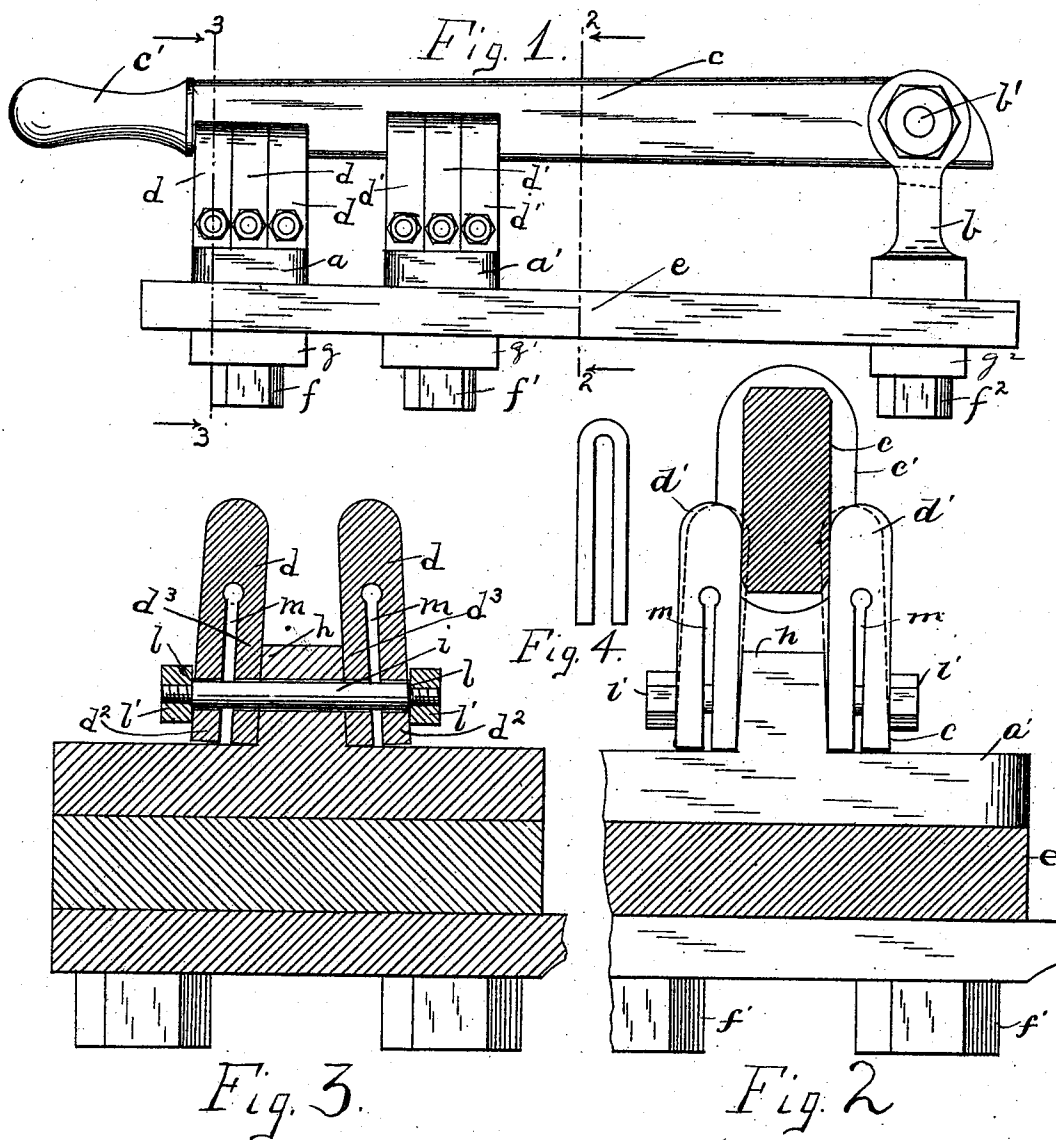


(No Model.)

E. P. WARNER.
ELECTRIC SWITCH.

No. 503,180.

Patented Aug. 15, 1893.



Witnesses:
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UNITED STATES PATENT OFFICE.

ERNEST P. WARNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 503,180, dated August 15, 1893.

Application filed October 29, 1892. Serial No. 450,371. (No model.)

To all whom it may concern:

Be it known that I, ERNEST P. WARNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Switches for Electric Circuits, (Case No. 52,) 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 for electric circuits, and has for its object to provide a switch that shall carry a strong current without unduly heating.

My invention belongs to that class of switches known as knife switches, in which the blade of a pivoted lever is adapted to close between two spring contact fingers, the resilience of which tends to resist the separation caused by the insertion of the blade, thus forming an electrical contact between the springs and the blade of the lever. Such switches have previously been constructed by making the fingers, between which the blade is adapted to be inserted, of solid pieces of resilient metal, or of a number of flat springs placed face to face. I obtain this resilient effect by using contact fingers of hard rolled copper, or other material possessing resilient properties, and provide a slot in the same so disposed as to render the contact fingers yielding upon the insertion of the blade. Hitherto the difficulty in constructing switches of this kind has been to secure the desired resiliency and at the same time provide a sufficient conductivity in the resilient members of the switch, for increase of conductivity requires an increase of cross section of the resilient members, and increasing the cross section decreases the resiliency.

In the accompanying drawings—Figure 1 is a view of the switch with the lever blade closed. Fig. 2 is an enlarged sectional view on line 2—2 of Fig. 1. Fig. 3 is an enlarged sectional view on line 3—3 Fig. 1, the lever blade having been removed. Fig. 4 shows a modification of the contact finger.

The base plates *a*, *a'* and the standard *b* are preferably attached to the switch board *e* by bolts *f*, *f'* and *f''* passing through the switch board and the plates *g*, *g'* and *g''*, forming the

terminals of the switch, and screwing into holes provided in the base plates and the standard.

The base plate *a* is provided with a projection *h* slightly tapering toward the top. The contact fingers *d d* are attached to the sides of this projection by a bolt *i*, provided with threads upon each end, and shoulders *l l* against which the nuts *l' l'* are adapted to be screwed. Said bolt passes freely and loosely through the contact fingers *d d* and the projection *h*, and the nuts *l' l'* upon being screwed against said shoulders *l l* serve to hold the contact fingers *d d* against the tapering faces of the projection *h*, the nuts bearing upon said contact fingers *d d* by their lower edges.

The contact fingers are provided with transverse slots *m m* in planes approximately parallel to the plane of the lever blade and extending in depth from the lower ends thereof to a point beyond the lower edge of the nut *l'* and preferably throughout about two-thirds of the length of the contact fingers. When in this position the upper ends of the contact fingers are at a less distance apart than the width of the lever blade. The upper ends of the said contact fingers are made rounding or are chamfered so that the lever blade upon coming against the ends thereof may separate said contact fingers.

The projection *h* may be made with perpendicular sides and the contact fingers curved or otherwise constructed to bring their ends to a less distance apart than the width of the lever blade.

The contact fingers *d' d'* may be made longer than the fingers *d d*, so that the lever blade may make contact with the fingers *d' d'* before it makes contact with the fingers *d d*. The fingers *d' d'* are attached to the base plate *a'* in the same manner that the fingers *d d* are attached to the base plate *a*.

The lever *c* is pivoted to the standard *b* in the usual manner by a bolt *b'* by means of which the frictional contact between the lever blade and the adjacent surfaces of the standard *b* may be secured. The lever *c* is provided with a handle *c'* by means of which the switch may be opened or closed. The blade in descending between the fingers *d d* and be-

ing of a greater width than the distance between the contact fingers, due to the taper of projection h , will impinge against the rounding ends of said contact fingers and tend to separate them. It will be observed that the finger d bears against the tapering face of the projection h by its limb d^2 and against the lower edge of the nut l' by its limb d^3 . When the upper ends of the fingers are thrust apart by the blade, d^3 will tend to break contact with projection h except at the lower end thereof; the other limb d^2 , bearing against the lower edge of nut l' , will cause the limbs d^2 and d^3 to approach at the ends, thus permitting the ends of the fingers d to separate to admit the blade of the lever. Thus, while the blade is inserted the contact finger d will have two points of contact, one being the end of limb d^3 , the other the portion of limb d^2 where it bears upon the edge of nuts l' . The resilience of the limbs d^2 , d^3 reacting upon these supports will cause a firm contact between the lever blade and the contact fingers d .

To provide for irregularities in the surface of the lever blade more than one contact finger is provided upon each side of the projection on the base plate, and I preferably employ three such fingers. By this arrangement there will always be a firm contact between the contact fingers and the lever blade and strong currents may be passed through the switch without unduly heating the parts thereof. Contact fingers may be made upon this principle in various ways without departing from my invention. For instance, the contact fingers may be made as shown in Fig. 4 by bending a piece of spring metal into a "U" shape, or the contact fingers may be provided with more than one transverse slot, any of which modifications come within the scope of my invention.

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

1. The combination with a switch board, of a standard attached to said board, a lever pivoted to said standard and provided with a blade, one or more base plates attached to said board and each provided with a projection, contact fingers normally held against the faces of said projections with their ends at a less distance apart than the width of said lever blade, bolts passing freely through said projections and said contact fingers, shoulders upon said bolts against which nuts are adapted to screw to bear against said contact fingers, transverse slots in said contact fingers in planes approximately parallel to the plane of said blade of the lever, substantially as described.

2. In an electric switch, the combination with a lever provided with a blade of one or more base plates, each provided with a projection, contact fingers normally held against

the faces of said projections, bolts passing freely through said projections and said contact fingers, shoulders upon said bolts against which nuts are adapted to screw to bear against said contact fingers, transverse slots in said contact fingers in planes approximately parallel to the plane of said blade of the lever, substantially as described.

3. In an electric switch, the combination with a base plate a , of a tapering projection h , contact fingers normally held against the tapering faces of said projection, a bolt i passing freely through said projection h and said contact fingers, shoulders l' upon said bolts, nuts l' adapted to screw against said shoulders and bear against said contact fingers, transverse slots in said contact fingers in planes approximately perpendicular to said bolt i , substantially as described.

4. The combination with a blade adapted to be inserted between contact fingers whose free ends normally rest at a distance apart less than the width of the blade, of said contact fingers, provided at their fixed ends with transverse slots lying in planes approximately parallel to the plane of motion of the blade, bearing points provided upon each side of said slotted ends and adapted to permit the lateral yielding of the free ends of the contact fingers by the partial closing of said slots, substantially as described.

5. The combination with a blade adapted to be inserted between contact fingers whose free ends normally rest at a distance apart less than the width of the blade, of said contact fingers provided at their fixed ends with limbs, bearing points provided for said limbs upon each side of said contact fingers and adapted to permit the lateral yielding of the free ends of the contact fingers by the approaching of said limbs, substantially as described.

6. In an electric switch or connection, a contact finger provided with a transverse slot at one end, points of support upon each side of said slotted end adapted to react approximately at right angles to the plane of said slot, and to permit the lateral movement of the free end of said contact finger by the partial closing of said slot, substantially as described.

7. In an electric switch or connection, a contact finger provided with limbs d^2 , d^3 upon one end, points of support upon each side of said limbs adapted to react approximately at right angles to the lengths of said limbs and to permit the lateral movement of the free end of said contact finger by the approaching of said limbs, substantially as described.

In witness whereof I hereunto subscribe my name this 1st day of October, A. D. 1892.

ERNEST P. WARNER.

Witnesses:

CHARLES A. BROWN,
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