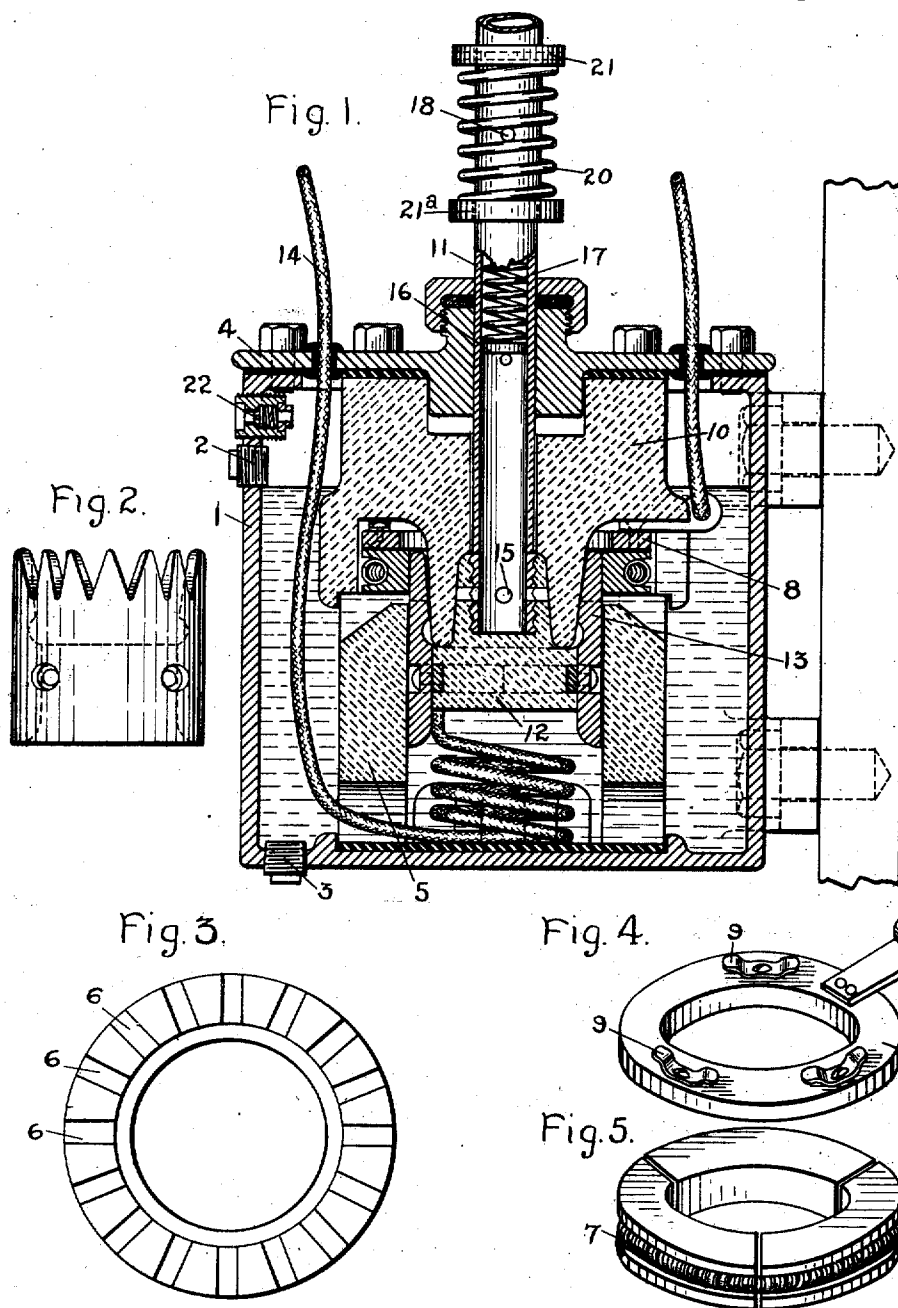


C. D. HASKINS.
ELECTRIC SWITCH.

(Application filed July 27, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses;

Albert B. Chapman.
Benjamin B. Hulse.

Inventor:

Caryl D. Haskins.
by *Albert B. Davis*
Atty.

No. 695,150.

Patented Mar. 11, 1902.

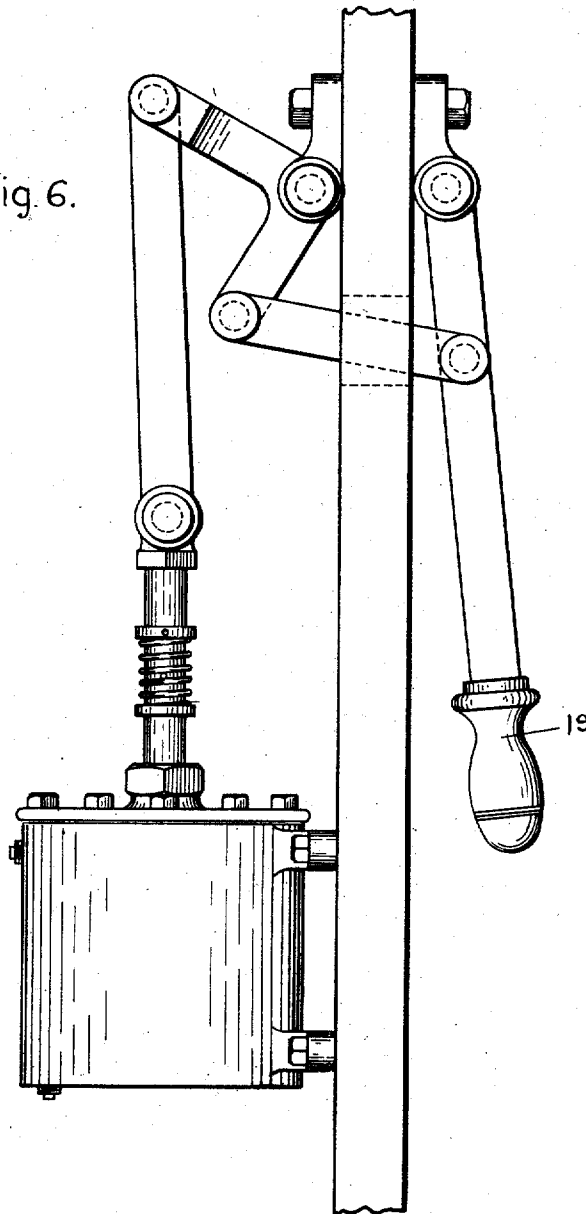
C. D. HASKINS.
ELECTRIC SWITCH.

(Application filed July 27, 1901.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 6.



Witnesses;

Att. C. Chapman.
Benjamin B. Hill.

Inventor.

Caryl D. Haskins.

by *Albert S. Davis*
Atty.

UNITED STATES PATENT OFFICE.

CARYL D. HASKINS, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 695,150, dated March 11, 1902.

Application filed July 27, 1901. Serial No. 69,943. (No model.)

To all whom it may concern:

Be it known that I, CARYL D. HASKINS, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Switches, (Case No. 2,232,) of which the following is a specification.

This invention relates to electric switches or other devices for opening and closing circuits of high potential, the object being to provide a switch of simple construction which will facilitate the handling of heavy currents of high voltage.

In carrying out the invention I provide for breaking the current under oil or other insulating fluid, the essential feature of my invention being the storage of pressure on the oil before circuit-rupture and provision for permitting a flow of oil under pressure across the separating contacts. By these means the arc is extinguished by the chilling action of the oil and by its high resistance and by the bodily movement of the oil carrying the arc products away from the vicinity of the electrodes and but a small quantity of oil is required to handle currents of great energy. I provide a closed casing in which is an oil-chamber containing an oil-bath, beneath the surface of which the circuit-terminals are adapted to meet to close the circuit. The chamber is provided with a considerable air-space, and the movable electrode is so contrived that in opening the circuit the oil is subjected to pressure by a compression of the air in the free space. One of the terminals is made hollow, with openings by which after a certain amount of movement a tubular exit is provided for the oil, which is driven across the separating contact-faces into the tube, carrying with it such arc products as are developed by the break.

The invention embodies various features of novelty which will be hereinafter more particularly described, and will be definitely indicated in the claims appended to this specification.

In the accompanying drawings, which illustrate the invention, Figure 1 is a sectional

elevation of a switch embodying my improvements. Fig. 2 is a detail view of one of the electrode-contacts. Fig. 3 is a detail view showing the arrangement of the ports leading from the oil-well to the movable electrode. Figs. 4 and 5 are detail views of a socket-contact, and Fig. 6 is a side elevation of a switch embodying my improvements mounted on a supporting-board.

The switch embodies an oil-well 1, of cast-iron or other strong metal, provided with screw-plugs 2 3, permitting the well to be charged with or emptied of oil. It may, if desired, be enameled on the inside with insulating material or lined with any suitable insulating material—such, for example, as fiber. Such provision, however, is only necessary for currents of very high potential. It is provided with a cover 4, fastened down by bolts, as indicated, and packed at the joints, so as to provide an air-tight seal. On the bottom of the well rests a tubular guide 5, of insulating material—as, for example, a heavy ring of porcelain—the bottom of which is grooved, as indicated, to permit free circulation of the oil. This guide is provided with lateral ducts on its upper end, as indicated at 6 in Fig. 3, to afford a passage for the oil to the electrode-contacts. On top of this insulator rests a socket-terminal, formed of a ring of metal sawed into segments, as indicated in Fig. 5, and grooved on the periphery to accommodate a helical ring-spring 7, the spring serving to clamp the sections in elastic engagement. On top of the sectional ring bears a copper disk 8, to which is riveted a metal terminal adapted for connection with one of the circuit-leads, as indicated in Fig. 1. The top of the disk is provided with springs 9 for producing a firm elastic contact between the ring-terminal and the split-ring socket. The inner diameter of the ring-terminal is larger than that of the socket to accommodate entrance of the movable electrode. The ring-contacts are held firmly in position by a block of porcelain 10, clamped in place by the cover and bearing against the lower porcelain ring 5.

Soft packing of suitable character, such as

asbestos, may be placed at the ends of the insulating-column, formed by the two pieces 5 10, to prevent fracture. The porcelain block 10 is centrally bored to accommodate a metal 5 tube 11, which moves through a stuffing-box in the cover, as indicated, and to the lower end of which is fastened a block of insulating material 12, to which is screwed fast a copper tube 13, which forms one terminal of the circuit, being connected therein by a flexible lead 14. This tubular terminal is larger in diameter than the inside of the ring-socket when collapsed, and in closing the circuit an upper beveled tip is forced into the ring-socket, separating its sections against the tension of the ring-spring 7, and thus effecting a good hard contact. An elevation of the tubular contact is seen in Fig. 2. Its upper end is provided with an irregular or notched edge to form channels for the passage of oil of increasing area as it is lowered away from engagement with the fixed contact. In communication with these indentations are radial channels 15, which lead to the interior of the tube 11. Within the tube is a piston 16, upon which bears a spring 17, adapted to uncover a port 18 under pressure of the arc in an opening movement of the switch and permitting rapid movement of oil across the separating contacts. The switch may be operated by a handle 19, connected by links with the movable electrode, and in closing the switch an operation of the handle raises the movable electrode 13, separates the segments of the socket, and brings the indented top above the lower face of said socket, thereby cutting off communication between the tube 11 and the oil-well.

A cushioning-spring 20, held between a fixed collar 21, fastened to the tube 11, and carrying at its free end a movable collar, prevents a violent blow of the movable electrode against the bottom of the oil-well when the switch opens, the movable collar 21^a engaging the top of the stuffing-box. The air-chamber is provided with an inwardly-opening valve 22 to equalize the pressure when the circuit is closed. As thus organized when the circuit is opened a preliminary movement of the movable electrode stores pressure in the air-chamber, causing a movement of the oil the instant the indented tip of the movable electrode passes below the ring-contact, thereby promoting a cooling of the contact parts and when the arc draws stretching the latter by the movement of the oil, which carries the arc products across the radial openings 15 up into the tube 11. The oil-vapor generated augments the pressure, so that a stream of rapidly-moving oil is forced into the tube and the accumulated pressure raises the valve until the port 18 is cleared, when the pressure is immediately relieved. During this time the electrodes have been separating and the arc has been extinguished. The long

tube 11 prevents spattering of the oil while permitting its movement to extinguish the arc. The invention is applicable to other types of circuit-breaking devices, such as circuit-breakers or other instruments, at the separating contacts of which arcs may be formed. An important incident of my construction is the small volume of oil needed relatively to other switches of the oil type. This follows from the movement to which the oil is subjected. It is desirable to have the smallest possible quantity of combustible material in an electric station, and my organization admirably effects such a result.

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

1. A high-potential switch comprising a closed chamber containing an insulating liquid, a movable electrode, means for subjecting the liquid to pressure preliminary to the separation of the electrodes, and means for leading the liquid across the electrode-contacts when they part.

2. A high-potential switch comprising a closed vessel containing an insulating liquid, means for subjecting the liquid to pressure during an opening movement of the electrodes, a tubular exit communicating with the arcing ends of the electrodes, and means for permitting a free flow of the oil under pressure into said duct across the arcing faces when the electrodes separate.

3. A high-potential switch comprising an air-tight vessel containing an insulating liquid and an air-space, means for compressing the air during separation of the contacts, a tubular electrode communicating with an exhaust-duct, and means for leading the oil across the contact-faces of the electrodes in opening the circuit.

4. A high-potential switch comprising an air-tight vessel partially filled with oil, an exhaust-duct communicating with the atmosphere, and means for inducing a flow of oil into said exhaust-duct across the contact-faces of the electrodes when the circuit is opened.

5. A high-potential switch comprising an air-tight oil-tank partially filled with oil, a fixed ring-contact beneath the surface of the oil, a movable electrode engaging said contact adapted to put the oil under pressure in an opening movement, and exhaust-ducts leading from the electrodes put into communication with the oil during such opening movement.

6. A high-potential switch comprising an air-tight tank, an insulating-column between its cover and bottom, a contact-ring beneath the oil-surface secured thereto, and a movable contact adapted to put the oil under pressure in opening movement and drive the oil across the separating contact-faces.

7. A high-potential switch comprising an

air-tight tank partially filled with oil, an exhaust-duct communicating with the atmosphere, electrodes beneath the oil-surface, the electrodes having their point of engagement
5 submerged in the oil, the duct being so arranged as to carry oil across the contact-faces, a valve in the air-chamber to equalize the pressure, and means for compressing the

air so as to put the oil in movement when the circuit is opened.

In witness whereof I have hereunto set my hand this 26th day of July, 1901.

CARYL D. HASKINS.

Witnesses:

BENJAMIN B. HULL,
CHARLES STEINER.