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SPRING ARRANGEMENT

Johan Hinrich Couveld and Hendrik Johannes de Jong, Hilversum, Netherlands, assignors, by mesne assignments, to North American Philips Company, Inc., New York, N. Y., a corporation of Delaware

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The present invention relates to a spring arrangement. More particularly, the invention relates to a contact spring set, for example, a spring set of an electromagnetic relay, in which a movable contact spring is displaced by means of a driving member which moves at right angles to the plane of the spring and which acts upon the spring at a point situated between the fixed end of the spring and a contact member secured to the spring.

It has been found that due to the mass inertia of the contact member, especially when such member is comparatively heavy (such member may be duplicated, for example as is the case with change over contacts of heavy current relays, on displacement of the spring large forces may be produced therein, which may give rise to fracture of the spring in the proximity of the working point of the driving member. In order to prevent the occurrence of such fracture, the movable contact spring may be strengthened. However, this has a limitation in that an equal rapid displacement of the contact spring requires more energy, and maintaining the spring in the displaced position requires a larger force.

It is an object of the invention to provide a construction in which fracture of the contact spring is substantially avoided without appreciably affecting the spring characteristic of the contact spring, especially with respect to the restoring force. According to the invention, the movable contact spring is provided with a strip which extends in the direction of length of the spring and passes between the spring and the driving member and is secured to the spring only at a point, which seen from the fixed end of the spring, lies beyond the point of engagement of the driving member. This strip absorbs the bending produced when the contact spring is moved, so that no local large bending moment is produced in the spring. In the final position of the contact spring, however, said spring alone supplies the restoring force.

The strip is preferably connected to the movable contact spring at the point of attachment of a contact member. The attachment of the strip is simple and may be effected at the same time as the provision of the contact member.

In order that the invention may be readily carried into effect, it will now be described in detail with reference to a drawing, in which:

Fig. 1 is a longitudinal cross-sectional view of an embodiment of the contact spring arrangement of the invention; and

Fig. 2 is a cross-sectional view taken along the line II—II of the embodiment of Fig. 1.

To a yoke 1 of an electromagnetic relay which is only partly shown and has an armature 2 which is pivotally mounted by the end of the yoke, a contact spring group comprising a change-over contact is secured with the interposition of insulating members 3. The spring group comprises a comparatively rigid contact spring 4 pro-

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vided at its end with a contact member 5, a movable contact spring 6 having a double contact member 7 provided at its end and a second comparatively rigid contact spring 8 having a contact member 9. In the normal position of the armature, the lower part of the contact member 7 provided on the movable contact spring 6 due to its own spring action engages the contact member 5 of the lower spring 4.

The armature 2 has a ladder-shaped driving member 10 coupled to it which, on movement of the armature due to energization of the relay, is raised at right angles to the plane of the contact springs. The driving member 10 is maintained in the upright position by means of a spring 14 which is passed through an aperture 13 and is secured to the yoke 1 together with the contact springs 4, 6 and 8. When the driving member 10 moves from the position shown, a cross-bar 11 of said driving member moves the contact spring 6 to a position in which the upper part of the contact member 7 engages the contact member 9 of the upper contact spring, whereas the contact between the contact member 7 and the lower contact spring 4 is interrupted. Along the underside of the movable contact spring 6 provision is made of a flexible metal strip 12 which is connected to the strip 6 at the same point as the contact member 7 and which passes between this spring and the cross-bar 11 of the driving member 10.

In the normal position of the armature, space is available between the strip 12 and the cross-bar 11 of the driving member in order that the contact pressure between the contact members 5 and 7 be only determined by the tension of the spring 6.

When the relay is energized, the cross-bar 11 strikes the strip 12 and the spring 6 at a certain velocity so that the latter are subjected to a mechanical shock. Since the contact member 7 has a comparatively large mass, the spring 6 would be bent sharply without the provision of the strip 12. However, the bending of the spring 6 is obviated to a certain extent by the strip 12 so that no locally high concentration of the mechanical tension is produced in the contact spring 6. In the final position the strip 12 substantially does not influence the restoring force exerted upon the driving member 10, the resilience of only the contact spring 6 is deciding. In addition, the strip 12 provides the advantage due to friction with the spring 6 the tendency for the contact member 7 to rebound, when it is brought into contact with the upper spring, is reduced.

While the invention has been described by means of a specific example and in a specific embodiment, we do not wish to be limited thereto, for obvious modifications will occur to those skilled in the art without departing from the spirit and scope of the invention.

What is claimed is:

1. An electric contact arrangement comprising a plurality of contact springs, means mounting said contact springs in superposed relationship, at least one bendable contact spring firmly held in said means at one end thereof, a first electric contact secured to the free end of said bendable contact spring, a second electric contact mounted on an adjacent contact spring, said first electric contact engaging said second electric contact upon movement of said bendable contact spring, a flexible strip secured to said bendable contact spring and extending from the point of fixation freely along said bendable contact spring in the direction of the fixed end of said bendable contact spring, said flexible strip being secured in a manner whereby a free end thereof leans towards said adjacent contact spring, and operating means for engaging said bendable contact spring and

movable in a direction substantially perpendicular to the plane of said contact spring, said operating means being provided with an abutment which engages said strip on the side remote from said bendable contact spring, the point of engagement of said abutment with said strip being between said point of fixation of said strip to said bendable contact spring and the fixed end thereof.

2. An electric contact arrangement as claimed in claim 1 wherein said strip is secured to the bendable contact spring at the location of the first electric contact thereon.

References Cited in the file of this patent

UNITED STATES PATENTS

1,909,783	McWhirter	May 16, 1933
2,547,062	Towner et al.	Apr. 3, 1951
2,638,514	Martin	May 12, 1953

FOREIGN PATENTS

730,125	Great Britain	May 18, 1955
892,742	France	Jan. 13, 1944