

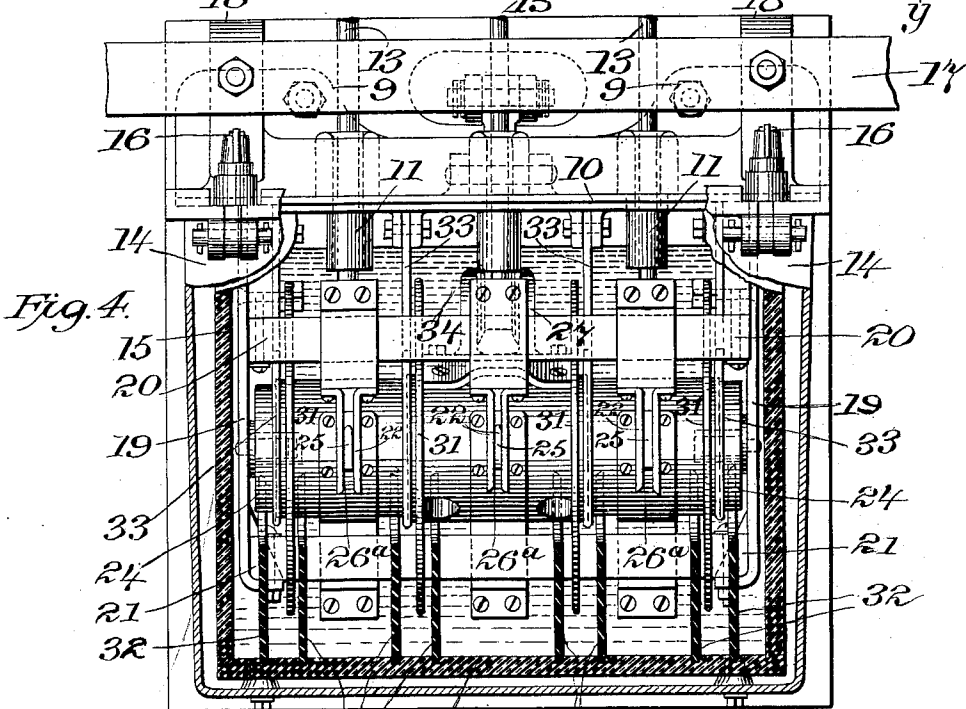
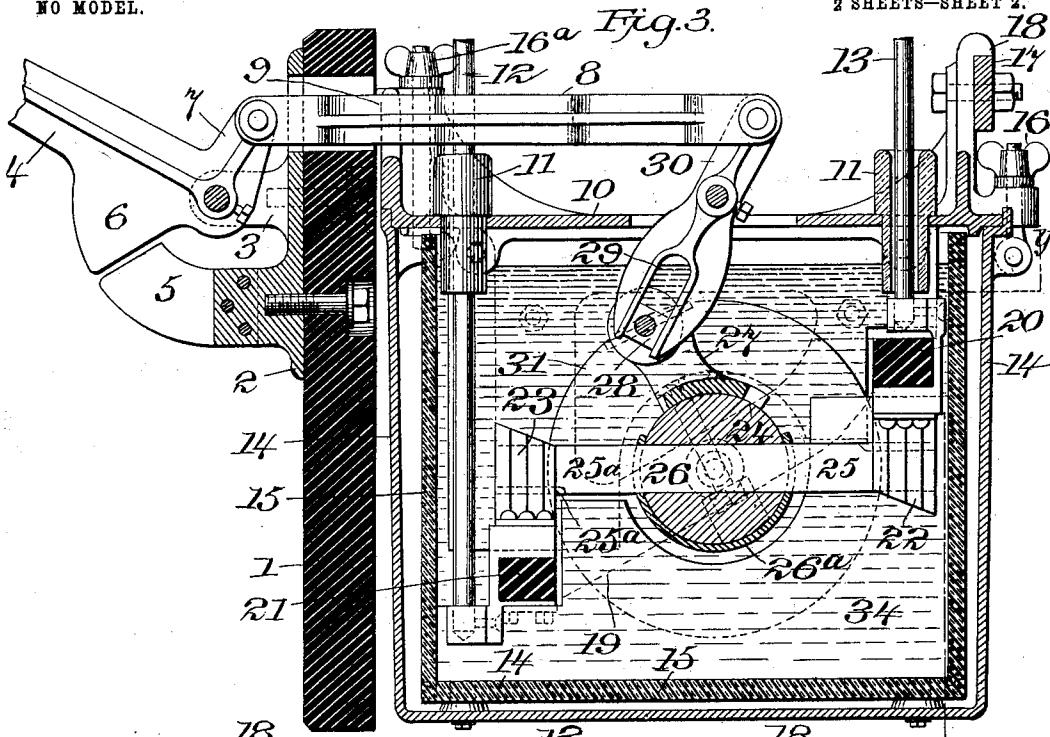


H. P. BALL.  
ELECTRIC SWITCH.

APPLICATION FILED JUNE 11, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

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## ELECTRIC SWITCH.

**SPECIFICATION** forming part of Letters Patent No. 732,672, dated June 30, 1903.

Original application filed July 6, 1900, Serial No. 22,691. Divided and this application filed June 11, 1902. Serial No. 111,214. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to electric switches, and more especially to the type designed to be employed with high-tension currents; and it consists, essentially, of a series of switches electrically separated from each other and immersed in a bath of oil and means for simultaneously making and breaking the respective circuits through such switches.

My invention also relates to various details of construction of the switches, the operating mechanism for the switches, the case in which the switches are contained, &c.

The object of my invention is a construction in which the operative parts are constantly immersed in an insulating fluid and the switch-contacts so arranged relative to each other that by no possibility a short circuit or an arc can take place or be formed between the contacts.

The accompanying drawings will serve to illustrate my invention, and in which similar numerals indicate like parts.

Figure 1 is a perspective view taken from the front, showing a switchboard, an operating-lever for actuating the switches, a portion of the frame for supporting the switch, and the containing-case for the insulating fluid removed, so as to permit an examination of the switch mechanism. Fig. 2 is a plan view looking from the top. Fig. 3 is a section taken on the line X X of Fig. 2. Fig. 4 is a section taken on the line Y Y of Fig. 3.

In the drawings, 1 is a switchboard. Mounted on and suitably secured to the front of the switchboard by bolts or other suitable means is a plate 2. The plate 2 is provided with projecting studs 3, to which is pivoted an operating-lever 4. Projecting from the plate 2 below the studs 3 is a bifurcated arc-shaped guide 5, the side plates of which are resilient and adapted to receive between them a blade 6, depending from and formed integrally with

the operating-lever 4. The object of this blade and resilient guide is to cushion the downward movement of the operating-lever. Projecting upward from the inner end of the operating-lever 4 and formed integrally therewith is an arm 7, which is pivotally connected to a connecting-rod 8. This rod is secured at its inner end to the mechanism for operating the switch-lever, as will hereinafter be described.

It will be observed that the operating-lever 4 and the arm 7 form a bell-crank and that as the bell-crank is pivoted at its angle the vertical movement of the operating-lever will be transmitted horizontally at right angles through the connecting-rod 8.

Secured to the rear of the switchboard are the brackets 9. These brackets serve to support the horizontal plate 10, which may be cast integrally with the brackets or made separate, as desired. The horizontal plate 10 has openings in it in which are located insulators 11, through which leading-in conductors 12 and leading-out conductors 13 are carried to the interior of the switch mechanism.

14 indicates a metallic inclosing casing carrying within it a second casing 15, made of glass, rubber, or other insulating material, which will hold a fluid. The casings 14 and 15 are supported on the plate 10 by means of pivoted thumb-screws 16 16<sup>a</sup>. The casings 14 and 15 are arranged to be readily detached from the plate 10, so as to permit of access to the switch mechanism or for renewal of the insulating fluid. This can be accomplished by releasing the thumb-screws 16 16<sup>a</sup>.

In order to aid the brackets 9 to support the weight of the switches and their inclosing casing and insulating fluid, where the switches are of large size, a metallic framework may be arranged at the back of the switchboard, a horizontal portion of which, 17, is indicated at Fig. 1, in which case brackets 18 with hooked ends are cast integrally with or otherwise attached to the plate 10.

Depending from the plate 10 are the side plates 19, connected together at top and bottom by rectangular bars of wood or other insulating material 20 21. Depending from the

bar 20 and in electrical relation with the leading-out conductors are the spring-contacts 22. Three of such contacts are shown. Projecting upward from the bar 21 and in electrical relation with the leading-in conductors are the spring-contacts 23. Three of such contacts are shown. The contacts forming the group 22 as well as the group 23 are separated from each other, and these contacts are formed of the ordinary split spring-plates, such as are common in knife-switches.

Pivoted so as to rotate in the side plates 19 is a cylinder (of wood or other insulating material) 24, from the periphery of which project two sets of oppositely-disposed knife-blades 25 25<sup>a</sup>. These knife-blades, of which there are six—three on each side of the cylinder—are formed from three plates 26, of good conducting material, which are carried through the cylinder and secured in position therein by straps 26<sup>a</sup>, arranged over and secured to the external surface of the cylinder. Projecting from the upper part of the cylinder 24 is a metallic arm 27, secured to the cylinder at its base, in which is pivotally mounted a block 28, which block is located in a guide 29, formed in the lower end of a slotted lever 30, which is pivoted in a suitable bearing on the top of the plate 10. The upper end of the slotted lever 30 is connected through a pivotal joint with the end of the connecting-rod 8.

Surrounding the cylinder 24 and connected thereto or forming a part thereof and arranged to oscillate with the cylinder are the disks 31. Four of such disks are shown. Projecting upward from the bottom of the casing 15 are partitions 32. Eight of such partitions are shown. These partitions are cut away at their upper part to conform to the circumference of the cylinder 24 and are located on opposite sides of the disks 31. Depending from the plate 10 are the swinging partitions 33. Four of such partitions are shown. These partitions are cut away at their lower extremity to conform to the circumference of the cylinder 24 and are located two at the left of the disks 31 and two at the right of the disks 31. The object of the disks 31 and partitions 32 33 is to separate the switches from each other, so that each switch will be practically located in a separate receptacle and, further, will establish partitions between the switches, which, while they will prevent a short circuit or the formation of an arc between the switches, will permit circulation of the insulating fluid.

34 indicates a body of oil or other fluid insulating material carried in the casing 15. I prefer that the body of oil shall completely immerse the switch mechanism and all the operative parts.

The operation of the device will be readily understood. In the drawings, Figs. 3 and 4, the circuits through the respective switches are shown as closed and the handle of the

bell-crank lever 4 elevated. Upon depressing the operating-lever 4 traction in a horizontal direction will be made upon the connecting-rod 8, which will move the upper end of the slotted lever 30 to the left, which motion will be transmitted through the lower end of the slotted lever and block 28 (the block 28 moving upward in the guide 29) to the cylinder 24, oscillating it to the right, and thereby causing the respective knife-blades to leave the respective spring-contacts on each side of the cylinder.

I have described my invention as applied to a switch transmitting three currents or current phases. It will be understood that the same general construction may be employed in a switch transmitting one or more currents or current phases.

Having thus described my invention, I claim—

1. In an electric switch, the combination of a horizontally-disposed supporting-plate, a series of partitions suspended from said plate, a receptacle for containing an insulating fluid, and a series of partitions projecting upward from the bottom of said receptacle.

2. In an electric switch, the combination of a horizontally-disposed supporting-plate, a series of partitions depending from said plate, a receptacle for containing an insulating fluid, a series of partitions projecting upward from the bottom of said receptacle, and a series of movable partitions interposed between the first-mentioned two sets of partitions.

3. In an electric switch, the combination of a horizontally-disposed supporting-plate, a series of partitions depending from said plate, a receptacle for containing an insulating fluid, a series of partitions projecting upward from the bottom of said receptacle, an oscillating cylinder, and a series of disks mounted on said cylinder, and interposed between pairs of said partitions.

4. In an electric switch, the combination with a horizontal supporting-plate, of side plates depending therefrom, insulating-bars connecting said side plates, spring-contacts mounted on said insulating-bars, knife-blades corresponding in number with pairs of spring-contacts, an oscillating cylinder pivoted in said side plates, an arm projecting from said cylinder carrying a pivoted block, a slotted lever provided with a guide for said block pivoted on said horizontal supporting-plate, an operating-lever, and a connecting-rod between the lever and toggle.

5. In an electric switch, the combination with a series of spring-contacts, of a cylinder carrying knife-blades adapted to coact with said contacts, an arm projecting from said cylinder carrying a pivoted block, a pivoted slotted lever provided with a guide for said block, an operating-lever, and a connecting-rod between the upper end of said slotted lever and said operating-lever.

6. In an electric switch, the combination of

the cylinder 24, knife-blades 25, 25<sup>a</sup>, straps 26<sup>a</sup>, arm 27 carrying the pivoted block 28.

5 7. In an electric switch, the combination of the bell-crank lever 4, connecting-rod 8, slotted lever 30, pivotally-mounted block 28, cylinder 24, contacts 20, 21, and leading-in and leading-out wires 12, 13.

8. In an electric switch, the combination

with the supporting-plate 10, casing 15, partitions 32, 33, and oscillating partitions 31. 10

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

HENRY PRICE BALL.

Witnesses:

J. E. PEARSON,

FRANK O'CONNOR.