W. ELLERD-STYLES.

ELECTRICAL SWITCH.

APPLICATION FILED MAY 27, 1918.

1,306,141.

Patented June 10, 1919.

*Fig. 1.*

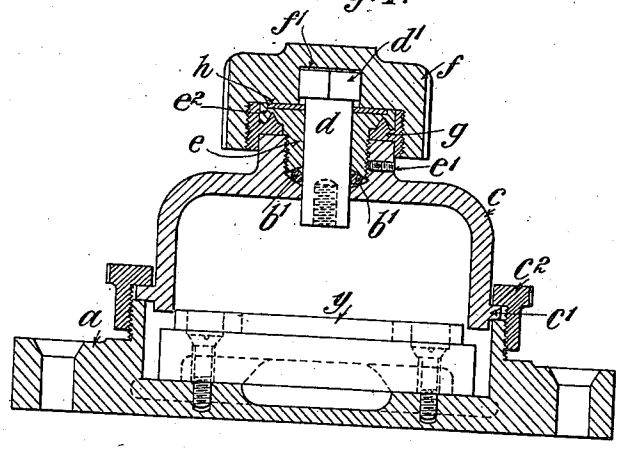
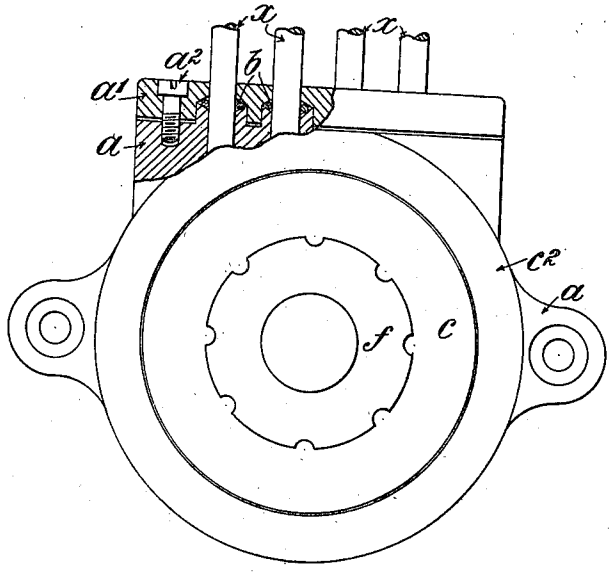



*Fig. 2.*




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# UNITED STATES PATENT OFFICE.

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## ELECTRICAL SWITCH.

1,306,141. Specification of Letters Patent. Patented June 10, 1919.

Application filed May 27, 1918. Serial No. 236,901.

*To all whom it may concern:*

Be it known that I, WILLIAM ELLERD-STYLES, a subject of the King of Great Britain and Ireland, residing at 81 Rosebery avenue, London, England, have invented certain new and useful Improvements in and Relating to Electrical Switches, of which the following is a full and complete specification.

This invention relates to water and gas tight electrical switches of the rotary type, intended for use in mines, ships, hangars, airships, chemical works, and other places where gas, water or corrosive or other deleterious elements are likely to be present.

The present invention comprises essentially an improved form of key or handle for the switch spindle in combination with means for rendering the said spindle and also the entering ends of the cables to the switch housing, water tight.

The operating key or handle is attached to the spindle of the operating mechanism by forming the spindle with a squared or other suitably shaped end adapted to engage a correspondingly shaped recess in the under side of the key or handle, forming a flanged sleeve—through which the spindle passes—attached to the housing and forming on the under side of the flange of said sleeve concentric depressions adapted to be engaged by similarly shaped projections formed concentrically on a ring adapted to screw into a recess in the under side of the key or handle.

The means for rendering the spindle of the key or handle and the entering ends of the cable to the switch housing water tight comprise glands or stuffing boxes having conically shaped seatings in the housing of the switch, gaskets or packing rings of rubber or like resilient material—preferably of a circular cross section—contacting with said seatings and adapted to be caused to tightly embrace the parts to be rendered fluid or gas tight by similarly coned shaped seatings arranged to be screwed or otherwise attached to the housing so as to exert pressure on the said gaskets or packing rings to make fluid or gas tight joints.

I will now more particularly describe my invention making reference to the accompanying drawing in which:—

Figure 1 is a sectional view in side elevation with the contacts and make and break mechanism omitted for the sake of clearness, and

Fig. 2 is a view in plan partly in section.

In both views similar parts are marked with like letters of reference.

The means which I at present adopt for carrying this invention into effect are as follows:—The switch-box base $a$ which may be of ebonite or other suitable non-conducting material, or may be of malleable iron (sherardized, galvanized or painted) where great strength is required, or of aluminium where lightness is essential, such as in airships, and may be circular in shape, is formed with a circular depression and has an upstanding annular flange around the circumference. On the outside of the base $a$ I provide a block adapted to receive a cap $a^1$ which is fixed on to said block by screws or the like $a^2$. Through the block on the base $a$ are holes for the passage of the cables $x$ into the depression in said base, said holes being of a diameter at their outer ends only slightly in excess of that of the cables. On the face of the block adapted to receive the cap $a^1$ are bosses through which the holes for the cables pass and in the opposite face of the cap are recesses to receive said bosses both the recesses and the bosses being coned as required to receive a gasket $b$ or packing ring of rubber or other suitable non-rigid material.

The cables $x$ to be introduced for connection with the switch are first passed through the holes in the cap $a^1$, then threaded through the gaskets or packing rings $b$, and then passed through the holes in the block, after which the cap is screwed on to block by the screws $a^2$ but is prevented from being screwed right down by the thickness of the gasket or packing ring. The screwing is then continued so as to compress the gasket or packing ring between the two conical seatings, which by their shape compress said gasket or packing ring so as to cause it to tightly grip the cable and thus seal any passage around the cable through which gas, water or the like might penetrate. To keep the gasket or packing ring in this state of compression its resistance must still be sufficient to prevent the face of the cap from being screwed right down on to the block. The gap left between the cap and the block may be filled with a layer of rubber as an additional precaution. Lugs are pro-

vided at intervals in the depression in the switch-box base $a$ to form seatings to which the switch base $y$ may be screwed, and so as to leave an ample clearance space thereunder. The domelike cover or housing $c$ of the switchbox may be screwed directly to the annular flange on the base $a$, but is preferably attached as shown, by forming the cover $c$ with a flange $c^1$ adapted to contact with the flange on the base and to be held in contact therewith by a flanged ring $c^2$ adapted to be screwed on to the annular flange on the base. In either construction a flexible washer may be interposed between the engaging faces of the cover and block to insure a gas and water tight joint. When the switch is to be used with a conduit instead of a cable no cap will be required as it will only be necessary to screwthread the holes through the block to receive the piping.

For sealing the spindle $d$ at the point where it passes through the circular hole running vertically through the top of the housing $c$, the diameter of the hole at the outer side of the cover is enlarged to a sufficient depth, and is formed with a conical seating, to receive gasket or packing ring $b^1$, which is preferably treated with graphite. This enlarged hole is screw threaded to receive a conically-shaped nipple $e$ which is adapted to be screwed down on to the gasket or packing ring. The spindle $d$ having been inserted through the hole in the housing, through the gasket or packing ring and through the nipple $e$, said nipple $e$ is then screwed down so that the gasket or packing ring becomes compressed between the two conical seatings whereby it is forced out centrally toward and against and tightly around the spindle so as to seal any passage around said spindle through which gas or water might penetrate when the spindle is turned to operate the switch.

A grub or locking screw $e^1$ is provided to lock the sleeve or nipple $e$ after adjustment.

For securely fixing on the operating key $f$ which is made of any suitable insulating material and to provide additional sealing of the spindle inlet I adopt the following arrangement. I provide the sleeve or nipple $e$ with a fairly broad head, so that the latter will form a flange $e^2$, and make the sleeve or nipple of sufficient length to allow plenty of play in screwing down on to the gasket or packing ring and to allow a clamping annular-shaped cup ring $g$ to be inserted under the flanged head $e^2$ before the sleeve or nipple $e$ is screwed down, the nipple $e$ being passed through the ring $g$, and on said floor of the ring I may make an inverted V-shaped circular projection to fit into an inverted V-shaped groove in the under side of the flange, or vice versa. I form on the cylindrical surface of the ring $g$ a screw-thread, and I also form a screw thread in the recess in the under side of the operating key $f$, so that the ring $g$ can be screwed into said operating key. These screw threads I make to engage so tightly that the engagement of the two parts can only be effected by the exercise of considerable force. This said screwed connection is relied upon in reversed movement of the handle. In the recessed under side of the key $f$ is a centrally arranged square socket $f^1$, adapted to receive the square head $d^1$ of the spindle $d$, said socket being preferably provided with a liner. A washer $h$ of graphite or other suitable packing is inserted between the top of the sleeve or nipple and the recessed under side of the operating key.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In an electrical switch of the type specified, the combination with a base and a detachable housing, of an operating key having a recess in which is a square-shaped socket, a spindle for the operating mechanism having a square-shaped head adapted to engage the square-shaped recess in said key, a flanged nipple mounted in said housing and having a concentric depression on the under side of its flange, and an annular cup-shaped ring mounted in the recess in the under side of the operating key and having a concentric projection adapted to engage the concentric depression in the flange of the nipple.

2. An electrical switch of the type specified, comprising a base adapted to receive an insulated plate carrying the contacts and the make and break mechanism and having an annular screw-threaded flange thereon, a housing having a flange on its lower edge to fit on said screw threaded flange, a screw-threaded ring adapted to engage both said flanges so as to secure the housing to the base, a spindle passing through the housing having a square-shaped head and adapted to be fixed to the spindle of the make and break mechanism, an operating key having a recess in its under side in which is a square-shaped socket adapted to engage the head of the spindle, means for sealing the entry of the spindle through the housing comprising an annular conical seating in the housing, a packing ring encircling said spindle, a conically seated nipple mounted in said housing so as to compress the gasket around the spindle, means for locking said nipple to said housing, a flange carried by said nipple having a concentric groove in its under side, a flanged ring mounted in the recess in the under side of the operating key and having a concentric rib on the upper face of its flange adapted to engage

the concentric groove in the flange carried by the nipple and a packing washer between the top of the nipple and the recessed under side of the operating key.

3. An electric switch of the type specified comprising a base adapted to receive an insulated plate carrying the contacts and the make and break mechanism, a block formed on one side of said base, a cap adapted to be clamped on to the face of said block, holes through said cap and block for the passage of the cables, recesses in said cap and block surrounding the holes through same, packing rings located in said recesses and means for adjusting the plate in relation to the block for the purpose of compressing said packing rings.

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