

Aug. 19, 1941.

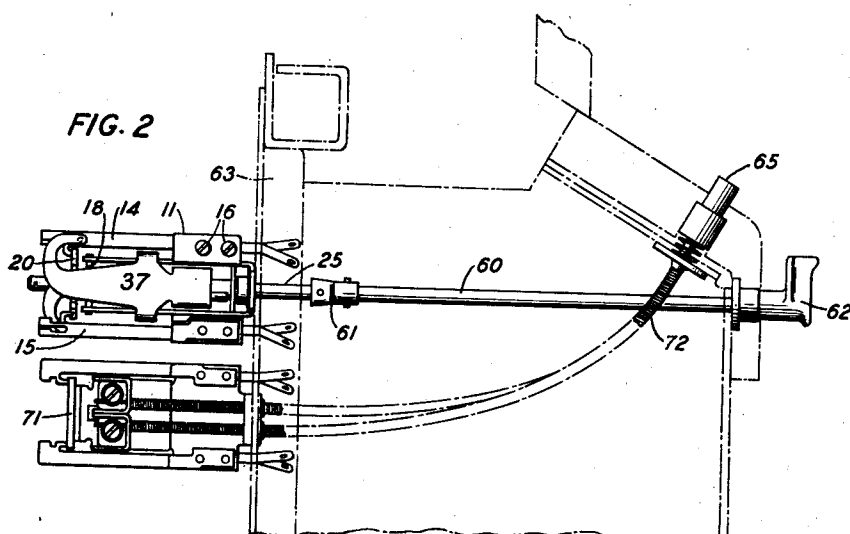
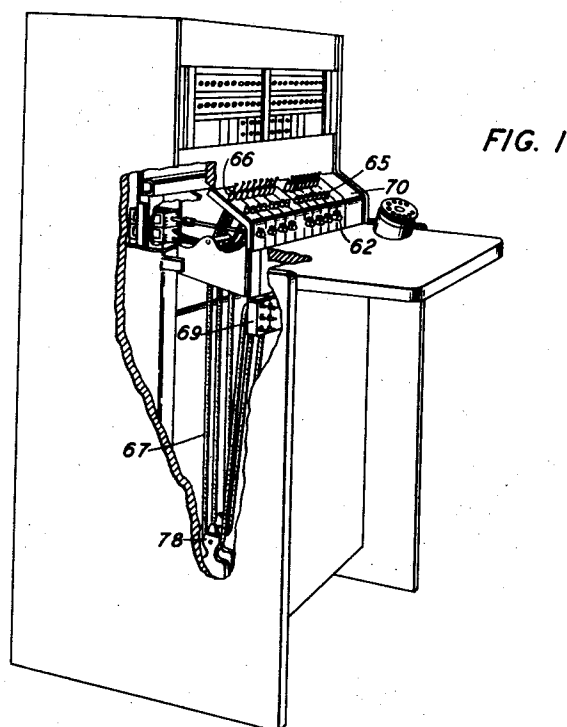
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2,253,335

CIRCUIT CONTROLLING DEVICE

Filed Feb. 14, 1940

3 Sheets-Sheet 1



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Aug. 19, 1941.

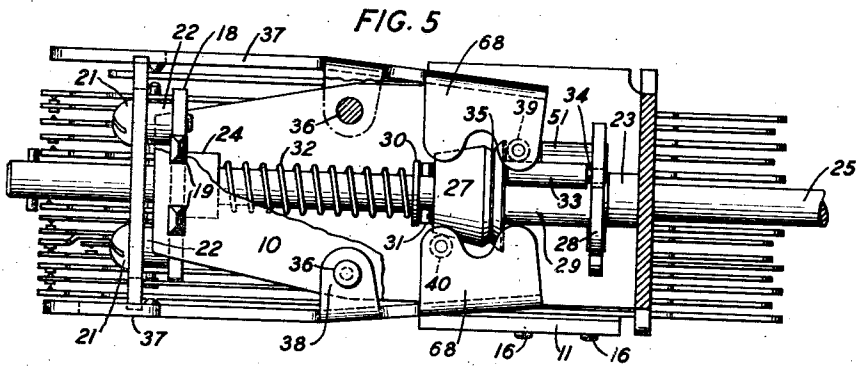
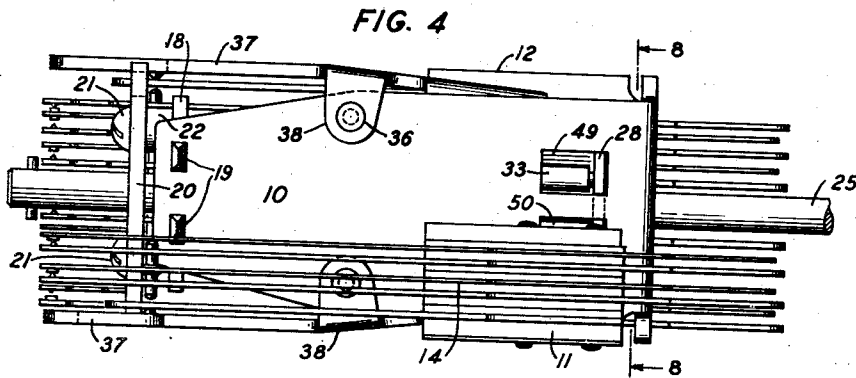
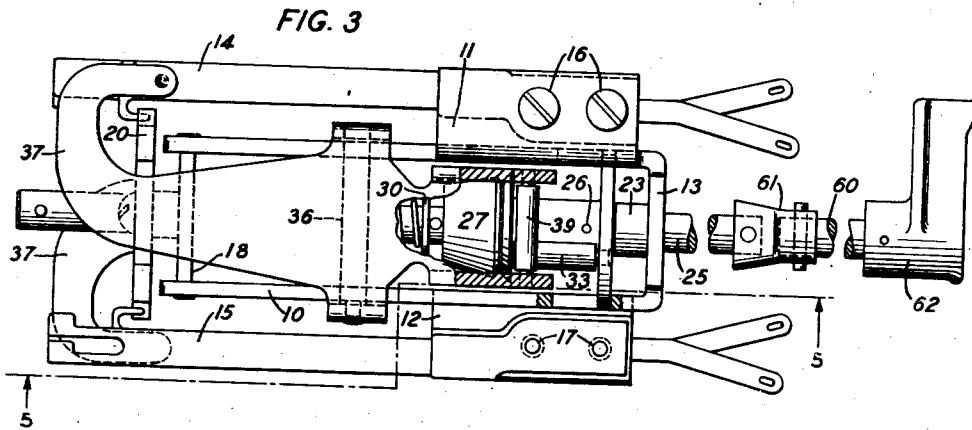
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CIRCUIT CONTROLLING DEVICE

Filed Feb. 14, 1940

3 Sheets-Sheet 2



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CIRCUIT CONTROLLING DEVICE

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3 Sheets-Sheet 3

FIG. 6

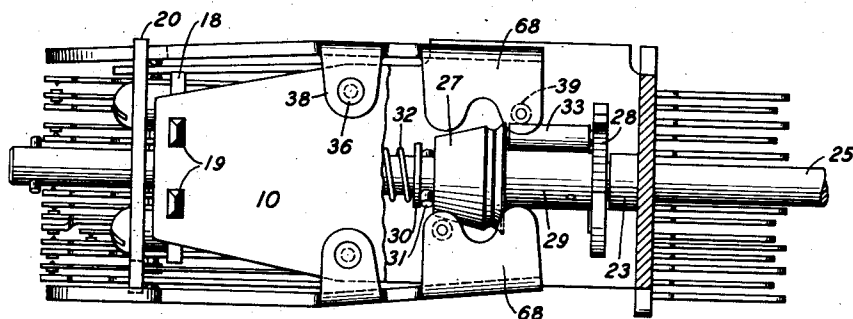


FIG. 7

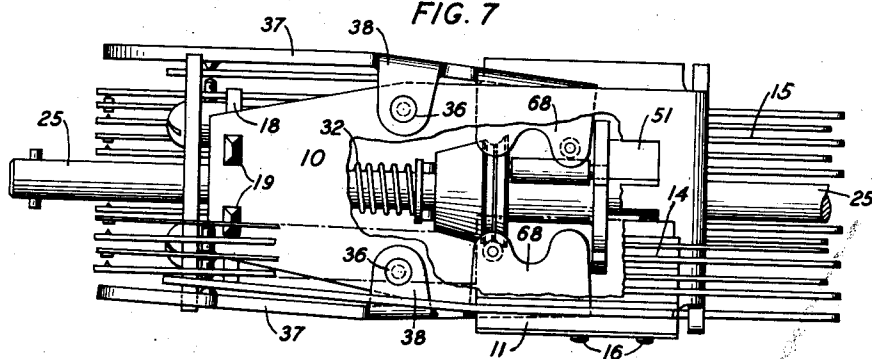


FIG. 8

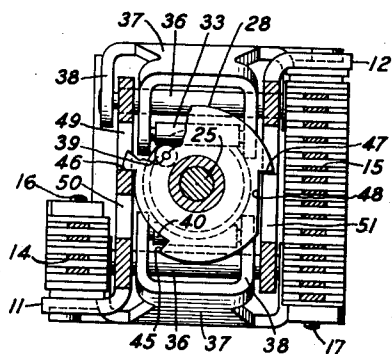


FIG. 9

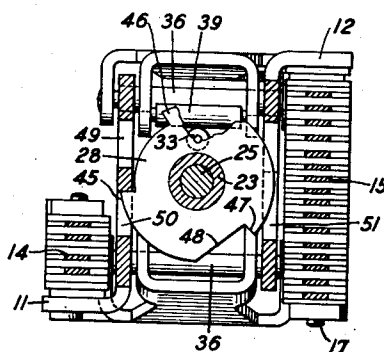


FIG. 10

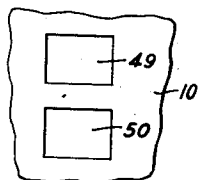
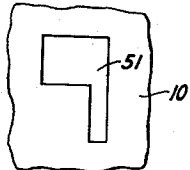


FIG. 11



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2,253,335

CIRCUIT CONTROLLING DEVICE

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Application February 14, 1940, Serial No. 318,812

9 Claims. (Cl. 179-176)

This invention relates to circuit controlling devices and particularly to manually operable contacting devices for use in telephone communication systems.

The object of the invention is to simplify the construction of manually operable circuit controlling devices of the type in which a plurality of independent contact spring assemblies are separately controlled by a single manually operable actuating device.

Heretofore, manually operable circuit controlling devices have been provided in which a key, or its equivalent, is operated in two different ways to actuate different sets of contacts to effect two distinct circuits. Such keys find use in telephone systems wherein an operator is called upon to first associate her telephone set with a calling line and subsequently, to apply signaling current to a called line. In general, a lever type key mounted on the shelf of the telephone switchboard has been used for this purpose which, when actuated in one direction, serves to connect the operator's telephone set with the calling line and, when actuated in another direction, functions to connect a source of ringing current to the called line.

In recent development of the telephone switchboard it has been found desirable to locate the actual circuit controlling mechanism at the rear of the board in a space comparable to that ordinarily occupied by a telephone relay, and to render such control device operable from the front or face of the board. Switching devices of the prior art do not readily lend themselves for mounting in this manner.

According to the present invention, advantages over devices of the prior art are secured by constructing the circuit controller per se, in such a manner that the separate spring assemblies are mounted parallel to one another on either side of a mounting frame which may be readily carried by the apparatus support at the rear of the board, and by providing manually operable means, in the nature of a plunger capable of rotary and longitudinal displacements, for separately operating the spring assemblies, the plunger being adapted to be actuated in a rotary manner and longitudinally from the front of the switchboard. More specifically, the plunger acts upon a separate rocker arm during each of its rotary and longitudinal displacements in such a manner that each of the spring assemblies is actuated in substantially the same manner, thus obviating the necessity for mounting one spring assembly in such a manner as to be influenced directly by the ro-

tary movement of the plunger and the other spring assembly at right angles to the first assembly so as to be controlled directly by the longitudinal thrust of the plunger.

A related feature of the invention resides in the use, in a structure of the type described above, of cooperating guide slots cut into the side of the mounting frame and of means carried by the plunger and adapted to be selectively engaged in either thereof to effect the respective rotary and longitudinal displacements of the plunger, said means functioning in said slots in such a manner as to preclude the possibility of simultaneous rotary and longitudinal displacements of the plunger.

The invention will be readily understood from the following detailed description made with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a telephone switchboard with sections of the superstructure broken away to disclose the relationship of the switching device of this invention to other equipment of which the switchboard is made up;

Fig. 2 is an enlarged view of the switching device of the present invention illustrating the manner in which it is mounted on the switchboard, a portion of which is outlined in broken lines;

Figs. 3 is a side view of the switching key with a portion of one of the rocker arms broken away to disclose the mechanism located beneath it;

Fig. 4 is a top view of the switching key without the handle and universal coupling between the plunger and operating shaft;

Fig. 5 is a view of the switching key taken along the line 5-5 of Fig. 3 looking in the direction of the arrows;

Fig. 6 is a view of the switching key corresponding to Fig. 4 with a portion of the mounting frame removed and in which the plunger has been rotated to effect the actuation of the upper spring assembly shown in the figure;

Fig. 7 is a view corresponding substantially to Fig. 6 and in which the plunger has been displaced longitudinally to effect the actuation of the lower spring assembly;

Fig. 8 is an end view taken along the line 8-8 of Fig. 4 looking in the direction of the arrows;

Fig. 9 is a view substantially similar to Fig. 8 and in which the plunger shaft has been rotated; and

Figs. 10 and 11 are views of portions of the two sides of the mounting bracket showing the apertures therein which serve as interlock and stops for the operating shaft of the switch.

The following description is made with particular reference to Figs. 3 to 9, inclusive.

The switching device of this invention is in reality a "push-turn" key and has a substantially U-shaped mounting bracket 10 which serves to support all the elements of which the device is composed. The bracket 10 is provided with two shelf-like integral projections 11 and 12, the former extending upwardly (viewing Fig. 3) from the outer edge of one of the parallel arms of the bracket near the cross-piece 13, whereas the latter extends downwardly from the inner edge of the other parallel arm of the bracket, also near the cross-piece 13. Upon these shelf-like extensions are mounted the spring pile-ups 14 and 15, the spring pile-up 14 being secured to the extension 11 by means of screws 16, while the spring pile-up 15 is secured to the extension 12 by means of screws 17. The contact springs of the two spring pile-ups run parallel to the longitudinal axis of the frame 10 and, as described, are mounted on either side thereof.

At the front end of the bracket 10 a substantially square metal piece 18 is interposed between the outer extremities of the two parallel arms of the bracket 10 and is provided with two lugs 19 on each of two of its opposite edges which fit into corresponding holes in the two arms of the bracket. The lugs 19, after passing through the bracket holes, are staked over to hold the piece 18 against displacement. Thus, the two parallel arms of the bracket are permanently held in spaced relation.

A substantially rectangular-shaped insulator 20 is secured to the metal piece 18 by means of screws 21 and is spaced from the ends of the bracket arms by means of bushings 22 through which the screws 21 pass to engage threaded holes in the piece 18. On its two longer sides, the insulator 20 is notched to provide seats upon which the contact spring tangs rest.

The cross-bar 13 and the metal piece 18 are each provided with a circular opening into each of which is tightly fitted a brass collar 23, 24; the former projecting inwardly from the inner face of the cross-bar 13 and being flush with its outer face, and the latter projecting inwardly from the inner face of the metal piece 18 and being flush with its outer surface. These collars or bushings provide bearings for the plunger shaft 25 whose inner end extends through a circular aperture in the insulator 20, which aperture is in alignment with the opening in the collar 24.

Fixedly associated with the shaft 25 by means of a pin is a spool 29, one head of which comprises a notched disc 28 and the other head of which is provided with a centrally located boss against which the forward face of a tapered element or cone 27 abuts. The cone 27 is loosely fitted to the shaft 25 and is held against substantial longitudinal movement relative to the shaft by the rear head of spool 29 and pin 31. The cone is thus made subject to the longitudinal movements of the shaft but is free to rotate independently thereof. The boss reduces the area of contact between the spoolhead and the front face of the cone. A washer 30 fits over the shaft 25 just ahead of the smaller end of the cone 27 and is separated therefrom by the pin 31 which extends through the shaft as clearly disclosed in Fig. 5. Encircling the shaft 25 between the washer 30 and the front face of bushing 24 is a compression spring 32 which tends to hold the shaft 25 against longitudinal movement and which serves to restore the shaft to normal position

after it has been longitudinally actuated as will be more particularly described hereinafter.

Interposed between the forward end of the tapered element or cone 27 and the rear face of the disc 28 is a hollow cylindrical roller 33 which is adapted to rotate on a pin whose ends are staked or otherwise secured to the tapered element 27 and disc 28. The function of this roller will appear from a description to be made hereinafter. The tapered element 27 near its larger end is provided with an annular groove 35 for a purpose to be indicated later.

The upper and lower edges of each of the parallel arms of the U-shaped bracket 10 are each provided with a small hole located at a point substantially equidistant from the ends of the parallel arms and slightly nearer the rearward ends. These holes accommodate pins 36, each of which bridges the two arms of the bracket 10. Each pin 36 provides a mounting for a substantially J-shaped rocker arm 37, each of which is provided with a pair of integral lugs or ears 38 which are apertured to fit over the protruding ends of the pins. The arms 37, when actuated, pivot about their respective pins 36 as will be described more fully later.

The forward end of each of the rocker arms is provided with a pair of oppositely disposed integral ear-like appendages or lugs 68, between each pair of which is mounted a roller 39, 40, identical to and mounted in the same fashion as roller 33 hereinbefore described. As illustrated particularly in Fig. 5, the roller 40 normally contacts the tapered element 27 near its smaller end whereas the roller 39 is constantly in contact with the surface of roller 33, the rollers 33 and 39 being disposed at right angles to one another. It will now be apparent that when the shaft 25 is displaced longitudinally, that is, when it is moved inwardly on its bearings 23 and 24, the tapered surface of element 27 will ride over the roller 40 and, due to its camming action, will move the roller downwardly (viewing Fig. 5) with the result that the lower rocker arm (Fig. 5) will rotate about the pin 36 causing its hooked arm to actuate the spring assembly 14 which is mounted on the shelf-like extension 11 of the mounting bracket 10. During this operation the roller 39 rides freely over the roller 33. When the roller 40 is passed over by substantially the entire length of the tapered portion 27 it falls into the groove 35, thus being held in its operated position against accidental displacement and by the force of spring 32 which is compressed during this action. It is apparent from this description that when the shaft 25 is moved inwardly the lower rocker arm 37 (Fig. 5) is actuated to cause it to operate the springs 14, it being understood that the outer extremity of the hooked end of the rocker arm is positioned immediately over the outer spring of this pile-up. The condition which prevails when the shaft 25 is moved inwardly is illustrated in Fig. 7. To restore the key to normal it is only necessary to pull outwardly on the shaft 25 to clear the roller 40 of the groove 35, the spring 32 as well as the tension of the springs 14 then serving to project the shaft 25 back to its normal position.

With the key in its normal unactuated position illustrated in Fig. 5, the shaft 25 may be rotated as well as moved longitudinally. When rotated, the shaft 25 and the spool 29 also rotate so that roller 33 is moved in an arcuate path, and being in contact with the roller 39 associated with the upper rocker arm 37 (Fig.

5), moves the roller 39 upwardly so that the rocker arm is caused to pivot about its pin bearing 36 and actuate the springs 15 which are mounted on the bracket extension 12. It is apparent that during the rotary movement of shaft 25 there is no camming action between the roller 40 and the tapered element 27, nor does the latter follow the rotational movement of the shaft. The condition which prevails when the shaft 25 has been rotated is illustrated in Fig. 6.

The functions of the disc 28 will now be described and for this purpose particular reference is made to Figs. 8, 9, 10 and 11. The disc 28 is fundamentally circular but is provided, at one location, with an arcuate notch defined by the projections 45 and 46 and at another location with an L-shaped cut defined by the projection 47 and the flat edge 48. The parallel arm of bracket 10, to the left in Figs. 8 and 9, is provided with two substantially rectangular apertures 49 and 50, as clearly disclosed in Fig. 10, whereas the other arm of bracket 10 is provided with an L-shaped aperture 51, as clearly shown in Fig. 11. These apertures, or the walls defining the same, cooperate with the disc projections in such a manner as to effect an interlocking arrangement by virtue of which the shaft 25 may be rotated or moved longitudinally from its normal position but cannot experience both movements simultaneously, thereby preventing the actuation of both spring pile-ups 14 and 15 at the same time. As illustrated in Fig. 8, the shaft 25 is in its normal position, and in such position the disc projection 46 abuts against the upper edge of the metal piece, or partition, which separates the bracket apertures 49 and 50. In this position also, the straight edge 48 is in a plane parallel to the vertical plane of the arm of bracket 10 shown on the right of Figs. 8 and 9, and the face of projection 47 just clears the lower wall of the horizontal portion of the L-shaped slot 51 and is in vertical alignment with the vertical portion of slot 51. It will be apparent, therefore, that from the normal position illustrated in Fig. 8, the disc 28 may be rotated clockwise until the face of projection 45 engages the upper wall of aperture 50 and during such rotation, the projection 47 passes freely in the vertical portion of aperture 51. The position of the disc when fully rotated is illustrated in Fig. 9. It will be thus observed that the shaft 25 may be rotated in a clockwise direction from its normal position to cause the actuation of the spring pile-up 15 and is limited in the extent to which it may be rotated by the engagement of projection 45 with the underface of the metal partition between apertures 49 and 50.

From its normal position (Fig. 8) the shaft 25 may be moved inwardly. During such an operation the disc projection 46 rides along the upper face of the partition between apertures 49 and 50, and the projection 47 rides along the face which defines the lower edge of the horizontal portion of aperture 51. The straight edge 48 clears the inside face of the mounting frame arm shown at the right of Figs. 8 and 9. The extent to which the shaft 25 may be displaced longitudinally is determined by the length of aperture 49 and the length of the horizontal portion of aperture 51 since the projections 46 and 47 abut against the rear walls of these apertures when the shaft 25 is moved inwardly.

Not only does the disc 28 and the apertures 49, 50 and 51 constitute a guide arrangement

whereby the shaft is guided in its longitudinal and rotary displacements, but they also serve to effect an interlock arrangement. It will be observed that when the shaft 25 is moved inwardly, it is impossible to rotate the shaft at any time during such movement due to the engagement of projection 47 with the lower edge of slot 51 as well as due to the engagement of projection 46 with the upper face of the partition between apertures 49 and 50. Similarly, when the shaft is being rotated, it cannot be moved longitudinally due to the fact that the projection 47 and that portion of the disc immediately behind it, travels rotationally into the vertical portion of slot 51 and should an effort be made to move the shaft longitudinally, the disc portion moving in the narrow portion of slot 51 would abut against the side walls thereof.

In order to permit the mounting of the key unit at the back of the switchboard on the apparatus supporting frame and at the same time to allow the device to be actuated from the front of the board, the shaft 25 is provided with an extension 60 which is joined thereto by means of a universal coupling 61. This coupling is essentially a sleeve having its two ends flared, with a pin securing the end of shaft 25 to one end of the sleeve and a similar pin securing the end of extension 60 to the other end of the sleeve. The pins are relatively disposed at right angles so that a limited amount of relative universal movement of the shaft and its extension is permitted. The purpose of such a coupling is to allow for any variations in the alignment of the shaft 25 with the hole in the front of the switchboard through which the extension end protrudes. A grip or handle 62 is secured to the forward end of the extension 60 to facilitate the operation of the key.

In Figs. 1 and 2 the key structure of this invention is illustrated in its particular application as a telephone switchboard accessory. The cross-bar 13 of the mounting bracket 10 is furnished with a series of tapped holes which accommodate a corresponding number of screws which pass through the switchboard frame piece or relay rack 63. In this manner the key unit is securely held in position. In practice, the "push-turn" key constitutes one of the elements of a cord circuit unit which includes a "push-push" key 65, a plug 66 with its associated cord 67 and weighted pulley 78, and a cord terminal block 69. Such units may be added to the switchboard as required and when the board does not require all the cord units which it will accommodate, the unused spaces are furnished with blanks, one such being indicated at 70. Except for the "push-turn" key, this equipment does not constitute a part of the present invention and has been illustrated merely to show the location and mounting of the "push-turn" key with respect to other apparatus of the cord circuit unit of which it constitutes an essential element. The "push-push" key indicated generally by the numeral 65 is operated by means of two buttons located on the sloping section of the board, and in order to permit the switching device 71 to be mounted on the rack 63 which carries the "push-turn" key and other switching devices, such as relays, etc., it is necessary that the actuating buttons 65 be coupled to the operating mechanism of key 71 by means of a flexible shaft or its equivalent. In Fig. 2, each of the buttons 65 is shown connected to the contact spring operating mechanism by means of a

piece of piano wire which is encased in a flexible casing 72.

From the foregoing description it is apparent that the switching device of this invention is simple and compact in construction, dependable in operation and is of a design which readily lends itself for use in modern type telephone switchboards, wherein all the circuit controlling devices, per se, are mounted on a relay rack at the rear of the board and certain of which are manually controlled from the front of the board.

What is claimed is:

1. In a switching device, a mounting frame, a spring assembly supported on either side of said frame, a plunger mounted on said frame for rotary and longitudinal displacements to actuate one of said spring assemblies when rotated and to actuate the other of said spring assemblies when displaced longitudinally, a pair of guide slots in said frame, and means comprising a notched disc carried by said plunger and so positioned relative to said guide slots that a projection thereof effected by the notching is adapted to be selectively moved in either of said guide slots to control the respective longitudinal and rotary displacements.

2. In a switching device, a mounting bracket comprising a pair of parallel arms joined at one end by an apertured cross-bar and a shelf-like projection formed integral with each of said arms, a spring assembly mounted on each of said shelf-like projections, a shaft longitudinally and rotatably movable in the aperture of said cross-bar, a rocker arm for actuating each of said spring assemblies, a roller carried by each of said rocker arms, means carried by said shaft and cooperating with the roller of one of said rocker arms when said shaft is moved longitudinally for causing the rocker arm to actuate its corresponding spring assembly and other means carried by said shaft and cooperating with the roller on said other rocker arm when said shaft is rotated for causing the said other rocker arm to actuate its corresponding spring assembly.

3. In a switching device, a bracket, a plurality of independent spring assemblies, separate means for actuating each of said spring assemblies, a plunger carried by said frame and arranged to operate one of said actuating means when moved longitudinally and the other of said actuating means when rotated, and an interlocking arrangement for precluding the simultaneous operation of said actuating means comprising a notched disc carried by said plunger, and guide means comprising a pair of right-angularly disposed intersecting slots in said bracket so disposed relative to said disc that when said shaft is actuated, a projection on said disc travels freely in either of said slots depending upon whether the shaft is rotated or moved longitudinally and is precluded from traversing the other of said slots by the impingement of the disc projection with the side walls of the slot in which it is moving freely.

4. In a switching device, a mounting frame comprising a pair of parallelly extending arms joined at one end by a cross-bar and held in spaced relation by a spacer at the other end, said cross-bar and spacer having aligned apertures, a shelf-like projection formed integrally with each of said bracket arms and each supporting a spring assembly, separate means for actuating each of said spring assemblies, a shaft supported in the aligned apertures of said cross-bar and

spacer and arranged to be rotated and moved longitudinally, means carried by said shaft for actuating one of said spring actuating rocker arms when said shaft is rotated, means carried by said shaft for actuating the other of said spring actuating arms when said shaft is displaced longitudinally and means for controlling said shaft in its rotary and longitudinal movements, said means comprising a notched disc carried by said shaft and an L-shaped slot in one of said bracket arms, a projection of said disc effected by the notching thereof normally positioned in the intersection of the two portions of said L-shaped slot whereby, when said shaft is rotated, the said disc projection moves into one of the portions of said L-shaped slot and is prevented from longitudinal movement by the side walls thereof, and when moved longitudinally, the said disc projection moves into the other portion of said L-shaped slot and is prevented from rotary motion in one direction by a side wall thereof.

5. In a switching device, a mounting bracket comprising a pair of parallel arms joined at one end by an apertured cross-bar, a spacer interposed between the outer ends of the parallel arms of said mounting bracket and having an aperture in alignment with the aperture in said cross-bar, a shelf-like projection formed integral with each of said bracket arms and extending outwardly therefrom, a spring assembly mounted on each of said shelf-like projections, a shaft mounted for longitudinal and rotary displacements in the aligned apertures of said cross-bar and spacer, a rocker arm pivotally supported near one edge of said bracket arms and having an extension in alignment with the springs of one of said spring assemblies, a second rocker arm pivotally supported near the other edge of said bracket arms and having an extension in alignment with the springs of the other of said spring assemblies, a roller carried by each of said rocker arms and extending at right angles to the longitudinal axis of said shaft, a camming device carried by said shaft and cooperating with the roller of one of said rocker arms when said shaft is displaced longitudinally in one direction to cause said rocker arm to rotate about its pivot support and its extension to actuate the springs of one of said spring assemblies, and a roller carried by said shaft and cooperating with the roller of said second rocker arm when said shaft is rotated to cause said second rocker arm to rotate about its pivot support and its extension to actuate the springs of the other of said spring assemblies.

6. In a switching device, a mounting bracket comprising two parallelly extending arms joined at one end by an integral cross-bar, a spacer element interposed between said arms near their ends and rigidly secured thereto, said spacer and cross-bar having aligned apertures, a bearing in each of said apertures, a shaft mounted in said bearings for rotation and longitudinal displacement, a shelf-like extension extending laterally from each of said bracket arms, a spring assembly secured to each of said shelf-like extensions extending parallel to the bracket arms towards the spaced ends thereof, each of said assemblies comprising movable and stationary contact springs and said stationary springs being provided with integral tangs, an insulator secured to said spacer having an aperture through which the end of said shaft extends and being provided with a series of laterally extending integral spacing lugs upon which the tangs of said stationary springs normally

rest and the springs thus held in spaced relation, a rocker arm mounted on a pivot pin bridging the two arms of said bracket having an integral extension on one end thereof in alignment with the free ends of the springs of one of said assemblies and having a roller supported at its other end, a second rocker arm mounted on a pivot pin bridging the two arms of said bracket having an integral extension on one end thereof in alignment with the free ends of the springs of the other of said assemblies and having a roller supported at its other end, means carried by said shaft and cooperating with the roller of said first rocker arm for causing said first rocker arm to rotate about its pivot pin when said shaft is moved longitudinally, whereby the bracket extension aligned with the corresponding spring assembly engages and actuates the springs thereof, and other means carried by said shaft and cooperating with the roller of said second arm for causing said second rocker arm to rotate about its pivot pin when said shaft is rotated, whereby the bracket extension aligned with the corresponding spring assembly engages and actuates the springs thereof.

7. In a switching device, a mounting bracket comprising two parallelly extending arms joined at one end by an integral cross-bar, a spacer element interposed between said arms near their ends and rigidly secured thereto, said spacer and cross-bar having aligned apertures, a bearing in each of said apertures, a shaft mounted in said bearings for rotation and longitudinal displacement, a shelf-like extension for each of said bracket arms integrally formed therewith, a spring assembly secured to each of said shelf-like extensions and extending in the direction of the longitudinal axis of said bracket, a rocker arm mounted on a pivot support bridging the two arms of said bracket having an integral extension on one end thereof in alignment with the free ends of the springs of one of said assemblies and having a roller supported at its other end, a second rocker mounted on a pivot support bridging the two arms of said bracket having an integral extension in alignment with the free ends of the springs of the other of said assemblies and having a roller supported at its other end, means carried by said shaft and cooperating with the roller of said first rocker arm for causing said first rocker arm to rotate about its pivot support when said shaft is moved longitudinally whereby the bracket extension aligned with the corresponding spring assembly engages and actuates the springs thereof, and other means, carried by said shaft and cooperating with the roller of said second arm for causing said second rocker arm to rotate about its pivot support when said shaft is rotated whereby the bracket

extension aligned with the corresponding spring assembly engages and actuates the springs thereof.

8. In a switching device, a mounting bracket comprising a pair of parallelly extending arms joined at one end by an integral cross-bar and held in spaced relation by means of a spacer element interposed between said arms near their extremities, said cross-bar and spacer having aligned apertures, a bearing supported in each of said apertures, a shaft housed in said bearings and arranged for rotary and longitudinal displacements, a disc on said shaft, a stop comprising the partition between two apertures located on one of the arms of said bracket, means comprising a projection on said disc and one edge of said partition for limiting the rotational movement of said shaft from normal to a clockwise movement, means comprising another projection on said disc and the other edge of said portion for limiting the extent to which said shaft may be moved in the clockwise direction, guide means on the other of said bracket arms comprising intersecting right-angularly disposed slots, means comprising still another projection on said disc adapted to be selectively engaged in either of said right-angularly disposed slots to guide said shaft in its rotary and longitudinal movements, a pair of independent spring assemblies, separate operating means therefor and means carried by said shaft adapted to actuate a separate one of said spring operating means for each of its rotary and longitudinal displacements.

9. In a switching device, a mounting frame, a spring assembly supported on either side of said frame, separate means for actuating each of said spring assemblies, a plunger mounted on said frame and arranged for rotary and longitudinal displacements, a spool-like member fixed to said plunger, a roller carrier between the heads of said spool-like member and extending in the longitudinal plane of said plunger, means carried by the actuating means for one of said spring assemblies and cooperating with said roller for causing said spring actuating means to actuate its corresponding spring assembly when said plunger is rotated, a cone carried by said plunger and adapted to rotate relative thereto, said cone having one end abutting said spool member and the other end abutting a pin extending through said plunger whereby said cone moves longitudinally with said plunger, and means carried by the actuating means for the other of said spring assemblies and cooperating with said cone for causing said spring actuating means to actuate its corresponding spring assembly when said plunger is displaced longitudinally.

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