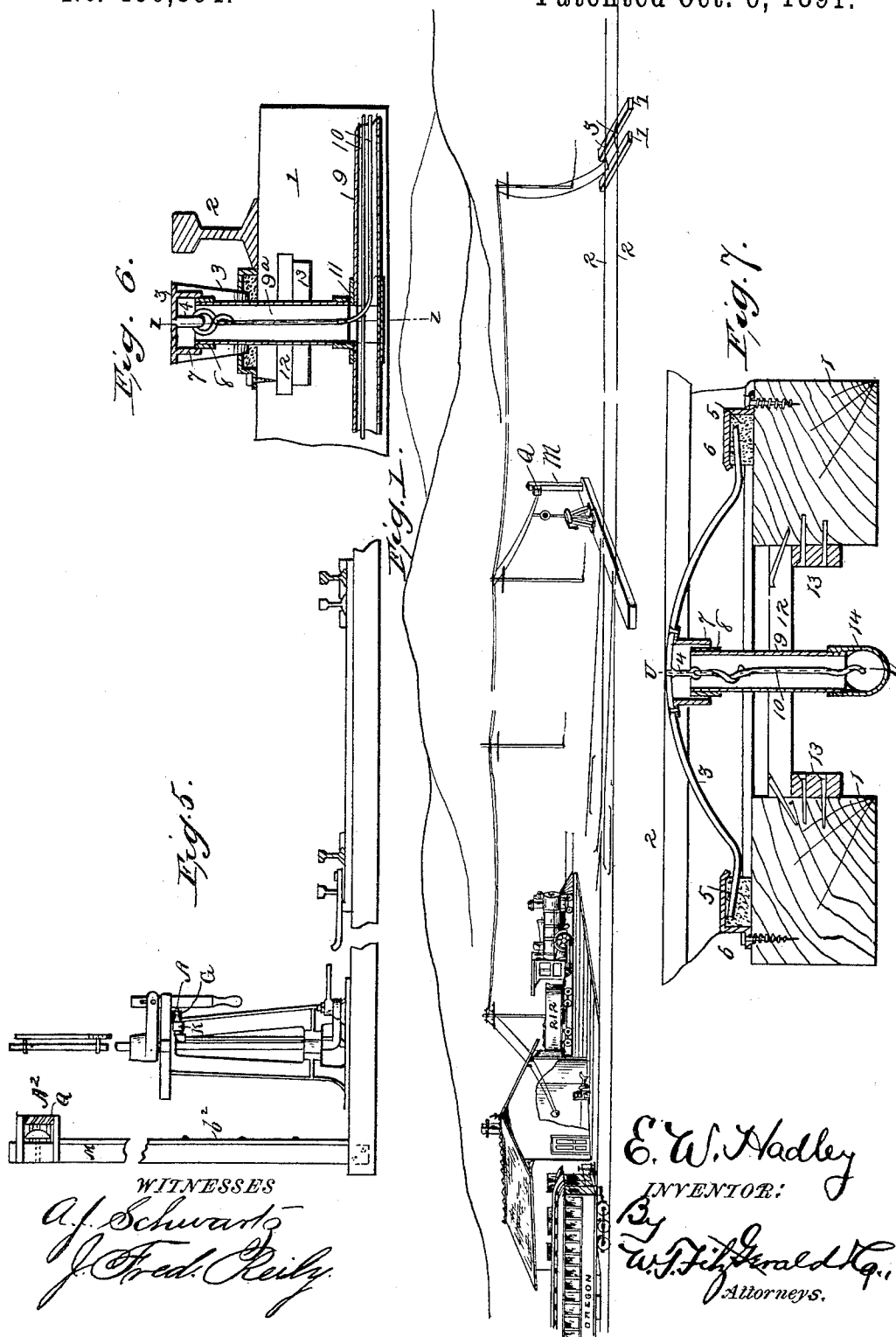


E. W. HADLEY.

AUTOMATIC ELECTRIC SWITCH INDICATOR.

No. 460,864.

Patented Oct. 6, 1891.



(No Model.)

4 Sheets—Sheet 2.

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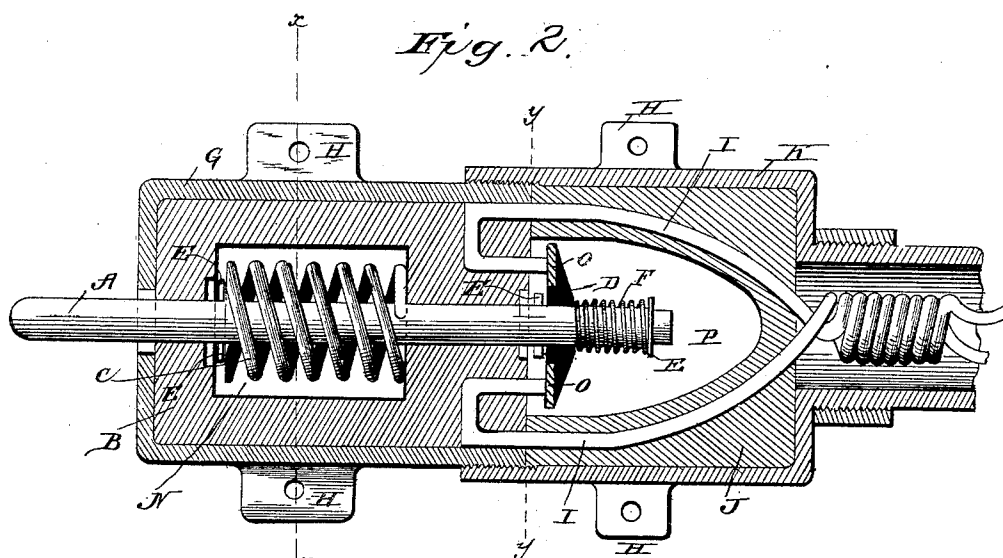


Fig. 3.

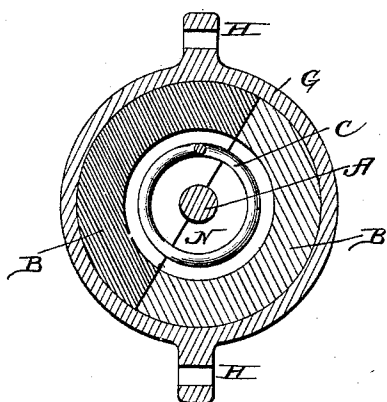
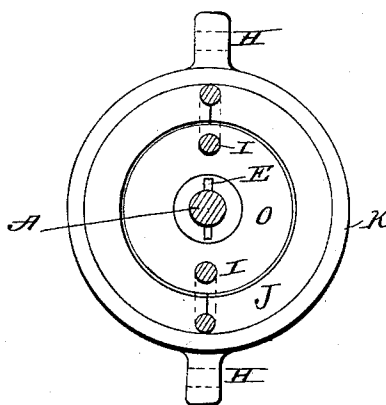


Fig. 4.



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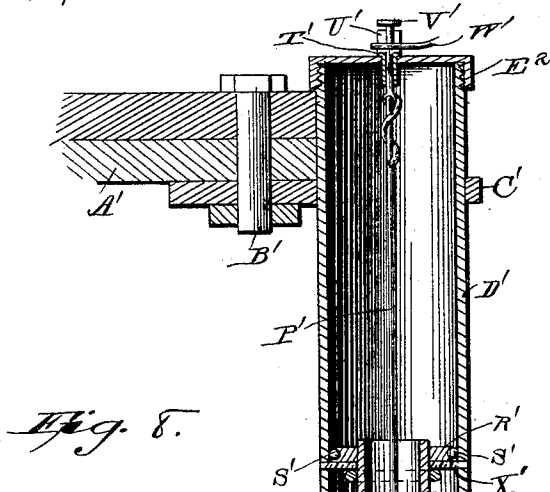
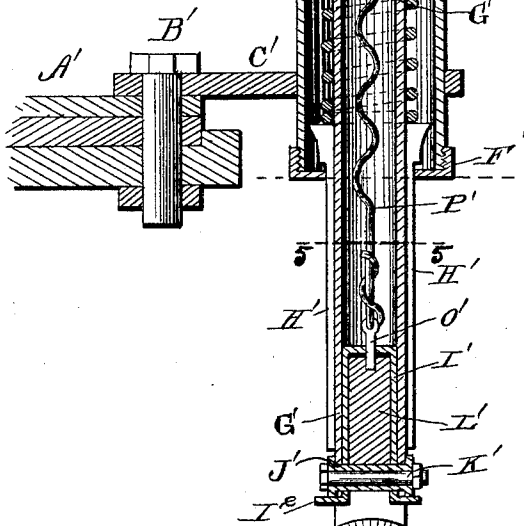
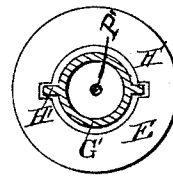


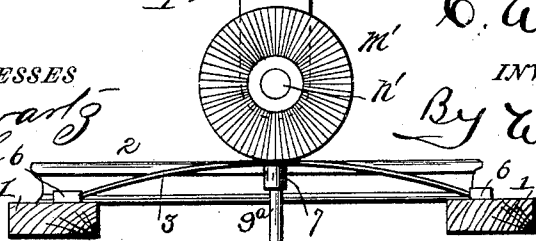
Fig. 9.



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UNITED STATES PATENT OFFICE.

EVEREST W. HADLEY, OF CORVALLIS, OREGON.

AUTOMATIC ELECTRIC SWITCH-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 460,864, dated October 6, 1891.

Application filed January 7, 1891. Serial No. 377,015. (No model.)

To all whom it may concern:

Be it known that I, EVEREST W. HADLEY, a citizen of the United States, residing at Corvallis, in the county of Benton and State of Oregon, have invented certain new and useful Improvements in Automatic Electric Switch-Indicators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has relation to railway-switches and their signals; and it consists, broadly, in a combined electrical and mechanical construction which will automatically ring a gong or bell located near the switch and also one in the nearest station where an agent is located, the bells in both said places being rung continuously as long as the switch remains open and only ceases when the switch is closed and locked in its closed position.

My device further consists in certain new features of construction whereby when a train approaches an open switch an electric bell in the engine-cab will be automatically rung to notify the engineer of the fact that the switch stands open.

My invention will be hereinafter fully described and claimed.

Referring to the accompanying drawings, Figure 1 is a perspective view showing the relative positions of the switch, the bells, and the contact-arcs. Fig. 1^a is a diagrammatic view of the electric circuit between the station, the switch, and the contact-arcs. Fig. 2 is a longitudinal sectional view of the electric button and its accompanying housing. Fig. 3 is a transverse section on line X X, Fig. 2. Fig. 4 is a transverse section taken on line Y Y of Fig. 2. Fig. 5 is a perspective view of the electric button, gong, and attachments as applied to use. Fig. 6 is a vertical sectional view taken at one of the contact-arcs transversely to the line of the track. Fig. 7 is a longitudinal sectional view of one of the contact-arcs taken on a line z z of Fig. 6. Fig. 8 is a longitudinal sectional view of one of the contact-brushes and its accompanying housing. Fig. 9 is a transverse sectional view taken on line 5 5 of Fig. 8. Fig. 10 shows one of the contact-brushes as applied to use on one side

of a locomotive and also the wire connecting said brush with the bell in the cab.

The same letters and numerals of reference indicate corresponding parts in all the figures.

In order that the object of my invention may be more readily understood and the need for such an appliance more fully appreciated I desire to call attention to the existing state of the art.

Until within the past few years inventive effort has been almost wholly directed to the production of visual attachments for switches to indicate whether the switch is open or closed—that is to say, for daylight targets of various and conspicuous shapes were devised. To these colored lamps were added to indicate the position of the switches by night. The appeal thus made is wholly to the eye, and the eye must be skilled in the meaning of arbitrary position and color. Natural obstacles, curves in the track, snow, smoke, fog, &c., aggravated by the presence of train-lamps at night, render it practically impossible to always read the signals aright. Then again, the train-man learns to do his work mechanically. It is a rule that all switches, when not in use, shall be set and locked for the main track. The train-man presumes that the switch is in this correct position; but numerous casualties have proven the fallibility of this presumption. The target and the switch-lamp are thus rendered useless, for the reason that they are not observed. Again, switches are often purposely left open to facilitate switching and are afterwards forgotten.

My device is not intended to wholly supplant the target and its lamp, but rather to supplement them.

I am aware that I am not alone in the undertaking of supplying audible railway-signals.

My invention, as will be hereinafter fully described, does not depend upon the visual, but upon the aural sense, thus by its constant appeal thereto rendering it practically impossible for the train-men to accidentally misplace the switch or to leave it open.

My invention consists more particularly of an electric button of peculiar construction (the component parts of which will be here-

inafter fully described) connected by wires with a battery in the depot and having in current two or more electrical bells, one preferably mounted upon a post seven feet high, more or less, attached to the head-block directly back of the switch-stand. The other is located in the agent's office at the depot. The button is so placed on the switch-stand that when the switch is set for the main track the switch-lever compresses the button and holds the circuit open. When the lever is moved out of contact with the button, the circuit is automatically closed. The spring operating the push-button is of such strength that it will move the lever and close the circuit unless the lever is not only put into main-track position, but is also locked or fastened in that position.

My invention further consists in extending the wires of the circuit to a point at a suitable distance from the entrance to the switch and there connecting them with devices placed at the sides of the two rails, so that when a locomotive reaches that point attachments mounted on the engine-truck will come in contact with the said devices, thus closing a circuit and causing an electric bell located in the engine-cab to ring and thus aurally announce to the engineer that the switch which he is approaching is open.

Referring in detail to the various parts of my invention by their designating letters and numerals, B indicates the insulating body of the electric button, which is molded of strong glass or any other suitable non-conducting material in two halves, so that the body is divided longitudinally. By thus molding the insulator in two parts provision is easily and cheaply made for the formation in the median face of each half of a longitudinal groove *L*, which shall register with each other, so that when the halves are placed together a cylindrical bed is provided for the button-rod A, hereinafter referred to. The middle third, more or less, of the groove just referred to is enlarged so as to form the pocket N in each of the halves, the object of which is to provide a housing for the spiral spring C, arranged around the button-rod at this point. In like manner the retaining-cup J is molded in two equal parts, so that the cup will be divided longitudinally while registering grooves *j* are provided in the meeting faces of the halves for the reception and insulation of the wires I I, as shown in Fig. 7. It will be seen also that the retaining-cup presents a cup-shaped appearance when the two halves are joined together, and the cavity P thus provided is occupied by the inner end of the button-rod A, and by the circuit-closer D attached thereto, as shown in Fig. 2. By providing a bed for the wires I I they will be kept out of the way of the button-rod and the circuit-closer D when the latter moves inward. After the wires I I pass through the retaining-cup, they are coiled for a short distance in the piping which extends to the gong-

post M, so as to permit of the device being detached from the stand and drawn out of the case for examination without the necessity of detaching the wires. The circuit-closer D is a disk of indurated fiber or other suitable non-conductor, arranged to slide upon the rod A, and bearing on its face a thin metal washer O, adapted to form connection between the free ends of the wires I I, as shown in Fig. 2. The compensating spring F is arranged around the inner end of the rod A in such a manner that the circuit-closer D is held snugly to its work against the ends of the wires I I, insuring perfect contact therewith when the button-rod A is not compressed.

Retention-pins E E E are arranged to pass diametrically through the button-rod A at the points shown, the object of which will be apparent. A suitable metal housing G K is provided to inclose the insulators and accompanying parts, a sectional view of which is shown in Fig. 2.

A gong A² is mounted upon a post M, erected at the outer end of the head-block, and is preferably the ordinary six-inch electric gong of vibratory stroke, protected from exposure to the weather by a slatted metal cover Q, or by other suitable means. The necessary current to operate the bells can be obtained from the station battery, or from the cells of a dry battery placed in the station for this special purpose. The dry battery is preferred as it will not freeze, and will require attention only at intervals of six or eight months.

My electric button is attached to the switch-stand by means of the ears H H, arranged to project conveniently from the sides of the outer casing G and K. The button is so placed that the push-rod A will be forced inward by the switch-lever, when the switch is in the main-track position. It will be seen that when the switch-lever is moved to open the switch, the push-rod A will be forced by the spring C to follow the lever until the circuit-closer A is forced against the ends of the wires I I, thus closing the circuit, when the gong upon the post M and the bells in the station and in the locomotive-cab will ring, and those in the station and at the switch will continue to clamorously call attention until the switch is again placed in the main-line position, when the lever will impinge upon the button-rod A and push it inward until the circuit-closer D is pushed away from contact with the ends of the wires I I, thus breaking the circuit between the battery and the gong-relay.

I desire to call attention to another part of my invention, which will greatly increase its utility. This additional feature consists in placing along the side of both of the rails of the main track, outward from the switch, a suitable means for effecting an electrical connection between the ends of the wires of the circuit prolonged and an electrical bell in the cab of the locomotive in such manner that when a locomotive approaching an open

switch arrives at the point of contact the bell in the cab will sound, thereby warning those in the cab that the switch is open. Generally speaking, this part of my invention consists in prolonging the original circuit-wires from the battery and carrying them on the ordinary telegraph-poles alongside the track to any distance preferred, outward from the entrance to the switch, preferably about one thousand feet, where they are to be led down the pole to a point near the ground where they are to be separately wrapped with some suitable non-conductor and thence carried inside of a small pipe or by other suitable means to the track, where each wire is to be connected to a separate insulated metallic surface placed close to each rail, in such manner that an insulated metallic brush or other suitable device attached to each side of a locomotive, will impinge upon the insulated metallic surfaces before referred to at the same moment when the locomotive is passing the point where they are located, in such manner that the current shall pass from one insulated surface by means of the impinging brush, wheel, or other device on the locomotive, and thence by means of a wire connected therewith to an electric bell in the cab, and thence by means of another wire to the corresponding wheel or brush on the opposite side of the locomotive to the insulated surface in contact therewith, thus completing the circuit. Of this part of my invention Fig. 1 shows the prolonged circuit-wires and the relative position of the contact-arcs, and Figs. 8 to 12, inclusive, show various features of this part of the invention.

1 1 indicate two adjacent ties in the track, and 2 2 indicate the rails.

3 3 are curved rigid metal strips whose ends are embedded in blocks of suitable non-conducting material 5 5, which in turn are protected by a metallic housing 6 6. On the under side of the contact-arcs is fastened a short piece of pipe 7, of a larger diameter than that in which the circuit wires are conveyed to the track. When the pipe 9 containing the insulated circuit-wires 10 10 reaches a point beneath the center of the first contact-arc, a T-connection 9^a is screwed to it, by means of which the pipe 9 is extended upward at right angles to its previous line of direction, and made to enter the pipe 7. From the T 11 the pipe 9 is also extended in its original line of direction, which is at right angles to the track-rails to a point beneath the center of the other contact-arc, and by means of the elbow 14 is prolonged upward, at right angles to its original line of direction and entered into the pipe 7, as shown in Fig. 8. A tubular section of insulating material 8 8 is slipped over the ends of the pipe 9 where they enter the cups 7 7, so as to insulate them therefrom. Eye-bolts 4 4 are secured to the centers of the contact-arcs and project downward into the pipes 9 9. To each of these eyebolts is connected the end of one of the circuit-wires 10

10. Wooden cleats 12 12 are nailed at their ends, to the inner opposite faces of the two ties which support the ends of the contact-arcs. The strips are further supported at their ends by the blocks 13 13, also nailed to the faces of the ties. The cleats are perforated through the centers so as to admit of the passage of the pipes 9 9, which they serve to support and keep in position. To further carry out this part of my invention, an electric bell of vibratory stroke is placed in the cab of the locomotive, and by means of properly insulated wires is connected with contact brushes or wheels, one of which, Fig. 10, is a longitudinal sectional view, these brushes being attached one on each side of the locomotive, preferably to the rear end of the truck-frames, in such position that when the locomotive passes the point of track at which the insulated contact-arcs are placed, each brush or wheel will impinge upon its proper contact-arc, and both at the same moment of time. Should the switch be open at such moment of contact the circuit will be closed by means of the synchronous contact between the brushes and the arcs, and the electric bell in the cab will sound, thus warning those in the cab of the open switch. Referring in detail to the various parts of this feature of my invention, M' indicates a circular metal brush-wheel, pivoted upon an axle N', the ends of which are mounted in the bifurcated lower end of the rod L'.

G' indicates a hollow cylindrical tube, the lower half, more or less, being formed with the opposite exterior ribs H' H'. Inside the lower extremity of the tube G' is fitted a thimble of indurated fiber or other suitable non-conducting material I', into which is fitted the upper end of a rod L'. The lower end of the insulating-thimble I' has a flange I² turning outward so as to come between the shoulder on the rod L' and the lower end of the tube G'. A retaining-bolt K' is passed laterally through the tube G' and the rod L', and is insulated from both by the flanged-tube washer J', made from some suitable non-conducting material.

Around the upper end of the tube G' is fastened the metal washer R', having mounted in its circumference four or more anti-friction rollers S' S'. Coiled around the upper half of the tube G' is the spiral spring Q', bearing at its lower extremity against the tops of the ribs H' H' and at its upper extremity against the retention-pins X' X'. The upper half, more or less, of the tube G', with the washer R', and the surrounding spring Q', is housed in the tube D', on the lower end of which is fastened the cap F', perforated and slotted, as shown in Fig 11, to receive the tube G' and the ribs H' H'. The ribs H' H', passing through the slots in the cap F', prevent the tube G' from turning. The upper end of the tubular housing D' is closed by the cap E², through the center of which passes the eyebolt U'. This eyebolt is insulated

from the cap E² by the tubular-flanged non-conducting washer T'. To the exterior end of the eyebolt U' is attached, by means of the thumb-screw V', or other suitable means, the end of a wire W', leading to the electric bell Y' in the cab, as shown in Fig. 12. In the upper end of the rod L', Fig. 10, is inserted the eyebolt O'. The eyebolts O' and U' are then connected by means of the insulated wire P', which is coiled in the upper end of the tube G', so as to keep the wire out of the way of the tube G' when the latter is pushed upward into the housing D'. The device is attached to the locomotive, and preferably to the rear ends of the truck-frames A' thereof by means of straps C' and the bolts B', as shown in Fig. 10.

From the construction described it is evident that the brush M', together with the attached rod L', is entirely insulated from the tube G', to which it is secured, by means of the non-conducting thimble I' and the tubular washer J', and that an insulated electric connection is maintained between the brush M' and the electric bell Y' in the cab by means of the rod L', the eyebolt O', the wire P', the eyebolt U', and the wire W', the same being true of the brushes attached on either side of the locomotive.

In operation, the spring Q', pressing upon the upper ends of the ribs H' H', forces the tube G' downward and outward from the housing D' to the extent allowed by the lugs upon the upper ends of the ribs H' H', which impinge upon the upper surface of the cap F', but should the brush meet with an obstruction the tube G' may be forced upward into the housing D' by the force of the contact between the brush M' and the obstacle, compressing the spring Q', thus preventing injury to the brush or to its attachments. Immediately the obstacle is passed the tube G' is again forced outward into position by the spring Q'.

The wires forming the circuit are to be properly insulated and disposed of by being inclosed within a pipe of suitable diameter placed under ground, or the wires may be suspended in the usual manner on that portion of the circuit where it is possible to so support them. In order that the wires between the button and the gong-post may be guarded from injury they also are carried inside a pipe of suitable size from the button to the foot of the gong-post. The face of the post may be then grooved to receive the wires, and a proper face-board b² secured to the post over the grooves.

It will be seen from the foregoing description that the whole mechanism is simple in construction, effective in operation, and not liable to derangement. It is arranged to admit of easy examination and can be set up or repaired by any competent line-repairer. The position of the button on the switch-stand is such that it is protected from accidental injury by the frame of the stand.

It will be understood that the use of my invention is not limited to the switches in the immediate vicinity of a station where an agent is located, as many switches are miles distant from such stations. Such distant switches are peculiarly liable to be left open and to escape attention. Such switches may be fully protected by being equipped with my device and connected with the nearest station.

The essential feature of value of my invention consists in thus making it possible to warn an approaching train of an open switch, to inform the agent of the same fact, and also warn those in the vicinity of the switch.

Believing that the advantages, construction, and operation of my invention will be readily understood further description is deemed unnecessary.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The automatic circuit opener and closer, consisting of the insulating-body B, divided longitudinally in two halves, each of which is provided with the groove l and pocket N, the insulator-cup J, likewise divided longitudinally in two equal parts, each half provided with registering grooves to provide a bed for the wires II, the button-rod A, mounted in the grooves l in the case B and extending into the hollow of the cup J and carrying on its inner end the circuit opener and closer D and washer O, the circuit-wires II, embedded in the insulating-cup and coiled at their outer ends, while their inner ends are placed to form a contact with the circuit-closer when the button-rod is not compressed, and the casings G and K, adapted to snugly house the insulating case and cap, all substantially as set forth.

2. In an automatic switch-indicator, the combination of the metal arcs 3, located by the sides of the rails at a suitable distance from the entrance to a switch, having their ends secured in non-conducting bearings and having connected to them the wires of an electric circuit, conductors or contact-brushes mounted at the sides of an engine in insulated bearings, where they will come in contact with the arcs 3, an electric gong in the engine-cab, in the station, and at the switch-stand, insulated wires adapted to connect said gongs, and the circuit opening and closing mechanism actuated by the switch-staff, substantially as set forth.

3. In an automatic switch-indicator, the combination of the metal arcs 3, located by the sides of the rails at a suitable distance from the entrance to the switch, having their ends insulated and having connected to them the wires of an electric circuit, the contact-brushes mounted at the sides of the engine and consisting each of a rod L', the wheel-brush M', mounted in the lower end of the same, the non-conducting cap I', having the outwardly-extending lower end, the trans-

verse bolt K', having the insulating-jacket J', the tubular casing D', having the slotted lower end, the sliding tube G', having the lower outer ribs H', the coiled wire P', leading from the
5 eyebolt O', secured in the upper end of the rod L' to an insulated eyebolt U' in the cap of the casing D', the spiral spring arranged to press the tube G' normally downward, and
10 wires connecting the upper eyebolt U' with an electric bell Y' in the engine-cab, substantially as set forth.

4. The combination, with an electric circuit in which are located bells at the switch and at the nearest station and the mechanism for
15 closing this circuit and causing the bells to continuously ring when the switch-lever is moved to open the switch, of the herein-de-

scribed metal arcs 3, connected with the extended wires of said circuit at a suitable distance from the entrance to the switch and
20 having their ends insulated, contact brushes or conductors mounted at the sides of an engine in insulated bearings, where they will come in contact with the arcs 3, an electric
25 bell located in the engine-cab, and insulated wires connecting the said contact-brushes with the electric bell in the cab, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EVEREST W. HADLEY.

Witnesses:

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CHAS. CLARK.