a train entering the detector track circuit for the switch S will shunt out track relay T and deënergize relay R. The switch machine being in the normal position, the deënergization of relay R breaks the common return connection 104—104ª, so that as long as the train remains on the detector track circuit, power cannot be supplied to the switch machine to operate the switch, Suppose, however, that the towerman starts the switch machine into operation just at the time a train enters the detector track circuit. Under these conditions, power would not be cut off from the switch machine, since the main common connection would be established through the contact springs 7—8 and contact piece 6. Consequently, in spite of deënergization of relay R by the entrance of the train into the detector track circuit, the switch machine would be able to complete its cycle of operation.

In describing my invention, I have selected a simple form and have shown its application to one type of power interlocking. It will be evident, however, to one skilled in the art that the same features and principles of operation characterizing my invention can be applied to other power interlocking systems, and may also be used in conjunction with the various well known features commonly employed in interlocking systems, which have not been disclosed, I wish it to be understood, therefore, that the embodiment of my invention herein shown and described is merely illustrative and does not exhaust the various modifications and adaptations of the broad idea of means underlying my invention.

What I claim as new and desire to secure by Letters Patent, is:—

1. In a power interlocking system, a detector track circuit, a switch machine, means controlled by said track circuit for preventing operation of the switch machine while said track circuit is occupied, and means governed in accordance with the operation of the switch machine for rendering said first mentioned means ineffective while the switch machine is operating.

2. In a power interlocking system, a detector track circuit including a track relay, a switch machine having its operating circuits carried through front contacts of said track relay, and means for shunting said contacts while the switch machine is operating.

3. In a power interlocking system, a detector track circuit including a track relay, an electrical operable switch machine having a main common carried through front contacts of said track relay, a circuit controller closed while the switch machine is at any intermediate point in its cycle of operation and open when such cycle of operation has been fully completed to throw the switch points to either position, and a shunt for said front contacts governed by said circuit controller.

4. In a power interlocking system, a detector track circuit, a switch operating mechanism, a circuit controlling said mechanism and governed by the track circuit, and means for maintaining the continuity of said circuit independently of the track circuit control while the mechanism is operating.

5. In a power interlocking system, a switch operating mechanism, a track circuit, means controlled by the track circuit for preventing application of power to the mechanism while the track circuit is occupied, and means for permitting the mechanism to complete a cycle of operation once started prior to the entrance of a train into the track circuit.

6. In a railway traffic controlling system, a track including a track circuit, a switch, an electrically controlled mechanism for said switch, a circuit controlling said mechanism, a plurality of means for controlling said circuit, one of said means controlled by said track circuit, and means for maintaining the controlling circuit of said mechanism throughout its operation independently of said track circuit control.

7. In a railway traffic controlling system, a track provided with a track circuit, a track switch, an electrically controlled mechanism for operating said switch, means for controlling said mechanism by said track circuit, and means for removing said control when said mechanism is operating.

8. In a traffic controlling system, a track provided with a track circuit, a track switch, a power operated switch machine, a control circuit for governing the opera-

tion of said machine, a relay controlled by the track circuit and acting to interrupt said control circuit when the track circuit is occupied, and means for preventing the effective action of the relay while the switch machine is operating.

9. In a power interlocking system, a switch operating mechanism, a track circuit, and means at the switch acting to prevent operation of the mechanism while at rest in an operated position when the track circuit is occupied, said means permitting the mechanism to complete an operation once started regardless of the entrance of a train into the track circuit in the meantime.

10. In a power interlocking system, an electrically operable switch engine, a detector track circuit, a circuit controller governing the application of operating current to the switch machine, means for opening the circuit controller when the track circuit is occupied, and means effective only when the switch machine is operating to supply operating current thereto independently of the track circuit control.

11. In a power interlocking system, a switch operating mechanism, means for at times preventing operation of said mechanism, and automatic means effective while the mechanism is operating to nullify the influence of the first mentioned means.

12. In a power interlocking system, an electrically controlled switch operating mechanism, a track circuit, a control circuit for said mechanism which is interrupted while the track circuit is occupied, and means for independently maintaining the continuity of the control circuit while the mechanism is operating.

13. In a power interlocking system, an electrically controlled switch operating mechanism, a control circuit therefor, a relay at the mechanism acting when deënergized to interrupt the control circuit, a track circuit, means controlled by the track circuit for governing the relay, and means for shunting the contacts of the said relay while the switch machine is operating.

14. In a power interlocking system, an electrically operable switch machine having a common wire, a track circuit, a circuit controller in said common wire governed by the track circuit, and means for establishing a shunt around the circuit controller while the switch machine is operating.

15. In a power interlocking system, a switch operating mechanism, a source of current and control means for governing the operation of said mechanism from a distant point, a track circuit, and means preventing operation of the mechanism while the track circuit is occupied, said means permitting the mechanism to complete a cycle of operation once started regardless of the entrance of a train into the track circuit in the meantime.

16. In a power interlocking system, a switch operating mechanism, track circuit controlled means for governing the operation of said mechanism, and means dependent upon the movement of the mechanism to permit it to complete a cycle of operation regardless of the control of the track circuit control.

17. In a power interlocking system, a switch operating mechanism, circuit controlling means closed while the mechanism is operating and opened when the mechanism has completed a cycle of operation, and track circuit controlled means coöperating with the circuit controlling means to govern the application of power to the mechanism and thereby prevent operation thereof from either extreme position while the track circuit is occupied but permitting completion of a cycle of operation started prior to the entrance of a train into the track circuit.

18. In a power interlocking system, a track switch, mechanism for operating the switch, a track circuit, and means controlled by the track circuit for preventing operation of the mechanism from either of its extreme positions but permitting the mechanism to assume either extreme position if operating when the track circuit becomes occupied.

19. In a power interlocking system, a switch operating mechanism having an operating circuit, and track circuit controlled means located at the switch for governing the operation of the mechanism, said means being effective only when the mechanism has fully operated to one or the other of its extreme positions.

20. In a power interlocking system, a switch operating mechanism, a track circuit, means preventing operation of the mechanism while the track circuit is occupied, and means whereby the mechanism may be operated to either of its extreme positions if it is operating at the time the track circuit becomes occupied.

21. In a power interlocking system, a track switch, electrically controlled mechanism for actuating the switch, a track circuit, and circuit controlling means partly governed by the track circuit and partly in accordance with the condition of said mechanism for preventing operation of the mechanism from rest while the track circuit is occupied but permitting the mechanism to complete a cycle of operation started prior to the entrance of a train into the track circuit.

22. In a power interlocking system, the combination with a track circuit, of switch operating mechanism having its operation from either extreme position dependent on the

condition of the track circuit, and means permitting the mechanism to be operated from an intermediate point in its cycle of operation to either of its extreme positions independently of the track circuit control.

23. In an electric interlocking system of the dynamic indication type, a switch machine, a track circuit, and means for breaking the operating circuits of said machine while the track circuit is occupied, but permitting operation and indication of the machine if it is operating at the time the track circuit becomes occupied.

24. In a power interlocking system, a switch machine, means actuated by the switch machine when it changes from either extreme operated position, and track circuit controlled means coöperating with said means to govern the operation of the switch machine.

25. In a detector locking arrangement for switch machines of the type which have a locking plunger, a contact block operated by the plunger and shifted to the middle position and to an extreme position when the plunger is unlocked and locked respectively, a contact piece carried by said block, and contact fingers coöperating with said contact piece, said fingers being electrically connected while the contact block is in its middle position and disconnected when the block is in either extreme position.

WINTHROP K. HOWE.