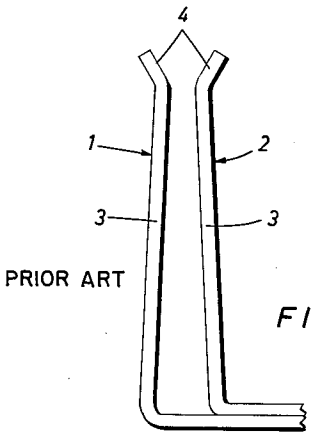
Sept. 11, 1962 J. F. DUFFIELD 3,053,957

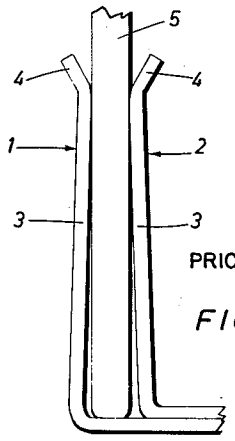
SWITCHING ASSEMBLY

Filed July 1, 1960




PRIOR ART

FIG. 1




PRIOR ART

FIG. 2

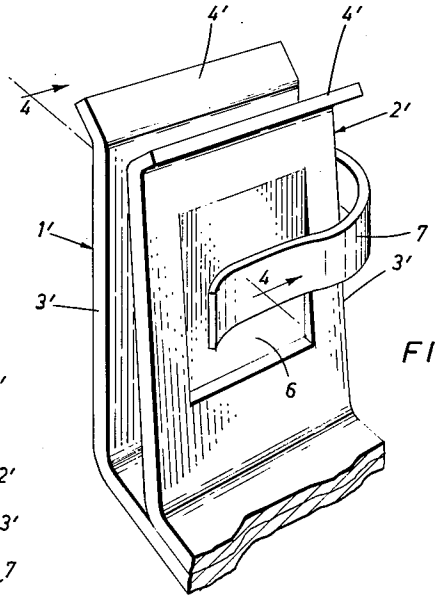



FIG. 3

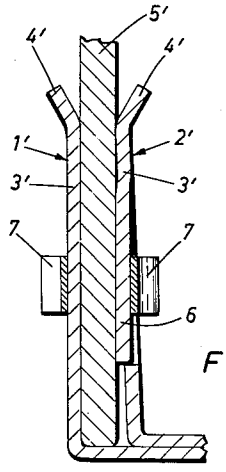



FIG. 4

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# SWITCHING ASSEMBLY

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This invention relates to an electrical switching assembly of the type comprising two spaced-apart, resilient contact plates adapted to receive a moveable contact member slidably therebetween in contact making engagement therewith.

More particularly, in accordance with my invention, I provide, in a switching assembly of the aforementioned type, a downwardly extending flap in at least one of the contact plates, the flap being formed so as to provide a contact making surface with the moveable contact member.

Prior art switching assemblies include a pair of spaced-apart, resilient contact plates, which, when they receive a moveable contact member therebetween, move slightly outwardly relative to one another, and by virtue of their resilience grip the moveable contact member. In order to provide the necessary resilience, the contact plates usually have lower portions inclined towards one another so that the spacing between the upper part of the lower portions is less than the spacing between the lower part of the lower portions. Generally the upper portions of the contact plates, i.e. the portions adjacent the upper part of the lower portions, are oppositely inclined so as to facilitate insertion of the moveable contact member between the contact plates. As will be apparent at a later point, switching assemblies of this type substantially reduce the amount of surface contact between the contact plates and the moveable contact member, thereby tending to cause heating of the switch assembly, hence watts lost in the switch assembly and reduced efficiency.

It is therefore an object of my invention to provide an electrical switching assembly including means to permit increased surface contact between the contact plates and the moveable contact member.

It is another obejct of my invention to provide a new and improved electrical switching assembly which, by virtue of its construction, materially improves surface contact between the contact plates and the moveable contact member, thereby decreasing the heating of the switch assembly when current is passed therethrough and increasing the overall efficiency of the circuit in which the switch assembly is employed.

Other objects and advantages of the apparatus embodying my invention will become apparent from the following detailed description and drawings in which:

FIGURE 1 shows in side elevation a pair of prior art spaced-apart, resilient contact plates;

FIGURE 2 shows in side elevation a prior art switching assembly including a moveable contact member positioned between two spaced-apart resilient contact plates;

FIGURE 3 shows in perspective an electrical switching assembly constructed in accordance with one embodiment of my invention; and

FIGURE 4 is a side elevation in section of the embodiment of my invention shown in FIGURE 3.

In brief, an electrical switching assembly constructed in accordance with my invention comprises two spaced-apart contact plates, at least one of which is resilient, adapted to receive a moveable contact member slidably therebetween in contact making engagement therewith. A downwardly extending flap is formed in at least one of the contact plates, the flap being formed by slits in one of the contact plates and inwardly bent about an unslit side out of the plane of the contact plate and towards the other of the contact plates. The flap thereby provides a contact making surface with the moveable contact member. It should be noted that the term "contact making surface" as used herein, is to be interpreted in the macroscopic rather than the microscopic sense, since, as is well known, unless two flat surfaces are optically polished, there will not be true surface contact between them, rather the contact will be in the nature of numerous isolated point contacts.



In FIGURES 1 and 2 I have shown two spaced-apart, resilient contact plates generally designated 1 and 2 fastened together by suitable means (not shown) which prevent any movement of one plate relative to the other. Each contact plate has a lower portion 3 and an upper portion 4. The lower portions 3 are inclined towards one another so as to form a downwardly opening space therebetween so as to provide the necessary resilience. The upper portions 4 are oppositely inclined so as to form an upwardly opening space therebetween, thereby facilitating insertion of a moveable contact member 5 (FIGURE 2) therebetween.

When moveable contact member 5 is inserted between contact plates 1 and 2, the plates spring apart slightly, and by virtue of their resilience, tend to grip moveable contact member 5 therebetween. In order to impart resilience to contact plates 1 and 2, the lower portions 3 thereof are inwardly inclined as shown and described. It will be apparent that if contact plates 1 and 2 were parallel to one another and the spacing therebetween was the same as the width of moveable contact member 5, surface contact between contact plates 1 and 2 and moveable contact member 5 would be poor because of the lack of resilience in contact plates 1 and 2 and the consequent low pressure between the plates and moveable contact member 5, thereby resulting in undesirable heating of the switch assembly and reduced circuit efficiency. Hence, prior art assemblies have generally followed the form of construction outline in FIGURES 1 and 2.

It will be apparent from a consideration of FIGURE 2, however, that good surface contact between contact plates 1 and 2 and moveable contact member 5 is achieved only at the upper part of lower portions 3, and that the pressure between contact plates 1 and 2 and moveable contact member 5 steadily decreases towards the lower part of lower portions 3. Eventually a point is reached where there is no surface contact at all, and a relatively large area on the lower part of lower portions 3 of plates 1 and 2 is not in contact with movable contact member 5. Since the amount of mating surface area between two electrically contacting members and the pressure with which they are held together determines the amount of current that can be passed between the members without undue heating, it will be apparent from a consideration of FIGURE 2 that the switch assembly shown therein is not efficient inasmuch as it provides only a small amount of surface contact with steadily reducing contact pressure. Hence for large currents passing between moveable contact member 5 and contact plates 1 and 2, there will be a large amount of heating and resultant switch and circuit inefficiency.

While in the prior art switching assembly just described, good surface contact between contact plates 1 and 2 and moveable contact member 5 is achieved only at the upper part of lower portions 3, if contact member 5 is wider than the spacing between the lower part of lower portions 3, good surface contact between contact plates 1 and 2 and moveable contact member 5 will be achieved only at the lower part of lower portions 3, the upper part of lower portions 3 and upper portions 4 being forced away from contact member 5. This also is undesirable for the same reasons as previously mentioned.

Referring now to FIGURES 3 and 4 wherein I have

illustrated an electrical switching assembly embodying my invention, I have shown a pair of contact plates 1' and 2' made of an electrically conducting material such as, for example, copper, each having lower portions 3' and upper portions 4'. Lower portions 3' form a downwardly opening space therebetween, and upper portions 4' form an upwardly opening space therebetween so as to facilitate insertion of a movable contact member 5' therebetween. Preferably contact plate 1' is mounted so as to be parallel to contact member 5', contact plate 2' being slightly inclined with respect thereto. Contact plates 1' and 2' could be inclined towards one another in the manner shown in FIGURES 1 and 2 with a possible slight reduction in total contact area from the preferred embodiment. While in the embodiment of my invention illustrated in FIGURES 3 and 4 both contact plates 1' and 2' are resilient, it will be apparent that contact plate 1' could be non-resilient. For example, it could be made of a relatively massive block of copper. In accordance with my invention, a flap 6 is formed by slits in contact plate 2'. Flap 6 is inwardly bent about an unslit side out of the plane defined by lower portion 3' of contact plate 2' and towards contact plate 1' to form a flap which is more resilient than contact plate 2'. As best shown in FIGURE 4, flap 6 provides a contact making surface with moveable contact member 5'. Since contact plate 1' is parallel to contact member 5', thereby establishing large area surface contact with one side of contact member 5' and flap 6 makes a large area surface contact with the opposite side of contact member 5' by virtue of its resilience and inwardly bent position, and there is contact pressure between contact plate 1', contact member 5' and flap 6 it will be apparent from a comparison of FIGURES 2 and 4 that a switching assembly embodying my invention provides a greater contact making surface between moveable contact member 5' and contact plates 1' and 2' than is possible with the prior art switching assembly shown in FIGURE 2. As an additional feature of my invention, a strong, spring clip 7, which may be made of spring steel, may be provided bridging the sides of contact plates 1' and 2' and urging flap 6 towards contact plate 1'. In this manner the contact pressure between contact plate 1', flap 6 and moveable contact member 5' may be substantially increased. Thus it will be seen that I have provided a switching assembly having both increased pressure and increased surface area between the contact making surfaces thereof.

It should be noted that it is also possible to provide a flap 6 in contact plate 1' in which case it is preferable that lower portions 3' of contact plates 1' and 2' be



inclined towards one another slightly, as in the case of contact plates 1 and 2 shown in FIGURES 1 and 2. The greater is the contact making surface area of flap 6, the greater will be the rating of the switch i.e. the amount of current the switch can carry without undue heating.

It will be apparent that moveable contact member 5 could be the knife blade of a conventional knife blade switch, the terminal of a conventional fuse or any other electrically conducting moveable member required to be inserted between a pair of contact plates and establish good electrical contact therewith. It is, therefore, in this sense that the terminology switching assembly is to be interpreted.

It will be understood that while I have described and illustrated various embodiments of my invention, changes and modifications thereof may be made without departing from the spirit and scope of the invention as defined in the appended claims.

What I claim as my invention is:

In a switching assembly of the type comprising two spaced-apart generally L-shaped contact plates having portions thereof defining a downwardly opening space therebetween and adapted to receive a moveable contact member slidably therebetween in contact making engagement therewith, said portion of one of said contact plates being parallel to and in surface contact with a side of said contact member, said portion of the other of said contact plates being inclined inwardly and upwardly toward said contact member, at least said other contact plate being resilient, the improvement which comprises a downwardly extending flap in said portion of said other contact plate, said flap being formed by slits in said other contact plate and being inwardly bent into the downwardly opening space about an unslit side out of the plane of said portion of said other contact plate and towards said portion of said one contact plate, at least substantially all of one surface of said flap providing thereby a contact making surface with another side of said contact member, and a spring clip bridging said contact plates from the sides thereof and urging said flap toward said one contact plate.

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