July 4, 1933. L. K. WRIGHT 1,916,942

CIRCUIT BREAKER AND CHANGER

Filed Jan. 31, 1928

FIG. 1.

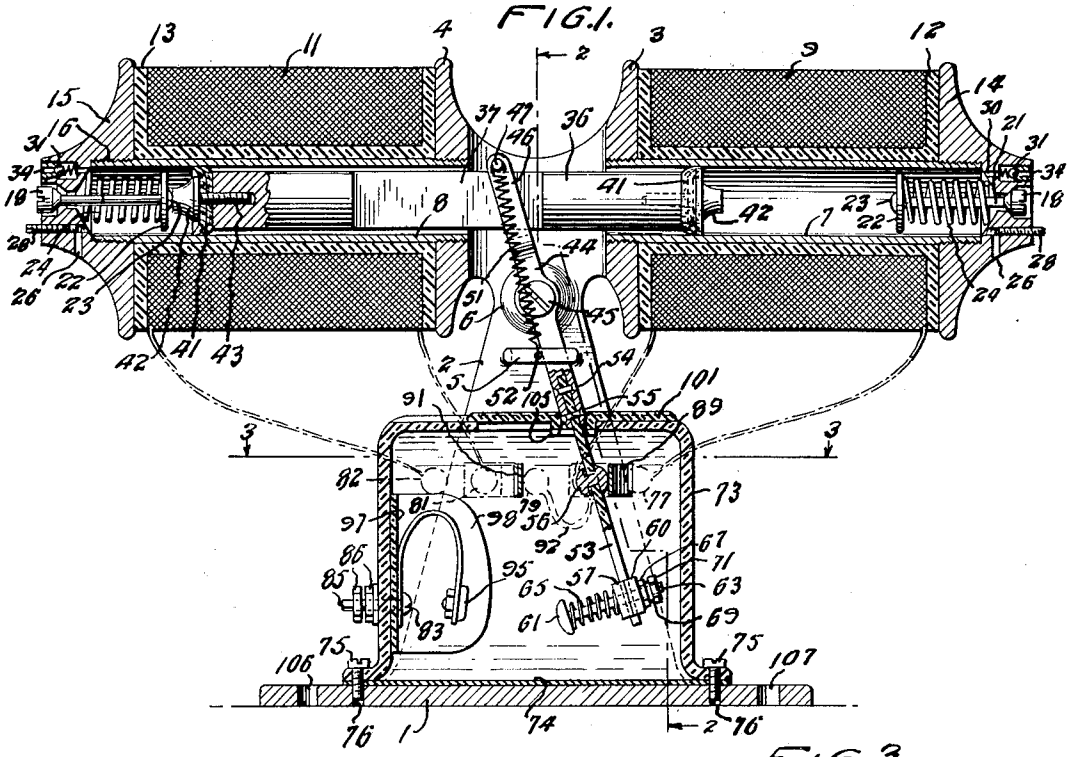


FIG. 2

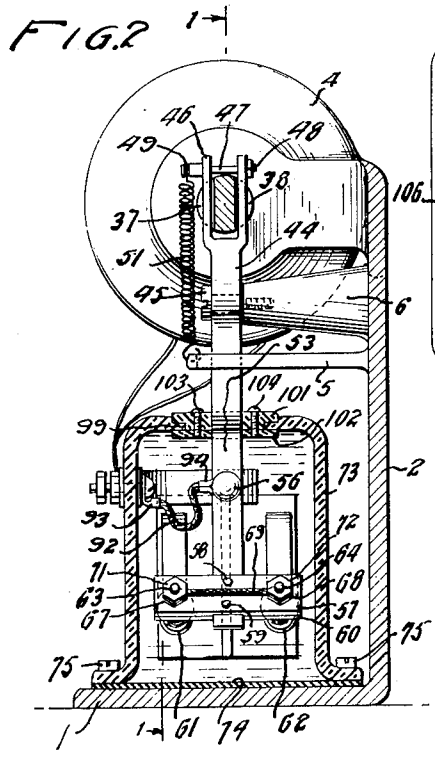


FIG. 3.

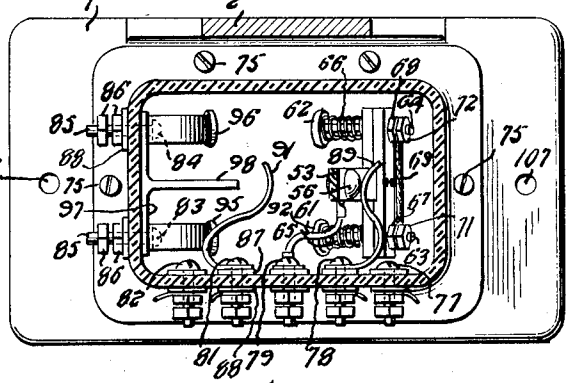
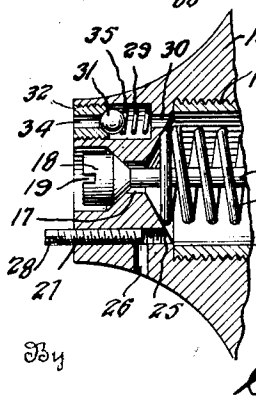


FIG. 4.



Inventor
LEONARD K WRIGHT

By Semmes & Semmes
Attorney

Patented July 4, 1933 1,916,942

UNITED STATES PATENT OFFICE

LEONARD KAY WRIGHT, OF JACKSON HEIGHTS, NEW YORK

CIRCUIT BREAKER AND CHANGER

Application filed January 31, 1928. Serial No. 250,774.

This invention relates in general to circuit devices and more particularly has reference to a combination circuit breaker and changer.

Previous to this time the devices of this character have been attended by certain inherent disadvantages that this invention seeks to overcome. The circuit breaking and changing devices have usually been constructed separately and separately interposed in a circuit. This has given rise to the necessity of installing two apparatus where the exigencies of the particular installation are more suitable for one. Also, the operative mechanism of such apparatus has been liable to clog due to the entrance of foreign material which might prevent the operation at a critical moment as well as being generally unprotected so far as guarding against the arc which occurs when a circuit is broken.

An object of this invention is to provide a compact and sturdy combination circuit breaker and changer.

Another object of this invention is to provide a simple combination circuit breaker and changer having the operating parts covered to prevent foreign material entering the mechanism.

A further object of this invention is to provide a circuit changer adapted to allow current to pass for a regular period of time.

A still further object of this invention is to provide a circuit breaker adapted to quench the flame or arc incident to the breaking action.

With these and other objects in view which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention, may be varied in construction, proportions and arrangement, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawing means for carrying the same into practical effect, without limiting the improvements in their useful applications to the particular constructions, which for the purpose of explanation, have been made the subject of illustration.

In the drawing forming a part of this specification:—

Figure 1 is a sectional view of the combination circuit breaker and changer forming the subject matter of my invention.

Figure 2 is a sectional view taken on line 2—2 of Figure 1 (looking in the direction of the arrows).

Figure 3 is a sectional view taken on line 3—3 of Figure 1 (looking in the direction of the arrows).

Figure 4 is a sectional view of the cap.

Referring by numerals to the drawing in which the same and similar elements are designated by like symbols of reference throughout and particularly to Figure 1, there is shown the circuit breaker and changer comprising a base 1 preferably a casting, made out of any non-magnetic material such as bell metal, bronze, aluminum, lead or any similar material or materials applicable to die casting or forming.

A vertical support 2 is formed integral with the base and provided with an oppositely disposed pair of flange members 3 and 4 extending outwardly from the support. A bracket 5 together with a boss 6 may be formed integral with the support 2 or fixed thereon by bolting or welding.

The flanges 3 and 4 are provided with threaded apertures adapted to receive a plurality of sleeves 7 and 8 made of any suitable non-magnetic material permeable to magnetic flux, and threaded on both ends. A plurality of solenoid coils 9 and 11 wound on reels 12 and 13 formed of non-conductive material are adapted to be fitted over the sleeves and held in place by a pair of caps 14 and 15 threaded to the ends of the sleeves.

The cap 15 is provided with a threaded aperture 16 in the face of the largest diameter adapted to engage the threads on the end of the tube 8, communicating with a constricted port 17 formed in the opposite side. The port 17 is adapted to act as a seat for a valve having a mushroom head 18 formed with a diametrical slot 19 and stem 21 extending within the tube 8. A washer 22 fixed by a nut 23 is mounted on the end of the stem 21 and a helical spring 24 interposed around the stem between the washer and the end of the aperture 16. The valve 18 may be firmly ground in the constricted neck to insure a tight seat by engaging the slot 19 with a suitable tool.

The cap 15 is also provided with a threaded aperture 25 communicating with the tube 8 and a transverse channel 26 bored in the

side of the cap, the aperture 25 is closed by a screw 27 having a slotted head 28. The position of the end of the screw 27 is adapted to be adjusted by the engagement of a suitable tool with the slot 28 to fix the opening of the channel 26 so that only a regulated quantity of air may be allowed to escape from the tube 8 through the aperture 25.

Another aperture 29 is drilled in the small face of the cap oppositely disposed with respect to the aperture 25 and constricted at the bottom to form a channel 30 extending to the opposite face and communicating with the tube 8. A ball 31 is positioned within the aperture 29 and held against a seat in a bushing 32 having a central channel 34, by a helical spring 35 interposed between the ball and the bottom of the aperture 29. The ball 31 is adapted to be drawn from the seat in the bushing as the vacuum within the tube 8 overcomes the force of the spring and air admitted through the channel 29.

A piston 36, made of material such as Swedish steel that will be affected by magnetic flux emanating from the solenoids, extending between the flanges 3 and 4, is mounted in the sleeves 7 and 8, as shown in Figure 1. The ends of the piston are circular in cross sections but the sides of the midsection are cut away at 37 and 38 as shown in Figure 2 so that the piston is oblong in cross section in the central portion.

The ends of the piston are adapted to afford a tight sliding fit within the cylinders formed by the sleeves 7 and 8. A plurality of washers 39 and 41 are mounted on the ends of the piston and held in place by a cap 42 formed on a screw 43 mounted in the ends of the piston as shown in Figure 1. While the washers may be dispensed with, they are deemed preferable as they are self-fitting and the necessity of grinding the piston to fit the bore of the cylinder is eliminated.

The rocker arm 44 is pivotally mounted on the end of the boss 6 by a screw 45. The upper end of the rod 44 is formed as a fork 46 adapted to straddle the center of the piston rod so that when either of the body portions of the piston contact with the fork, the arm is caused to move. The forked end prevents the rotation of the piston so that the washers working over the same portion of the cylinder may take up any unevenness in the walls of the sleeve. A bolt 47 is inserted across the fork and fixed by a nut 48 to prevent the fork from spreading and the end formed with a groove 49 to which there is adapted to be affixed the end of a helical spring 51. The other end of the spring is adapted to be connected in an aperture 52 bored in the end of the bracket 5. The spring is adapted to impart a snap action to the arm when it is brought past the center which is essential in making or breaking electrical contacts, and also to hold the arm firmly in or out of contact so that as the apparatus is subjected to vibration such as would occur in a moving vehicle or vessel, the arm cannot be jarred out of place.

The end of the arm 44 opposite the fork is formed with a slit adapted to receive a non-conductive strip 53 preferably made of bakelite or any other suitable insulating material held in the end of the slit by a plurality of rivets or other fastening means 54 and 55.

A contact 56 having faces protruding on both sides is fixed in the strip 53 approximately midway between the point of juncture with the arm and the end of the strip. A bar 57 is mounted transversely across the end of the strip 53 and fixed thereon by a plurality of rivets 58 and 59, together with a similar bar 60 on the opposite side of the arm, as shown in Figure 2. A plurality of contacts 61 and 62 held on stems 63 and 64 having helical springs 65 and 66 interposed between the contact and the bar are fixed on the bar by nuts 67 and 68. The ends of the stems 63 and 64 are connected by a woven metal bridge 69 held thereon by a plurality of nuts 71 and 72. A housing 73 preferably made of bakelite or any other suitable non-conductive material, adapted to be filled with oil, is mounted on the base 1 with a gasket 74 interposed and fixed thereon by a series of studs 75 engaging threaded apertures 76 formed in the base. The front walls of the housing 73 are provided with a series of apertures adapted to receive a plurality of contacts 77, 78, 79, 81 and 82 and one of the side walls provided with a plurality of apertures adapted to receive a pair of contacts 83 and 84. The contacts are formed with threaded stems 85 adapted to receive conventional lock nuts 86, and a plurality of gaskets 87 and 88 mounted on the stem on both sides of the casing to insure a leak proof joint.

A pair of resilient contact strips 89 and 91 are fixed on the stems of contacts 78 and 81 adapted to mate with the opposite sides of the contact 56 fixed on the strip 53. A woven metal bridge 92 having terminals 93 and 94 on the opposite ends, is fixed to the contacts 79 and 56 respectively.

A plurality of folded over resilient springs having contacts 95 and 96 fixed on the end are mounted on the stems of the contacts 83 and 84 and interposed therebetween a plate of non-conductive material 97 having an outwardly extending leaf 98 positioned between the contacts 95 and 96 to prevent the passage of an arc therebetween.

The top of the casing is provided with a rectangular aperture having bevelled edges 99 adapted to receive a cover 101 held thereon by a strip 102 fixed to the cover by screws 103 and 104 and overlapping the edges on the sides of the aperture. The cover 101 is

provided with an aperture having downwardly extending sides 105 adapted to receive the end of the arm 44 and thus afford a tight sliding joint between the arm and the housing to prevent the entrance of foreign material.

The base 1 is provided with oppositely disposed apertures 106 and 107 adapted to afford a mounting for the device on any suitable support.

The operation of this invention may be readily understood by first having reference to Fig. 1. When the device is at the setting shown in Fig. 1 and the current turned on, the electrical impulse is sent through the post 79 to the contact 56, fixed on the rocker arm 44, and in contact with the terminal 89 connected to one terminal of the solenoid 9, the other end of the solenoid being connected to the binding post 77. When an impulse is transmitted from post 78 to post 77 the circuit is completed and the end of the piston in the solenoid 9 is magnetically affected and drawn within the cylinder 7. The pin 27 in the cap 14 is adjusted to allow the desired amount of compressed air to escape through the channel 24. The travel of the piston being slow or rapid according to the quantity of air allowed to pass by the screw. No resistance to the travel of the piston is offered within the cylinder 8 as the solenoid 11 is not magnetized and the ball 31 allows air to enter through the channel 29.

The contact 56 remains in contact with the contact 89 until the arm immediately passes the center position when the force of the spring 51 coupled with the end of the piston striking the head valve stem 21 and releasing a quantity of air, thus breaking the pressure, causes a sudden snap from the contact with the terminal 89 to jump and make contact with the terminal 91. The contact 56 in the center position during the rocking of the arm is in contact with both the terminals 91 and 89 and the contacts 61 and 62 make contact with the spring contacts 95 and 96 and remain in contact while the arm is in center position. When the arm 44 is flipped by the force of the spring 51, the action of parting between the contacts is sudden and practically prevents the jumping of an arc as the circuit is broken in two places and the current thus divided. The shield 98 also tends to prevent an arc jumping, but in the event that this does occur, it may be quenched by the oil with which the housing 73 is adapted to be filled.

There is accomplished by this invention a combination circuit breaker and changer, sturdy and compact in construction and simple in operation having provisions for quenching the flame or arc incident to circuit breaking and suitably housed to prevent foreign material clogging the operating mechanism.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth, by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

I claim:

1. An electrical control device comprising a base, a support, solenoids positioned thereon in spaced apart relation, a plunger extending between and within said solenoids, said plunger having cylindrical ends and a cutaway center portion, a rocker arm pivotally mounted upon said support, one end of said arm being forked and engaging the cutaway portion of the plunger, a spring secured to said forked end and to the support, the other end of said rocker arm being provided with a plurality of contacts so that solenoid circuits and a main circuit may be made and broken.

2. An electrical control device comprising a base, a support, solenoids positioned thereon in spaced apart relation, a plunger extending between and within said solenoids, said plunger having cylindrical end portions and a cutaway center portion, a rocker arm pivotally mounted upon said support, one end of said arm being forked and adapted to engage the center portion of the plunger, the opposite end of said arm carrying a double contact point adapted to bear against either of a plurality of contacts connected to separate solenoids, said arm being also provided with a plurality of spring pressed contact points adapted to bear against an equal number of resilient contacts connected to a main circuit.

3. An electrical control device comprising a base, a housing adapted to be filled with a liquid for quenching a spark, a support, solenoids, positioned upon said support in spaced apart relation, a plunger extending between and within said solenoids, said plunger having cylindrical end portions and a cutaway center portion, a rocker arm pivotally mounted on said support one end of the arm adapted to engage the central portion of the plunger, the opposite end of the arm extending through said housing and provided with a fixed contact point and a plurality of spring pressed contact points, spring-like contact arms connected to each of said solenoids and adapted to contact with the fixed point on said rocker arm, other spring-like contact arms connected to a main circuit, said main line contact arms being separated by a shield of non-conducting material, said rocker arm being actuated by said plunger so that the circuit between the main circuit contacts may be made and broken.

In testimony whereof I affix my signature.

LEONARD KAY WRIGHT.