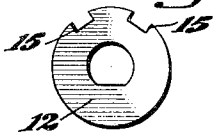
March 19, 1929. W. F. LLOYD 1,705,774

ELECTRIC SNAP SWITCH

Filed Feb. 4, 1927

Fig. 4



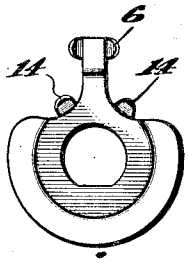
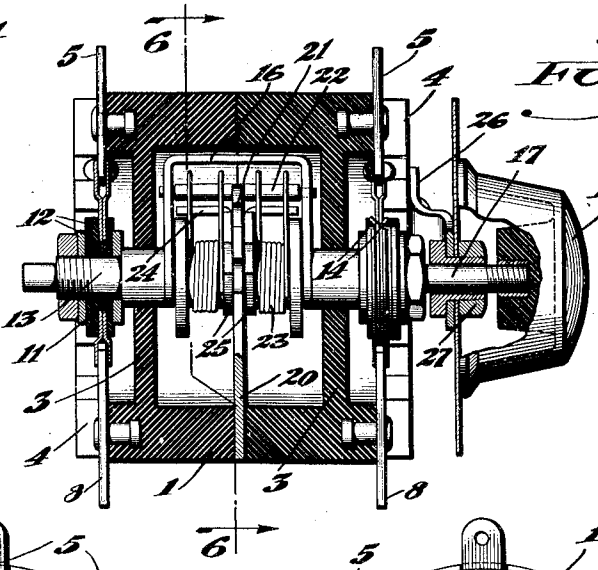


Fig. 5

Fig. 1



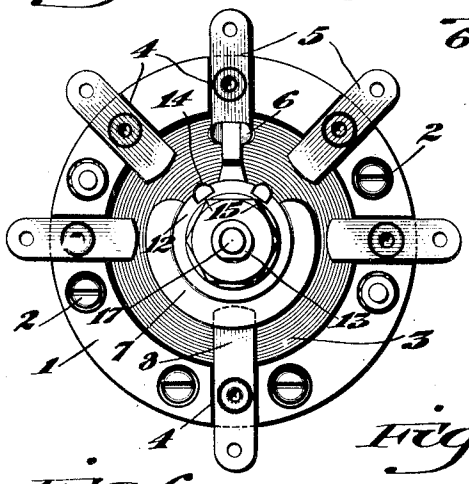


Fig. 2

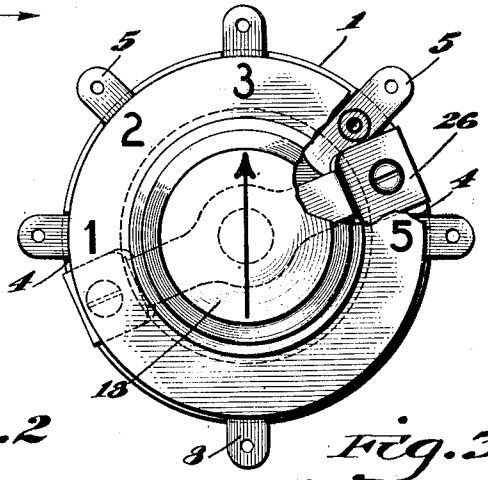
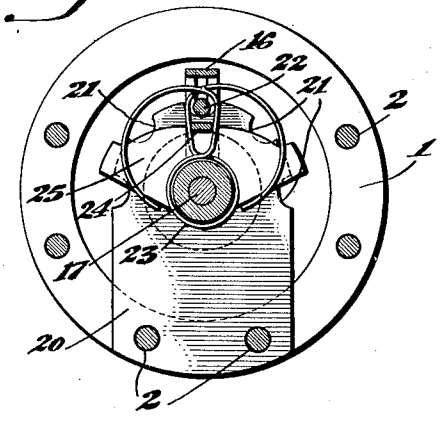


Fig. 3

Fig. 6



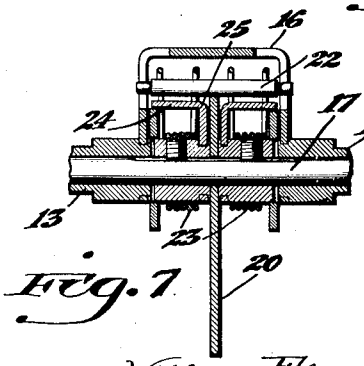


Fig. 7

Inventor

William Folwell Lloyd

By Wood & Wood

Attorneys

Patented Mar. 19, 1929. 1,705,774

UNITED STATES PATENT OFFICE.

WILLIAM FOLWELL LLOYD, OF CINCINNATI, OHIO, ASSIGNOR TO THE COOPER CORPORATION, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

ELECTRIC SNAP SWITCH.

Application filed February 4, 1927. Serial No. 165,916.

The invention relates to a double pole and plural contact reversibly operative snap switch for electric circuit control.

The object of the invention is to provide a plural contact reversibly rotative snap switch, either a single or double pole control, of simple and compact structure.

Another object of the invention is to provide an electric switch wherein a plurality of relatively spaced stationary contacts are radially disposed about the axis of a reversibly rotative movable contact.

Another object of the invention is to provide a rotative movable contact of an electric switch with ratchet and spring tension pawl mechanism, the pawl actuated by a rotative trip member for releasing the pawl from the ratchet and for winding up or increasing the tension of a spring for quickly actuating the pawl from one ratchet step to a second in its arc of movement, and correspondingly moving the movable contact, the trip member and spring influence being similarly effective in reverse rotations of the trip member.

Further features and advantages of the invention will be more fully set forth in a description of the accompanying drawings, in which:

Figure 1 is a central section through the switch.

Figure 2 is a rear view of the switch.

Figure 3 is a front elevation of the switch.

Figure 4 is a detailed view of an insulator disk for connecting the movable contact to the operating shaft or spindle.

Figure 5 is a plan view of one member of the movable contact.

Figure 6 is a section on line 6—6, Figure 1.

Figure 7 is a section through the pawl and ratchet devices for actuating the movable contactor.

The switch as herein disclosed is primarily adapted for service in connection with radio receiving apparatus for double pole controlling embracing duplex sets of contacts with a movable contactor for each set of contacts, the contactors of the switch operating as a unit, under rotative snap impulses in moving from one contact to a second and reversibly as to direction of rotation. The contacts are engaged by the contactor in a successive order, both in forward or rotative rotation within the operating limits of the contactor, constituting a portion of the rotative cycle. The switch, however, for other uses may be organized for a single pole contact control or it may be enlarged, increasing the number of sets of contacts and contactors for either single or double pole control.

The switch as illustrated comprises a cylindrical casing 1 of insulated material cast to form a casing consisting of two cup shaped sections joined together by bolts 2 extending through the walls of the sections longitudinally of the casing. Each section is provided with a recessed head 3 formed integral with the section so that the casing completely houses the contactor actuating mechanism installed within the casing, forming a very compact structure.

The switch is of duplex type having plural sets of contacts recessed into the opposite ends of the casing preferably outside of the casing heads which are the duplicate of each other in construction. The detailed description thereof for the present purpose is confined to the singular, that is, to one set of contacts and its contactor, the contacts of both sets being in a relative and corresponding arrangement recessed into their respective ends of the casing. Such arrangement, however, may be variously modified to meet the various conditions for which the switch may be utilized and, likewise, the number of contacts to a set may be of any number within an operating range of a given size of switch, or to meet the special conditions.

Each end of the casing is provided with a plurality of radial notches 4 for seating and mounting the stationary contacts 5 respectively, the walls of the notches securing the contacts against lateral displacement and the opposite ends of the contacts extending beyond the wall lines of the casing so as to be accessible at their outer ends for making

the wiring or circuit line connections and at their inner ends for engagement with the flexible fingers 6—6 of the movable contactor 7. The contact fingers of the movable contactor engage on opposite sides of the stationary contact, thus following the principal of a well-known knife switch. One of the stationary contacts 8 is arranged to be in constant contact or circuit connection with the movable contactor and, therefore, is of greater length or extends inwardly a greater degree than the contacts 5. The movable contactor comprises a pair of plates or disks clamped together and between which the contacts are engaged to insure efficient conductivity.

The disks represent stampings having a centrally depressed or embossed portion which relatively engage or abut each other and are provided with annular flared margins of segmental form between which the stationary contact 8 engages. This marginal portion of the disks is of segmental form and of a diameter clearing the stationary contacts 5. The disks are further provided with the radial extending fingers 6 for engaging the stationary contacts 5, the ends of the fingers being provided with angular tangs serving as guides to direct the knife or blade edge of the stationary contacts between the fingers 6. The fingers 6 are flexible to compressively engage the contactor and only engage one of the contacts 5 at a time for establishing or completing a circuit between the contact 8 and a selected contact 5. The movable contactor is operated under rotative motion in reversible directions so that the fingers of the movable contactor engage the contacts 5 in a successive order as the movable contactor is operated. The disks of the movable contactor are mounted upon an insulator bushing 11 and between a pair of insulator disks 12 to insulate the same from a sleeve or hub 13 of the actuator mechanism upon which the disks of the movable contactor are mounted and to which it is transmittently connected.

The bushing and insulator disks have a key connection with the sleeve or hub 13 and are each provided with a pair of notches 15 into which outwardly flaring tangs 14 of the contactor disks engage for rotatively connecting the contactor disks with the insulator disks. The construction of the parts of the movable contactor, as described, enables the same to be made of stampings, easily assembled and combines the same as a unit, with the current carrying or electric conducting parts insulated from the non-current carrying parts and actuator mechanism. The sleeve or hub 13 forms a part of a yoke shaped crank or pawl carrier 16 extending from one limb of the crank or pawl carrier. A similar or second sleeve or hub extends from the opposite limb upon which a second movable contactor member is mounted for cooperating with a second set of contacts. The sleeves or hubs 13 are loosely journalled upon a spindle 17 which extends beyond one end of the casing and is provided with a knob 18 by which the parts are manually operated. The sleeves or hubs 13 respectively engage through and may also be journalled in the end walls of the casing, bringing the actuating mechanism within the casing and the movable contactors exterior of the casing walls. The crank or pawl carrier 16 extends about a stationary ratchet member or plate 20 which is secured to the casing and between the abutting edges of the sections of the casing, its inner end of circular outline and provided with a series or plurality of notches 21 arranged in stepped degree corresponding to the contact spacing and to the member thereof for automatically arresting the motion of the movable contactor in throwing the movable contactor from one contact to a second.

The crank or pawl carrier 16 has its limbs slotted to receive the pintle ends of a roller pawl 22 which is adapted to engage into the notches of the ratchet plate for limiting the movement of the pawl carrier. The pawl carrier is operated under the tension of a pair of springs 23 arranged at opposite sides of the stationary ratchet member, each spring being coiled about the axis of the pawl and has its opposite ends bent into hook form engaged over the roller pawl and against a laterally extending tang 24 of a cam plate 25 fixed to the spindle 17. As shown, a pair of springs and cam plates are employed and arranged at opposite sides of the stationary ratchet plate, producing a balanced condition for a freer operation of the parts. The pawl normally is engaged into one of the notches of the ratchet plate and upon rotation of the spindle in either direction the cams operate the roller pawl to elevate or withdraw the same from the notch and during such rotative motion the spring is wound to store up sufficient tension for throwing the pawl or crank from one notch to a second. The pawl as soon as it is released from the circumferential portion of the ratchet plate between adjacent notches is free to engage into such successive notch with which it is brought into registration, thus locking the pawl to the stationary ratchet plate against rotation.

The springs and cams being the duplicate of each other and employed for balancing conditions, it follows that their operation is simultaneous, and reference need be only made to one cam and spring in describing the operation thereof. Upon the rotation of the spindle, the cam will move correspondingly with the spindle, whereby the laterally projecting tang which engages one end of the spring imparts a winding influence to the coil of the spring to increase each tension, the opposite end of the spring being hooked and engaged over the roller pawl which is ar-

rested in motion by engagement into a notch of the stationary ratchet, thus locked until the cam has elevated the pawl sufficiently to raise it up out of the notch and released to permit the crank or pawl carrying arm to be moved until the pawl comes into registration with a second notch, whereupon it snaps into engagement with said second notch influenced by the action of the end of the spring which engages over the roller pawl. The laterally projecting tang of the cam, as in the case of the pawl, is engaged between the opposite ends of the spring so that a re-wind operation of the spring is effected in either forward or reverse directions of rotation of the spindle. In one direction one end of the spring is effected for a re-wind operation of the spring coil, while the opposite end is arrested by the roller pawl, while alternately under a reverse action a reverse operation takes place. Thus, it will be recognized that the pawl is operated in stepped degrees, the spring advancing the pawl at a higher rate when disengaged from a notch then imparted by the movement of the operator in rotating the spindle so that the pawl snaps into engagement with a notch enabling the contactor to be operated in definite stepped degrees from one contact to a second.

The indicator disk or dial is engaged upon a screw bushing extending through a bridge plate 26 secured to an end of the casing, the bushing being concentric about the spindle and the dial frictionally clamped to the bridge plate by a nut 27 in threaded engagement with the screw bushing. Thus, the dial is rigidly mounted in set position, the frictional clamping means enabling the dial to be adjusted so that the indicator on the turning knob is brought into reading with the indicator positions of the dial corresponding to the settings of the contactor.

Having described my invention, I claim:

1. A rotary electric switch embodying a plurality of fixed terminals of blade formation disposed about a central operating spindle, a spindle suitably journalled, and a pair of rotatable contacts in conductive engagement carried by and insulated from said spindle and arranged to compress upon relative opposite sides of said terminals when in engagement therewith, and in constant engagement with one of said terminals.

2. In a rapid make and break rotary electric switch embodying a plurality of fixed contacts disposed about a central spindle, a rotative spindle, a movable contact concentrically upon said spindle adapted to be successively engaged with said fixed contacts, a rigid ratchet about said spindle provided with a plurality of pawl engaging notches spaced relative to the spacing of said fixed contacts, a pawl carrier rotatable about said spindle having a pawl adapted to engage with the notches of said ratchet, said movable contact being fixed to said carrier, tension means for said pawl and carrier, and a rotative cam fixed upon said spindle for actuating said pawl to release it from its ratchet engagement and adapting the same to be rapidly moved for automatically moving said carrier and pawl to a successive notch under tension of the spring and correspondingly rotating said movable contact.

3. In a rapid make and break rotary electric switch embodying a plurality of fixed contacts disposed about a central spindle, a rotative spindle, a movable contact adapted to be successively engaged with said fixed contacts, a rigid ratchet about said spindle provided with a plurality of pawl engaging notches spaced relative to the spacing of said fixed contacts, a pawl carrier connecting with said movable contact and journalled upon said spindle having a spring controlled pawl cooperating with the notches of said ratchet for locking said movable contact in set position, engaged with one of said fixed contacts, and a rotative cam fixed upon said spindle for actuating said pawl to release it from its ratchet engagement and adapting the same to be rapidly moved for automatically moving said carrier and pawl to a successive notch under tension of the spring and correspondingly rotating said movable contact.

4. In a rapid make and break rotary electric switch embodying a plurality of fixed contacts disposed about a central spindle, a rotative spindle, a movable contact swivelled upon said spindle to be successively engaged by said fixed contacts and carrying a pawl for locking the spindle in its adjusted positions, a stationary ratchet for said pawl, a spring coiled about the axis of said spindle and engaging relative opposing sides of said pawl for moving said pawl and movable contact in reversible directions from one ratchet step to a second, and means carried by said spindle for tripping the pawl and tensioning said spring in a rotative motion of the spindle.

5. In a rotary electric switch embodying a plurality of fixed contacts disposed about a central spindle, a rotative spindle, a movable contact swivelled upon said spindle adapted to be successively engaged with said fixed contacts, stationary ratchet means for holding said movable contact in positions relatively to said fixed contacts, a pawl carrier movable as a unit with said movable contact, a pawl carried thereby for cooperation with said ratchet, a spring for forcibly moving said carrier and movable contact in reversible directions, and means fixed upon said spindle for releasing the pawl from the ratchet and tensioning said spring on imparting a step motion to the carrier and movable contact upon a partial rotation of the spindle.

6. In a rotary electric switch embodying a plurality of fixed contacts disposed about a central spindle, a rotative spindle, a mov-

able contact swivelled upon said spindle adapted to be successively engaged with said fixed contacts, stationary ratchet means for holding said movable contact in positions relatively to said fixed contacts, a pawl movable as a unit with said movable contact cooperating with said ratchet, a spring for forcibly moving said movable contact in reversible directions, and means fixed upon said spindle for releasing the pawl from the ratchet and tensioning said spring on imparting a step motion to the movable contact upon a partial rotation of the spindle.

In witness whereof, I hereunto subscribe my name.

WILLIAM FOLWELL LLOYD.