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G. DEAKIN

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KEY-SENDER FOR TELECOMMUNICATION SYSTEMS

Original Filed April 21, 1944

Fig. 1.

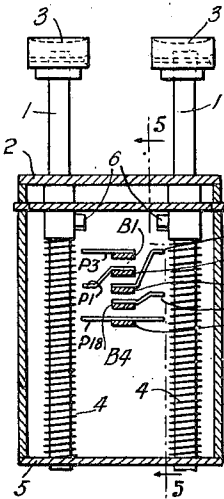


Fig. 3.

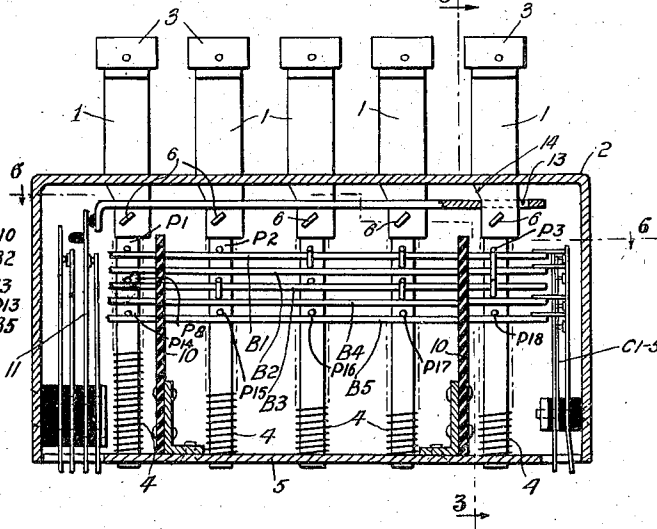


Fig. 2.

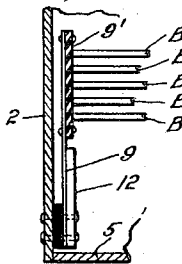


Fig. 4.

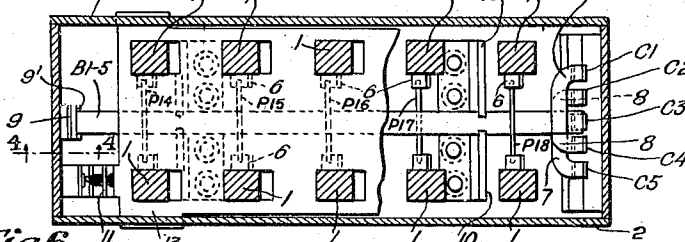


Fig. 6.

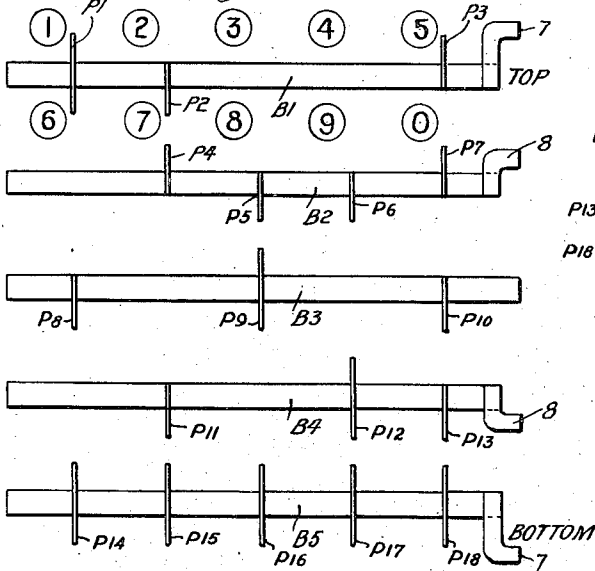
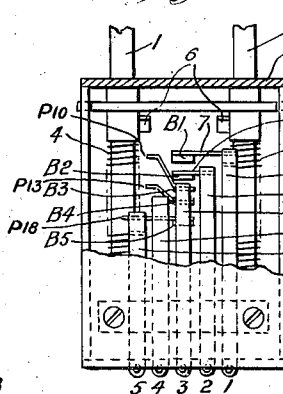


Fig. 5.



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KEY-SENDER FOR TELECOMMUNICATION SYSTEMS

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6 Claims. (Cl. 179-90)

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This invention relates to new and useful improvements in key-senders more particularly for use in switching systems of the type useful in controlling telecommunication.

An object of the invention is to provide a simple key-sender for selectively switching in circuit a relatively small number of resistances for controlling as many different switching operations as there are keys. For instance, a ten-button key sender may be associated with five resistances for controlling the performance of a desired one of ten switching operations, by selectively switching into the line circuit in succession different combinations of two or three resistances. Such a system is disclosed in my co-pending application No. 532,142 filed April 21, 1944, from which the present application is divided.

According to a feature of the invention, a key sender comprises a plurality of keys, a plurality of sliding members, contact switches associated with each of the sliding members so as to be actuated by the movement thereof and camming means associated with the keys for displacing a plurality of the sliding members in succession.

Other features will be apparent from the following description and the accompanying drawing showing one embodiment of my invention and in which:

Fig. 1 is a sectional elevation along 3-3 of Fig. 3,

Fig. 2 a section along 4-4 of Fig. 4,

Fig. 3 a section along 5-5 of Fig. 1,

Fig. 4 a section along 6-6 of Fig. 3,

Fig. 5 an end view of the key set with part of the wall broken away, and

Fig. 6 is explanatory of the manner in which the contacts are operated.

Referring first to Figs. 1 to 4 the key sender comprises ten key plungers 1 of which a rectangular portion pierces a housing 2 and is free to slide in said housing. The plunger 1 is slipped through the housing from the bottom, after which button 3 is attached to it in any suitable manner. The lower part of the plunger 1 is round and over this part is slipped retractile spring 4, which rests against the bottom plate 5 of the housing and against the rectangular part of the plunger at the top. Thus the spring normally keeps the plunger in the position shown. A slanting cam 6 projects from each plunger.

When any key is depressed, it longitudinally displaces two or three of five horizontal bars, B1, B2, B3, B4, and B5 in accordance with the setting of pins, P1, P2, P3, P4, etc., which pro-

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ject from the bars in patterns that determine the sequence of contacts C1-C5 that will be operated by the key. As best seen from Fig. 6, the pins P1-P18 are arranged on the bars B1-B5 in positions corresponding to the five pairs of keys. Thus, bar B1 has a pin P1 in position 1 projecting to the left and right adapted to be engaged by either key 1 or key 6. This bar carries a pin P2 in position 2 which projects only to the right, so that only the operation of key 7 will result in a displacement of the bar B1 through the agency of pin P2, and the depression of key 2 will have no effect on the bar B1 at all. There are no pins in positions 3 and 4 so that the actuation of keys 3, 8, 4 and 9 will have no effect on the bar. In position 5 pin P3 projects to the left from B1 so that only the depression of key 5 will be effective.

From the above explanation it will be clear that bar B2 will be displaced through the agency of pins P4-P7 when keys 2, 8, 9 and 5 are depressed, bar B3 will be displaced through the agency of pins P8-P10 when keys 6, 3, 8 and 0 are depressed, bar B4 will be displaced through the agency of pins P11-P13 when keys 7, 4, 9 and 0 are depressed, and bar B5 will be displaced through the agency of pins P14-P18 when any one of the ten keys is depressed. Each of the five bars engages at one end a contact C1 to C5 (see particularly Figs. 4 and 5). Part 7 is welded to bars B1 and B5 and operates the two outer contacts C1 and C5 when either bar is moved by a key. Part 8 projects from B2 and B4 and operates contacts C2 and C4. Bar B3 operates contact C3 direct. The other ends of the five bars rest against an insulated piece 9¹ attached to bank spring 9 (see Fig. 2). Spring 9 keeps all the five bars in engagement with their corresponding C contacts. Movement of the spring 9 is limited by back stop 12. The five bars are held in position by slotted supports 10 (Fig. 3) of insulating material which are attached to the bottom of the housing 5.

Supported from the housing by any suitable means, such as shown in Figs. 3 and 4, is a sliding plate 13 which engages the home contact nest 11 and is normally kept in the position shown by the tension of the spring next. When any key is depressed, the slanting part 14 of the plunger 1 (Fig. 3) forces the sliding plate 13 to the left, thereby operating the home contact nest.

The arrangement of the pins in sliding bars B1 to B5 (see Fig. 6) corresponds to the selection to be performed. For example, when key 6

is depressed and released, the following operations take place in the order listed:

- a. Sliding plate 13 operates home contact nest 11.
- b. When the key is about $\frac{1}{4}$ way down, wiper 6 engages pin P1 and forces bar B1 to the right, thereby opening contact C1. Almost immediately thereafter, part 6 disengages the pin and bar B1 is forced back sufficiently by contact C1 to allow its closure.
- c. When the key is about $\frac{1}{2}$ way down, bar B3 is similarly forced to the right through pin P8 and momentarily opens contact C3.
- d. When the key is about $\frac{3}{4}$ way down, bar B5 is forced to the right by pin P14 and contact C5 is momentarily opened.
- e. When the key is all the way down, bar B5 is released and contact C5 recloses.
- f. When pressure is removed from the key button, the plunger 1 is quickly restored to normal by retractile spring 4. Cam 6, however, engages the three pins in question from the under side, thereby forcing them to the left against common back stop 9. Contacts C1, C3 and C5 are thus not opened on the return stroke. As cam 6 passes each pin, spring 9 restores the bar to normal.
- g. When the plunger is fully restored to its normal position, sliding plate 13 resumes its normal position under the tension of the spring nest 11.

Since each key has three operating positions and since there are five bars, some of the pins are straight, others are bent upwards or downwards, as shown in Figs. 1 and 5. If this were not done, the sliding part 6 would in certain cases find the pins too close together and it would be difficult to close the first contact before opening the second. This is particularly true in the case of key 0 which operates bars B3, B4 and B5.

The invention is not limited to the detailed construction illustrated in drawings and various modifications coming within the spirit of the invention as set out in the appended claims will readily occur to those versed in the art.

What is claimed is:

1. A key sender for a telecommunication system comprising a plurality of keys, a plurality of sliding members, contact switches, means respon-

sive to the actuation of each of said sliding members to be actuated by the movement thereof to operate said switches, and camming means associated with said keys for displacing a plurality of said sliding members in succession.

2. A key sender for a telecommunication system comprising a plurality of keys, a plurality of sliding members, contact switches, means responsive to the actuation of each of said sliding members for operating said switches, camming means associated with certain of said keys for displacing one of said sliding members when said keys are actuated and camming means associated with other keys for displacing a plurality of said sliding members in succession when said other keys are actuated.

3. A key sender according to claim 1 comprising a further sliding member, a further contact switch associated therewith for actuation by the movement thereof and camming means associated with each of said keys for displacing said further contact switch when any one of said keys is actuated.

4. A key sender for a telecommunication system comprising a plurality of plunger keys, a plurality of sliding bars arranged one above the other in a plane parallel to the axis of said keys, a contact switch adjacent an end of each said bar for actuation by the movement thereof, a camming member on each key, and pins projecting from said bars in the paths of said cams to determine the sequence of contact switches to be operated by the depression of each key.

5. A key sender according to claim 2 comprising a further sliding member comprising a plate formed with apertures through which the key stems project and a further contact switch associated with said plate and in which each key stem is formed with a camming surface which engages an edge of the respective aperture when said key is depressed.

6. A key sender according to claim 4 in which certain of said pins are bent in the plane of movement of said plunger keys for the purpose of increasing their spacing when a plurality of pins are adapted to be engaged upon the depression of a key.

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