Electric contact device for the permanent connection between relatively movable conducting members, said device consisting of a rod-shaped conductor, a contact holder surrounding said conductor with ample clearance and a zigzag folded metal contact strip bent in the shape of a ring and provided in the annular gap between said conductor and said holder, the parts of said strip extending between the folds thereof being all bent in the same direction.

8 Claims, 8 Drawing Figures
The invention relates to an electric contact device for the permanent electrically conductive connection between a metal contact holder provided with a round opening and a conductive metal rod extending centrally with ample clearance through the opening of said holder and having a round cross-sectional area, in which said contact holder and said rod are mounted for relative movement and a zigzag folded metal contact strip bent in the shape of a closed ring is clamped in the annular space left between said holder and said rod.

Many constructions of electric contact devices of this kind are known and said devices are e.g., used in switches of great power for the permanent electrically conductive connection between the axially movable switching rod and a fixed terminal contact of the switch, in bus bar systems provided with bus bars supported by such contact devices and liable to appreciable expansion, furthermore in distributing and switching systems provided with rotatable connecting conductors which are electrically conductively connected with other conductors of such systems through axle pins mounted for rotation in stationarity is decreased, or rings, etc. It appeared that the zigzag folded annularly bent contact strip of such contact devices is apt to deform at the axial movement or the rotation of the rod relative to the contact holder whereby the conduction of the current can be seriously affected.

The invention aims to provide a contact device of the meant kind, in which the possibility of a deformation of the contact strip affecting the conduction of the current at relative movement of the rod and the contact holder is reduced to a minimum. According to the invention this is achieved in that the parts of the contact strip extending between the folds thereof are all bent in the same direction in places between their ends and consist each of a shorter and a longer portion extending from the bend, in which contact strip parts, of which the shorter portion extends between the bend and the contact holder and the longer portion extends between the bend and the rod, alternate with parts, of which the longer portion extends between the bend and the contact holder and the shorter portion extends between the bend and the rod.

Due to these bent strip parts the rigidity of the contact strip against movement of its parts at relative movement of the rod and the contact holder is highly increased without considerable variation of the contact pressure between said strip and the contact holder on one hand and between said strip and the rod on the other hand. Furthermore the contact strip provided with bent parts has the advantage that, when strong currents, say, short circuit currents, are conducted said parts try to stretch themselves, so that the contact pressure between the contact strip and the contact holder and that between said strip and the rod is increased and as a result thereof the transition resistance is decreased.

It is observed that contact devices are known, in which a circumferential row of individual bent contact plates are provided between the contact holder and the rod-shaped conductor. These plates must be, in the place of their bend, either supported by an individual ring or interconnected by interconnecting bars in order to form together a closed ring which is rigid in the places of the bend. These known contact devices are complicated and difficult to assemble.

The rigidity of the contact strip of the contact device according to the invention can be appreciably increased when each part of said strip the shorter portion extending from the bend comes to lie against the longer portion extending from the bend of the following part of said strip. In that case the parts support each other. The effect of the bent parts of the contact strip can be further increased when the portions extending from the bend of each part of the contact strip enclose an angle of about 90°.

It is advantageous to use for a contact device provided with a rotatable rod a contact strip, of which the parts join each other at least at their one ends by means of tubularly bent portions. This construction has also advantages for other contact devices, e.g., for contact devices having axially movable rod-shaped conductors, since the contact places are better cooled.

In order to prevent that, when an axially movable rod, e.g., the axially movable switching rod of a switch, or a tubular axially movable contact holder is used, the contact strip scratches the rod or the contact holder and thereby is taken along in the direction of movement, so that the contact strip is unfavorably deformed, different measures may be taken. To that end the parts of the contact strip may join each other at least at their one ends in a sharp fold and the end portions of said fold may be bent out of the plane of the strip. It is also possible to use a strip provided with parts joining each other at least at their one ends in a sharp fold and to give said fold a convex shape in the plane of the strip. Furthermore the strip may have a dumbbell-shaped or a bulging cross-sectional profile. All these embodiments prevent that the contact strip contacts the rod-shaped conductor or the contact holder with sharp corners.

The invention will be further elucidated with the aid of the drawing, in which:

FIG. 1 is partially an axial cross-sectional view, partially an elevational view of a part of a switching rod and a stationary contact holder of a switch, in which said contact holder is in permanent electric connection with said rod,

FIG. 2 is, on a still larger scale, a cross-sectional view taken on the line II—II in FIG. 1,

FIG. 3 is, on a still larger scale, a plan view of a part of a contact strip for the contact device shown in FIG. 1,

FIG. 4 is a plan view of a variant of the contact strip shown in FIG. 3,

FIG. 5 is a perspective view of a part of a second variant of that contact strip,

FIG. 6 is a perspective view of a portion of a third variant of said contact strip,

FIG. 7 is a perspective view of a part of a fourth variant of the said contact strip and

FIG. 8 is a perspective view of a part of a fifth variant of said contact strip.

In FIGS. 1 and 2 an axially movable switching rod of an electric switch of great power is designated by 1. Provided for the permanent electric connection of the switching rod 1 with the external circuit is a stationary contact device which consists of an annular metal contact holder 2 and a contact strip 3 supported by said holder. The contact strip 3 is formed from a straight metal strip which is first folded in zigzag and thereafter locally bent at 4 through an angle of 90° or about 90° in each one of its parts. Thereupon the strip is bent in the shape of a closed ring which is clamped between the switching rod 1 and the contact holder 2. It appears from FIG. 2, that each part of the contact strip 3 consist of a shorter portion 3a and a longer portion 3b extending both from the bend 4 and also that each part lies with its shorter portion 3a against the longer portion 3b of the following part and with its longer portion 3b against the shorter portion 3a of the preceding part. Consequently, parts of which the shorter portion 3a extends between the bend 4 and the contact holder 2 and the longer portion 3b extends between the bend 4 and the switching rod 1, alternate with parts, of which the longer portion 3b extends between the bend 4 and the contact holder 2 and the shorter portion 3a extends between the bend 4 and the switching rod 1.
is axially moved, in the embodiment shown in FIG. 5 the corner portions 7 are bent out of the plane of the strip a little. To the same end the variant shown in FIG. 6 is such that the sharp folds 8 at the ends of the parts of the contact strip have a convex shape. In the contact strips illustrated in FIGS. 7 and 8 the scratching of the switching rod by the contact strip is avoided in that in FIG. 7 the contact strip has a dumbbell-shaped cross-sectional profile 9 and in FIG. 8 a bulging cross-sectional profile 10.

What I claim is:

1. An electric contact device for the permanent electrically conductive connection between two relatively movable conductors, said device comprising a metal contact holder having a round opening, a metal rod having a round cross-sectional area and extending centrally with ample clearance through the opening of said holder and a zigzag folded metal contact strip bent in the shape of a closed ring, said contact strip being clamped in the annular space left between said holder and said rod, all parts of the zigzag folded strip being bent in the same direction in places between the folds of said strip and consisting each of a shorter and a longer portion extending from the bend and strip parts, of which the shorter portions extend between the bends of said parts and the contact holder and the longer portions extend between said bends and the rod, alternating in said strip with strip parts, of which the longer portions extend between the bends of said parts and the contact holder and the shorter portions extend between said bends and the rod.

2. An electric contact device as claimed in claim 1, in which the shorter portion extending from the bend of each part of the contact strip lies against the longer portion extending from the bend of the following part of said strip.

3. An electric contact device as claimed in claim 1, in which the two portions extending from the bend of each part of the contact strip enclose an angle of about 90°.

4. An electric contact device as claimed in claim 1, in which tubularly bent portions connect the parts of the strip in pairs at least at the one ends of said parts.

5. An electric contact device as claimed in claim 1, in which the parts of the zigzag folded strip join each other in pairs at least at their one ends in sharp folds and the end portions of said folds are bent out of the plane of the strip.

6. An electric contact device as claimed in claim 1, in which the parts of the zigzag folded strip join each other in pairs at least at their one ends in sharp folds and said folds have each a convex shape in the plane of the strip.

7. An electric contact device as claimed in claim 1, in which the contact strip has a dumbbell-shaped cross-sectional profile.

8. An electric contact device as claimed in claim 1, in which the contact strip has a bulging cross-sectional profile.

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