C. J. KLEIN.

ELECTRIC SWITCH.

APPLICATION FILED MAY 31, 1911.

1,162,866.

Patented Dec. 7, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

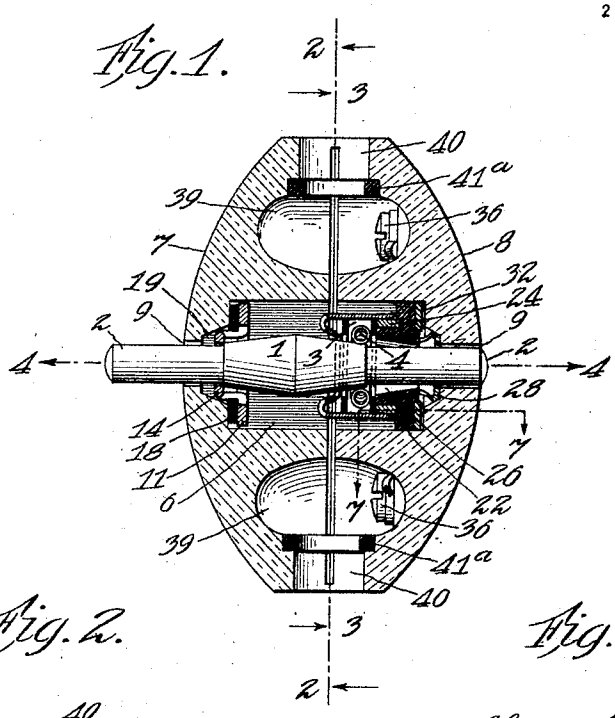


Fig. 2.

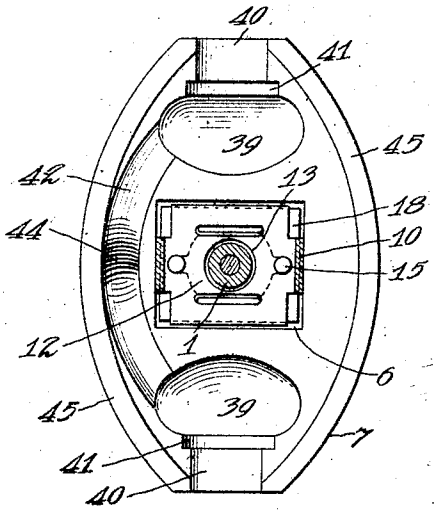


Fig. 3.

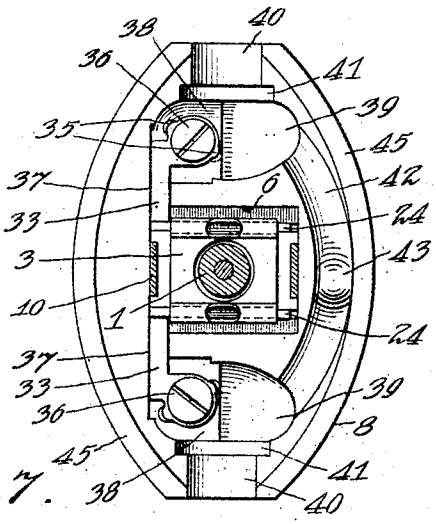
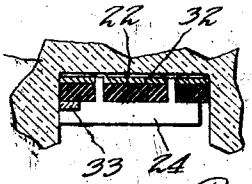


Fig. 7.



Witnesses:

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2 SHEETS—SHEET 2.

Fig. 4.

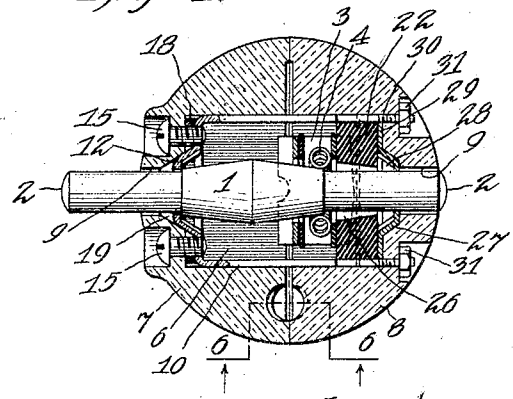


Fig. 5.

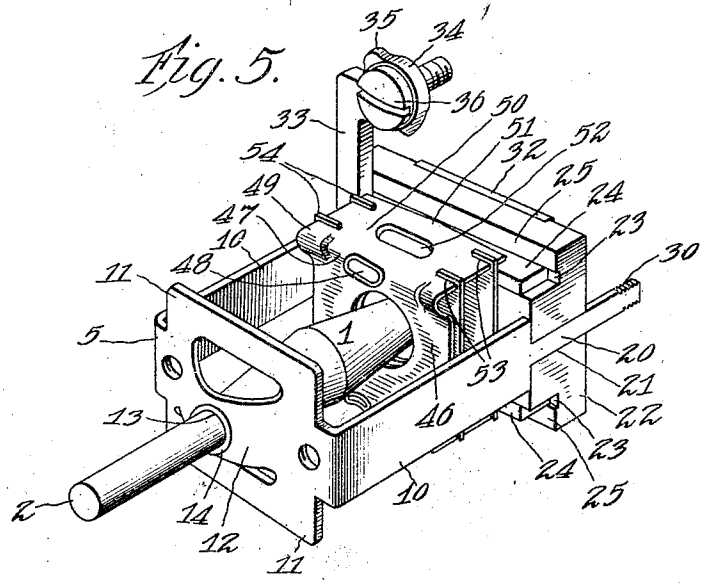
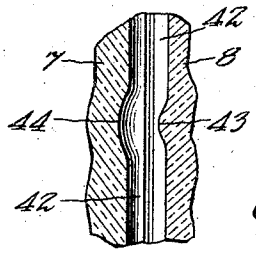


Fig. 6.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,162,866. Specification of Letters Patent. Patented Dec. 7, 1915.

Application filed May 31, 1911. Serial No. 630,388.

To all whom it may concern:

Be it known that I, CHARLES J. KLEIN, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Electric Switches, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to electric switches. It more especially relates to electric switches of the feed through type described in my co-pending application Serial No. 628,781, filed May 22, 1911; but as in the case of the switch shown in that application it is not limited in its application to switches of this type, but may be used in various types of switches and in widely modified forms.

One of the objects of my invention is to provide an improved electric switch device.

A further object of my invention is to provide an improved switch device equipped with a self-contained switch unit which is exceedingly compact and serviceable and which may be readily assembled and removed when desired.

Other objects and advantages of my improved construction will hereinafter appear.

In the accompanying drawings I have shown one form which my invention may assume in practice and I shall for purposes of illustration herein describe my invention as applied to this form which is of the feed through type, but my invention is neither limited in its use to the specific form chosen nor to switches of this specific type.

Figure 1 shows a partial central longitudinal sectional view of the assembled switch. Fig. 2 shows a central sectional view on line 2—2 of Fig. 1. Fig. 3 shows a central sectional view on line 3—3 of Fig. 1. Fig. 4 shows a transverse sectional view on line 4—4 of Fig. 1. Fig. 5 shows a perspective view of the self-contained switch mechanism. Fig. 6 shows a sectional view on line 6—6 of Fig. 4. Fig. 7 shows a sectional view on line 7—7 of Fig. 1.

In these drawings I have illustrated a switch mechanism of the push button type inclosed between the two parts of a casing in which the switch mechanism is housed and mounted in a frame carried by the two parts of the casing so that the switch mechanism is entirely self-contained and may be readily removed from the casing when desired. This switch mechanism is preferably of the type described in my prior Patent No. 985,421, patented February 28, 1911, and includes a reciprocable cam member 1 of the conformation of a double frustum positioned base to base and carrying push buttons 2 of a reduced diameter on its opposite ends. A reciprocable contactor 3, hereinafter described, is arranged to be reciprocated upon this cam member by a garter spring 4 within the contactor when the cam member is reciprocated, in order to make or break an electrical circuit. The switch mechanism, that is the cam member 1 and the contactor 3 arranged to reciprocate upon the same, is supported in a frame 5 and is so arranged in a chamber 6 of substantially rectangular cross section formed in the two parts of a casing 7 and 8 as to be supported centrally in the same and extend transversely across the casing so that the push buttons 2 pass through oppositely disposed alined recesses 9 in the opposite sides of the casing. In a preferred form the frame 5 is provided with parallel sides 10 which extend transversely across the recess 6 and are located substantially centrally between the top and bottom of the recess. One of the ends of the frame 5 is provided with a side 11, preferably integral with the sides 10, of substantially rectangular shape and provided with a convex spacing strip 12 having a central perforation 13 arranged to permit the reciprocation of the push buttons and having a flange 14 around the edge of the perforation arranged to engage the edge of the cam 1 to limit its movement. In a preferred form the side 11 is of substantially the same size as the chamber 6 and is adapted to fit within the same and be secured to the side wall of the same by screws 15 on opposite sides of the push buttons which are housed in suitable recesses in the outer surface of the casing member 7 and extend inward through perforations 16 in the side 11. In a preferred form the heads of the screws 15 may be sealed into their recesses. Further in a preferred form an insulating washer 18 is provided between the outer surface of the side 11 and the side wall of the chamber 6. This washer is preferably so fashioned as to permit screws 15 and the convex portion 12 of

the side 11 to pass through the same and in a preferred form the wall of the casing 7 is cut away as at 19 in order to receive the convex portion 12 as shown in Fig. 4.

The cam member has one of its push buttons extending through the perforation 13 in the convex portion 12 on the side 11 and the contactor 3 is arranged to reciprocate upon the cam member as shown in Fig. 5 between the sides 10 on the frame 5. The opposite ends of the frame 10 are preferably provided with reduced shanks 20 which pass through transversely extending grooves 21 in the sides of a substantially rectangular shaped base member 22. This base 22 is preferably formed of an insulating material and is arranged to carry the terminal contacts for the switch mechanism against the opposite wall of the chamber 6. In a preferred form the base 22 is provided with longitudinally disposed parallel grooves 23 on its opposite sides in which are seated the terminal members 24 of the switch mechanism in such a position that when the contactor 3 is reciprocated by the movement of the cam member 1, the contact surfaces of the contactor will engage with the outside of these terminal members. In a preferred form the outer longitudinal edges of the base 22 are cut away along the side of the terminals 24 as at 25 in order to permit the free movement of the contactor. A perforation 26, tapered as shown in Fig. 4, is provided in the base 22 in a substantially central position between the terminals 24 and between the sides 10 of the frame 5. As illustrated in Fig. 4 the end of the cam member is arranged to pass through this perforation and in a preferred form the sides 11 of the frame 10 are provided with a connecting member 27 which at the same time serves as a stop for the cam member. As illustrated in Fig. 4 the side wall of the chamber 6, in back of the base 22, is cut away as at 28 to form a substantially tapered circular recess of a greater diameter than the recess 9 through which the push buttons extend. The combined stopping and connecting member 27 is arranged to be seated in this recess and in order to enable it to assist in holding the parts in assembled relation it is provided with bifurcated feet 29 arranged to pass around on opposite sides of each of the arms 20 so that a portion of the member 27 will be inclosed between the side wall of the casing 6 and the back of the base 22 while the remaining central portion of the member 27 will extend outward to form a stop for the cam member similar to the stop provided on the other end of the frame. In a preferred form the ends of the extensions 20 on the frame sides 10 are screw threaded as at 30. These ends extend through suitable perforations in the side walls of the chamber 6, communicating with suitable recesses in the outer surface of the casing 8 and are arranged to be secured in these recesses by suitable taps 31. If desired these taps may be sealed in these recesses. In a preferred form the terminal members 24 are provided with extensions which pass through the bottoms of the grooves 23 to the back of the base 22 where they are suitably riveted or otherwise secured to holding strips 32 which extend along the upper and lower edges of the base 22 and in a preferred form lie substantially flush with the back of the same. Further the terminals 24 are preferably provided at one of their ends with shanks 33 extending at right angles to the body portions of the terminals. In a preferred form the shanks 33 and the terminal members 24 are formed in the same piece and are bent into the proper shape. Upon the free ends of the shanks 33 enlarged heads 34 are provided extending substantially at right angles to the shanks 33 and provided with ears 35 to enable connections to be readily made to binding posts 36. In a preferred form the casing 8 is provided with a recess 37 communicating with the upper and lower walls of the chamber 6 at one side of the same which is adapted to receive the shanks 33 of the terminal members. Further, above and below the recess 37 and communicating with the same are enlarged recesses 38 arranged to house the enlarged head of the terminal shanks 33 and provided with suitable means for housing the threaded ends of the binding screws 36. These recesses 38 communicate with enlarged substantially semi-spherical recesses 39 formed in the adjacent parts of the adjoining casings. These recesses 39 communicate with longitudinally disposed grooves 40 formed between the parts 7 and 8 of the casing having transversely extending grooves 41. Thus it is seen that the conductors for the switch may pass down through the grooves 40 and through insulating washers 41^a carried in the transverse grooves 41 to the binding screws of the switch mechanism and that if desired they may be knotted and held in place in the chambers 39.

In order to permit one of the conductors to pass down through the switch in the manner required in switches of this type I provide a suitable groove 42 near one side of each of the casing members 7 and 8. This groove is formed in the parts of the casing members which are adapted to be clamped together when the parts are assembled and in a preferred form passes around the switch mechanism as shown in Figs. 2 and 3, communicating with the chambers 39 at the top and bottom of the casing. In a preferred form a raised portion 43 is provided in the trough of the groove in the casing member 8 as shown in Fig. 8 and a depressed portion 44 is provided in the trough of the groove

in the casing member 7 as shown in Fig. 2 so that when the conductor is placed in the groove and the parts are assembled this conductor is firmly gripped by the raised portion 43 and forced into the depressed portion 44 to hold it securely in place. In a preferred form I preferably provide a slight wall 45 around the edges of each of the casing members 7 and 8, and I preferably provide casing members of a substantially oval longitudinal cross section when assembled, as shown in Fig. 1. This construction is very neat in appearance and permits the switch mechanism to be very compactly housed.

In Fig. 5 I have illustrated the construction of an improved form of contactor. This contactor is preferably formed of a single sheet of stamped metal and is of the general construction of the contactor described in my co-pending application Serial No. 628,732, filed May 22, 1911. As described in that application the contactor is provided with a body portion 46 having rearwardly extending rounded shoulders 47 provided with suitable notches 48 and projections 49 arranged to take the impact when the contactor engages the walls of the casing and conserve the shape of the contactor. Further, the contactor is provided with the contact sides 50 having out-turned peaked edges 51, and as in the previous construction these sides are preferably formed integral with the body portion 46, and are provided with slots 52 to permit the expansion of the spring as well as slots 53 in the edges of the sides arranged to receive a spacing strip. However, in this instance I have provided this contactor with a plurality of spacing strips 54 of a similar conformation to the spacing strips described in that application, and similarly secured to the body portion of the contactor. These spacing strips are, further, located in different positions in the contactor, one of the same being positioned so that its body portion rests against the flat portion of the back of the contactor and the other being spaced apart from this spacing member by a sufficient distance to enable the garter spring 4 to be housed between the two spacing members. Further in a preferred form I construct these spacing members of insulating material so that the spring 4 is kept out of circuit.

As in the case of the construction described in my previous application the contactor is arranged to reciprocate across the casing upon the reciprocation of the cam member in an opposite direction and due to the spring contained within the contactor is arranged to reciprocate with a very quick snap action to make or break circuit at the terminals. As shown in Fig. 5, the circuit would be broken at the terminals 24 and the limits of the movement of the switch mechanism, that is both the contactor and the cam, will be established on one side by engagement with the frame 10 and upon the other side by engagement with the terminal contacts 24, the base 22 and the stop 27 carried by the frame. As in the case of the previous construction these limits of travel are reached substantially simultaneously and the shape of the contactor is conserved by causing the impact to be taken upon the raised portions on its rounded shoulders when thrown to open circuit position.

By my improved construction I have been able to provide a compact and simple self-contained switch mechanism which may be readily placed in position in the switch casing and readily removed from the same. Further the contact members for the switch are amply protected and securely housed so as to permit of long continued use in service and are so arranged that the entire switch mechanism may be readily removed if desired by simply removing the taps on the ends of the extensions 20 and the screws 15. If it is desired only to obtain access to the switch mechanism all that it is necessary to do is to remove the screws 15 when one of the halves of the casing may be removed and the entire switch mechanism becomes accessible. Thus it is seen that the two parts of the switch casing are secured together by securing them to a frame which incloses the switch mechanism and that the casing may be separated or the mechanism readily removed from the same as desired. Further by the provision of the groove extending through the casing and the means for clamping the conductor in this groove I have provided a positive means for preventing the relative movement of the conductor with respect to the casing, and accurately positioning the same in the casing. Other advantages of my improved construction will readily appear to those skilled in the art.

While I have in this application described one specific form which my invention may assume in practice I have chosen this form only as a means of illustrating the principle of my invention which may assume various other forms and be widely modified and used in switches of different types, consequently I do not wish to be limited to the specific form chosen for purposes of illustration, but rather wish to cover all the forms of my invention which fall in the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is as follows:—

1. In an electric switch, a base, a pair of spaced parallel contacts thereon having free outer contact faces, means for bridging said contacts comprising a sheet metal contactor having a body portion and parallel spaced contact portions for engagement with said

outer faces, operating means for said contactor including a spring disposed between said contact portions thereof and a pair of spaced insulating strips on opposite sides of said spring and interlocked with said contact portions for insulating said spring therefrom and from said contacts.

2. In an electric switch, a reciprocating cam member of the conformation of a double frustum positioned base to base, a sheet metal contactor arranged to reciprocate thereon, said contactor having a body portion and contact surfaces substantially at right angles to said body portion, a spring inclosed within said contactor and gripping said cam member, and means for insulating said spring.

3. In an electric switch, a reciprocating cam member of the conformation of a double frustum positioned base to base, a sheet metal contactor arranged to reciprocate thereon, said contactor having a body portion and contact surfaces substantially at right angles to said body portion, a spring inclosed within said contactor and gripping said cam member and means for insulating said spring carried by the contactor.

4. In an electric switch, a reciprocating cam member of the conformation of a double frustum positioned base to base, a sheet metal contactor arranged to reciprocate thereon, said contactor having a body portion and contact surfaces substantially at right angles to said body portion, a spring inclosed within said contactor and gripping said cam member, and means for spacing apart the contact surfaces of said contactor and insulating said spring.

5. A self-contained switch mechanism including end portions, means connecting said end portions to form a frame, a reciprocating snap switch mechanism guided and limited in its movement by said frame, and terminal members carried by one of said end portions on opposite sides of said switch mechanism, said terminal contacts having shanks extending substantially at right angles to their body portions and carrying binding screws.

6. A self-contained switch mechanism including end members, means connecting said end members to form a frame, a push button operated snap switch mechanism guided and limited in its movement by said end members, terminal contacts carried by one of said end members arranged in parallel planes on opposite sides of said switch mechanism, said terminal contacts having shanks at their ends extending at right angles to their body portions and formed integral therewith.

7. A self-contained switch mechanism, including end members, means connecting said end members to form a frame, a push button operated snap switch mechanism inclosed in said frame and guided and limited in its movement by said frame, terminal contacts carried by one end of said end members having integral shanks extending at right angles from the body portion of the terminal members, the body portion of said terminal members being riveted to one of said end members.

8. In an electric switch device, a push button operated snap switch mechanism, end members arranged to guide and limit the same in its movement, side members connecting said end members to form a frame, said side members extending beyond one of said end members, and a two part base, one part of said base being attached to the ends of said side members and the other part attached to the other of said end members.

9. In an electric switch device, a push button operated snap switch mechanism, end members guiding and limiting the movement of said switch mechanism, side members connecting said end members to form a frame, said side members being provided with reduced ends extending through grooves in one of said end members and a two part casing attached to and inclosing said switch mechanism.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

CHARLES J. KLEIN.

Witnesses:
H. L. ROCKWELL,
J. S. BROCK.