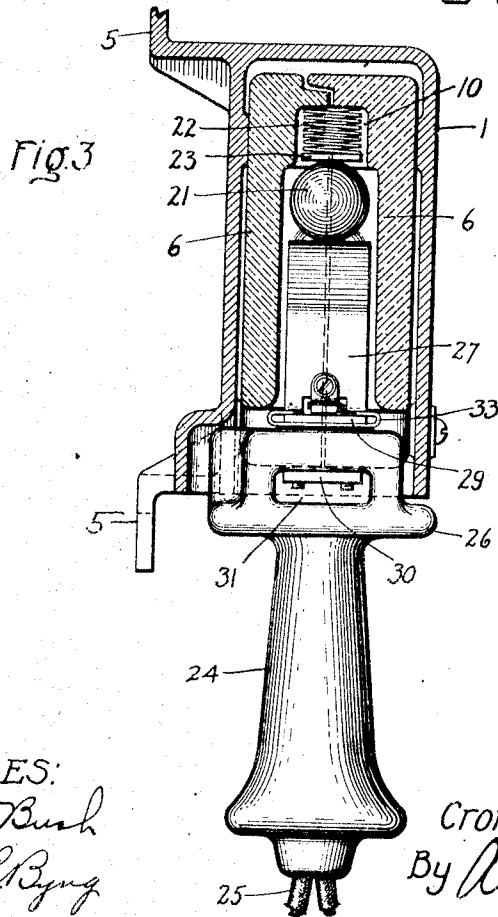
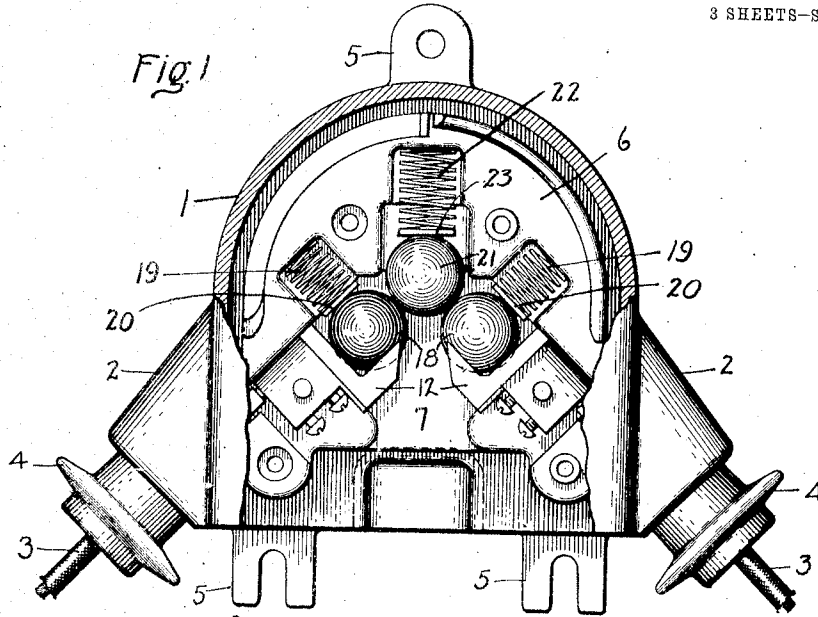


C. A. B. HALVORSON, JR.
 ARC LAMP CUT-OUT.
 APPLICATION FILED AUG. 27, 1908.

1,045,703.

Patented Nov. 26, 1912
 3 SHEETS—SHEET 1.



WITNESSES:

Lloyd C. Bush
Marcus L. Byng

INVENTOR:

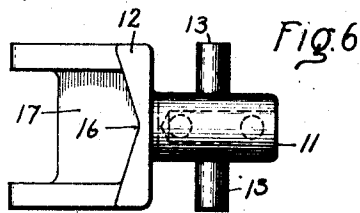
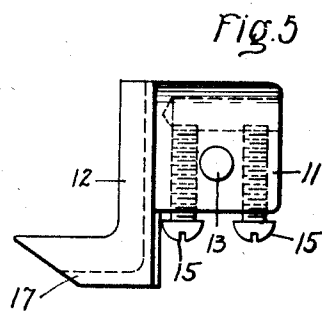
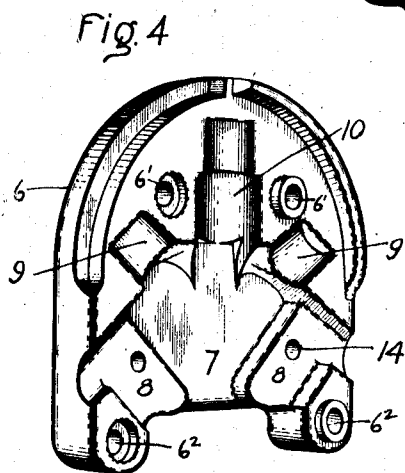
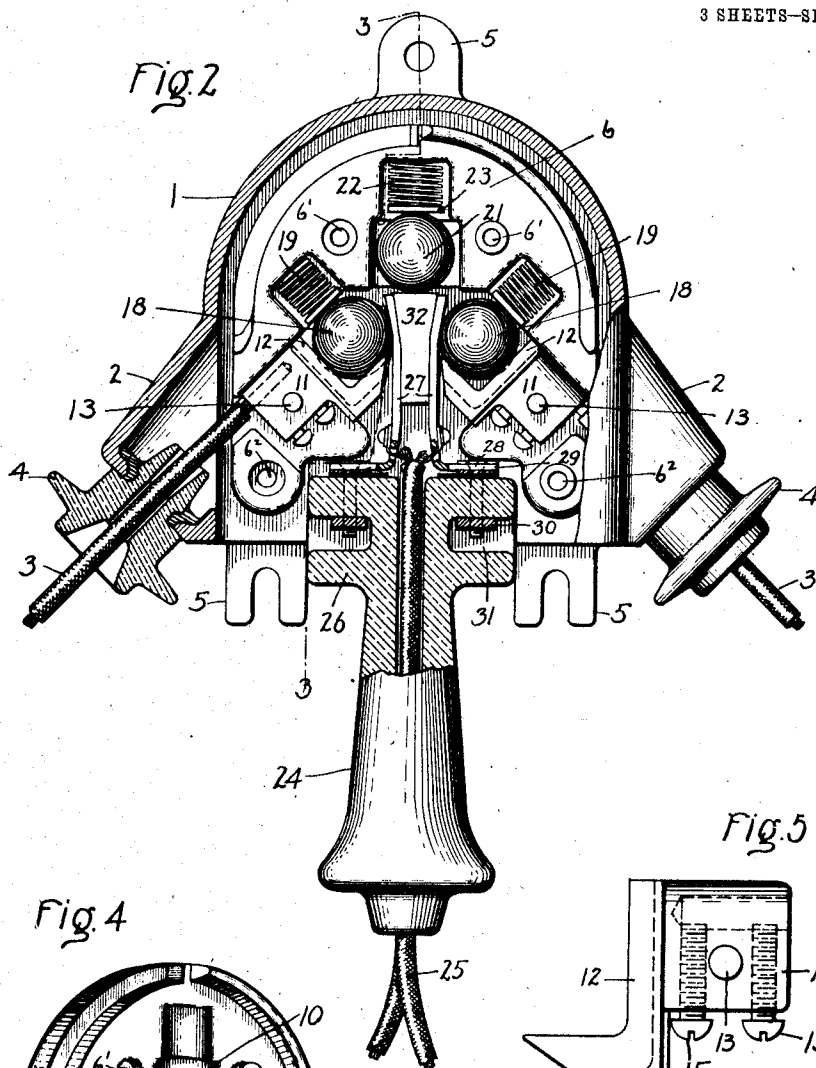
Cromwell A. B. Halvorson Jr.

By *Albert H. Dwyer* Att'y.

C. A. B. HALVORSON, JR.
ARC LAMP OUT-OUT.
APPLICATION FILED AUG. 27, 1908.

1,045,703.

Patented Nov. 26, 1912.
3 SHEETS—SHEET 2.



WITNESSES:
Lloyd C. Bush
Marcus C. Byng

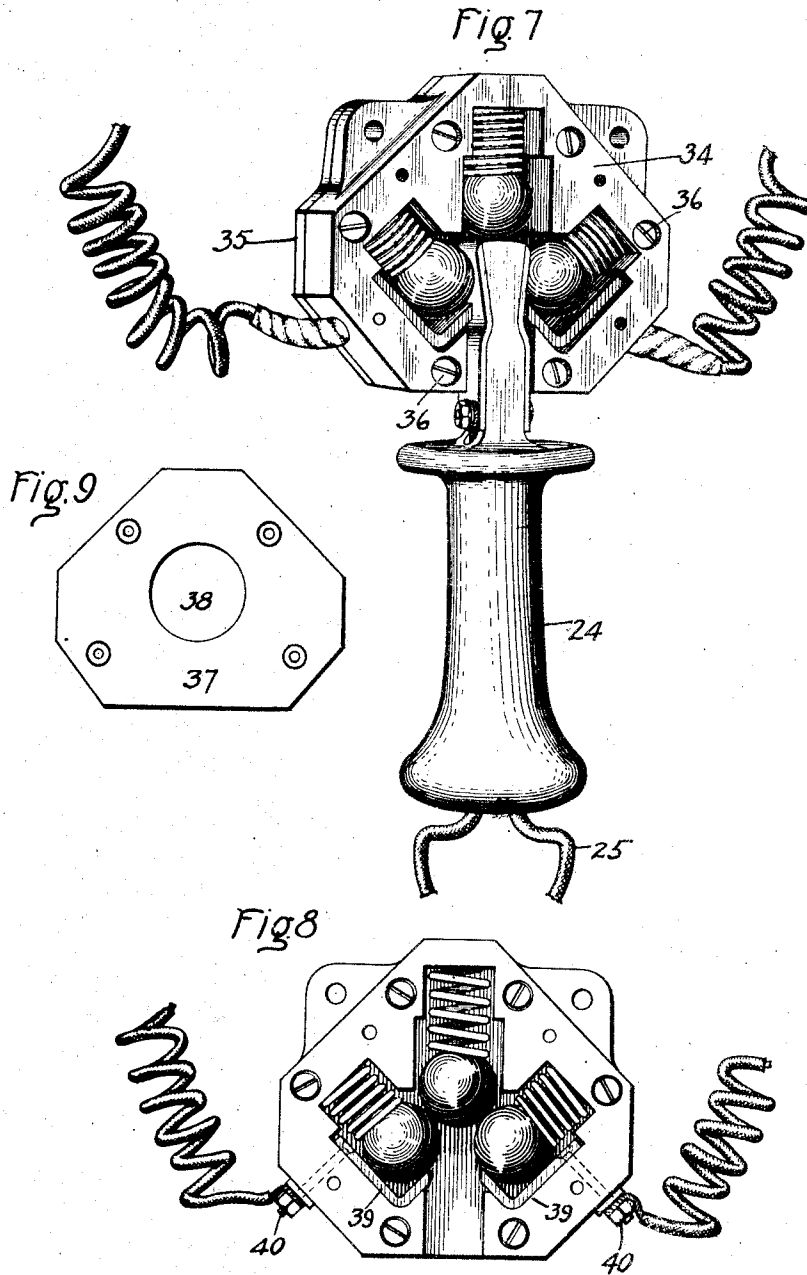
INVENTOR:
Cromwell A. B. Halvorson, Jr.
By *Alfred H. Davis*
Atty.

C. A. B. HALVORSON, JR.
 ARC LAMP CUT-OUT.
 APPLICATION FILED AUG. 27, 1908.

1,045,703.

Patented Nov. 26, 1912.

3 SHEETS—SHEET 3.



Witnesses:
 Lloyd C. Bush
 Marcus L. Byng.

Inventor:
 Cromwell A. B. Halvorson, Jr.
 By *Alfred S. Davis* Att'y.

UNITED STATES PATENT OFFICE.

CROMWELL A. B. HALVORSON, JR., OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ARC-LAMP CUT-OUT.

1,045,703.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Application filed August 27, 1908. Serial No. 450,567.

To all whom it may concern:

Be it known that I, CROMWELL A. B. HALVORSON, JR., a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Arc-Lamp Cut-Outs, of which the following is a specification.

This invention relates to switches for controlling electric circuits, and especially circuits for lighting by arc lamps connected in series. In cutting one or more series of arc lamps into circuit it is desirable to make the lamp connections before breaking the circuit connections and in cutting out the lamps to make the circuit connections before breaking the lamp connections. It is also desirable to have the switch operate with a snap or quick-break action, to avoid arcing at the switch contacts. Durability of said contacts is necessary in a switch intended for frequent use on circuits carrying heavy currents.

My invention aims to provide a switch having these characteristics, with strong, ample conducting surfaces, and capable of severe usage.

In the accompanying drawings, Figure 1 is a front elevation, partly broken away and partly in section, of a switch embodying my invention the plug contact being removed; Fig. 2 is a similar view with the plug contact inserted; Fig. 3 is a vertical section, on the line 3 3, Fig. 2; Fig. 4 is a perspective view of one of the halves of the socket; Fig. 5 is a side elevation of one of the line terminals; Fig. 6 is a top view of the same; Fig. 7 is a perspective view of a modified construction of the switch; Fig. 8 is a front view thereof with the plug removed, and Fig. 9 shows the front plates therefor.

The stationary part of the switch is housed in an iron casing 1 which is preferably an integral casting. The bottom of the casing is open, and on each side are tubular inlets 2 for the line terminals 3, which enter through insulating bushings 4 suitably secured in the mouths of said inlets. At the back of the casing are lugs 5 for receiving the screws for attaching it to any suitable support. The top of the casing is preferably rounded to shed rain.

The socket of the switch is composed of insulating material, preferably molded porcelain, and is made in duplicate halves or sections 6 which match together and fit into the

casing. One of these halves or sections is shown in Fig. 4. It has a deep central recess 7 flanked on either side by a flat shelf 8 and a semi-cylindrical recess 9. The recess 7 extends to the bottom of the section, and at its upper end it merges into an upright semi-cylindrical recess 10, the upper portion of which may be of less diameter than the lower, as shown. When these halves or sections are fitted together and fastened by screw bolts passed through the holes 6', there are spaces between the adjacent flat shelves 8 into which fit the shanks 11 projecting from the backs of metallic L-shaped terminal blocks 12, which extend into each side of the central recess 7. Said shanks have laterally-projecting dowels 13 which enter holes 14 in said shelves, and they are also drilled to receive the terminals 3 of the line wires, which are secured by one or more suitable set screws 15; the drill holes being in line with the bushings 4, and the set-screws being accessible through the open bottom of the casing and the socket. The fronts of the terminal blocks are somewhat grooved, as shown at 16 in Fig. 6, and their arms 17 are flanged on each side, for the purpose of retaining in position the loose metallic ball contacts 18, one of which is held by each block. The balls are urged downwardly upon the arms 17 of said blocks by compression springs 19 seated in the recesses 9 and bearing upon followers 20 which press upon the upper sides of the balls; the line of pressure being diagonally downward and inward, preferably at an angle of about 45 degrees to the vertical center line of the socket.

In the upper recess 10 is a similar metallic ball contact 21, urged downwardly into contact with both the other balls by a spring 22 and follower 23. This ball serves as a bridging contact between the two terminal balls, and closes the circuit across the break in the line, as shown in Fig. 1.

In order to cut in an arc lamp in series with the line, a plug contact is thrust in between the balls 18. Any suitable construction of plug may be used, but I prefer the one illustrated, in which there is a tubular handle 24 of insulating material such as porcelain, through which the leads 25 from the lamp terminals are threaded. The handle has a hilt 26 which effectually protects the hand of the operator. Two metallic con-

tact strips 27 are mounted on the hilt, preferably by means of screws 28 passing through a foot 29 on each strip into screw-threaded holes in a bar 30 housed in a recess 31 in the side of the hilt. The strips are rigidly connected but insulated from each other by a filler 32 of porcelain or the like interposed between them, and suitably secured thereto. The strips diverge at their upper ends, for a purpose hereinafter set forth. Springs 33 on the hilt cushion the blow between the hilt and the socket when the plug is inserted.

The lamp is cut in by thrusting the plug up into the socket of the switch between the balls 18 to the position shown in Fig. 2. Prior to the insertion of the plug, the balls 18 approach each other nearer than the arms 17 of the terminal blocks which support them, as appears in Fig. 1, so that when the plug enters, the strips 27 touch the balls 18 at once, and close the lamp circuit before the upper end of the plug lifts the ball 21 and breaks the line circuit. When the plug has been pushed home, the ball 21 is supported on the upper end of the insulating filler 32, well out of contact with the balls 18. The divergent upper end of the plug goes up above the balls 18, which are pressed by their springs against the sides of the plug at its narrower portion and thus prevent it from dropping out. The spring 22 is much lighter than the springs 19, so that it cannot force the plug downwardly, after the wider portion of the plug passes the balls 18.

When the plug is pulled out, the bridging ball 21 comes down into contact with the terminal balls 18 before the strips 27 separate therefrom, so that there is no break in the circuit. The balls 18, pushing against the rounded upper end of the plug, force it quickly out of the socket with a snap action. The socket is held in the casing by bolts passed through the holes 6², but Figs. 7 and 8 show a cheaper form of the switch for indoor work, in which the casing is omitted, the socket being composed of a recessed central portion 34 having a back plate 35 secured to it by screws 36. A front plate 37 may be provided with a central opening 38 so that the action of the ball contacts can be observed. The L-shaped terminals 39 are secured to the central portion 34 by screw bolts 40 which serve as binding posts for the line terminals. The springs rest directly on the balls, without any interposed followers.

While I have described my invention in its application to controlling arc lamps, yet I do not wish to be understood as limiting it to that service alone, as it is evidently capable of use in connection with instruments or other translating devices.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A cut-out, comprising two terminal contacts, a loose bridging ball contact, and a plug contact adapted to connect a translating device with said terminal contacts and disconnect the bridging contact.

2. A cut-out, comprising two terminal ball contacts, a loose bridging contact, and a plug contact adapted to connect a translating device with said balls and disconnect said bridging contact.

3. A cut-out, comprising two terminal ball contacts, a loose bridging ball contact, and a plug contact adapted to connect a translating device with said terminal balls and disconnect the bridging ball therefrom.

4. A cut-out, comprising a socket, three loose ball contacts therein, springs urging them together, and line terminal blocks supporting two of said balls.

5. A cut-out, comprising a socket having three recesses radiating from a common center, a spring-actuated ball contact in each recess, and a plug contact adapted to enter between the two side recesses and in line with the middle one.

6. A cut-out, comprising two terminal ball contacts, a loose bridging contact, springs urging the terminal balls toward each other, and a plug contact adapted to enter between said balls, and having a divergent upper end to be engaged by said balls.

7. A cut-out, comprising a socket having three radiating recesses, L-shaped terminal blocks adjacent to the two side recesses, spring-actuated ball contacts on said blocks and in the middle recess, and a plug contact cooperating with said ball contacts.

8. A cut-out, comprising an integral casing open at the bottom, and a socket of insulating material fitting into said casing and made in duplicate halves, said socket having a central recess opening downward, three recesses radiating from said central recess, loose ball contacts in said radiating recesses, and a plug contact adapted to enter between the side contacts and to disconnect the middle contact therefrom.

9. A cut-out, comprising a socket, three loose ball contacts therein, springs urging said balls together, line terminal blocks freely engaging two of said balls, and means for forcing said balls apart.

In witness whereof, I have hereunto set my hand this twenty second day of August, 1908.

CROMWELL A. B. HALVORSON, JR.

Witnesses:

ALEX. F. MACDONALD,
JOHN A. McMANUS, JR.

It is hereby certified that in Letters Patent No. 1,045,703, granted November 26, 1912, upon the application of Cromwell A. B. Halvorson, Jr., of Lynn, Massachusetts, for an improvement in "Arc-Lamp Cut-Outs," an error appears in the printed specification requiring correction as follows: Page 1, line 12, strike out the word "of"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of February, A. D., 1913.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

It is hereby certified that in Letters Patent No. 1,045,703, granted November 26, 1912, upon the application of Cromwell A. B. Halvorson, Jr., of Lynn, Massachusetts, for an improvement in "Arc-Lamp Cut-Outs," an error appears in the printed specification requiring correction as follows: Page 1, line 12, strike out the word "of"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of February, A. D., 1913.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.