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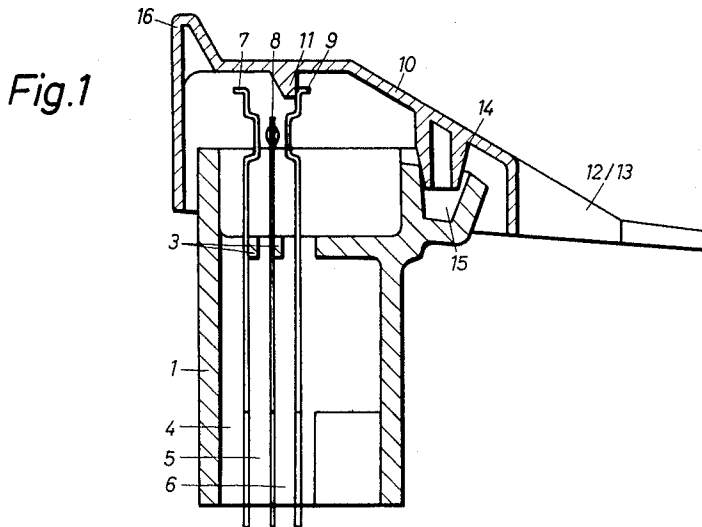
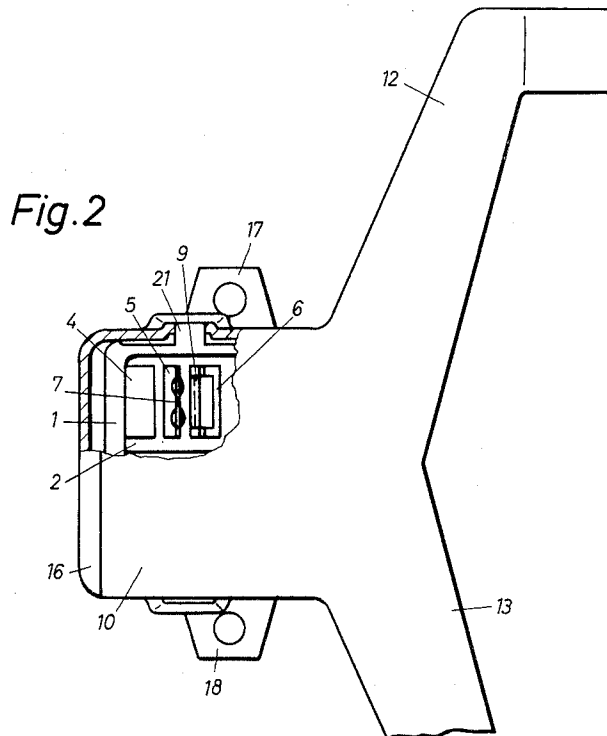
L. BAUER ETAL

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CRADLE-SWITCH SPRING ASSEMBLY

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3 Sheets-Sheet 1



INVENTORS
L. BAUER
W. GRÜGER

BY

Thilf A. Weiss

ATTORNEY

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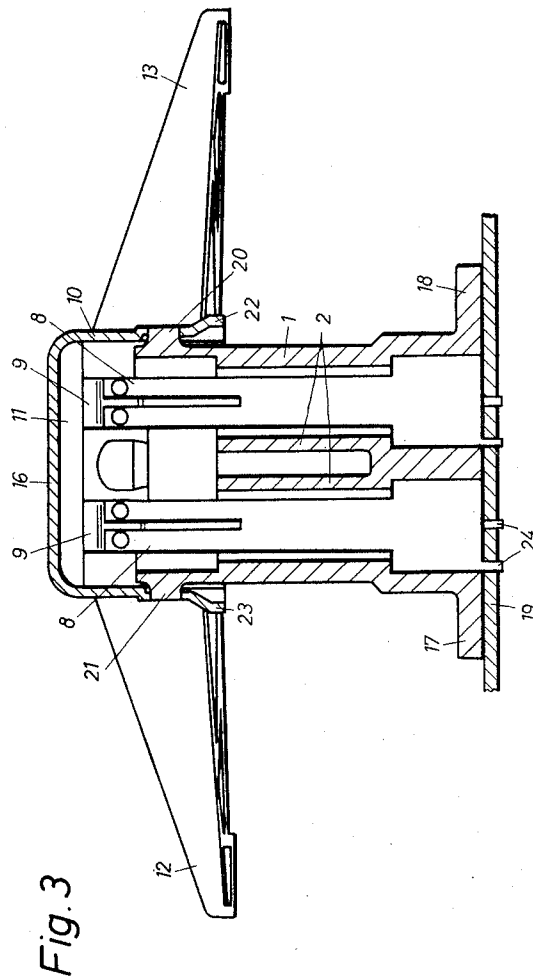
L. BAUER ETAL

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CRADLE-SWITCH SPRING ASSEMBLY

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INVENTORS
L. BAUER
W. GRÜGER

BY

Philip A. Weiss

ATTORNEY

Nov. 16, 1965

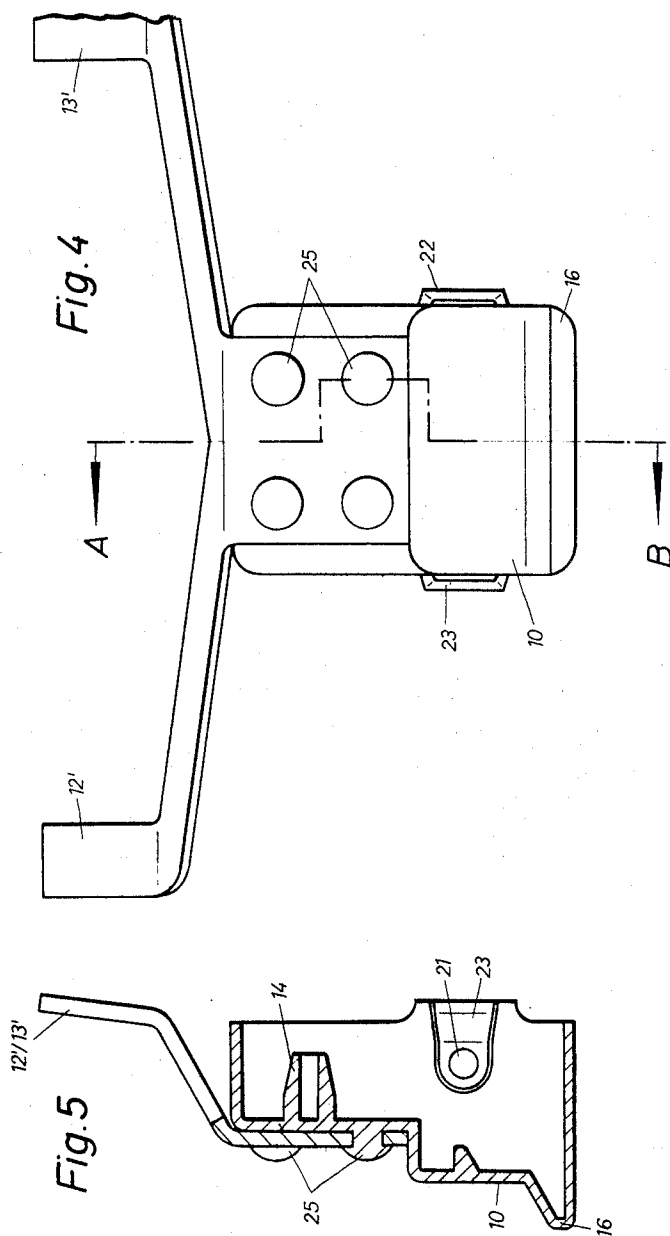
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CRADLE-SWITCH SPRING ASSEMBLY

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3 Sheets-Sheet 3



INVENTORS
L. BAUER
W. GRÜGER

BY

Fuller A. Weiss

ATTORNEY

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CRADLE-SWITCH SPRING ASSEMBLY

Ludwig Bauer, Kornwestheim, and Wolfgang Grüger, Stuttgart-Zuffenhausen, Germany, assignors to International Standard Electric Corporation, New York, N.Y., a corporation of Delaware

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7 Claims. (Cl. 179—164)

The present invention relates in general to telephone subsets and in particular to cradle-switch spring assemblies and in using contact springs which are designed as flat springs for use in telephone subsets. The flat contact springs are inserted in cavities of a socket (base), and retained in the required position at their outer edges in a form-locked manner.

Contact-spring assemblies are known in which the individual contacts existing in the form of flat springs, as well as the opposing contacts are laminated and screwed together. These conventional types of arrangements, however, have the disadvantage of requiring a considerable time for the assembly, because the individual contacts or contact-carrying flat springs, have to be laminated or arranged within a piling device, and have to be pressed together to the shape of a pack of spring sets with the aid of screws or rivets, and then have to be assembled and adjusted.

Moreover, with respect to the use in keyboards it is known to insert the contact springs consisting of flat springs, into cavities, and to retain these spring sets in a form-locked manner at their outer edges without requiring special noses, projections, or the like, in the respectively required position. Of course, with respect to the assembly, this form block arrangement has many advantages because of the ease of piling the different contact springs. This arrangement has the disadvantage that the flat springs which are inserted into the cavities, are likely to chatter subsequent to the opening of the contact springs.

Moreover, an arrangement has already become known which, subsequently to the removal of the case of the apparatus, serves to fix or retain the cradle-switch spring assembly in its depressed condition after removal of the case. In that conventional type of arrangement this is accomplished with the aid of a slide arranged at one limb of the chassis and which, subsequently to the pressing-down of the cradle-switch by hand, retains the cradle switch as well as the cradle-switch spring assembly which is connected thereto, in its depressed condition. The release of this latching is effected by the resetting of the slide. This arrangement, however, has the disadvantage that the latching can only be effected with the aid of additional parts mounted to the cradle-switch spring assembly, and that this latching has to be set by hand and released later on in the course of a separate operation. An object of this invention is to provide new and unique cradle-switch spring assemblies.

Another object of the invention is to provide an arrangement which avoids the disadvantages of the conventional types of arrangements. According to the invention these and other objects and features are obtained in that supporting straps are pressed or injection-molded into the cavities, for limiting the after-oscillation of the contact springs subsequently to the opening of the contact springs. Also, the cover is provided with a cone-shaped portion serving to arrest in position the cover designed in a rocker-like fashion, and in that this arrestation is automatically cancelled upon mounting the case to a telephone substation set.

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According to the further embodiment of the invention a cover consisting of a transparent or translucent pressed or injection-molded material is positioned, in a manner engaging at both sides, onto the base or socket, with the cover being so designed that a portion, pressed or injection-molded portion inside the cover, is provided to engage the projecting ends of the contact springs inserted into the cavities, and is retained by these contact springs in a certain position by action of spring force.

The cover which serves to cover up the contact springs inserted into the cavities, comprises two arms which, in the mounted state of the cabinet of a telephone substation set, are acted upon by the actuating portions arranged inside the cabinet. The top part of the cover is provided with a pressed or injection-molded elevated portion (nose), serving to release the cone-shaped portion which is provided on the cover, from its arresting position upon mounting of the case of a telephone substation set. Two round studs are pressed or injection-molded inside the socket to a resilient wall, with these studs being engaged by the cover when positioning the latter onto the said socket. The necessary spacings between the contact springs can be maintained by placing there between plates of insulating material or by providing guide grooves arranged at the sides in the walls of the cavity. All parts of the socket are only connected to one another by way of form-locking and/or thermal deformation. At their ends not facing the contacts, the contact springs are provided with projecting portions (extensions) which are so designed as to be suitable for being inserted into printed circuit boards.

Unlike the conventional types of cradle-switch spring assemblies, the invention is featured by the advantages according to which the cradle-switch spring assembly only consists of four parts, that in future, by inserting the contact springs into socket cavities which are provided with guide grooves, there is neither required a piling (lamination) and pressing, nor a readjustment of the individual contact springs which are assembled to the form of a spring assembly, and that subsequently to the opening of the contact springs, with the aid of supporting straps pressed or injection-molded into the socket, there is reliably avoided an after-oscillation (chatter) of the contact springs. In addition thereto, the inventive arrangement of the cradle-switch spring assembly, by simply pressing upon the arms of the cover, enables the cradle-switch assembly, subsequently to the removal of the cabinet of a telephone substation set, to be latched and thus retained in this depressed condition. A special cancellation of this latching, however, is not required because the cover is so designed as to automatically release this latched condition of the cradle-switch spring assembly upon replacing the case of the telephone substation set.

The invention will now be described in detail with reference to the accompanying drawings, in which:

FIG. 1 is a side view of a cradle-switch spring assembly shown in a sectional elevation, at an enlarged scale,

FIG. 2 is the top view of a cradle-switch in a partly sectional representation of the cover, at an enlarged scale, and

FIG. 3 is a front elevation of the cradle-switch spring assembly, shown in a sectional view, at an enlarged scale;

FIG. 4 is a top view of another embodiment of the invention; and FIG. 5 is the sectional view taken along line AB of FIG. 4.

In FIG. 1, reference numeral 1 indicates a socket or base consisting of a pressed or injection-molded insulating material which, with the aid of guide portions 2 (FIG. 2) and supporting straps 3, is subdivided into individual cavities, e.g. 4, 5 and 6. In the guide portions 2, as well as in the walls of the cavities opposing these portions 2,

there are provided grooves into which the contact springs, e.g. 7, 8 and 9, may be inserted. The contact springs 7 and 8, in opposition to their support at the supporting straps 3, are biased (pre-tensioned), so that they, in the non-actuated state of the cradle-switch spring assembly, in other words, in the open condition of the contacts, will come to lie close to the supporting straps 3. These supporting straps 3, in the opened condition of the contact-spring assembly, serve to maintain the contact airgap between the individual contact springs 7 and 8, and also serve to limit the after-oscillation (chatter) of the contact springs 7 and 8 subsequent to the opening of the contact-spring assembly. Onto the socket or base 1 there is mounted a cover 10 consisting of a transparent or translucent pressed or injection-molded material. Inside the cover 10 there is pressed or injection-molded a portion 11 which, with its edge, engages the one ends of the contact springs 9. The contact springs 7 and 9 are provided with precious-metal contacts rolled thereon (sandwiched) at their contact-making ends, and have substantially the same shape, with the exception that their pretensions act in opposite ways on account of the alternating lamination. The contact spring 9 is thus biased (pre-tensioned) with respect to the portion 11 and, in the actuated condition of the spring set, retains the cover 10 in a certain tilted position. The cover 10 is provided with two arms or extending portions 12 and 13 which, in the mounted condition of the case of the telephone substation set, are acted upon by the actuating portions upon which the handset is replaced. The arms or portions 12 and 13, together with the cover 10, can be made from one piece, or may consist of metal. In the latter type of embodiment, the arms or portions 12' and 13' are pressed or injection-molded into the cover 10, or are riveted thereto while being in the warm condition (FIGS. 4 and 5). Inside the cover 10 there is provided an injection-molded or pressed cone-shaped portion 14 which, upon pressing down of the arms or portions 12 and 13, slides into a correspondingly shaped recess 15 provided in the socket or base 1, with the pressed-down cover 10, by the friction produced at the inside wall of the recess 15 of the socket or base 1, being latched in this position. A nose or projecting portion 16 provided on the cover 10, serves to unlatch the cover 10 in the socket or base 1 automatically when mounting the cabinet of a telephone substation set.

FIG. 2 is the top view of a cradle-switch spring assembly. To the socket or base 1, i.e. to its bottom edge, flaps 17 and 18 are pressed or injection-molded to the sides thereof, with the aid of which a cradle-switch spring assembly may be mounted to a base plate 19 (FIG. 3). The conductors of a printed circuit are arranged on this base plate 19.

FIG. 3 shows the cradle-switch spring assembly in a front elevation. Round studs 20 and 21 are injection-molded to the socket or base 1, and are engaged by correspondingly shaped recesses of the cover 10, upon pressing the cover thereon. This engagement is facilitated by the projecting portions 22 and 23 provided on the cover 10. The cover 10 itself is pivoted on the round studs 20 and 21. At their sides not facing the contacts, the contact springs 7, 8 and 9 are provided with projecting portions 24 extending through corresponding recesses (cutouts) in the base plate 19. These terminals 24 are soldered at these points to the conductors on the printed wiring board. The contact springs 7, 8 and 9 are retained in the socket or base 1 independently of one another and, consequently, may also be replaced individually.

FIGS. 4 and 5 show some examples of embodiment of a cradle-switch spring assembly which is in accordance with the assembly described hereinbefore with reference to FIGS. 1-3, wherein the arms or extensions of the cover 10 which are indicated by the reference numerals 12 and

13 in FIGS. 1-3, consist of metal. In FIGS. 4 and 5 these arms or extending portions are indicated by the reference numerals 12' and 13', and are either pressed or injection-molded into the cover 10, or are riveted to the cover while in the warm state, with the aid of riveting bolts pressed or injection-molded to the cover 10, at the points 25.

In operation, when a handset is placed on the arms 12, 13 the cover 10 is actuated to rotate around studs 20, 21 so that projection 11 applies pressure to spring 9 maintaining it in the open position. When the handset is removed, spring 9 presses against springs 7, 8 to close the circuits connected thereto.

While we have described above the principles of our invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of our invention as set forth in the objects thereof and in the accompanying claims.

What we claim is:

1. A cradle-switch spring assembly for a telephone subset, said subset provided with socket means, flat contact springs inserted in cavities in said socket, form-lock means for retaining said springs with their outer edges in the required position, strap means in said cavities for limiting the chatter of the said contact springs normally caused by the operation of the contact springs, movable cover means for covering said socket, cone-shaped means on said cover for holding the cover in a first position, first means on said cover for maintaining said spring open when said cover is in said first position and nose means on said cover for automatically moving said cover when the telephone station subset case is placed over said cradle switch spring assembly, said automatic movement of said cover operating to release said spring and allow said spring contacts to close.

2. A cradle-switch spring assembly according to claim 1 wherein said first means on said cover comprises an injection molded portion in the inside of the cover which engages the projecting ends of the contact springs inserted into the cavities, and means whereby said cover is retained in said first position by the spring force of the engaged contact springs.

3. A cradle-switch spring assembly according to claim 2 wherein stud means are provided on the sides of said socket, means on said cover for engaging said studs when said cover is positioned on top of the socket whereby said cover can rotate around said studs.

4. A cradle-switch spring assembly according to claim 3 wherein all parts of the said socket are connected to each other only by form locking.

5. A cradle-switch spring assembly according to claim 3 wherein all parts of the said socket are connected to each other only through thermal deformation.

6. A cradle-switch spring assembly according to claim 3 wherein the socket comprises said cavities made of one piece.

7. A cradle-switch spring assembly according to claim 3 wherein means suitable for being inserted and soldered into printed circuit boards are provided at the ends of said springs that do not face the contacts.

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ROBERT H. ROSE, *Primary Examiner*.

WILLIAM C. COOPER, *Examiner*.