

Jan. 6, 1942.

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2,268,794

TELEPHONE SUBSTATION APPARATUS

Filed Oct. 24, 1939

2 Sheets-Sheet 1

FIG. 1

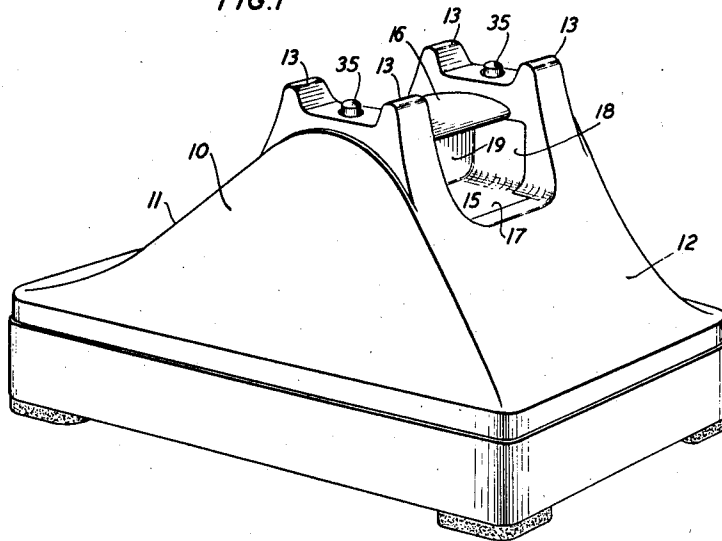
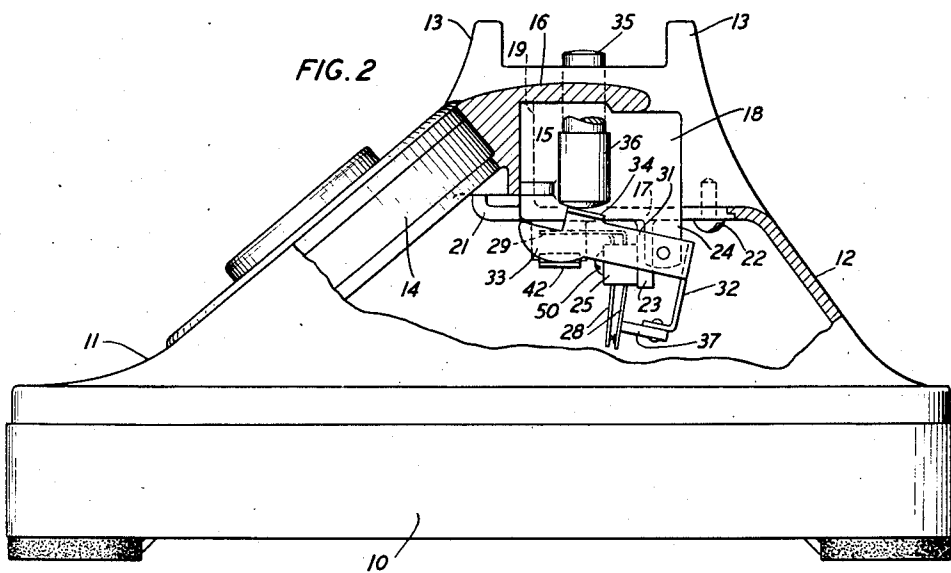


FIG. 2



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FIG. 3

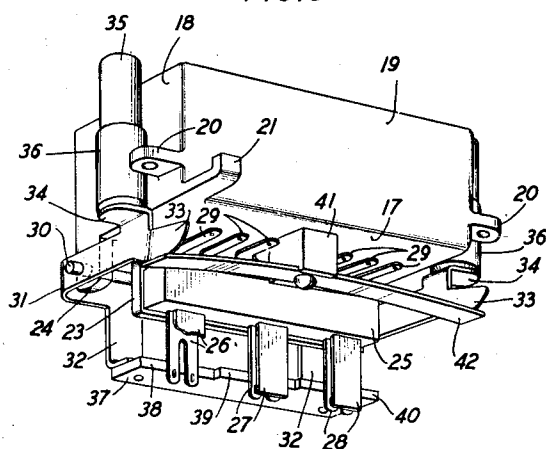


FIG. 4

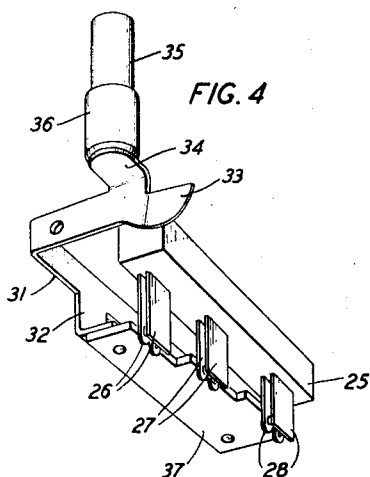
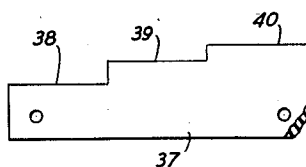


FIG. 5



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TELEPHONE SUBSTATION APPARATUS

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Application October 24, 1939, Serial No. 300,933

6 Claims. (Cl. 179-164)

This invention relates to telephone substation apparatus and, more particularly, to contact spring assemblies for desk and wall telephone sets.

In telephone sets, such as shown, for example, in Patent 2,096,046, granted October 19, 1937, to John J. Kuhn and George R. Lum, the various elements of the substation apparatus, such as the transmitter, receiver, dial and associated transmission apparatus, are connected to a telephone line leading, for example, to a central office through the agency of spring contacts. These contacts, as is known, may close certain circuits, open certain circuits, or transfer a connection from one point in a circuit to another. In general, the spring contacts are actuated in accordance with the placement of a telephone instrument, such as a hand telephone, upon the mounting therefor and the removal of the instrument from the mounting. Thus, for example, in the apparatus disclosed in the above-identified patent of G. R. Lum and John J. Kuhn, the spring contacts are associated with plungers engaged by the hand telephone and by their tension are effective to actuate the plungers when the hand telephone is removed from the mounting.

In order that the various elements of the telephone set may be connected in circuit properly, it is necessary in many instances that the various connections be established or broken in a particular sequence. Furthermore, efficient and satisfactory operation necessitates the establishment of definite pressure between engaging contact springs. Desired sequential operation and contact pressures may be obtained by preforming, biasing and accurately spacing the cooperating springs. This, however, may not be entirely satisfactory in view of the high degree of accuracy involved. Furthermore, in sets wherein the contact springs are effective to raise the plungers when the telephone instrument is removed from the mounting, when the instrument is on the mounting, which in most cases is for the major part of the time, the springs are subjected to stresses so that after a time their resiliency is altered and the contact pressures are varied. Moreover, in some telephone sets false signals may be produced by jarring of the telephone instrument or partial removal thereof from the mounting.

One general object of this invention is to improve the structure and operation of switch contacts in telephone substation apparatus.

More specifically, objects of this invention are:

To facilitate the attainment of a desired sequence of operation for a number of switch contacts in telephone substation apparatus;

To reduce variations in the resiliency and tension of contact springs in telephone sets and thereby to extend the useful life thereof;

To establish and maintain for a long period desired and uniform contact pressures between cooperating contact springs in mountings for telephone instruments;

To reduce the possibilities of false operation of the contact springs in telephone sets by jarring of the telephone instrument or partial removal of the instrument from the mounting therefor; and

To simplify and improve the construction of mountings for hand telephones.

In one illustrative embodiment of this invention a mounting for hand telephones comprises a casing having a cradle portion for accommodating the hand telephone, a plurality of contact springs within the casing and one or more reciprocable plungers extending into the cradle and operatively associated with the contact springs to actuate the springs in accordance with the placement of the hand telephone in the cradle or removal of the hand telephone from the cradle.

In accordance with one feature of this invention, means are provided for actuating the contact springs individually and in a desired sequence. In one specific form the contact springs are mounted in pairs and a rockable actuating member operable by the plunger is provided, the actuating member having in one portion thereof a series of steps, one for each pair of contact springs, spaced predetermined distances from the contact springs whereby the springs are actuated in a desired sequence.

In accordance with another feature of this invention, the contact springs and the actuating member are related so that when the telephone instrument is upon the mounting therefor, the actuating member is disengaged from the contact springs and means, separate from the contact springs, are provided for rocking the actuating member to engage the springs when the telephone instrument is removed from the mounting.

In accordance with a further feature of this invention the actuating member, plunger or plungers, and contact springs are so related that travel through a predetermined distance of the plunger or plungers is necessary before the actuating member becomes effective to operate the

contact springs, whereby the possibilities of false operation of the contacts are reduced.

In accordance with still another feature of this invention the contact springs, actuating means therefor, and the rocker means for the actuating means are fabricated in a unitary assembly which may be installed in or removed from the mounting as a unit.

The invention and the foregoing and other features thereof will be understood more clearly and fully from the following detailed description with reference to the accompanying drawings, in which:

Fig. 1 is a view in perspective of a mounting for a hand telephone including a contact spring assembly illustrative of one embodiment of this invention;

Fig. 2 is a side view of the mounting shown in Fig. 1, a portion of the housing being broken away to show details of the internal structure more clearly;

Fig. 3 is a view in perspective of the unitary contact actuating structure included in the mounting shown in Figs. 1 and 2 and constructed in accordance with this invention;

Fig. 4 is a detail perspective view illustrating the association of the contact springs and the actuating member therefor in the assembly shown in Fig. 3; and

Fig. 5 is a detail plan view of the actuating member for the contact springs, showing the configuration thereof.

Referring now to the drawings, the hand telephone mounting shown in Figs. 1 and 2 comprises a casing or housing 10 having sloping front and rear walls 11 and 12, respectively, and having extending therefrom two pairs of fingers or tines 13 which form a cradle for accommodating a hand telephone. The front wall 11 of the housing may have mounted thereon a dial 14 and the rear wall 12 is provided with a finger receiving recess 15 below a rearwardly extending portion 16 of the housing adjacent the cradle, which facilitates moving and carrying of the mounting as described clearly in the aforementioned patent of John J. Kuhn and George R. Lum.

Mounted within the housing or casing 10 is a support member, preferably cast in one piece of metal, having a base 17, side walls 18 and an end wall 19, the base 17 and walls 18 and 19 forming walls of the recess 15, as shown clearly in Figs. 1 and 2. The support member is provided with a projection 21 and with flanges 20 which bear against shoulders upon the inner walls of the housing 10, the flanges 20 receiving screws, not shown, threaded into the housing to secure the support member in position. The base 17 is provided with apertures for receiving screws 22, one of which is shown in Fig. 2, threaded into the housing and further securing the support member in position.

The support member is provided further with an integral flange 23 depending from the base 17 and with parallel flanges or projections 24 depending from the side walls 18. Mounted upon the flange 23 and secured thereto as by screws 50, is an insulating block 25 which carries a plurality of pairs of contact springs 26, 27 and 28, each having connected thereto or integral therewith a terminal portion 29. Preferably, as shown clearly in Figs. 3 and 4, one contact spring of each pair is bifurcated. The several pairs of springs may be spaced equal or unequal distances from the longitudinal edge of the insulating block 25.

Extending between the flanges or projections 24 is a shaft or axle 30 which supports a U-shaped rocker member 31 having a pair of L-shaped arms 32 extending from the intermediate portion thereof and having also projecting stops 33, one of which is adapted to engage the projection 21 and thereby limit movement of the rocker member. The rocker member 31 is provided also with flanges 34, each of which is engaged by a reciprocable plunger 35 extending into the cradle and engageable by the telephone handset, the plungers having enlarged portions 36 to limit upward movement thereof.

Carried by the rocker member 31 and movable therewith is a plate member 37, preferably of insulating material, having a stepped edge 38, 39, 40, one step for each of the pairs of spring contacts. As shown clearly in Fig. 5, the steps in the stepped edge of the plate member 37 may be of unequal depth.

Secured to or integral with the base 17 of the support member is a block 41 which has secured thereto a spring 42, the ends of which bear against the projections 33 on the rocker member 31.

When the hand telephone is placed upon the cradle it engages and depresses the plungers 35, whereby the rocker member 31 is rotated on the axle or shaft 30 and the actuating plate 37 is moved away from the contact springs 26, 27 and 28. Inasmuch as the steps 38, 39 and 40 are of unequal depth and the contact springs are spaced unequal distances from the step corresponding thereto, the contact springs will be operated in sequence, that is the engagement between springs 26 will be broken first, then the contact between springs 27, and finally the contact between springs 28.

When the hand telephone is removed from the cradle the spring 42, by bearing against the projections 33, rotates the rocker member 31 so that the plate 37 is moved and the steps 38, 39 and 40 engage the contact springs corresponding thereto. Because of the inequality of the depth of the steps and the unequal spacings between the corresponding contact springs and steps, the contacts will be closed in sequence, that is contact will be established first between springs 28, then between springs 27, and finally between springs 26.

Although in the specific embodiment shown the steps are of unequal depths and the spacing between the steps and the corresponding contact springs are unequal, sequence operation of the springs may be effected, of course, with steps of the same depth, or a continuous contacting edge on the actuating plate 37, and unequal spacings between the contact springs and the plate, or by steps of unequal depths and equal spacing of the contact springs from the surface of the block 25 facing the axle or shaft 30.

It will be noted that the contact springs and actuating plate may be so related that when the hand telephone is in the cradle, the plate 37 is out of engagement with the contact springs and, therefore, the latter are unstressed. The spring 42 then serves as the sole means for actuating the rocker member 31 and raising the plungers 35. Furthermore, the contact springs and plate 37 may be spatially related so that any desired preliminary travel of the plungers and, hence, of the plate 37 before engagement of the plate with the contact springs may be obtained whereby false actuation of the contact springs is substantially prevented.

It will be apparent, further, that the contact springs and the actuating means therefor are fabricated as a unitary assembly which may be readily mounted in or removed from the housing 10. In addition, it will be appreciated that the contact springs of each pair may be adjusted independently of the others to facilitate attainment of any desired contact pressures.

Although a specific embodiment of this invention has been shown and described, it will be understood, of course, that various modifications may be made therein without departing from the scope and spirit of this invention as defined in the appended claims. For example, although the plate member has been shown and described as of insulating material, it may be wholly or in part of electrically conductive material. In one such construction the steps 38, 39 and 40 may have contacts thereon, or be plated, each contact having a leading-in conductor connected thereto and adapted to engage one of the contact springs 26, 27 or 28. Alternatively, each of such contacts may be adapted to engage two contact springs equally or unequally spaced therefrom and insulated from one another, and thereby to bridge the two springs and complete a connection therebetween.

What is claimed is:

1. A mounting for a telephone instrument comprising a casing having a portion for accommodating the telephone instrument, a plurality of laterally spaced sets of contact members within said casing, and means for sequentially actuating contact members of said sets in accordance with the placement of the telephone instrument upon said portion and removal thereof from said portion including a rockable member having an edge portion opposite said sets of contact members, said edge portion having a plurality of stepped surfaces each opposite and adapted to engage a corresponding contact member of a set.

2. A mounting for a telephone instrument in accordance with claim 1 comprising resilient means separate from said sets of contact members for tilting said rockable member when the telephone instrument is removed from said portion to move said surfaces into engagement with the respective contact member of a set.

3. A mounting for a hand telephone comprising a casing having a cradle for accommodating the hand telephone, a reciprocable plunger in said casing and projecting into said cradle, a rockable member within said casing and co-operatively associated with said plunger, and a plurality of sets of spaced contact springs mounted in a line within said casing, said rockable member including a portion having an edge opposite said sets of contact springs, and said edge having a plurality of steps of unequal depths each opposite and adapted to engage a contact of a corresponding one of said sets of contact springs.

4. A mounting for a hand telephone in accordance with claim 3 comprising a leaf spring separate from said contact springs and engaging said rockable member, said leaf spring being operable to tilt said rockable member when the hand telephone is removed from the cradle whereby said steps engage said contacts.

5. A mounting for a hand telephone comprising a casing having a cradle for accommodating the hand telephone, a unitary assembly within said casing including a supporting member secured to an inner wall of said casing, flanges extending from said supporting member, a shaft extending between said flanges, a rocker member supported on said shaft, a plurality of sets of contact members carried by said supporting member and mounted in spaced relation, and a plate member carried by said rocker member and having an edge opposite said sets of contact members, said edge being provided with a plurality of steps, one for each of said sets of contact members, and a reciprocable plunger co-operatively associated with said rocker member and having a portion extending into said cradle.

6. A mounting for a hand telephone in accordance with claim 5, wherein said rocker member is substantially U-shaped and said shaft extends through the arms thereof, and wherein said unitary assembly comprises a leaf spring supported at its center from said supporting member, the ends of said leaf spring engaging said arms.

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