July 18, 1950 S. D. VIGREN ET AL 2,515,914

CONTACT MOUNTING FOR ELECTRICAL SWITCHES

Filed Sept. 7, 1945 2 Sheets-Sheet 1

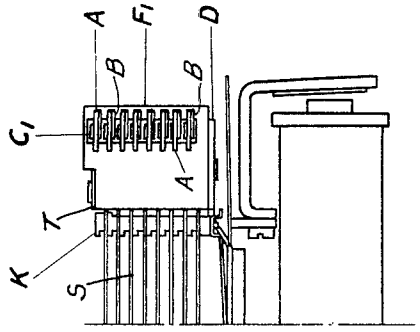


Fig. 3

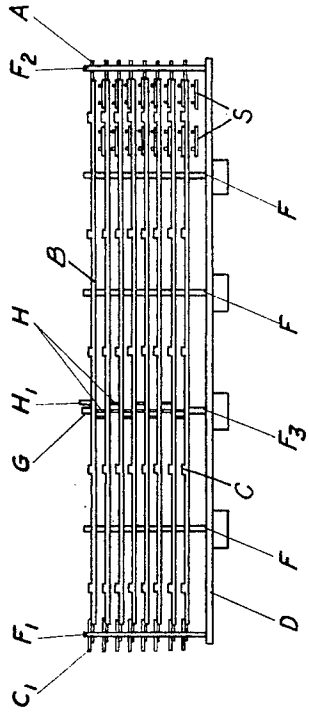


Fig. 1

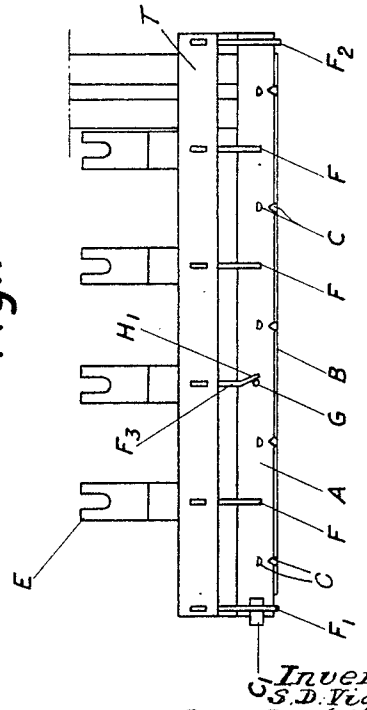


Fig. 2

Inventors
S. D. Vigren
W. O. W. Broberg
O. K. J. Olsson
By Glascock Downing & Seibold Attys.

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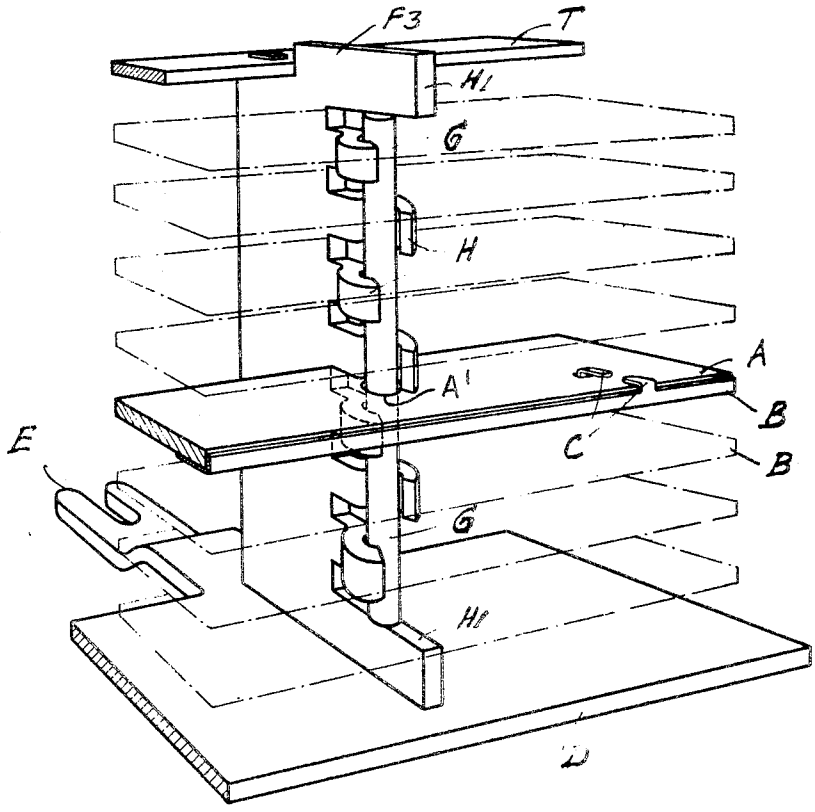


Fig. 4

INVENTORS
S. D. VIGREN
W. O. W. BROBERG
O. K. J. OLSSON
BY
Cascade Dawning & Sheridan

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UNITED STATES PATENT OFFICE

2,515,914

CONTACT MOUNTING FOR ELECTRICAL SWITCHES

Sten Daniel Vigren, Stockholm, and Walter Otto Wilhelm Broberg and Oscar Karl Johan Olsson, Nynäshamn, Sweden, assignors to Telefonaktiebolaget L. M. Ericsson, Stockholm, Sweden, a company of Sweden

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In Sweden May 25, 1943

1 Claim. (Cl. 200—166)

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The invention relates to contact devices for electric switching devices of the cross-bar type, in which movable contacts are provided to cooperate with a number of spaced contact points fitted along stationary carrier strips of insulating material.

In such electrical switching devices the contact spring sets are frequently arranged to be operated by lifting studs produced by a milling or pressing operation, the spacing between the contact springs being maintained with great accuracy. In order that, without involving undue work in setting or difficulties in manufacture, all movable contacts on operation of the spring sets engage the fixed contact points simultaneously and with equal contact pressure, the spacing between the fixed contact strips must be as accurate as the spacing between the movable contact springs.

Previously, the fixed contacts have been inserted in metal strips which are separated by means of insulating spacers, the unit formed by these metal strips and spacers being assembled with the aid of screws to form a rack. In this type of device, however, the drawback prevails that the limits of the manufacture of the metal strips and of the spacers and their relative expansion involve difficulties in uniform and accurate spacing. It has been necessary, therefore, in cross-bar switches, to make adjustable the individual parts of the metal strips which carry the contacts.

The present invention makes it possible to obtain as accurate a spacing between the fixed contact points supporting the strips as the spacing between the movable contact springs, and considerable advantages are also gained in regard to both simplicity and quantity of manufacture.

In accordance with the invention the stationary carrier strips are inserted in holes in a number of supporting members for supporting the carrier strips, each strip, in relation to only one of said supporting members, thus being rigidly arranged in the longitudinal direction of the carrier strip so that possible longitudinal changes in the length of the carrier strips may take place freely.

In order that the invention may be clearly understood and readily carried into effect, the same will hereinafter be more fully described with reference to the accompanying drawings in which:

Figure 1 is a vertical front view of the contact arrangement; and

Figures 2 and 3 are respectively plan and side views thereof.

Figure 4 is a fragmentary perspective view in

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which some of the parts are shown in dotted lines.

The contact strips B are formed as thin metal strips fastened by small tongues or tabs C to a strip A of insulating material which at the same time serves as a support. The rack is formed by an upper plate T and a lower plate D with suitable ears E for connection to the relay or the switch. A number of support plates F, F_1, F_2, F_3 of metal are riveted to the plates T and D, holes being pressed in said plates with the same spacing as the spacing of the lifting stud K. The holes are made so that the insulating strips fit into them easily but without excessive clearance. In a crossbar switch, for example, the two extreme support plates F_1 and F_2 are provided with pressed holes so that the strips are guided in all directions except in their longitudinal direction. The intermediate distance plates F, F_3 are formed only to control the strips vertically. The mounting arrangement is such that the strip is introduced in the distance plate F_1 so far as to bring the other end of the strip inside the support plate F_2. The strip is then fitted between the cam-shaped support plates F, F_3 and thereafter pushed forward longitudinally so that the end of the strip projects somewhat beyond the outer distance plate F_2. Mounted in that manner, the strip is guided in all directions except the longitudinal direction. When all the strips are mounted they are fixed by passing a small pin G through openings A, formed in all the insulating strips A and the support plate F_3 which has specially shaped portions H to hold the pin against lateral displacement when the pin has been pressed down into position the topmost portion H_1 of the plate F_3 is folded over the pin G to prevent the pin from falling out. The strips are now fixed in their longitudinal direction as well as in other directions the portions H and H_1 forming as it were a comb on the plate F_3.

This construction offers the following advantages:

The arrangement requires few components, all of which are simple and inexpensive to manufacture.

The assembly is easily effected, no screws being required.

Circuit connections to the contact strips may be made by soldering and for this purpose one extremity of the contact strip is formed as a soldering tag C1, which passes through a slot in the insulating strip and projects through the upper side thereof, where it is bent over. A construction of this kind excludes the risk of fluxing material from the solder flowing over the sur-

faces of the contact strips and in addition the tag is sufficiently supported by and secured in the insulating strips.

The spacing between the contact strips is as accurate as between the contact springs S. Experience proves that an appropriate fitting of the contact springs and a special adjustment of the same before their assembly gives a contact pressure the tolerances of which are satisfactory without necessitating adjustment during assembly. Should, on some special occasion, adjustment be required, this may be performed on the movable contact springs S.

By suitably arranging the fixing tongues or tabs C, the movable contact springs, in the inactive position, can press against the underlying insulating strips. Contrary to previous constructions with metal strips, it is thus not necessary to allow for a pre-determined distance between the movable springs and the underlying strip. Consequently, the arrangement provides smaller spacing between the contact springs than in previous constructions, without involving any inconveniences.

The device is unaffected by changes in temperature or humidity of the air. This is achieved by making the tongues or tabs C smaller than the holes in the insulating strip, so that the latter may contract or expand without creating any relative pressure between a metal strip and an insulating strip. Longitudinal positioning of the insulating strip, furthermore, is provided at one point only, which is approximately central, so that longitudinal expansion of the strip may take place freely. Eventually occurring lateral deflection of the strip is prevented by the two outer support plates F_1, F_2 and by pin G.

The invention may be varied and modified in many different ways within the scope of the appended claims. One or several contact strips, for example, may instead be arranged to provide break contact. Individual contacts may be provided for each contact spring. Instead of the metal contact strip, a plate of contact material is inserted in each contact point, said contact material being provided with a soldering tag, used also as a fixing pin, to which the connection is soldered. The insulating strip is in principle of the same design as when complete metal strips are used.

The support plates F, F_1, F_2 and F_3 which above are assumed to be of metal, may naturally also consist of insulating material. The contact strips may thereby, if required, be made entirely of conducting material.

We claim:

In a contact arrangement for electrical switches of the cross-bar type, stationary carrier strips of insulating material, a plurality of spaced contact points along each of said strips, a corresponding plurality of movable contacts cooperating with said spaced contact points, a plurality of supporting members common to said carrier strips and having apertures in which said strips are inserted, each strip being transfixed at one point only of its length coincident with one of said supporting members, so that longitudinal expansion and contraction of the carrier strip may take place freely with respect to said point, one of said support members having lugs and a member passing through said lugs and said strips to secure said strips fixed at one point only.

STEN DANIEL VIGREN.
WALTER OTTO WILHELM BROBERG.
OSCAR KARL JOHAN OLSSON.

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