(No Model.)

E. H. JOHNSON.

ELECTRIC SWITCH.

No. 473,228. Patented Apr. 19, 1892.

Fig. 1.

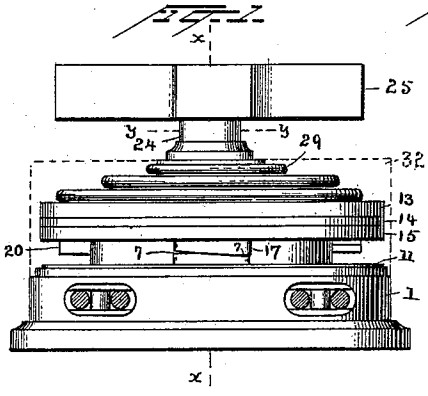


Fig. 2a.

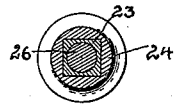


Fig. 2.

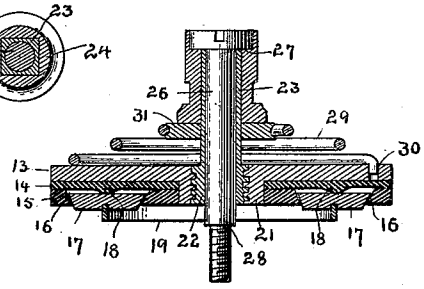


Fig. 3.

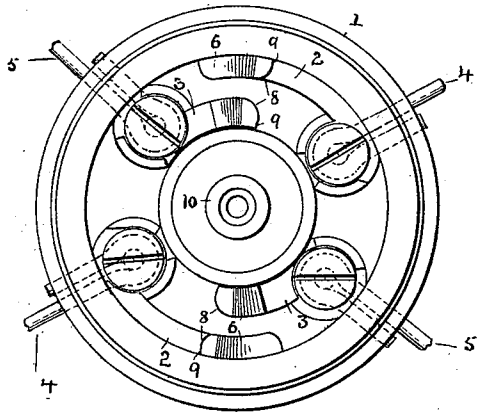


Fig. 4.

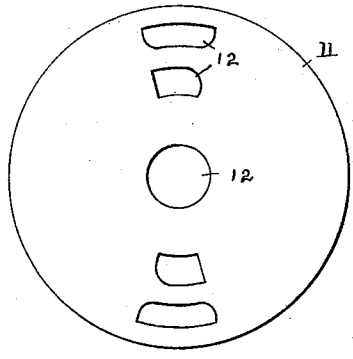
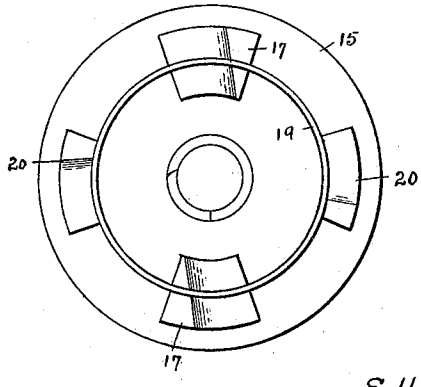


Fig. 5.



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EDWARD H. JOHNSON, OF NEW YORK, N. Y.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 473,228, dated April 19, 1892.

Application filed August 25, 1891. Serial No. 403,726. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. JOHNSON, a citizen of the United States, residing at New York city, in the county and State of New York, have invented a certain new and useful Improvement in Circuit Making and Breaking Switches, of which the following is a specification.

The present invention relates to that class of circuit making and breaking devices generally known as "snap-switches"—that is, switches in which the switch-arm or contact is thrown by a spring to cause an instantaneous make and break of the circuit to avoid the formation of a hurtful arc at the contacts. The switch which forms the subject-matter of this specification is well adapted for use with circuits carrying currents of any character, but is designed more especially for currents of considerable quantity and high tension, the construction being such that dangerous heating at the contacts while the circuit is closed or arcing on opening the circuit is practically impossible, and the construction is such that should the contacts begin to heat from any cause they become more firmly pressed together by the expansion of the metals, and their carrying capacity is thereby automatically increased. In this snap-switch the contacts are preferably rigid plates or blocks instead of yielding springs, and when the switch is operated to close the circuit the contacts are firmly wedged together and held between two rigid or unyielding surfaces or bodies, as in a vise, the spring which is designed to throw the movable contact exerting its whole force to wedge the contacts together.

Other important features and advantages will appear in the following description.

In the accompanying drawings, Figure 1 is a side view of the preferred form of my improved switch. Fig. 2 is a central section of the upper portion of the switch on line *x x* of Fig. 1. Fig. 2ª is a cross-section on line *y y* of Fig. 1. Fig. 3 is a plan view of the lower section of the switch. Fig. 4 is a plan view of an insulating-plate adapted to fit over the lower section of the switch, and Fig. 5 is an inverted plane of the upper section of the switch.

In constructing this switch I take an insulating-base 1 of cup form and preferably of porcelain or other rigid and refractory insulating material and mount circuit-terminals 2 3 just within the rim of the base. To these terminals the circuit-wires 4 5 are connected. Each of the terminals is provided at one end with a contact portion 6, the upper faces of which are preferably in the same plane. These contact-faces are inclined or beveled through a large portion of their length, but are flattened for a greater or less distance at the end at which contact is broken, as indicated at 7. The ends of the contact portions of the terminals are inclined or beveled outward, as shown at 8, so that when the connecting-plate leaves the terminals it has no tendency to form an arc between the two adjacent edges or corners of the terminals, but any arc to be formed must bridge the distance between the outer corners 9 of the terminals. At the center of the base is fixed a screw-threaded sleeve 10.

11 is an insulating plate or screen having openings 12, adapted to fit over the terminal contacts, and the central sleeve 10 to inclose the main bodies of the terminals and the connecting devices carried by the base.

The second or upper section of the switch consists of a movable body consisting, preferably, of a metal plate 13 of sufficient thickness to be rigid—that is, to resist the tendency to bend or yield under any strain which is put upon it in the ordinary use of the switch or which may be imposed by the expansion of the contacts under high degrees of heat—an insulating-plate 14, and an outer insulating-plate 15. In the latter plate are two dovetailed openings 16, in which the connecting plates or blocks 17 are fitted, and midway between them are two similar but smaller openings, in which are the blocks 20. The plate 14 is provided immediately under the center of the plates 17 with raised ribs 18 only partially as wide as said plates. The plates 17 have inclined or beveled faces, as already described in connection with the terminal contacts 6. The contact or connecting plates 17 are preferably grooved through the center, and an insulating-screen in the form of a ring 19 is set into said grooves and into a corre-

sponding groove in the plate 15. When the switch is built up, this screen extends between the contact portions 6; but it is evidently not necessary that the ring should be carried by the movable member. The detent-plates 20 are only one-half as wide and are placed in line with but one set of the contact-terminals, as shown in Fig. 5. At the center of this member of the switch and preferably formed integral with the plate 13 is an internally-screw-threaded sleeve 21, into which works the metal screw 22, formed at the bottom of the square spindle 23, onto which fit the sleeve and handle 24 25. Through the center of the handle, sleeve, and spindle passes a screw 26, the head of which is adapted to bear against the shoulder 27 and the lower end of which is adapted to screw into the sleeve 10 on the base, the shoulder 28 bearing against the top of said sleeve.

29 is a spring, one end of which is connected to the plate 13 at 30 and the other end of which is connected to the disk or collar 31, which moves with the handle 25 and spindle 23.

32 is a cap which covers the upper part of the switch.

The base is secured to a wall or other support and constitutes the fixed member of the switch, while the other section forms the movable member of the switch.

When the parts of the switch are put together, the spring 29 will be given an initial tension. When the handle is grasped and turned, two operations take place—namely, since the screw-threaded spindle 23 is held from longitudinal motion as it is turned, the movable member of the switch will ride upon the thread, thereby tending to separate the beveled connecting or contact plates from the beveled terminal contacts—that is, to move them directly away from each other in a direction parallel to the spindle—so that they can pass each other without much friction, and at the same time the spring 29 is put under increased tension, so that when the flat faces 7 of the connecting-plates and terminals come together the spring will have sufficient tension to throw the movable member forward instantaneously and with great force. The flat faces 7 allow the contacts to move forward when they have been separated far enough to bring the highest points of the bevels adjacent to each other. It will be clear that if we start with the circuit closed the first movement of the switch will break the circuit and bring the movable member to rest, with the detent-plates 20 bearing against the contact-faces of the outer terminals 2. While this arrests the movable member it holds the circuit open. When the switch is again moved in the same direction, since the switch is constructed to move forward whether the circuit is to be made or whether it is to be broken, the broad plates 17 are thrown forward and rest on the contact-faces of the terminals 2 3, thereby connecting them and completing the circuit. It may happen that one contact-surface will be a trifle lower than the other surface, and in this case if the plates 17 were immovable bad contact or no contact with one of the terminals would be obtained; but by providing the ribs 18 behind the plates 17 they are allowed to rock transversely, and hence can accommodate themselves to any slight irregularities in the contact-surfaces. Since the spring throws the wedge-shaped connecting-plates forward against the wedge-shaped terminal contacts with a good deal of force and since both the connecting-plates and the terminals are held rigidly from moving in a direction away from each other, the best possible contact is obtained and a contact which is capable of carrying all the current which the metal of the terminals and binding-posts is capable of conducting. If heating occurs at the points of contact, whereby the metal is expanded, the effect will be to cause more perfect contact, owing to the rigid support of the parts, thereby automatically increasing the conductivity at the contacts and enabling the switch to carry more current. The construction of the switch is such that when the circuit is closed it is permanently locked against reverse movement by the arrangement of the screw-threads and can only be operated by a positive forward movement. In switches having yielding spring-contacts the quality of the contact is dependent on the strength of the springs, and when the springs become heated, as frequently happens, their resiliency is impaired, thereby lowering the efficiency of the switch. This trouble is avoided in the switch above described.

What I claim is—

1. The combination, in a switch, of two rigid members corresponding to the jaws of a vise, one of which members is movable repeatedly in the same direction in making and breaking circuit, contacts carried by the switch members, which when the circuit is closed are held in contact between said rigid members, said members being positively held from moving away from each other, and means for disengaging the contacts, substantially as described.

2. The combination, in a switch, of two rigid members corresponding to the jaws of a vise, one of which members is movable repeatedly in the same direction in making and breaking circuit, contacts carried on the two adjacent sides of the rigid members, which contacts when the circuit is closed are held in contact between said rigid members, means for separating the contacts, and a spring for throwing one member, with its contacts, forward, substantially as described.

3. A circuit making and breaking switch having fixed and movable beveled or wedge-shaped contacts, rigid and relatively-movable bodies, on two adjacent sides of which the contacts are mounted, a spindle for the movable body, and means holding said bodies from moving away from each other in the di-

rection of the length of the spindle when the circuit is closed, whereby when the circuit is closed the contacts are wedged and held together between said rigid bodies, substantially as described.

4. The combination, in a snap-switch, of a fixed and a movable rigid body having a central spindle, the movable body being positively held from moving away from the other body, a spring for throwing the movable body, and contact devices between said bodies and in position to make and break contact as the movable member is turned on its spindle, substantially as described.

5. A circuit making and breaking switch having fixed and movable contacts, rigid bodies, on two adjacent sides of which the contacts are located, which contacts when the circuit is closed are pressed together between said rigid or unyielding bodies, and permanent locking devices for locking the movable bodies and contacts against reverse movement, substantially as described.

6. A circuit making and breaking switch having fixed and movable rigid bodies parallel with each other, contacts on two adjacent sides thereof, which when the circuit is closed are wedged together between said rigid or unyielding bodies, permanent locking devices for locking the movable member against a backward movement, and a spring for throwing the movable contact when the switch is operated, substantially as described.

7. The combination, in a switch, of a stationary rigid member, a movable rigid member, which is mounted so that it can be rotated in one direction only in making and breaking the circuit, engaging contacts carried by said switch members, and means for rotating the movable member and for moving it toward or from the stationary member, whereby when in one position said contacts are wedged together between the rigid members, substantially as described.

8. A circuit making and breaking switch having fixed and movable rigid bodies, contacts between two adjacent faces thereof, which when the circuit is closed are wedged together between said bodies, the contacts having faces beveled for a portion only of their length, means for moving the contacts directly away from each other, and means for advancing the movable contacts, said latter means operating when the contacts have been moved far enough apart to bring the highest points of the bevels on the contacts adjacent to each other, substantially as described.

9. The combination, in a switch, of two members carrying contacts, one member being fixed and the other movable, a screw rotatable only in one direction and held from longitudinal movement, said screw working in a nut carried by the movable member for moving it from the fixed member when the switch is moved to its open position, and means for turning the movable member on the screw, thus causing it to ride toward the fixed member, said screw constituting a spindle on which the movable member turns, substantially as described.

10. The combination, in a switch, of two members carrying contacts, one member being fixed and the other being movable, a screw rotatable only in one direction, said screw being threaded in such direction that when the screw is turned the movable member will be carried away from the fixed member, and a spring connected to the screw and to the movable member for throwing the latter forward, thereby causing it to ride down on the screw-thread, substantially as described.

11. The combination, in a switch, of two rigid members, contacts carried thereby, which when the circuit is closed are held in contact between said rigid members, which members are movable always in the same direction both in making and breaking the circuit, means for disengaging the contacts, and means for arresting the same before the circuit is again closed, substantially as described.

12. The combination, in a switch, of two switch members, contacts carried thereby, which when the circuit is closed are held in contact between said members, a screw held from longitudinal movement engaging with and adapted to move one member for disengaging the contacts, and a spring for throwing the movable member, with its contact, forward, causing it to ride down on the screw, substantially as described.

13. The combination, in a switch, of a base adapted to be connected to a support carrying circuit-terminals separated from each other, a rigid movable member fitting over the base and carrying connecting devices adapted to co-operate with the terminals to electrically unite them, a screw-threaded sleeve in said movable member, and a screw held from longitudinal movement, but adapted to turn in said sleeve, whereby when the screw is turned the movable member is raised and permitted to advance, substantially as described.

14. The combination, in a switch, of a base adapted to be connected to a support carrying circuit-terminals separated from each other, a rigid movable member fitting over the base and carrying connecting devices adapted to co-operate with the terminals to electrically unite them, a screw-threaded sleeve in said movable member, a screw held from longitudinal movement, but adapted to turn in said sleeve, and a spring connected to the screw and to the movable member, whereby when the screw is turned the movable member is raised and advanced, substantially as described.

15. The combination, in a circuit making and breaking switch, of a fixed member, a member adapted to rotate, terminal-contacts on the fixed member, an insulating-screen extending between the same, and a connecting-plate or connecting-plates on the movable member, substantially as described.

16. The combination, in a switch, of a con-

necting plate or device and a pair of terminals having contact-faces and arranged adjacent to each other side by side, the end of the contact portion of each terminal at which the connecting device leaves it being inclined or beveled away from the other terminal, whereby when the connecting device breaks the circuit no arc can be formed between the adjacent edges or corners of said terminals, substantially as described.

17. The combination, in a switch, of a connecting plate or device and a pair of terminals having contact devices and arranged adjacent to each other side by side, the end of the contact portion of each terminal at which the connecting device leaves it being inclined or beveled away from the other terminal, whereby when the connecting device breaks the circuit no arc can be formed between the adjacent edges or corners of said terminals, and an insulating-screen between the terminals, substantially as described.

18. The combination, in a rotary switch, of a fixed and a rotary member, circuit-terminals side by side—that is, in different circles—on one member, and a contact or connecting plate on the other member adapted to electrically unite said terminals, said plate having a transverse movement, whereby it is adapted to rest squarely on both terminals, substantially as described.

This specification signed and witnessed this 24th day of August, 1891.

EDWARD H. JOHNSON.

Witnesses:
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EDWARD F. SEIXAS.