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J. S. WHITAKER & H. P. WOOD.

TRANSFER SWITCH FOR TESTING CIRCUITS.

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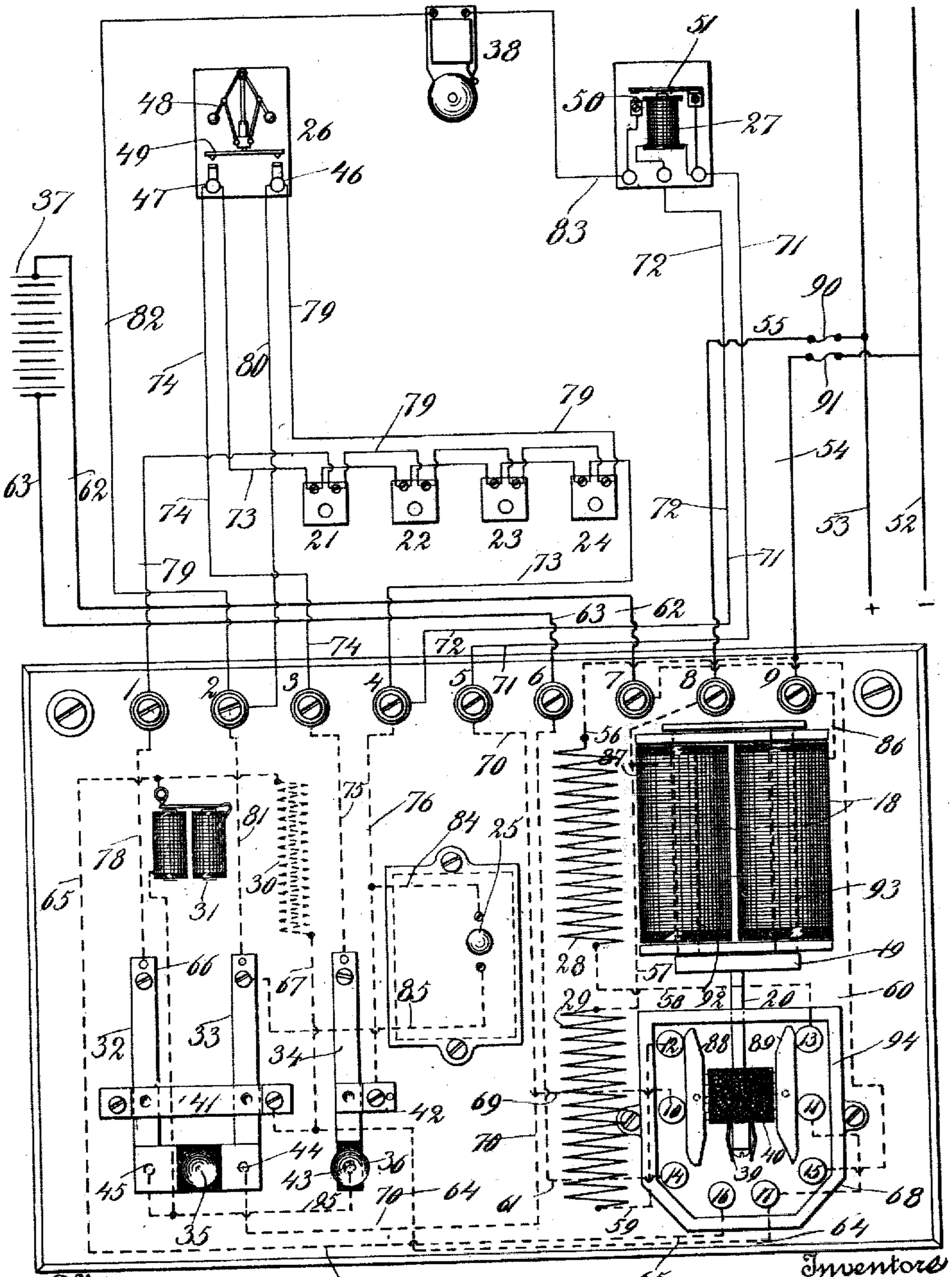

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TRANSFER-SWITCH FOR TESTING CIRCUITS.

No. 815,993. Specification of Letters Patent. Patented March 27, 1906.

Application filed July 24, 1905. Serial No. 270,956.

To all whom it may concern:

Be it known that we, JOHN S. WHITAKER, residing at Portsmouth, New Hampshire, and HARRY P. WOOD, residing at Brooklyn, New York, citizens of the United States, have invented certain new and useful Improvements in Transfer-Switches for Testing Circuits, of which the following is a clear, full, and exact description.

The object of this invention is to provide an automatic switch which will be adapted for use in supplying current to a signaling system—such, for example, as hereinafter described. The particular function of such switch is to automatically insure that a current from one of two sources of electricity will always be potentially present in the signal system and preferably to select a high-potential generator-current as the normal source of electrical supply, upon the failure of which the other source of supply, preferably low potential, will be impressed upon the system. A further function of the switch is to cause resistance to be inserted or cut out at certain points upon such changing from one potential to the other.

The switch is composed of an electromagnetic operating device, which may be a solenoid and an armature which carries the switch-arm, provided with one or more sets of switch-blades. In this application we have shown three such blades—two parallel ones for switching between two high-potential posts and two supply-posts or for switching between two low-potential posts and the supply-posts and a third blade for switching in or out a shunt resistance, hereinafter described, by means of two more contact-posts. The number of posts or blades used, however, is not essential.

In the following description and the accompanying drawing we have described and shown our invention as applied to an engine-stop-signal circuit—that is, one in which an electromagnetic device may be caused either from governor-contacts or from a push-button to operate to stop the engine. We have also shown such circuit to be supplied with means for testing the circuit at pleasure to assure the engineer that everything is in working condition, in which testing means there is included a test-responding signal adapted for operation by either source of potential. The test-responding signal is preferably supplied with a resistance which is cut out by the switch when low potential is on the line and cut in when high potential is present. We do not, however, limit ourselves to such type of signal system or to the specific embodiment of automatic switch shown, as we are aware that both may be varied to a great extent without departing from the scope of our invention as set forth in the claims.

In the accompanying drawing we have shown a full view of our improved automatic switch on a signaling-board with the connected mechanism diagrammatically shown.

We generally mount our automatic switch upon a base-board which may be provided with a pair of test switch-keys, a test-responding signal or buzzer, and a push-button for stopping the engine, or rather for operating the magnet which effects such stoppage.

The automatic switch in the embodiment herein described is composed of a pair of solenoid-magnets 18, within which cores 92 93, attached to a yoke-piece 19, travel. The yoke-piece and cores constitute the armature or operative means for moving the switch mechanism, which is connected to the armature 19 by a post 20. The switch mechanism is comprised of a block of insulation 40, which carries at its extreme end a spring contact member 39 and upon its sides contact-blades 88 and 89. In a suitable box 94, within which the block of insulation carrying the three contact-blades is adapted to travel, we preferably locate three sets of contact-posts. One set of these posts 10 and 11 are adapted always to be engaged by the switch-blades 88 and 89, which posts we will hereinafter refer to as the "supply-posts." The posts 12 and 13, shown in the upper part of the box 94, are connected with the high-potential circuit, while the posts 14 and 15 at the bottom of the box are connected to the low-potential supply system. Two posts 16 and 17, also in the bottom of the box, are so connected as to cut in or cut out a certain resistance in the buzzer-circuit, according to the position which the contact-blade 39 may occupy.

The high-potential circuit is led from the main supply-wires 52 53 through fuses 90 91,

conducting-leads 54 55 to binding-posts 8 and 9, secured upon the base. From post 9 conductor 86 leads current through the solenoid 18, through conductor 87 to post 8, in order that current may always pass through the solenoid when there is an existing potential upon the wires 54 and 55. When such is the condition, the cores of the armature 19 will be raised into the position shown in the drawing, causing the contact-posts 10 and 12 and 11 and 13 to be respectively engaged by the switch-contact blades 88 and 89, so that high-potential current will be delivered to the supply-posts 10 and 11. This high-potential current is led to the post 13, as follows: by the wire 56, which is connected with the binding-post 9, through a resistance 28, the wire 58 direct to the post 13, while high-potential current is conducted from post 8 by a conductor 57, secured to the post 8, through a resistance 29, from which resistance it passes by a conductor 59 to the post 12.

Should the high-potential circuit fail through disability to the line conductors 52 53, through the blowing of the fuses 90 91, or through any other cause, the solenoid immediately releases its armature, dropping the switch from the position shown to a lower position, cutting out posts 12 and 13 from the contact-blades, and connecting post 11 with post 15, post 10 with post 14, and connecting posts 16 and 17 together. Posts 14 and 15 we will speak of hereinafter as "low potential," posts 12 and 13 as "high potential," and posts 16 and 17 as "shunt-posts." Low-potential posts 14 and 15 receive current from conductors 60 and 61, conductor 61 being connected to feeding-post 6 and to post 14, while conductor 60 is connected between post 15 and binding-post 7. Current from a battery 37 is conducted to posts 6 and 7 by conductors 63 62, respectively.

The signaling-circuit is preferably one which in position for signaling is comprised of two separate closed loops, each one connected to one pole of the source of power. One of these separate loops is connected to supply-post 10 by a wire 69, wire 70, binding-post 5, wire 71, and magnet 27 of the engine-stop or other signal, wire 72 to binding-post 4, located in the loop proper, which consists of the wire 73, passing through the line of push-buttons 21 to 24, the governor-contact 47, wire 74, binding-post 3, wire 75, switch-blade 34, contact 42, and conductor 76 and the binding-post 4, thus forming a closed loop in connection with the supply-post 10 through the magnet 27. Another closed loop, which is adapted to be connected by the push-buttons and the governing device, receives a current of opposite potential from the post 11 by way of the conductor 68, post 17, conductor 64, switch-strap 41, where it branches into two sides of the second loop, the loop being as follows: strip 33, conductor 81, binding-post 2, conductor 80, governor-contact 46, conductor 79, through the series of push-buttons to binding-post 1, to strip 32 of the switch, to the strap 41. We thus secure two closed loops adjacent to each other within each push-button mechanism and at the governor, so that any current which is caused to travel across the two by the operation of any of these mechanisms will be caused to travel through the magnet 27 to operate it.

The object of the two closed loops, each of opposite potential and each connected through the switch-keys 35 and 36, is that upon operation of the keys the loops may be interrupted and a current momentarily thrown through the conductors of either loop to test out the same. For this purpose we mount a buzzer 31 upon the base and connect it so that upon depression of either test-switch current will be sent through the buzzer and through the conductor of one of the loops, which loop, as previously explained, will be broken at the same time, thus providing a means for immediate test to show the condition of the signaling system. The key 35 upon depression sets up the following connection for one of said signaling-loops. It is as follows: from supply-post 10, conductor 69, conductor 70 to contact 44, strip 33, conductor 81, binding-post 2, and by conductors 80 and 79 to binding-post 1, conductor 78, strip 32, contact 45 to conductor 66, to buzzer 31, to conductor 65, and, in the position shown in the drawings, through resistance 30, conductor 67, conductor 64, to post 17, conductor 68 to the other supply-post 11. If this circuit is intact, the buzzer will obviously ring and notify the operator that that side or loop of the signal-circuit is in perfect condition. If low tension were on the line instead of high tension, as just described, the circuit from the buzzer to the supply 11 would be slightly different, for the binding-posts 16 and 17 would then be connected together. Such circuit from the buzzer would be as follows: conductor 65 to post 16 through the blade 39 to post 17, thus cutting out the resistance 30, to post 11. To test the other loop of the signaling-circuit, we depress key 36, which causes the following circuit to be set up: from supply-post 10, conductor 69, conductor 70, binding-post 5, conductor 71, magnet 27, conductor 72, binding-post 4, conductor 73, through the push-buttons and governor-terminal 47 to conductor 74, binding-post 3, conductor 75, strip 34, contact 43, conductor 95, conductor 66 to the buzzer, and for low tension through conductor 65, post 16, blade 39, post 17, conductor 68, and supply-post 11, while for high tension from the buzzer to the resistance 30, conductor 67, conductor 64, post 17, conductor 68 to supply-post 11. In either case the loops will be broken and the current caused to traverse the entire length of loop, considered as a

straight conductor, passing also through the buzzer 31 without operating the magnet 27 in either case. To prevent operation of the magnet 27 when current is sent through it by the key 36, we make the buzzer of so great a resistance as to render the current which travels through it too weak to operate the armature 51 of the magnet 27. Upon the board we prefer to also place a key or push-button 25, which is an ordinary open-circuit button provided with two contacts, one of which passes by conductor 84 to conductor 76 of one signal-loop, while the other contact is connected by a conductor 85 with a strip 33 of the other signal-loop, so that the operation may be controlled from the signal or test board itself. This push-button 25 obviously is a counterpart of the push-buttons 21 to 24, any of which serve when depressed to connect the two loops of opposite polarity hereinbefore described.

As shown on our drawing, we prefer to connect a gong 38 to be automatically rung upon the operation of the magnet 27. To secure this operation, we provide a contact-post 50 in the path of movement of the armature and connect it with the conductor 71, which, as before described, leads to the supply-post 10 by means of a conductor 83, leading to the gong, and conductor 82, leading away from the gong and connected with binding-post 2, from which current may travel by conductor 81, strip 33, strap 41, conductor 64, post 17, conductor 68, and supply-post 11, so that as long as the armature remains seated against contact 50 the gong will ring and notify all who hear it that the engine-stop has been operated should they not by actual observation be able to see that such was the case.

It will be obvious, as both loops are of different polarity, one connected to post 11 and one connected through magnet 27 with post 10, that the connecting together of the loops either by push-button or by the contact-bar 49 of the governor 26, operated by centrifugal balls 48, will send a current through the magnet 27 for its operation.

What we claim is—

1. An electric circuit, two sources of electrical supply therefor, means for normally selecting and supplying one such source and automatic means operative upon the failure of said normal supply, adapted to connect the other supply, one of said sources being of high and one of low potential, resistance, and means for cutting out the resistance by the automatic means when the change is made from high to low potential.

2. In combination with a circuit, testing device for the same and test-responding signal, two sources of current-supply, an automatic switch, a resistance in the path of the responding signal, contacts for the switch adapted to supply current from one source through the resistance in one position, and from the other source with the resistance shunted in the other.

3. In combination with at least two distinct circuits comprising independent sources of current-supply, an automatic switch having an electromagnetic operating means, an armature therefor, one or more switch-blades operated thereby, one or more supply-posts controlled by said blades, two or more posts, at least one of which is connected to one source of current, and at least another of which is connected with another source, said blade adapted to contact with a post of one of said sources and with the supply-post at one time.

4. An automatic switch having an electromagnetic operating means, an armature therefor, one or more switch-blades operated thereby, one or more supply-posts controlled by said blades, two or more posts, at least one of which is connected to one source of current, and at least another of which is connected with another source said blade adapted to contact with a post of one of said sources and with the supply-post at one time, in combination with one or more shunt-posts and a resistance connected therewith, the blade of the switch adapted to contact therewith in one of its positions.

5. In combination with at least two distinct circuits comprising independent sources of current-supply, an automatic switch for changing from one circuit to another circuit upon failure of the first, comprising an electromagnetic operating device, an armature-operated switch therefor, three pairs of contacts, one pair for one circuit, one pair for the other circuit and one pair connected to the circuit to be supplied.

6. An automatic switch for changing from one circuit to another circuit upon failure of the first, comprising an electromagnetic operating device, an armature-operated switch therefor, three pairs of contacts, one pair for one circuit, one pair for the other circuit and one pair connected to the circuit to be supplied, in combination with an additional pair of cut-out contacts.

Signed at Portsmouth, New Hampshire, by JOHN S. WHITAKER, this 15th day of June, 1905.

JOHN S. WHITAKER.

Witnesses:
HELEN A. UNDERHILL,
ALICE M. LORD.

Signed at New York city, New York, by HARRY P. WOOD, this 19th day of July, 1905.

HARRY P. WOOD.

Witnesses:
T. MCCANN,
THOS. BLER.