Feb. 7, 1928. 1,658,511

C. BRUYNIS

SWITCH

Filed Nov. 12, 1925

Fig. 1.

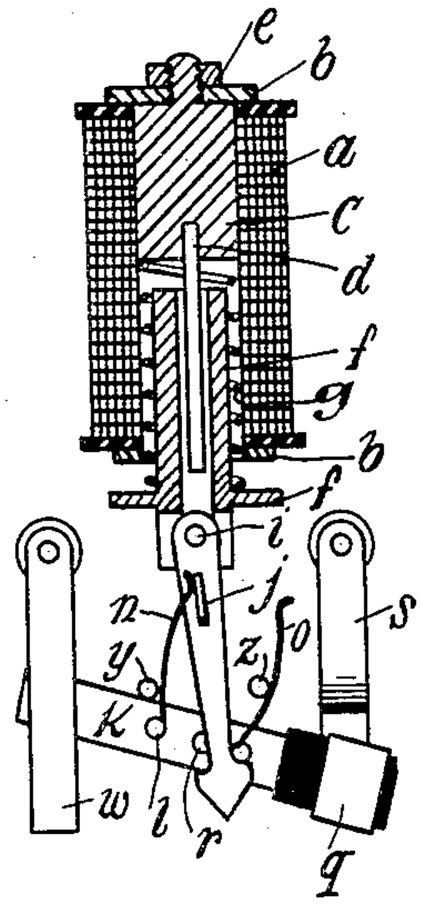


Fig. 4.

Fig. 2.

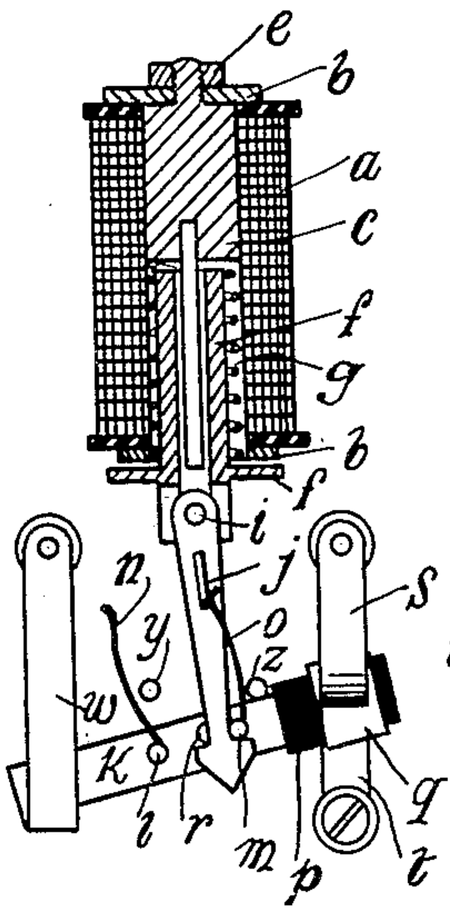


Fig. 5.

Fig. 3.

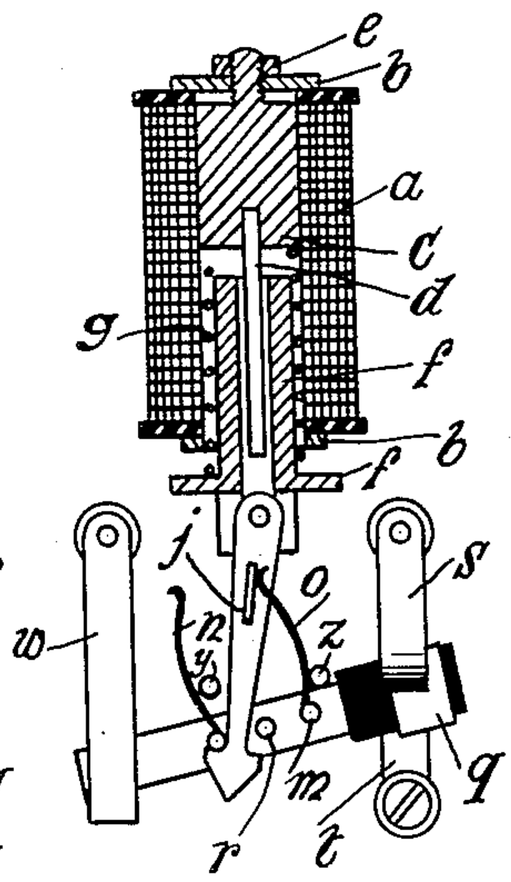
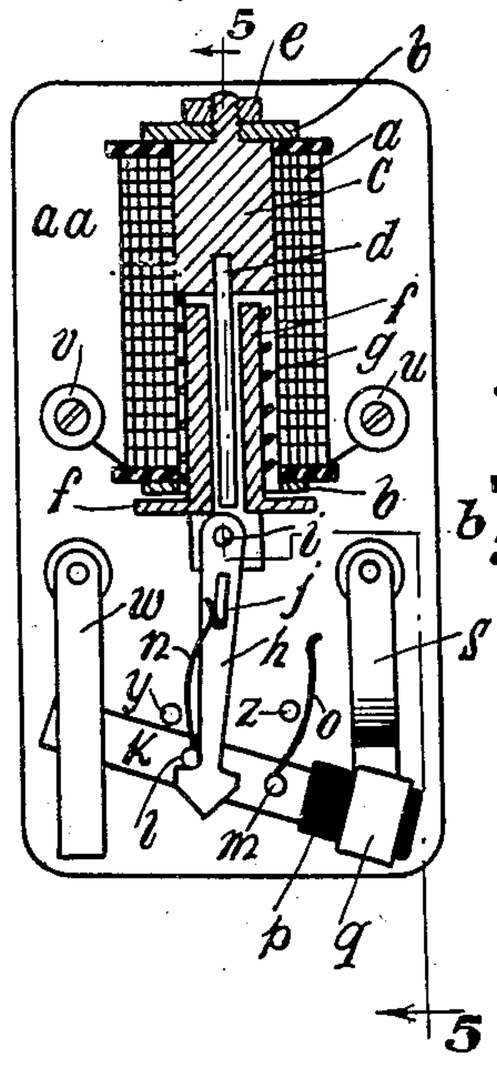
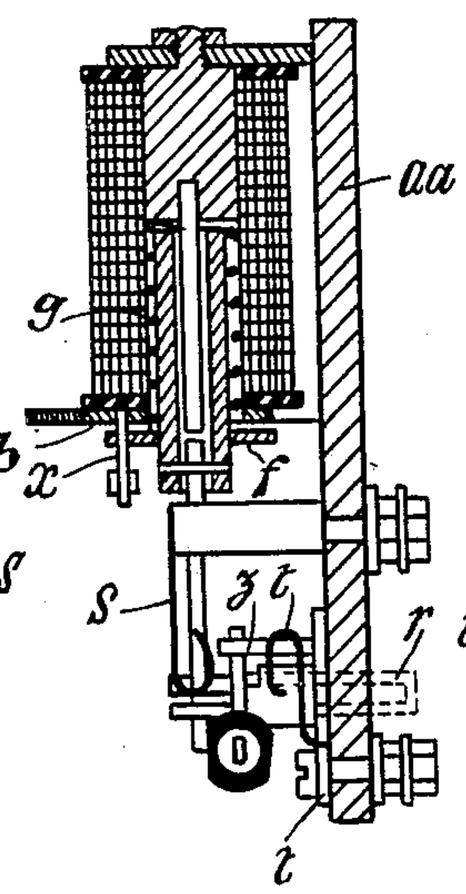
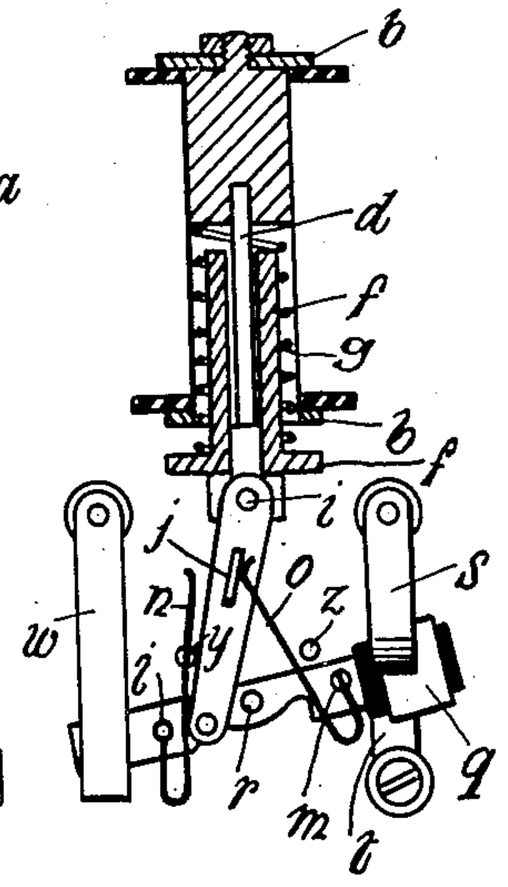


Fig. 6.







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UNITED STATES PATENT OFFICE.

CAREL BRUYNIS, OF THE HAGUE, NETHERLANDS.

SWITCH.

Application filed November 12, 1925, Serial No. 68,693, and in the Netherlands November 13, 1924.

The subject of the present invention is an improved high tension switch intended for operation by low tension current and especially adapted for switching comparatively high tensions (such as 220 volts) which are, in themselves, a source of danger to the human body.

The low tension current used for the operation of the switch is supplied by cells, accumulators, or from the low tension side of a transformer of the interrupter type.

A switch in accordance with the invention is mainly characterized in that the switch member is actuated by a current impulse generated by a separate source of low tension current not dangerous to the human body, said member being operated by a connecting rod that is brought into and retained in a suitable position ready for the succeeding switching operation ("on" when the switch is "off" and "off" when the switch is "on", or for switching over in the case of series or other special switches) by means of two independent or separate pressure springs arranged to come into action alternately and neither of which influences the action of the other.

When the one pressure spring is in operation and acts on the rod the other spring does not make contact with said rod. In other words, the rod is tilted by the spring pressure into the necessary ready position for the next switching operation in such manner that of the two alternately acting springs the only spring pressing on the rod at any time is the one that is to perform the task of tilting the rod into the succeeding ready position after a switching operation has been performed.

Preferably the switch member has studs for the connecting rod whereas co-acting surfaces are provided at the lower end of said rod such that when the rod comes to bear against either of said studs, the effort of traction exerted by the electromagnet is transmitted to the switch member. The studs may also serve as supports for the alternately acting springs.

As a modification a stud or stop may be provided on the connecting rod for co-operation with notches cut in the lower side of the switch member.

The invention will now be described hereinafter, with reference to the accompanying drawing, whereon:—

Figures 1 to 4 represent vertical sections through the commutator showing the movable parts in four different positions; Figure 5 represents a vertical section through the commutator at right angles to that of Figures 1 to 4; and Figure 6 represents a vertical section of another embodiment in which the low-current coil is omitted.

In Figures 1, 2, 3, 4 and 5, *a* denotes the solenoid; *b* an iron clamp for the same; *c* the iron core, secured to the clamp *b* by the nut *e*; *d* is a copper spindle secured in said core; *f* is an iron armature provided with a through longitudinal bore loosely surrounding the copper spindle *d*, so that the armature is able to move longitudinally; *g* (Figure 4) is a spiral spring arranged round the armature and exerting on the latter a force tending to thrust the latter outward; *h* is the connecting rod, one end of which is articulated to the armature by means of a pin *i*. whereas its other end is in the shape of a double-barb harpoon; *j* is a small plate set edgewise on the rod *h* and serving to limit the angular stroke of the same by contact with a spring *n* or a spring *o*; *k* is the switch lever for the high tension current.

The switch lever *k* pivots on a shaft *r* and has fitted thereto on one side of said shaft, or on both sides if the switch is of the double pole variety, a short piece of insulating tube *p*. On the end of this tube is fixed a copper contact ring *q*, flattened on opposite sides in such manner that these flattened surfaces are not parallel but diverge upwardly. The object of this is to retain the commutator lever *k* between the two contact springs *s* and *t* after the rod *h* has returned to its position of rest. Said contact springs *s* and *t* are connected to the high tension circuit, and the two terminals *u* and *v* (Figure 4) are connected to the ends of the winding of the magnet coil *a* and also to the low-tension current circuit. Spring jaws *w* hold the switch lever *k* when the latter is not engaged between the contact springs *s* and *t*.

On the switch lever *k* are two studs or stops *l* and *m*, to which are attached springs *n* and *o*.

A spindle *x*, (Figure 5), which is mounted on the iron clamp *b* and carries a button, limits the downstroke of the armature *f*.

Two stops *y* and *z* prevent the switch lever *k* from turning too far in either direction.

As shown in Figure 5, the whole unit is

mounted on a base plate *a*, *a* of insulating material.

Figure 1 shows the positions of the moving parts of the switch when the magnet coil and the contacts of the high tension circuit are inert. In this position, the armature *f* and the connecting rod *h* are at their lowest point, and the barb of the rod is pushed, by the spring *n*, under the stud *m* of the switch lever *k*.

As soon as the low-tension current circuit is closed through the solenoid, the armature *f* lifts the rod *h* and, in consequence, the switch lever *k* is turned over into the position shown in Figure 2 to close the high tension circuit through the contacts *s*, *t* and the contact ring *q*.

While the switch lever *k* is in this position, the spring *o* bears against the plate *j* on the rod *h*. If now the low-tension current circuit through the solenoid *a* is broken, the armature *f* with the rod *h* will descend again, coming into the position represented in Figure 3 and at the same time, under the pressure of the spring *o*, the barb of the rod will be swung under the stud *l* of the switch lever *k* so that on low tension current being again admitted to the solenoid the lever will be thrown over and the moving parts will take up the position shown in Figure 4 in which the high-tension circuit is broken.

In the modification illustrated by Figure 6, the harpoon rod is replaced by a rod terminating in a spindle at the lower end and acting in the same manner for reversing the switch lever, two notches being cut in the lower side of said lever to form stops, one on each side of its pivotal point, and situated at the same distance apart as the two studs *l* and *m* in the arrangement according to Figures 1 to 4. The spindle of the connecting rod is caused to engage the notches or stops by the spring mechanism of the commutator lever.

Having now fully described my invention what I claim and desire to secure by Letters Patent is:—

1. In an electromagnetic switch for a high-tension current installation, the combination of a switch member arranged to be actuated by current impulse generated by a separate source of low-tension current not dangerous to the human body, a connecting rod for operating the switch member, and two separate pressure springs arranged to act alternately and independently upon the connecting rod to bring and maintain the same in position ready for a succeeding switching operation.

2. In an electromagnetic switch for a high-tension current installation, the combination of a switch member arranged to be actuated by a current impulse generated by a separate source of low-tension current not dangerous to the human body, a tiltable and slidable connecting rod for operating the switch member, and two separate pressure springs arranged to act alternately and independently upon the connecting rod to bring and maintain the same in position ready for a succeeding switching operation.

3. In an electromagnetic switch for a high-tension current installation, the combination of a switch member arranged to be actuated by a current impulse generated by a separate source of low-tension current not dangerous to the human body, a tiltable and slidable connecting rod for operating the switch member, studs on the switch member, co-acting surfaces at the lower end of the rod such that when the rod comes to bear against either of said studs the effort of traction exerted by the low-tension current impulse on the rod is transmitted to the switch member, and two separate pressure springs arranged to act alternately and independently upon the connecting rod to bring and maintain the same in position ready for the next succeeding switching operation.

4. In an electromagnetic switch for a high-tension current installation, the combination of a switch member arranged to be actuated by a current impulse generated by a separate source of low-tension current not dangerous to the human body, a tiltable and slidable connecting rod for operating the switch member, studs on the switch member, co-acting surfaces at the lower end of the rod such that when the rod comes to bear against either of said studs the effort of traction exerted by the low-tension current impulse on the rod is transmitted to the switch member, and two separate pressure springs mounted on the aforesaid studs and arranged to act alternately and independently upon the connecting rod to bring and maintain the same in position ready for the next succeeding switching operation.

In testimony whereof I affix my signature.

CAREL BRUYNIS.