March 5, 1963 T. A. JANSSON ETAL 3,080,457

MULTIPLE SWITCHING DEVICE FOR AUTOMATIC TELEPHONE SYSTEMS

Filed Aug. 31, 1959 2 Sheets-Sheet 1

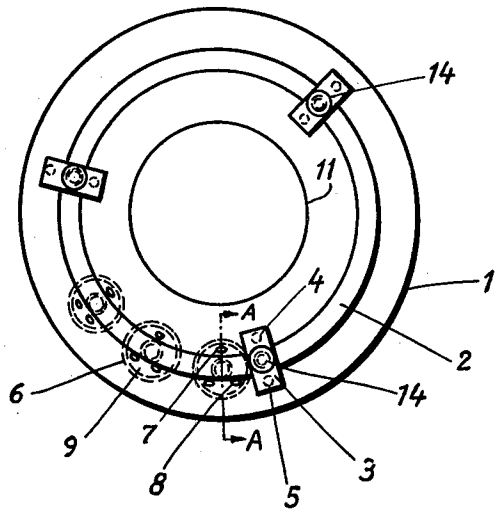

Fig. 1

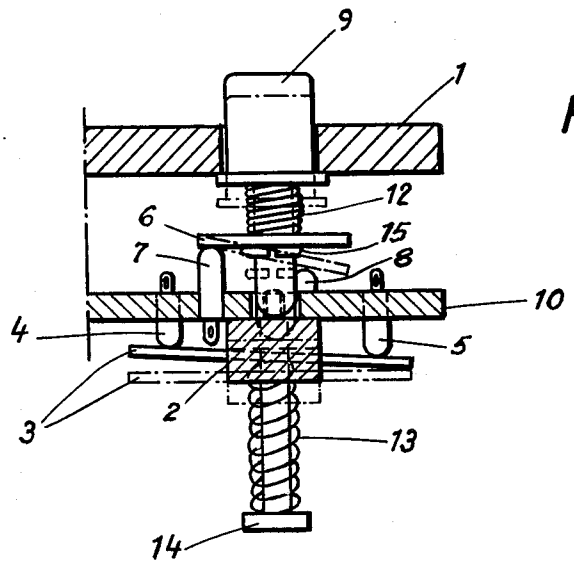

Fig. 2

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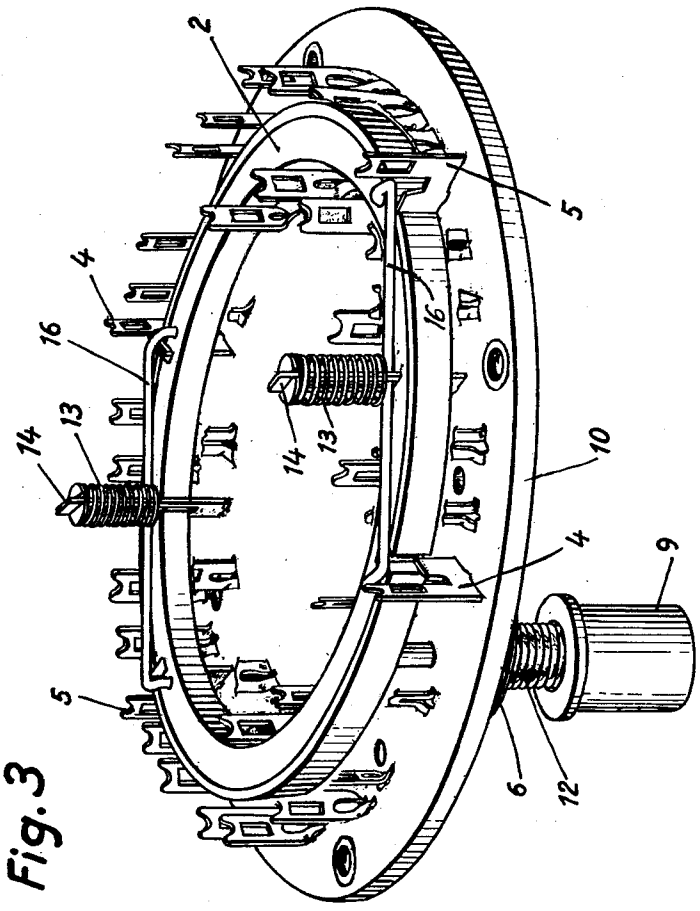

Fig. 3

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MULTIPLE SWITCHING DEVICE FOR AUTOMATIC TELEPHONE SYSTEMS

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6 Claims. (Cl. 200—5)

Up to the present time it has been customary to use dials for number selection in automatic telephone systems. It is, however, desirable to replace the dials by key sets, because the number selection is carried out much more rapidly and more comfortably by means of push buttons. The dials are normally provided with a contact spring group that is actuated each time the dial is turned off the home position. In key sets it is desirable to provide a corresponding contact spring group that is actuated each time any of the push buttons is oppressed. The object of the present invention is to solve this problem by simple means, requiring reduced space at such key sets where the push buttons are placed in a closed circle and designed to be displaceable in holes in a direction perpendicular to a front plate, so that the key set can be mounted in a space designed for a dial.

This is achieved by the use of an electrically insulated ring or a ring of insulating material, which in inactive position is held in a parallel position relative to the plate below said push buttons by means of at least two springs, equidistantly placed on the ring, and by the use of contact means at each of said springs which means are arranged to follow the displacement of the ring so that an oppressed push button displaces the ring whereby at least one of said springs is tensioned and at least one contact means is actuated.

The invention will be further described by means of the attached drawings, FIGURES 1, 2 and 3. FIG. 1 shows one embodiment of a key set seen from the back side, FIG. 2 shows a section A—A of FIG. 1 and FIG. 3 shows a perspective view of another embodiment of the invention.

In the embodiment of FIGS. 1 and 2 two round plates are provided, a front plate **1** and a mounting plate **10**, of which at least the latter **10** is made of an electrically non-conductive material. The plates have space enough for a plurality of at least **10** push buttons **9**, of which three are shown with dotted lines in FIG. 1 and one in FIG. 2. The plates are held together by means that are unessential in relation to the invention and, therefore, incompletely shown in the figure, for instance a centrally located body **11**. On the lower plate **10** contacts **4**, **5**, **7**, **8**, etc. are provided as well as three posts **14** each one carrying a spring **13**. The springs **13** press a ring **2** against the lower side of the plate **10**. The ring **2** is made of insulating material or covered with a non-conducting material. Between the spring **13** and the ring **2** a contact plate **3** is provided that with the key set in inactive position electrically connects the two contacts **4** and **5** with each other.

The push button **9** is made of insulating material and is displaceably supported by the plates **1** and **10** and normally held in inactive position by a spring **12**. The spring **12** rests against a metal disc **6**, that in turn rests against the contact **7**. The disc **6** is loosely mounted on the lower, narrower part of the push button **9** and rests in inactive position against an annular support **15** fixed to the push button **9**.

By oppressing the push button **9** the annular support **15** beneath the disc **6** is displaced downwards and the disc **6** is swung round the contact **7** downwards closing a circuit between the contacts **7** and **8**. Simultaneously the end of the push button **9** presses against the ring **2**. The ring **2** is pressed downwards whereby, according to the location of the push button, one or eventually two of the springs **13** are compressed. The ring **2** is displaced downwards and the circuit between the contacts **4** and **5** is interrupted.

By connecting the contacts **4** and **5** at each of the posts **14** in series a circuit is formed that is interrupted each time a push button is oppressed.

By arranging the contact plates **3** in such a way that a make contact is obtained between the contacts **4** and **5** instead of a break contact and by connecting all the make contacts in parallel a circuit is obtained that is closed every time any of the push buttons is oppressed.

FIG. 3 shows a perspective view of the second embodiment of the invention. In this embodiment the ring **2** is held in inactive position by means of two springs **13** each mounted on a post **14** which posts are as before fixed to the plate **10**. Below each spring **13** a contact wire **16** is placed, that by means of the respective springs **13** is pressed towards the ring **2**. When the ring **2** is in inactive position the wire rests with its end portions against two contacts **4** and **5**, which are thus electrically connected together by means of the wire. With this arrangement two break contacts exist at each wire and by means of an adequate wiring all the breaking points are connected in series. At the pressing of any push button **9**, so that the ring **2** is displaced in relation to the plate **10**, one or two of the breaking points are opened, so that the circuit is interrupted.

We claim:

1. A multiple switching device for use as a dialing device in an automatic telephone system, said switching device comprising a mounting plate and a plurality of switches mounted on said plate in circular arrangement circumferentially spaced from each other, each of said switches including several switch contacts mounted on said plate electrically insulated therefrom and protruding from one side thereof, a conductive bridge member mounted yieldably movable between contact bridging and non-bridging positions and a movable actuating member coacting with said bridge member to change the position thereof in reference to the switch contacts of the switch by displacement of the respective actuating member; groups of further switch contacts mounted on said mounting plate protruding from the other side thereof and disposed groupwise in concentric arrangement with said switches electrically insulated from the plate, a conductive bridge member for each of said groups mounted yieldably and pivotally between contact bridging and non-bridging positions, and an insulation ring disposed concentric with said switches and said groups of switch contacts and yieldably mounted in reference to the bridge members for said groups of switch contacts to control the position of said groups bridge members by the position of said ring, each of said switch actuating members being in engagement with said ring and displacement of any of the actuating members changing the position of said ring thereby changing also the bridging position of at least one of said group bridging members.

2. A switching device according to claim 1 wherein said plate is in the form of an annular plate, said switches being circumferentially spaced on said annular plate and said groups of further switch contacts being disposed intermediate said switches and equidistant from one another.

3. A switching device according to claim 1 wherein the switch contacts of each switch are of unequal height in reference to the mounting plate and the bridge member of each switch is mounted tiltable in reference to the re-

spective switch contacts and is yieldably urged into an engagement with one of said switch contacts, displacement of said actuating member changing the angle of tilt of the respective bridge member in respect to the switch contacts associated therewith to move the bridging member into engagement with at least a second one of the respective switch contacts.

4. A switching device according to claim 3 wherein each of said actuating members comprises a push button longitudinally displaceable in reference to said mounting plate, each of said push buttons being in engagement with the bridge member of the respective switch and said insulation ring to control the position of both the respective bridge member and the insulation ring by displacement of the push button from an initial position.

5. A switching device according to claim 4 wherein a spring means for each of said push buttons urges the same into its initial position.

6. A switching device according to claim 1 wherein said mounting plate is in the form of an annular plate, said switches being circumferentially spaced on said annular plate and said groups of further switch contacts being disposed intermediate said switches and equidistant one from another, and wherein spring means engage said ring at equidistant points to urge the same into a position in which the bridge members controlled by said ring occupy a predetermined position in reference to the switch contacts in said groups.

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