

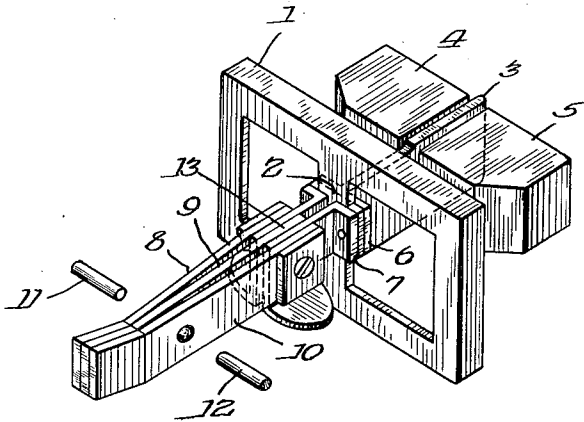
Oct. 9, 1956

H. BERG ET AL

2,766,357

CHATTERLESS CONTACT ARRANGEMENT FOR RELAYS

Filed June 26, 1953



Inventors.
Herbert Berg,
Christian Darr, &
Herbert Wilhelm.

By: M. J. Lee Atty.

1

2,766,357

CHATTERLESS CONTACT ARRANGEMENT FOR RELAYS

Herbert Berg and Christian Darr, Munich, and Herbert Wilhelm, Munich-Solln, Germany, assignors to Siemens & Halske, Aktiengesellschaft, Munich and Berlin, Germany, a German corporation

Application June 26, 1953, Serial No. 364,432

Claims priority, application Germany July 12, 1952

2 Claims. (Cl. 200—166)

This invention is concerned with a chatterless contact arrangement for relays.

In high-grade relays such as telegraphic or directional relays, it has heretofore been attempted to avoid chattering of the contacts by converting the kinetic energy, released upon engagement of the contacts and normally resulting in contact vibrations, into friction and thus into heat, thereby dissipating this energy from the vibratory system. It is known to cause the contact springs to engage each other with wiping friction as they are being deformed when making contact. However, it has been found that chatter reappears after prolonged periods of use, regardless of the materials selected for the interengaging parts. This is due to the fact that particles are scraped off at the frictionally interengaging surfaces and act to convert the wiping or sliding friction into rolling friction, thereby reducing the intensity of the wiping friction; alternatively, the friction surfaces may become frozen against each other so that the springs function as a more or less rigid unit. Moreover, the magnitude or intensity of such mechanical friction is generally difficult to control and never remains the same over extended periods of time.

The present invention makes it possible to obtain much more nearly constant conditions of wiping friction of almost unchanging magnitude, by coating the frictionally engaging surfaces with a viscous, for example oily, liquid or with a pasty substance. In this manner, mechanical friction between solid bodies, which is uncertain and uncontrollable as to its magnitude, is replaced by liquid friction which, as is well known, is more nearly constant and easier to control.

The degree of friction of such a viscous or pasty substance is constant if its viscosity can be maintained constant. It will therefore be advisable to employ liquids or pastes whose viscosity is as insensitive to temperature changes as possible. It is preferable to employ pastes that combine the consistency of petroleum jelly with a high damping factor. In addition, it is important that the paste possess a high degree of tackiness (little tendency to creep) and that its viscosity be independent also of the mechanical load imposed on it, that is, it should not be thixotropic.

It is advisable to form the interengaging springs with small depressions so as to insure more uniform distribution of the liquid or paste over the frictional surfaces and to impede, as far as possible, lateral oozing-out of the paste from between the relatively moving surfaces. Moreover, this expedient enhances the damping action, as it adds the shearing stresses occurring upon rupture of the paste disposed in these depressions, to the internal friction in the thin film of paste interposed between the relatively moving surfaces.

It is advisable to arrange a plurality of contact spring blades in a pile or stack, with one or more intermediate blades perforated while the outermost blades are imperforate and are preferably provided with the actuating or actuated contacts.

2

An embodiment of the invention, as applied to the set of contact springs of a relay, is illustrated in diagrammatic perspective view in the accompanying drawing.

The stationary frame 1 is formed with a resilient central web member 2 forming the fulcrum of the relay armature. As is apparent from the drawing, the armature proper 3, which moves between the pole pieces 4 and 5 of the relay (shown only fractionally), carries a flange 6 which is bolted onto a flange 7 provided on the fulcrum member 2. The flange 7 supports contact springs 8, 9 and 10. The fulcrum member 2 tends to maintain the armature 3 and thus also the springs 8 to 10 in the illustrated normal position in which these parts are located midway between poles 4, 5 and between stationary contacts 11, 12 respectively. Spherical contact points provided on the outer contact springs 8 and 10 co-operate with the stationary contacts 11, 12. The conductors leading to the various contacts have been omitted from the drawing for the sake of simplicity.

Upon energization of the relay, the armature 3 will be attracted to one or the other pole piece 4 or 5, causing either spring 10 to engage contact 12, or spring 8 to engage contact 11, and the corresponding spring is thereby more or less deflected, together with the remaining springs. This causes relative displacement of the outer spring ends upon each other, in a direction parallel to the principal axis of the armature. The springs 8 and 10 are pre-tensioned and are toward each other, at the stack 13, by means of a stud screw, so that the ends of these springs bear firmly against the intermediate spring 9.

Heretofore, these springs were pressed against one another in dry condition. According to the invention, however, a pasty or viscous liquid is interposed between the friction faces and forms a liquid film therebetween. The end portion of the intermediate spring 9 is in sieve-like manner perforated and thus permits the paste to pass from one side of this spring to the other. This provides not only for uniform distribution of the paste on both sides of the intermediate spring, but also increases the damping action inasmuch as the paste particles extending through the perforations are subjected to shear stresses upon displacement of the springs 8 and 10 relative to the intermediate spring.

Changes may be made within the scope and spirit of the appended claims.

We claim:

1. A relay comprising a stack of a plurality of contact springs with predetermined cooperable limited areas thereof in opposed relation with said springs arranged to urge such cooperable limited areas thereof into an engaged relation, a viscous substance disposed between said cooperable areas operatively separating the surfaces of the latter which would otherwise enter into engagement, contact members for contact cooperation with said contact springs disposed outside of the stack formed thereby, electromagnetic means for effecting relative displacement between said contact springs and said contact members to cause actuation of said contact springs whereby said predetermined limited areas are displaced relative to each other in a direction to apply frictional force to such viscous substance producing relatively constant internal friction therein with a corresponding elimination of mechanical friction which would otherwise occur between opposed contact surfaces of such areas in the absence of said viscous substance, recesses being formed at least in some of said contact springs to hold part of said viscous substance.

2. A relay comprising a stack of a plurality of contact springs with predetermined cooperable limited areas thereof in opposed relation with said springs arranged to urge such cooperable limited areas thereof into an engaged

3

relation, a viscous substance disposed between said co-
operable areas operatively separating the surfaces of the
latter which would otherwise enter into engagement, con-
tact members for contact cooperation with said contact
springs disposed outside of the stack formed thereby,
electromagnetic means for effecting relative displacement
between said contact springs and said contact members
to cause actuation of said contact springs whereby said
predetermined limited areas are displaced relative to
each other in a direction to apply frictional force to such
viscous substance producing relatively constant internal
friction therein with a corresponding elimination of

5

mechanical friction which would otherwise occur be-
tween opposed contact surfaces of such areas in the
absence of said viscous substance, holes being formed in
at least some of said contact springs to permit passage
of said viscous substance to either side thereof.

4

References Cited in the file of this patent

UNITED STATES PATENTS

1,342,674	Henderson	June 8, 1920
1,748,219	Hanel	Feb. 25, 1930
2,406,036	Pollard	Aug. 20, 1946

10