No. 656,291. Patented Aug. 21, 1900.

E. W. G. C. HOFFMANN.

SWITCH.

(Application filed Sept. 2, 1899.)

(No Model.)

Fig. 1.

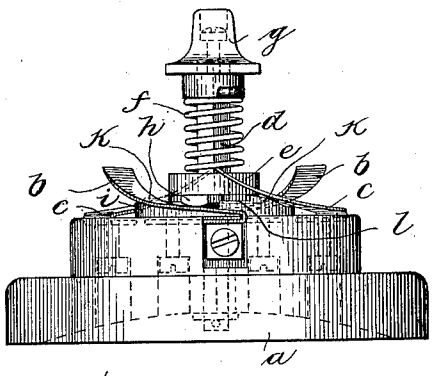


Fig. 2.

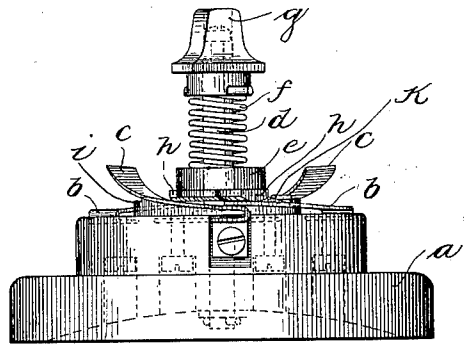


Fig. 3.

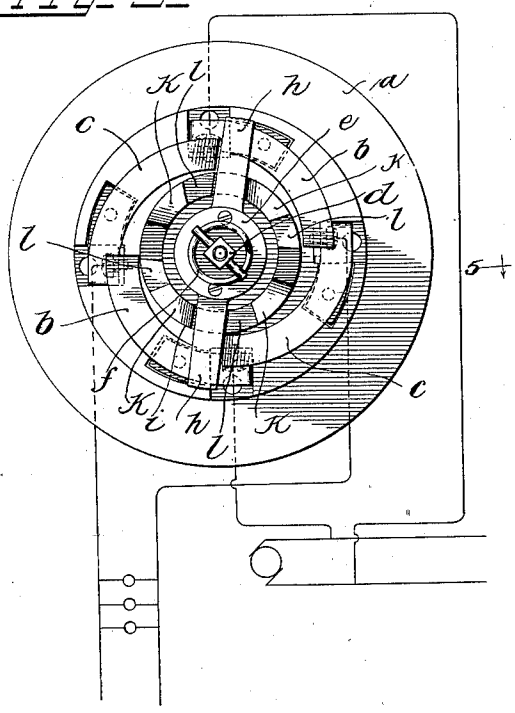


Fig. 4.

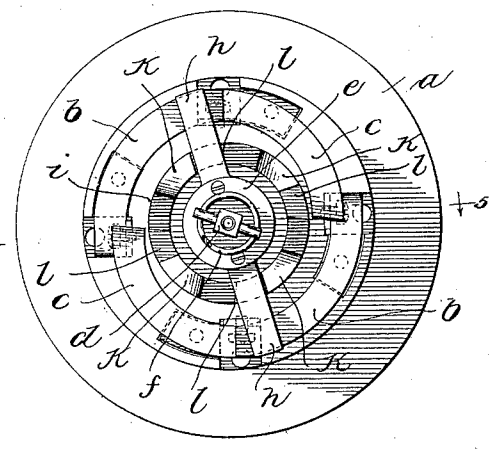
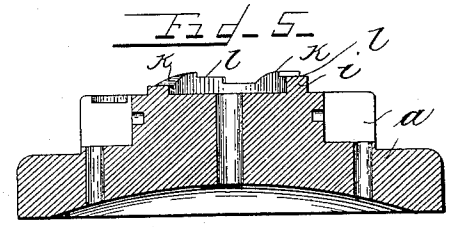


Fig. 5.



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UNITED STATES PATENT OFFICE.

ERNST WILHELM GUSTAV CARL HOFFMANN, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO THE SIEMENS & HALSKE ELECTRIC COMPANY OF AMERICA, OF CHICAGO, ILLINOIS.

SWITCH.

SPECIFICATION forming part of Letters Patent No. 656,291, dated August 21, 1900.

Application filed September 2, 1899. Serial No. 729,326. (No model.)

To all whom it may concern:

Be it known that I, ERNST WILHELM GUSTAV CARL HOFFMANN, a subject of the Emperor of Germany, residing at Charlottenburg, Germany, have invented a certain new and useful Improvement in Switches, (Case No. 241,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to switches, and primarily to that class of switches employed for controlling electric subcircuits, and has for its object the improvement of the construction and operation of switches of this class. In switches of this class as at present constructed a single movable circuit-controlling portion is employed, and in order to break the circuit quickly and positively it is necessary to actuate the movable portion, usually by strong springs. The sudden jar occasioned when the switch-actuating member is brought to rest by striking some rigid portion of the switch-base after having opened the circuit is frequently sufficient to break a switch part. To obviate this difficulty and to decrease the speed with which the switch-actuating portion moves, I preferably movably mount both contact-making parts instead of one, the two parts thus receding in opposite directions when the circuit is to be broken. The speed of the contact-making portions may be decreased considerably.

Generally speaking, my invention comprises a plurality of inclined springs forming terminals of the circuit that is to be controlled and a revoluble switch-actuating portion. The switch-controlling element serves to bring the contacts together, and the springs by their resiliency break contact when out of engagement therewith.

In the preferred embodiment of my invention I mount the terminal springs of the switch at one end and so relatively arrange the springs that the free end of one is elevated from and placed over the anchored end of another. I provide a ratchet mechanism whereby the switch-controlling element is limited to one direction of rotation. I also mount the switch-controlling element upon a shaft, with which it rotates, but upon which it is adapted to move longitudinally. A coiled spring is preferably placed about the said shaft, which is stiff enough to enable the switch-controlling portion to perform its function and which will yield sufficiently to prevent violent action.

I will explain my invention more particularly by reference to the accompanying drawings, in which—

Figure 1 is a side view of a switch made in accordance with the invention, the protecting-case being removed. Fig. 2 is a view similar to Fig. 1 with the switch parts and controlling element in a different relative position. Fig. 3 is a top view of the switch shown in Fig. 1 with the switch-handle removed, a circuit to be controlled by the switch being indicated diagrammatically. Fig. 4 is a top view of the switch shown in Fig. 2, the switch-handle being removed. Fig. 5 is a cross-sectional view of the base on line 5 5 of Fig. 4.

Like letters indicate like parts throughout the different figures.

An insulating-support *a* is provided, upon which springs *b b* and *c c* are mounted, each at one end, the free end of each spring being opposed to and capable by the resiliency of the spring of being removed from the anchored end of the next spring, the springs thus being spirally disposed. The springs *c c* are connected to one side of the circuit, Fig. 3, and the springs *b b* are connected to the other side. It is obvious, therefore, that the number of contact-springs might be reduced, but for the sake of symmetry and to prevent undue wear upon the actuating member I prefer the arrangement illustrated, by which construction small movements only are needed in effecting the control of the circuit. I employ a central shaft *d*, which is preferably of square cross-section throughout the major portion thereof, this shaft being rotatably supported within the base of the switch. A block *e* is mounted upon the shaft to rotate therewith, but to move longitudinally thereof, the shaft being of square cross-section fitting a corresponding square opening in the block *e*, the block being pressed toward the switch-springs by means of a coiled spring *f*, which is interposed between the block and

an operating-handle *g*. This coiled spring exerts a pressure upon the block toward the switch. The block supports radially-projecting arms *h*, adapted as the said block is rotated with its shaft successively to come into contact with diametrically-opposite springs to actuate the same. In order to prevent the shaft from being rotated in a reverse direction, I employ ratchet mechanism, one member, in this instance the toothed member *i*, forming part of the base of the switch and serving to engage the arms *h* of the operating-handle, which thus act in part as pawls.

The operation of the switch will now be evident. When the handle *g* is turned to the right from the position shown in Fig. 1, it will gradually depress the springs *b b*, the arms *h h* moving over the inclined surfaces *k k* of the ratchet mechanism *i*. When the arms *h* are almost above the anchored ends of the springs *c c*, they will suddenly depress the springs *b b* into engagement therewith, as the arms will then have passed over the inclined surfaces *k* of the ratchet and dropped into engagement with the intermediate surfaces *l*, due to the action of the spring *f*. The continuity of the circuit is thereby established, the springs *b* being wholly and the springs *c* slightly depressed. The motion of the arms *h* by dropping into engagement with this lower surface *l* gives sufficient indications that the circuit is securely closed. When the arms *h* are rotated farther, they leave the springs *b b*, whose free ends then recede from the springs *c c*, the arms *h* serving, further, to depress the latter springs at the same time by engaging the lowermost flat surface of the ratchet. By this means I am enabled to effectively break the circuit by moving the contact portions in opposite directions, no sudden jars being occasioned whereby the effectiveness of the switch portions might be decreased.

I do not wish to be limited to the precise construction shown, as changes may readily be made without departing from the spirit of my invention; but,

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with a contact-spring supported at one end and having a free end, of a second contact opposed to the free end of the said spring, a rotatable contact-spring-actuating member adapted to bring the free end of the contact-spring into engagement with the opposed contact, the said contact-spring being arranged in a plane transverse to the axis of rotation of the said actuating member, a shaft with which the actuating member is adapted to rotate and upon which it is adapted to move, and a coiled spring for thrusting the actuating member into engagement with the contact-spring, substantially as described.

2. The combination with two sets of contact-springs, each spring being anchored at one end and having a free end, the free ends of the springs being normally separated from and opposed to the anchored ends of the springs, of a rotatable actuating member adapted for successive engagement with the said springs to effect engagement between opposed springs, substantially as described.

3. The combination with two sets of contact-springs, each spring being anchored at one end and having a free end, the free ends of the springs being normally separated from and opposed to the anchored ends of the springs, of a rotatable actuating member adapted for successive engagement with the said springs to effect engagement between opposed springs, a shaft with which the actuating member is adapted to rotate and upon which it is adapted to move, and a coiled spring for thrusting the actuating member into engagement with the contact-springs, substantially as described.

4. The combination with a spring supported at one end and having a free end, of a second contact opposed to the free end of the said spring, a rotatable contact-spring-actuating member adapted to bring the free end of the contact-spring into engagement with the opposed contact, the said contact-spring being arranged in a plane transverse to the axis of rotation of the said actuating member, and ratchet mechanism for limiting the shaft to one direction of rotation, substantially as described.

5. The combination with a contact-spring supported at one end and having a free end, of a second contact opposed to the free end of the said spring, a rotatable contact-spring-actuating member adapted to bring the free end of the contact-spring into engagement with the opposed contact, the said contact-spring being arranged in a plane transverse to the axis of rotation of the said actuating member, a shaft with which the actuating member is adapted to rotate and upon which it is adapted to move, a coiled spring for thrusting the actuating member into engagement with the contact-spring, and ratchet mechanism for limiting the shaft to one direction of rotation, substantially as described.

6. The combination with two sets of contact-springs, each spring being anchored at one end and having a free end, the free ends of the springs being normally separated from and opposed to the anchored ends of the springs, of a rotatable actuating member adapted for successive engagement with the said springs to effect engagement between opposed springs, and ratchet mechanism for limiting the shaft to one direction of rotation, substantially as described.

In witness whereof I hereunto subscribe my name this 15th day of August, A. D. 1899.

ERNST WILHELM GUSTAV CARL HOFFMANN.

Witnesses:
HENRY HASPER,
WILLIAM MAYNER.