Feb. 14, 1950 E. W. LANDMEIER 2,497,306

ELECTRIC SWITCH

Filed March 5, 1945

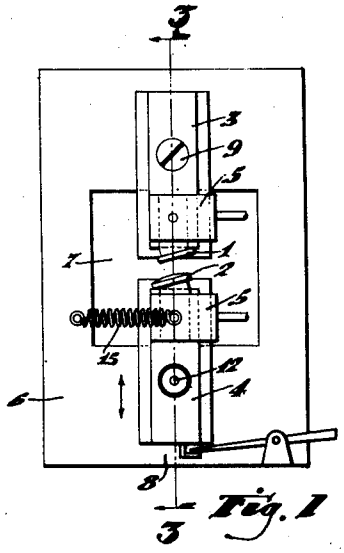


Fig. 1

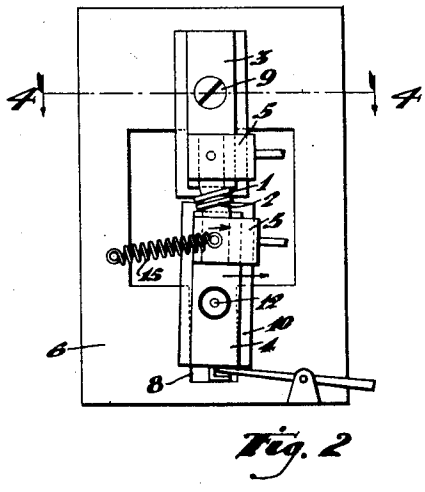


Fig. 2

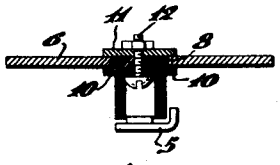


Fig. 4

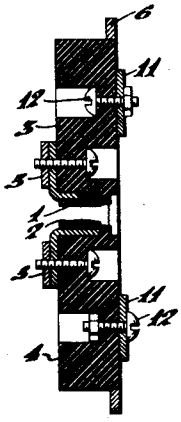


Fig. 3

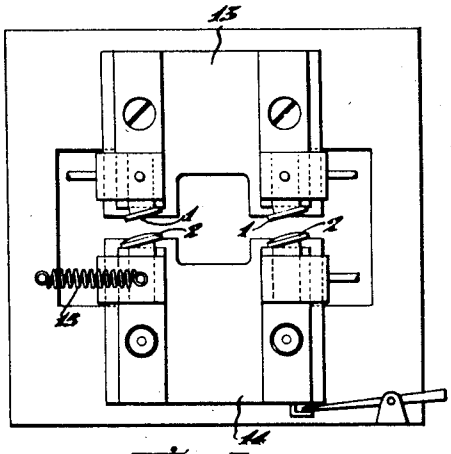


Fig. 5

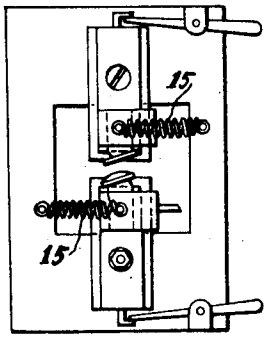


Fig. 6

INVENTOR.

Edwin W. Landmeier

BY

Wood, Arey, Herron & Evans

Attorneys.

Patented Feb. 14, 1950

2,497,306

UNITED STATES PATENT OFFICE

2,497,306

ELECTRIC SWITCH

Edwin W. Landmeier, Lakeside Park, Ky., assignor to The Wadsworth Electric Manufacturing Co., Inc., Covington, Ky., a corporation of Kentucky

Application March 5, 1945, Serial No. 581,106

4 Claims. (Cl. 200—166)

1

This invention relates to electric switches and it is directed particularly to improvements in the mounting of the switch contacts through which electric circuits are controlled.

The principal purpose of this invention has been to provide switches in which the contacts exert a cleansing action upon one another whereby their surfaces are maintained in a conductive and efficient operating condition. When energized contacts are brought together or are separated, arcs occur which may be of only momentary duration but are of such high temperature that the metal of the contact surfaces is likely to become oxidized, pitted, or corroded. As corrosion and impairment of the surface conductivity continues, the arcs become of greater intensity, and the surfaces eventually may become so badly burned that the contacts need to be replaced.

Briefly, in accordance with this invention, switches are provided having contacts movable toward and from one another and also movable laterally or sidewisely with respect to one another so that during their facial interengagement a wiping action is exerted by each contact surface on the other to keep them in a clean condition. Lateral movement, and the abrading action attending it, are accomplished by mounting one or both contacts of a cooperating pair loosely in guide slots or chambers and disposing the contact meeting faces angularly, or out of normal transverse relationship, to one another, such that a wedging action occurs to shift one or both contact members under the pressure of their engagement. In this manner no heavy accumulations of oxide or other surface coating are permitted to occur inasmuch as each engagement displaces at least a part of the coating that may have been formed when the contacts last were separated. For this reason the life of the contacts materially is prolonged.

In the preferred embodiments of the improvement the faces of the contacts are disposed at complementary angles, other than normal with respect to the path through which either or both moves to switch open and closed positions. Either one contact of each pair, or both members thereof, may be mounted so as to be transversely movable; the latter arrangement provides a greater sidewise shifting motion and consequently enables greater self- cleansing to take place. The sidewise movement is to some degree governed by the form of the contacts or carriers upon which they are mounted, and may be a pivotal or rocking displacement or an offsetting of the entire carrier throughout its length. Angularity at the meeting faces in the preferred structures is obtained by crowning one or both of them. This construction has the further advantage that the pressure through which the contacts are engaged is localized over a relatively small surface area to intensify the wiping and abrading action. As wear occurs some of the crown is worn away; still, by the time the two surfaces are mated together by mutual wear, there are no points or projections extending beyond either surface at which arcing is likely to commence before the electric circuit is completed or disrupted. However, crowning is not essential to procure the advantages of the improvement and, in the specification, the term "facial engagement" is intended to include contacts having flat or substantially flat surfaces as well as crowned or curved faces.

2

From the foregoing principles of the invention and from the following detailed description of the drawings in which typical embodiments of the invention are disclosed, those skilled in the art will comprehend various modifications to which the invention is susceptible.

In the drawings:

Figure 1 is an elevation showing a pair of contacts arranged for switching cooperation with one another.

Figure 2 is a view similar to Figure 1 showing the contacts in engagement, and one of them shifted laterally.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a modified form showing the improvement incorporated in a double pole switch.

Figure 6 is a view of a modified form of device embodying a pair of contacts both of which are movable toward and from one another.

This application is directed to subject matter disclosed but not claimed in my copending application, Serial No. 581,107, filed March 5, 1945 now issued as U. S. Patent No. 2,443,508 dated June 15, 1948, for "Electric timing apparatus." As disclosed in the aforesaid application contacts of the type disclosed herein are closed and opened by time dial actuated control levers.

The contacts shown in Figure 1 are generally of the butt type and are designated 1 and 2. For purposes of illustration, in this figure, it is assumed that the contact 1 is longitudinally stationary while the contact 2 is slidable toward and from the contact 1 and is also mounted for sidewise shifting movement. For simplifying the

present disclosure, it may be assumed that a movable contact of the switch of this invention may be actuated by a suitable lever 2*a*. Both contacts may be mounted upon carriers or supports 3 and 4 respectively which, as shown, are block-like pieces of insulating material having the contacts 1 and 2 suitably fastened thereon through terminal pieces 5—5.

In a typical construction contact 1 is a flat faced contact button while contact 2 is crowned and both are inclined, complementary to one another, at an angle oblique to the linear path through which one moves into engagement with the other. For instance, the faces may be inclined at approximately 30° to the longitudinal axis of the carrier. An angle of this magnitude provides the desired sidewise shift as well as the desired pressure abutment under relatively light compressive forces.

Carriers 3 and 4 are supported from a plate or base 6 presenting a guide surface for guiding the movable contact. In the construction disclosed, the base, for this purpose, is provided with a central clearance opening 7 and a slot 8 within which the movable carrier 4 is operable. Stationary carrier 3 supporting the contact 1 is fixed in place by means of a screw 9.

The movable carrier 4 has longitudinal flanges 10—10 extending outwardly from its sidewise edges at a point removed from one of its faces and these flanges engage the face of the plate 6 along the margins of the slot 8 while the narrower portion of the carrier extending beyond the flanges resides within the slot 8 and at its exposed face is equipped with a bridge plate 11 positioned to straddle the slot 8. The bridge plate is held in place by means of a screw 12.

The portion of the carrier 4 within the confines of the slot 8 is narrower than the slot and movement of the carrier in a sidewise direction thus is permitted when the carrier is urged sidewisely through the angulation of the contacts. In this manner the desired wiping action is obtained.

As shown in Figure 2 the carrier 4 has assumed a canted position under the pressure exerted upon it, as indicated by the arrow at its lower end, and upon being released, when the switch is to be opened, freely rights itself and drops or is moved back into the slot to switch open position.

While the construction shown in Figures 1 and 2 has been assumed to embody a stationary contact 3, for purposes of illustration it will be understood that the upper contact may be mounted in a manner identical with the lower for longitudinal or for sidewise movement, or for both, in which event the upper contact 3 will be shifted to the left as the lower contact is shifted to the right when they meet one another. Such a construction is shown in Figure 6. Thus, in this arrangement both of the contact carriers are shiftable sidewisely in their slots, as previously described in respect to the contact carrier 4 of Figure 1, and both of the shiftable contact carriers are biased by springs 15, 15 respectively. The springs urge the contacts in opposite directions, as will be noted in Figure 6, so that when they engage one another, one is moved to the right, and the other to the left during which movements the faces of the contacts wipe over one another.

The structure shown in Figure 5 is substantially like that shown in Figures 1 and 2 except that the carriers 13 and 14 respectively are wide enough to support spaced contacts for two pole switch operation. In this arrangement the wiping action is similar to that previously described.

It is recognized that any laterally displaceable contact riding in a loose slot may, when it is released upon switch opening, occupy its sidewise displaced position, that is, ride against that side of the slot or guideway which limits its displacement instead of at the other side of the slot, from which it is shiftable. To avoid this possibility a suitable spring preferably may be employed which holds the displaceable contact against that side of the guideway from which it is displaced when engaging the other contact. Spring 15, as indicated in Figure 1, is installed for this purpose. Thus, the contact is shifted sidewisely against the tension of the spring 15 and when the switch is to be opened the spring pulls the contact back to its starting position.

Having described my invention, I claim:

1. A switch comprising an elongated contact carrier having a contact at an endwise portion thereof, a base presenting an elongated guide surface for guiding said carrier, means for biasing the carrier towards said guide surface, means for moving said carrier along said guide surface, and a second contact for cooperating with the first, one of said contacts having a face which is angulated in respect to said guide surface such that the angulation of said face causes bodily lateral shifting movement of said carrier away from said guide surface as the two contacts are brought into pressure engagement with one another.

2. A switch comprising a pair of elongated contact carriers arranged substantially in alignment with one another, a base providing elongated guiding surfaces for guiding said contact carriers, means for biasing said contact carriers respectively towards said guide surfaces, means for moving said contact carriers relatively into and out of engagement, and cooperable contacts carried by said carriers respectively, at least one of said contacts presenting a face which is angulated in respect to at least one of said guiding surfaces such that both of said contact carriers bodily are shifted laterally away from said guiding surfaces upon pressure engagement of said contacts and one contact thereby wipes relatively over the surface of the other.

3. A switch comprising an elongated contact carrier, a base presenting an elongated guide surface for guiding said contact carrier, means for biasing the contact carrier towards said guide surface, means for moving the contact carrier along said guide surface, said contact carrier having a contact presenting a face at an endwise portion thereof, a second contact presenting a face cooperable with the first face, at least one of said contacts being crowned and at least one of said contacts having its face generally disposed in a plane of configuration which is angulated with respect to said elongated guide surface such that the angulation causes lateral sidewise shifting of said contact carrier upon pressure engagement of said contacts and thereby relatively wipes the surface of one contact over the other.

4. A switch comprising a base having an elongated guide slot therein, an elongated contact carrier disposed within said slot so as to be guided by a surface thereof, said contact carrier being substantially narrower than said slot, means for retaining the contact carrier in said slot, means for biasing the contact carrier towards one side

of said slot, a contact mounted at the end of said carrier, a cooperable contact, and means for moving said carrier toward and from the second contact, one of the said contacts having a face generally disposed in a plane of configuration which is angulated with respect to the axis of said elongated slot such that the angulation is effective to cause substantial bodily, lateral movement of said contact carrier in said slot upon pressure engagement of said contacts whereby one of the contacts wipes relatively over the surface of the other when they are brought into pressure engagement.

EDWIN W. LANDMEIER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
665,437	Hewlett	Jan. 8, 1901
768,334	Lloyd et al.	Aug. 23, 1904
941,266	Morse	Nov. 23, 1909
1,293,587	Weaver	Feb. 4, 1919
2,059,702	Matthias	Nov. 3, 1936
2,376,818	Rubel	May 22, 1945
2,377,250	Lawson	May 29, 1945