Sept. 22, 1925. 1,554,528

J. SACHS

ELECTRIC SWITCH

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Fig. 1

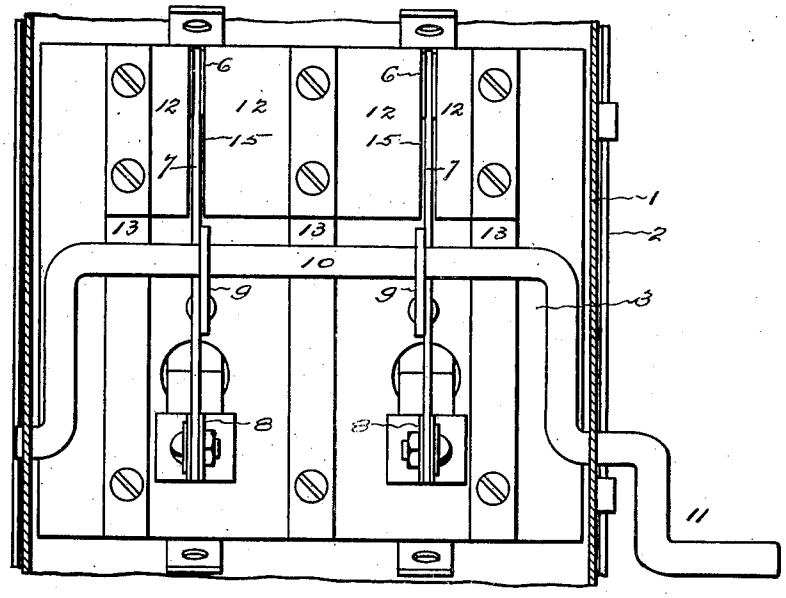
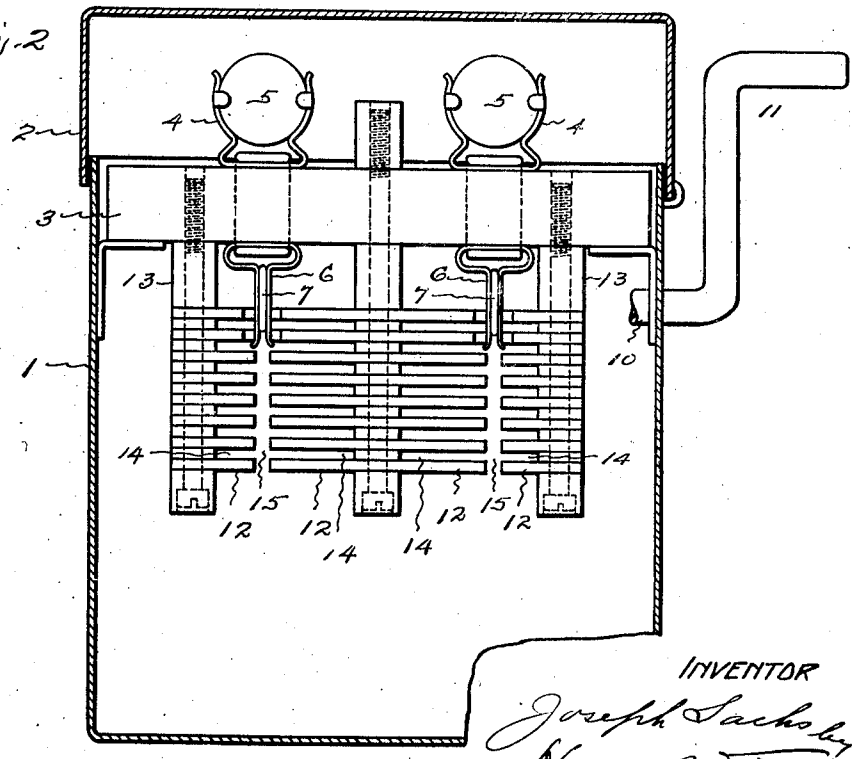


Fig. 2



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Fig. 3

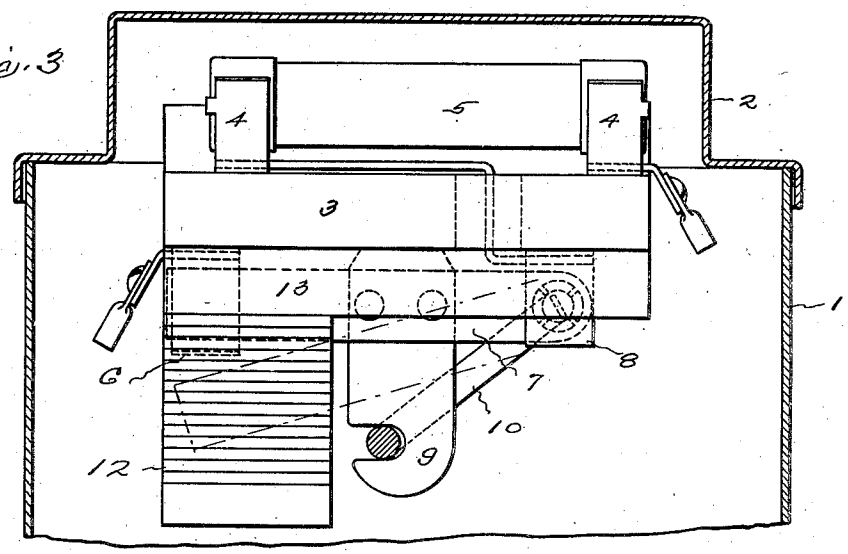


Fig. 4

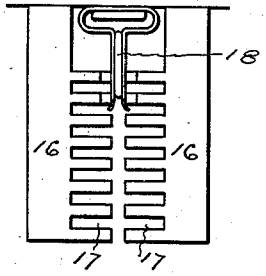


Fig. 5

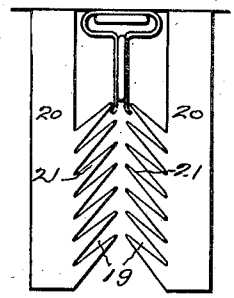


Fig. 6

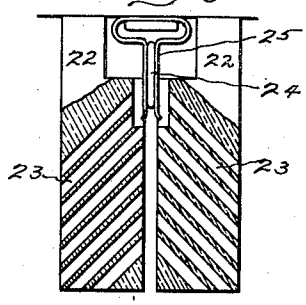


Fig. 7

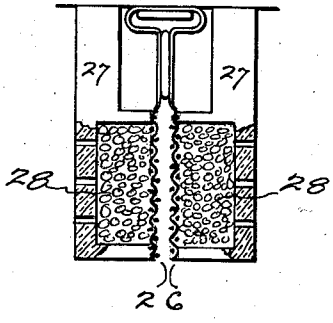


Fig. 8

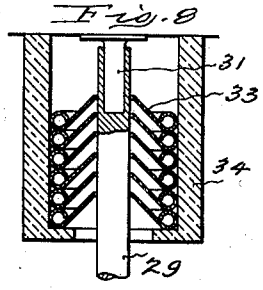
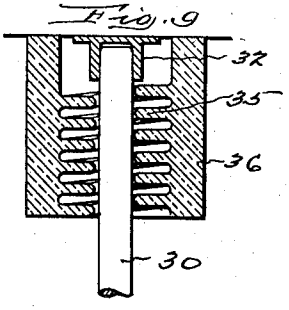


Fig. 9



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Patented Sept. 22, 1925. 1,554,528

UNITED STATES PATENT OFFICE.

JOSEPH SACHS, OF HARTFORD, CONNECTICUT.

ELECTRIC SWITCH.

Application filed February 7, 1922. Serial No. 534,682.

To all whom it may concern:

Be it known that I, JOSEPH SACHS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented a new and useful Improvement in Electric Switches, of which the following is a specification.

When an electric circuit of any considerable energy is opened an arc is usually formed between the rupture terminals with destructive effects.

This invention involves the placing adjacent to the terminals and in close proximity to the path of the movable conductors of electric switching or circuit opening and closing apparatus, of means for muffling or quenching any arcs that might have a tendency to form between the conductors when the circuits are opened.

The object of the invention is to provide very simple and inexpensive means which will effectually disperse or diffuse and condense or cool the gases at the inception or during the continuance of such an arc and thus break up and destroy at its beginning or when small any arc that tends to form between the rupture ends of the conductors such for instance as the fixed contact and movable switching member of the common form of electric switches.

The invention is particularly adapted for switches and circuit breakers of large capacity of rectilinear, rotatory or oscillatory contact type, but it is a valuable adjunct to any size of such apparatus, and is applicable to various arrangements of circuit rupturing members or parts.

Figure 1 of the accompanying drawings shows a view of the under side of a two pole knife blade switch of the enclosed type, with the casing broken away, provided with means which embodies this invention. Fig. 2 is an end elevation of such a switch with the operating crank spindle broken off. Fig. 3 is a side elevation of the same. Figs. 4, 5, 6, 7, 8 and 9 illustrate modified forms of gas diffusing and arc quenching means adjacent to a fixed terminal and in close proximity to the path of a movable conductor.

The switch illustrated is enclosed in a case 1 which has a cover 2. The base block 3 of insulation is fastened in the casing in any suitable manner. In the form shown, on the top of a base block are conducting clips 4 containing cartridge fuses 5 and on the bottom of the block are spring finger terminal clips 6. The blades 7 of conducting material are at one end pivoted to conducting ears 8 so that their free end will swing into and out of engagement with the terminal clips. Notched insulating plates 9 are fastened to the blades and engaging in the notches of the plates is the crank spindle 10 which on the exterior is bent to form an operating handle 11.

In the embodiment of the invention first illustrated pieces of sheet insulation 12 are mounted on insulating blocks 13 in such manner that there are openings 14 between the superposed sheets of each stack and openings 15 between the edges of the sheets of the adjacent stacks from the rupture ends of the clip terminals outward for the passage of the movable contact blades. When the blades are thrown for opening the circuit as they leave the rupture ends of the clips and pass between the separated insulating sheets, the gase of any arcs which tend to form expand into the spaces between the sheets and become cooled and condensed so that the arcs will be immediately ruptured and cannot be drawn out with the blades. This form of the invention provides in a simple way extensive gas trapping chambers with large or extended areas of cooling surfaces for condensing the hot gases.

Instead of forming the means for diffusing or trapping the gases and breaking up any arc that starts to form or exists between the rupture ends of the terminal and the movable conductors, of sheets of insulation as above described, the means may be molded to shape of insulating material. The arc quenching means illustrated in Fig. 4 comprises two molded blocks 16 with lateral openings 17 in their inner faces, which are set close to the path of the movable conductor 18. The openings in this case are at right angles to the path of the movable conductor. The arc dissipating, trapping, condensing or cooling openings may be made oblique to the path of the movable conductor as shown in Fig. 5. These oblique openings 19 in the blocks 20 may be tapered so as to produce teeth 21 that point inward toward the path of the movable conductor. As shown in Fig. 6 the passages for causing the dispersion of the gases of the arc may be drilled or otherwise made through blocks of insulation 22 and these holes 23 may incline toward the blade 24 as it opens from the clip 25. If desired the means for

breaking up the arc and dispersing and condensing the gases may be formed of coarse screens 26. These screens which may be formed of loose woven asbestos or other insulating material are placed each side of the path of the movable conductor in front of chambers in the blocks 27. These chambers can be filled with granular material 28, of an insulating nature. The hot gases of an arc being drawn by the outwardly moving blade are dispersed through the screens and diffused through the granular material. This breaks up the arc and condenses the gases. In the above described forms a knife blade oscillatory conductor is illustrated. The invention is not limited to the type of movable and fixed conductors. The movable conductor may be of female form 29 shown in Fig. 8 or male form 30, shown in Fig. 9, that are adapted to reciprocate into and out of engagement with the fixed terminals 31 and 32. The arc dispersing means can be made in the form of separate disks 33 molded or stamped of insulating material superposed in an insulating casing 34 as shown in Fig. 8. If desired the arc quenching means may be made in the form of an interior thread 35 that is molded or otherwise formed in the interior of a block of insulation 36 as illustrated in Fig. 9.

This invention is not limited to arc dispersing means made of any particular material. The means may be molded in single pieces or assembled from separate pieces. It is essential however that the arc quenching means be placed as closely as practicable on each side of the path of the movable conductor, and that the surface of the means be broken up or roughened in some manner so as to form passages, openings or extensions radiating or opening or extending out of and away from the passage, slot, hole or opening through which the circuit rupturing conductor travels in its opening movement, to divert, catch or trap the gases and vapor of eruption and break down the arc, by cooling and dissipating the vapors and gases of the arc due to such breaking up, diversion and catching.

The invention claimed is:

1. An electric switch having fixed and movable conducting contacts adapted to be engaged and disengaged, and rigid walls of insulating material forming a path through which the movable contact travels in making and breaking engagement with the fixed contact, said path being restricted in width to approximately the thickness of the movable contact and said rigid walls of insulating material containing on each side of the path chambers of substantial size in close proximity to and open to said path for receiving and condensing arc-formed gases.

2. An electric switch having fixed and movable conducting contacts adapted to be engaged and disengaged, and rigid walls of insulating material forming a path through which the movable contact travels in making and breaking engagement with the fixed contact, said path being restricted in width to approximately the thickness of the movable contact and said rigid walls of insulating material containing on each side of the path spaces of substantial size in close proximity to and extending angularly from said path for receiving and condensing arc-formed gases.

3. An electric switch having fixed conducting contacts, pivoted conducting contacts adapted to be swung into and out of engagement with the fixed contacts, rigid walls of insulating material forming paths through which the pivoted contacts swing in making and breaking engagement with the fixed contacts, said paths being restricted in width to approximately the thickness of the swinging contacts and said rigid walls of insulating material containing on each side of the paths spaces of substantial size in close proximity to and open to said path for receiving and condensing arc-formed gases.

4. An electric switch having a fixed conducting contact, a pivoted conducting contact adapted to be swung into and out of engagement with the fixed contact, rigid walls of insulating material forming a path through which the pivoted contact swings in making and breaking engagement with the fixed contact, said path being restricted in width to approximately the thickness of the swinging contact and said rigid walls of insulating material on each side of said path being in close proximity to and having openings into said path, and granular non-conducting means confined back of the walls of said path, for receiving and condensing arc-formed gases.

5. In an electric switch a hinge contact and a rupture-end stationary contact, a switch blade pivoted at one end to the hinge-contact and provided with means for swinging its other end into and out of engagement with the rupture-end contact, insulating means located to closely confine the path of movement of the swinging end of the blade as it is moved into and out of engagement with the rupture-end contact, said insulating means being positioned on both sides of the path of movement of the blade and closely adjacent thereto, and said insulating means being aranged to provide a plurality of arc dissipating chambers of substantial size on each side of said blade path, whereby the gases resulting from the disengagement of the blade from the stationary contact are directly dispersed into the chambers on each side of the blade as it opens and are thereby condensed.

JOSEPH SACHS.