Aug. 29, 1950 P. H. J. BROUWER 2,520,526

CONTACT DEVICE

Filed July 10, 1946

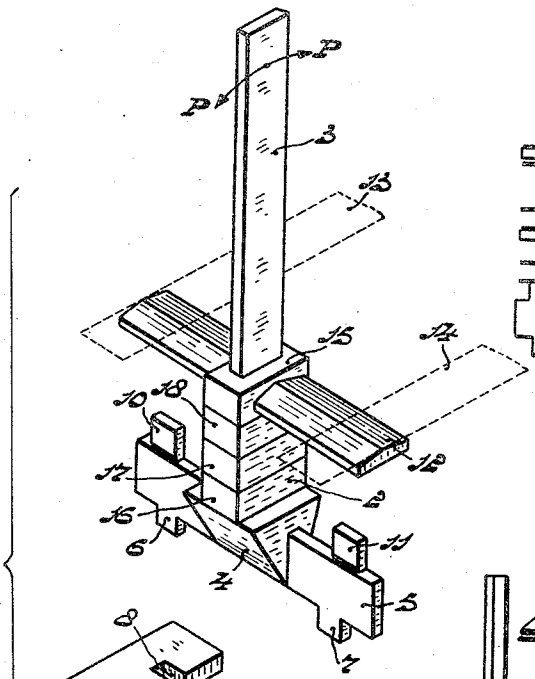

Fig. 1

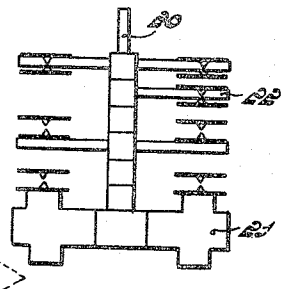

Fig. 2

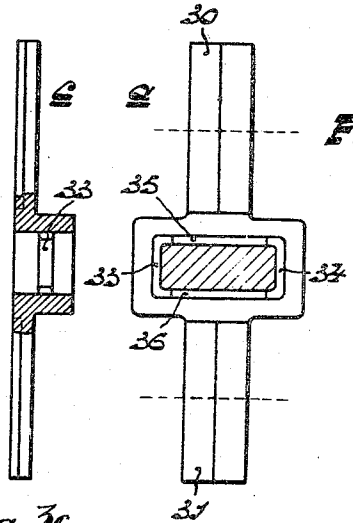

Fig. 3a

Fig. 3c

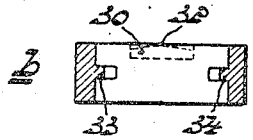

Fig. 3b

INVENTOR
PIETER HENDRIK JOHANNES BROUWER
Richard Schuyle
ATTORNEY

Patented Aug. 29, 1950

2,520,526

UNITED STATES PATENT OFFICE

2,520,526

CONTACT DEVICE

Pieter Hendrik Johannes Brouwer, Eindhoven, Netherlands, assignor to Hartford National Bank and Trust Company, Hartford, Conn., as trustee

Application July 10, 1946, Serial No. 682,660
In the Netherlands April 21, 1943

Section 1, Public Law 690, August 8, 1946
Patent expires April 21, 1963

8 Claims. (Cl. 200—166)

1

This invention relates to a contact device, more particularly a relay, whose contacts are arranged on springs grouped in parallel relation with one another.

In contact devices of this kind it is known to drive the springs which are moved by a driving member, hereinafter referred to as "driving arm," through a ladder-shaped auxiliary member. This constitutes a connection between the driving arm and the movably arranged springs, so that the movement of the driving arm is transmitted to these springs. In a known construction the ladder consists of two columns placed normally to the longitudinal direction of the springs. Between these columns there are fixed cross-arms on which lie the springs to be moved. In order to be able to utilize this ladder for contact devices with different spring groups, the height of the cross-arms has been made adjustable. This known construction has the drawback of being less suitable for the actuation of two or more spring groups arranged side by side. If in this case the same ladder is used for all the spring groups, the cross-arms must be chosen long, resulting in a weakening of the construction and in occupying considerable space. Using a ladder for each spring group also involves a great loss of space, particularly if all the ladders must be arranged in one plane. Further, in this construction it is difficult to find a suitable compromise between the desired rigidity and the desired leakage path. A robust construction requires the use of metal parts and these reduce the leakage path.

The present invention provides a novel construction of a contact device whereby the said drawbacks are obviated and other advantages may be obtained.

According to the invention, the auxiliary member consists of a central rod moved by the driving arm whose longitudinal direction is normal to that of the springs and which has pushed on it insulating cross arms which are provided with an aperture fitting the section of the rod and which are normal to the longitudinal direction of the springs and each of which actuates at least one of the movable springs. This simple form of construction exhibits a great rigidity and permits a compact structure of contact devices. By the use of distance pieces pushed on the central rod the mutual distance of the cross arms may be conformed to the positioning of the movable springs in the spring groups of the contact device. To this end, these distance pieces and the cross arms need only be pushed in the correct sequence on the central rod. The mounting is thus very simple so that it is not necessary to keep ladders of different constructions in store, since these can be mounted directly, according to requirements, from stored central rods, cross arms and distance pieces.

2

In one advantageous form of construction of a contact device according to the invention the central rod is arranged between two spring groups positioned side by side, both of which are actuated by cross arms pushed on the rods. This construction permits of obtaining a saving in space as compared with that utilizing the ladders known hitherto. The space between the spring groups is now used for the arrangement of the central rod.

In another advantageous construction according to the invention the central rod is of metal, which enables us to obtain a particularly rigid assembly. In order to avoid in this case an excessive reduction of the leakage path, the central aperture in at least one cross arm may be formed in a ribbed portion surrounding the central rod, so that at the points in the vicinity of the axis of the arm it does not engage the supporting rod.

In another advantageous construction of the device according to the invention, the cross arms have a flat shape and are with their surfaces parallel to those of the springs. It is thus possible for adjacent springs of a spring group, which are actuated by a cross arm located between these springs, to be positioned closely to one another.

In another advantageous form of construction of the device according to the invention, the central rod comprises at one end a widened portion by means of which it engages the driving arm. It is thus possible to take steps to prevent a mutual shift of the rod and the driving arm.

In order that the invention may be more clearly understood and readily carried into effect, it will be described more fully by reference to the accompanying drawing.

Fig. 1 shows a portion of a contact device according to the invention.

Fig. 2 also shows a detail of a contact device realized according to the invention.

Fig. 3*a* illustrates a top view of the ladder cross-arm forming part of a contact device according to the invention.

Fig. 3*b* is an elevation view of the ladder cross-arm partly in section.

Fig. 3*c* is a partial elevation view in section of a hub portion of the ladder cross-arm.

In Fig. 1, reference 1 denotes the driving arm of a contact device which otherwise is not shown. By means of a cross-piece 5 and a ladder-shaped assembly 2 the driving arm actuates the movable springs of the spring groups forming part of the contact device. The ladder assembly 2 consists of a central rod 3 which is of metal and which is secured in the insulating part 4 comprising the cross-piece 5. The latter fits with its projections 6 and 7 into the recesses 8 and 9 of the driving arm 1. The cross-piece 5 comprises in addition, the projecting parts 10 and 11 which serve to support the lower contact springs of the spring groups and to move these springs if they are movable. The central rod has pushed on it a certain number of cross arms, of which only the cross arm 12 is shown in the figure. The contact springs 13 and 14 shown in dotted lines in the figure are bearing in the manner shown on the cross arm 12 and are moved by the latter. The portion 15 of cross-arm 12 is thickened and is provided with an aperture embracing the cross-section of the rod 3. In order to be able to position the cross-arm at the correct height use is made of spacer pieces 16, 17 and 18. By pushing-on more cross-arms and spacer pieces the ladder shown in Fig. 1 is adapted to the actuation of one or more spring groups exhibiting a definite configuration of springs. After that the upper arm is locked in a manner known per se. If desired, use may be made of cross arms extending at only one side of the central aperture. From the figure it can be seen that the cross-arms have a flat shape and are with their surfaces parallel to those of the springs, thus resulting in a saving in space. The lower contact springs of the spring groups on each side of the central rod are bearing on the projecting parts 10 and 11 which comprise a break-groove at the place of their attachment to the cross piece 5, so that they may be broken-off, if superfluous.

Fig. 2 shows a completely mounted ladder of a contact device according to the invention. It can be clearly seen that the central supporting rod 20, together with the cross piece 21, exhibits a T-shape. The rod 20 has pushed on it three cross arms, of which the central one 22 extends only on the right-hand side of the central aperture. In the manner shown these cross arms and the projections of the cross piece 21 cooperate with the movable springs of the spring groups on each side of the supporting rod 20. The two lower pairs of springs of the two spring groups constitute make-contacts, all the adjacent pairs of springs are break-contacts. The construction of the cross piece 21 permits of avoiding an undesirable movement of the lower end of the ladder with respect to the driving arm. However, a movement of the ladder is still possible, with which the top end moves in one of the directions shown in Fig. 1 by the arrows P, so that the ladder turns about the fastening of the cross piece 5 in the driving arm 1. Means are provided for avoiding this movement, which, however, do not form a part of the present invention and are, therefore, not illustrated.

In Fig. 3, Fig. 3*a* is the top view, Fig. 3*b* a cross-sectional view and Fig. 3*c* another cross-sectional view of a cross arm with which special steps have been taken to increase the leakage path. In this case the springs are located on wedge-shaped arms 30 and 31 and engage these arms along the line 32. The central aperture of the cross arm is formed in a ribbed portion partly surrounding the central rod by means of grooves 33 and 34 provided in it. Consequently, in the vicinity of the portions 35 and 36 located in the axis of the arm, the metal rod passed through the aperture, of which the section is shown only in Fig. 3*a*, does not engage the insulating material at the edge of the central aperture. It is evident that the leakage path is thus materially increased.

The invention permits the construction of compact contact devices which satisfy high mechanical and electrical requirements.

What I claim is:

1. An electrical contact device, comprising stacked contact spring members, a ladder-like assembly having a central rod, at least one cross-arm member on said rod, removable spacing members mounted on said rod for vertically adjusting said cross-arm member, and driving means coupled to a driven member forming part of said ladder-assembly, for moving said cross-arm and actuating one of said spring members.

2. An electrical contact device, comprising spring members arranged one above the other, a ladder-like assembly having a central rod, cross-arm members and spacing members push-fitted on said rod adjusting the position of the cross arm members in operative relation to certain of said spring members, and driving means coupled to a driven member forming part of said ladder-assembly, for moving said cross arms and actuating through said cross-arms certain of said spring members.

3. An electrical contact device, comprising spring members stacked in parallel groups, a central metal rod between said groups, spaced cross-arms and spacer members each of insulating material and frictionally mounted on said rod adjusting the position of the cross arm members in operative relation to certain of said spring members, a driving means, and a member on said rod capable of engagement with said driving means for actuating certain of said spring means through said cross-arms.

4. An electrical contact device comprising flat contact spring members arranged one above the other in two parallel groups, a metal rod centrally arranged between said groups, cross-arm members and spacer members of insulating material push-mounted on said rod one above the other adjusting the position of the cross arm members in operative relation to certain of said spring members, and driving means rockably coupled to said rod, portions of said cross-arms having flat surfaces parallel to the flat surfaces of said spring members.

5. An electrical contact device, comprising contact spring members stacked one above the other in parallel groups, a rod centrally arranged between said groups, cross-arm members and spacer members each formed with a partly ribbed central opening for press-positioning same on said central rod, said cross-arm members being strengthened in the vicinity of said central opening and including surfaces parallel to the surfaces of said spring members, said spacers spacing the cross-arm members on said rod to a position engaging said spring members when the rod is operated by a driven member and driving means coupled to a driven member on said rod for moving said cross-arms and thereby actuating certain of said spring members.

6. An electrical contact device, comprising spring members stacked one above the other in parallel relation, a rod arranged between said

spring members, cross-arm members adjustably supported on said rod in operative relation to certain of said spring members, movable spacers arranged on said rod for supporting said cross-arm members, at least one of said cross-arm members having an arm extending substantially on one side of said rod, and driving means coupled to a driven member on said rod for moving said cross-arms and thereby actuating some of said spring members.

7. An electrical contact device comprising stacked contact spring members, a ladder-like assembly having a central rod formed with a T-shaped cross-piece at the bottom end portion, spaced apart cross-arms pushably mounted on said rod above said portion, driving means rockably coupled to the said rod at the said end portion and through said cross-piece and the said cross-arms to certain of said spring members, said T-shaped cross-piece having projecting upward portions adapted to actuate the lowermost of said spring members.

8. An electrical contact device, comprising pairs of contact spring members stacked one above the other in parallel relation, a metal rod centrally arranged between said pairs of springs, cross-arm members and spacer members each made of insulating material and including a grooved apertured portion for receiving said rod

in a press-fit manner, said cross-arm members being selectively positioned on the said rod in stacked relation to each other and in operative relation to certain of the said spring members, said spacer members being arranged on said rod for supporting said cross-arm members, and driving means loosely coupled to a driver end portion of the said rod for moving said cross-arms and thereby actuating certain of said spring members.

PIETER HENDRIK JOHANNES BROUWER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,969,926	Eickhoff	Aug. 14, 1934
2,077,091	Brander	Apr. 13, 1937
2,134,448	Knos	Oct. 25, 1938
2,238,458	Waller	Apr. 15, 1941
2,282,687	Vigren et al.	May 12, 1942
2,279,811	Baker	Apr. 14, 1942

FOREIGN PATENTS

Number	Country	Date
645,956	Germany	June 5, 1937