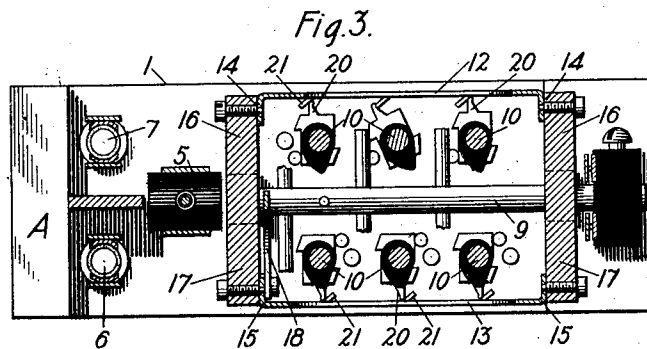
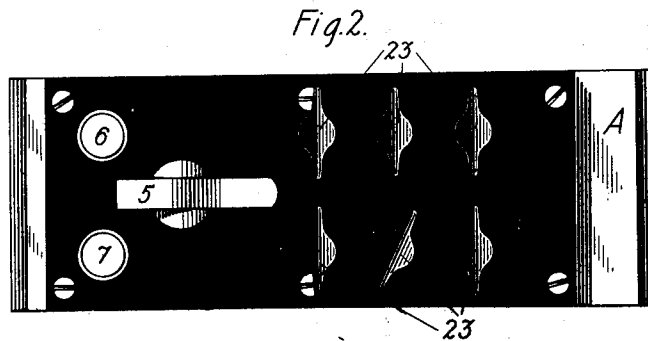
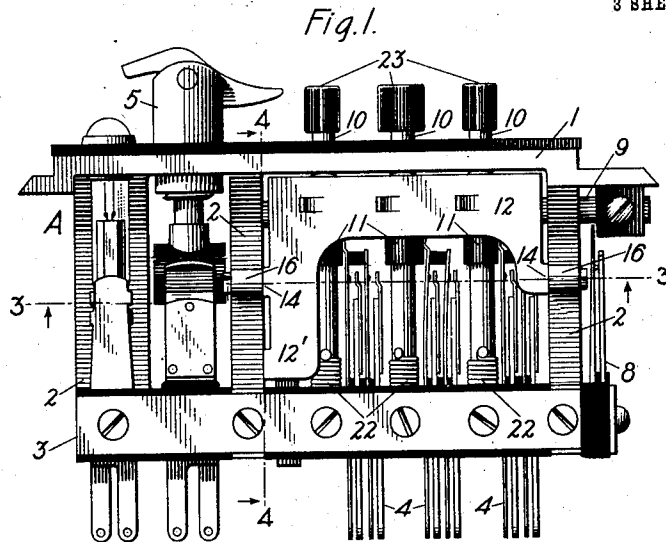


W. E. HARKNESS.
INDICATING RINGING KEY.
APPLICATION FILED APR. 14, 1909.

1,026,160.

Patented May 14, 1912.

3 SHEETS-SHEET 1.



Witnesses:
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3 SHEETS—SHEET 2.

Fig. 4.

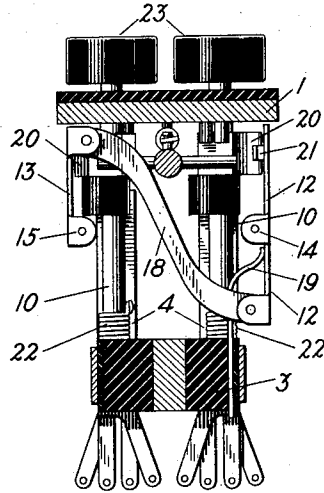


Fig. 5.

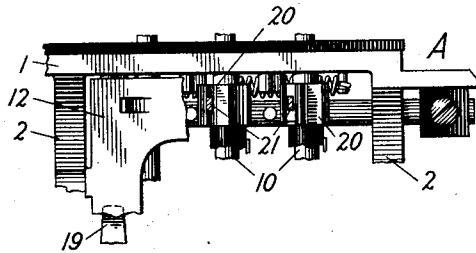
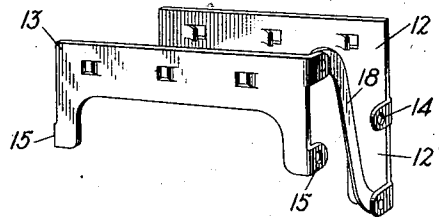


Fig. 6.



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3 SHEETS—SHEET 3.

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Fig. 7.

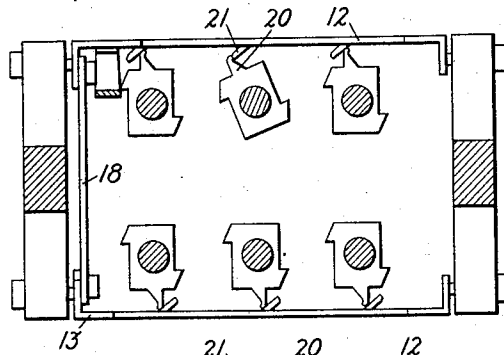


Fig. 8.

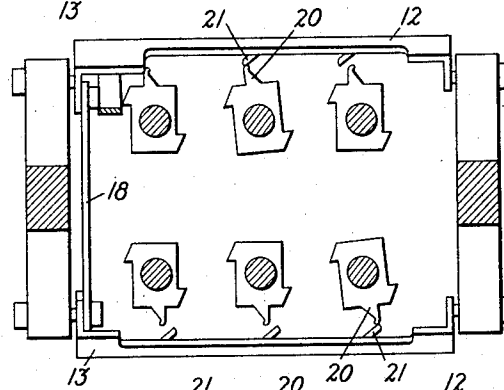


Fig. 9.

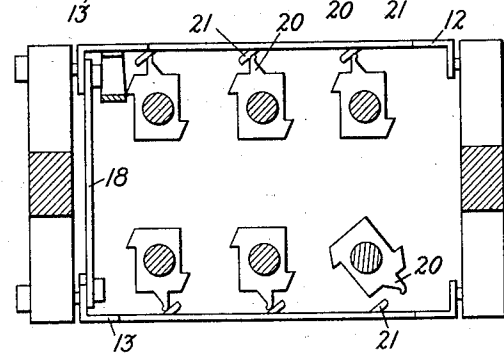
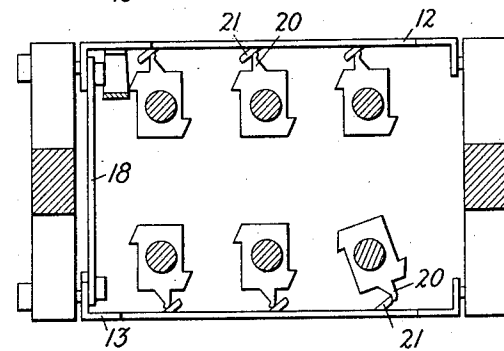


Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM E. HARKNESS, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

INDICATING RINGING-KEY.

1,026,160.

Specification of Letters Patent.

Patented May 14, 1912.

Application filed April 14, 1909. Serial No. 489,950.

To all whom it may concern:

Be it known that I, WILLIAM E. HARKNESS, citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Indicating Ringing-Keys, of which the following is a full, clear, concise, and exact description.

My invention relates to switch keys for telephone switchboards and particularly to selective party-line ringing keys having a plurality of shafts or plungers, each adapted when operated to close a set of individual switch-springs to send out over the line ringing impulses of a distinctive character.

The present practice in party-line ringing key construction is to provide a framework in which a row of vertically reciprocating plungers are mounted, and to provide means for retaining a plunger when depressed in a position intermediate its ringing and its normal or off positions, and for releasing said plunger upon the depression of another plunger in the row. Each plunger is provided with a button on its upper end above said framework, which button is adapted to serve as a convenient means by which to depress a plunger and to indicate to the operator, by reason of its being when depressed lower than the level of the other buttons in the row, that it was the last button operated, so that in case she desires to again ring the party called she may by examining the buttons determine the button corresponding to said party. These keys, however, are so mounted on the keyshelf of the switchboard that the operator must look obliquely downwardly along the row of buttons of said keys, and since the indicating position of the button of a depressed plunger is only a comparatively small distance below the level of the rest of the buttons, it is difficult for the operator to determine at a glance which plunger had been depressed.

The object of my invention is to provide a structure which will enable an operator to determine at a glance which shaft she last operated. To this end I provide a framework in which a series of vertical shafts are mounted to rock in bearings. I also provide a latch plate common to said shafts adapted to be operated by said shafts to retain an operated shaft in a po-

sition, preferably intermediate its ringing and its off or normal position, and to release said shaft upon the subsequent operation of any other shaft. I also provide each shaft at its upper end preferably with a horizontal double crank lever for operating said shaft, said levers when the shafts are in their normal positions being adapted to lie parallel with each other at right angles to the operator's line of vision, but adapted when said shafts are operated to assume a position at an angle to their normal position, thus giving a distinct and readily discernible indication to the operator.

In the preferred form of my invention I provide a framework in which two parallel rows of shafts are mounted to rock in bearings, and I also provide a latch plate parallel with each row, said latch plates being hinged to the framework and adapted to be moved outward by cam-hooks carried by the shafts. Each plate is common to its row of shafts and is provided with projections arranged to engage the cam-hooks on the shafts. The projections and hooks are so related to each other that after a shaft has been operated to its ringing position it automatically retreats to its indicating position where its cam-hook engages a projection on the latch plate, and it is retained in said position until another shaft is operated, which moves the latch plate to release said first operated shaft. In order that a shaft in one row may release an operated shaft in the other row I connect the two plates by a link, whereby when a shaft is operated it will move both plates. The shafts are provided at their upper ends with horizontal double crank levers adapted to serve as convenient means for operating the shafts and to indicate the position of said shafts.

Referring now to the accompanying drawings I will describe my invention in detail.

Figure 1 is a side elevation of a switch key embodying my invention; Fig. 2 is a top view showing one of the buttons in its indicating position; Fig. 3 is a sectional view on line 3—3 of Fig. 1 taken in the direction of the arrows and showing the relation of the latch plate to the cam-hooks on the plungers; Fig. 4 is a sectional end view on line 4—4 of Fig. 1 taken in the direction of the arrows; Fig. 5 is a fragmentary view partly broken away showing

the plungers and cam-hooks thereon; Fig. 6 is a perspective view of the latch plates and the link connecting them; and Figs. 7, 8, 9 and 10 are diagrammatic views showing the steps in the operation of a key and the releasing of a previously operated key.

Similar reference characters refer to like parts throughout the several views.

The framework A comprises a top plate 1 adapted to be secured to the keyshelf of a telephone switchboard in the usual manner. Depending from the under side of the top plate 1 are the arms 2 which carry at their lower ends the horizontal base 3, in which is supported the switch springs 4. This much is usual in party line ringing keys of this general character. I have shown in the drawings an operator's listening key 5, two supervisory lamps 6 and 7, and master contact springs 8, operated by the shafts through rod 9, all mounted in the framework A. These, however, form no part of my invention and will not be described.

In the framework A, I provide a plurality of shafts 10 arranged in two parallel rows and adapted to rock in bearings in the top plate 1 and base 3. Each shaft has associated with it an individual set of switch springs 4 which it is adapted to operate when rotated to the limit of its range of movement, and is provided with a cam 11, preferably of insulating material, adapted to engage the upper ends of switch springs 4 to close same, said cams being so shaped that they will not operate said springs to close same until after the shaft has partially completed its rotative movement. Arranged parallel with the rows of shafts and adjacent thereto are latch plates 12 and 13. These latch plates are pivoted at 14 and 15 to the outer ends of the lateral projections 16 and 17, respectively, on opposite sides of the arms 2. The plate 12 has a downwardly projecting extension 12', and this extension is connected at its lower end to the upper edge of the plate 13 by a link 18, and a spring 19 is secured to the base 3 and arranged to press outwardly on the extension 12' to yieldingly maintain its own plate 12 and the plate 13 through link 18 in operative relation to the shafts 10. On their upper portion, but underneath the top plate 1, the shafts carry cam-hooks 20. These hooks are adapted to engage corresponding projections 21 struck up from the latch plates 12 and 13. The cam-hooks 20 are so related to the projections 21 on the latch plates that when a shaft is rotated the projection 21 associated therewith rides up on the cam-hooks 20, and the latch plates are forced outwardly, but before the shaft has completed its rotative movement said projection rides off the hook 20 and, due to the pressure of spring 19, is moved

inwardly into the path of the return movement of the hook 20. The shaft is thereby retained in a partially rotated position, which I term its indicating position, until another shaft is operated, which moves the latch plates to allow said first operated shaft to return to its normal position.

Each shaft is provided at its lower end with a spiral spring 22 to automatically return an operated shaft to its normal position, and with a double crank lever 23 at its upper end to indicate to the operator the position of the shafts, and to provide a convenient means for operating said shafts.

Referring to Figs. 7, 8, 9 and 10, which are diagrammatic views showing the positions of a shaft being operated, Fig. 7 shows the normal positions of a set of shafts in a switch key, one of the shafts, however, having been operated and shown retained in its indicating position by the projection 21. Fig. 8 shows a shaft in the other row being operated. The latch plates 12 and 13 are moved outwardly by the projection 21 riding up on the cam-hook 20, and the previously operated shaft is about to be released and to return to its normal position. Fig. 9 shows the shaft being operated in its ringing positions, and shows the previously operated shaft returned. Fig. 10 shows the shaft being operated in its indicating position to which it has returned, and in which it will remain until the operator operates another shaft in the set.

It will thus be seen that when the operator operates a shaft she rotates it until the switch springs associated therewith are closed. She then releases said shaft and it returns to its indicating position and is there retained. In this position the switch springs are open, and the lever 23 is in an angular position with respect to the levers of the other shafts, thereby clearly indicating to the operator that its shaft was the last operated. When the operator operates another shaft said first operated shaft is released and returns to normal position, and the latter operated shaft is retained in its indicating position. The latch plates are connected by the link 18, so that when a shaft is operated both latch plates will be actuated to release any previously operated shaft in either row.

I claim:

1. In a switch key for telephone switchboards, the combination with a framework, a plurality of vertical rotatable operating shafts adapted to rock in bearings in said framework, each of said shafts having an off position, an intermediate indicating position and a ringing position, switch springs adapted to be operated by said shafts when rotated to their ringing positions, means for rotating said shafts to their ringing positions and for indicating the positions of said

shafts, means for restoring said shafts to their off positions, and a latch plate common to said shafts for retaining an operated shaft in its indicating position.

5 2. In a switch key for telephone switch-boards, the combination with a framework, of a plurality of vertical rotatable operating shafts adapted to rock in bearings in said framework, each of said shafts having
10 an off position, an intermediate indicating position and a ringing position, switch springs adapted to be operated by said shafts when rotated to their ringing positions, levers carried by said shafts adapted
15 to indicate the positions of said shafts and for rotating said shafts to their ringing positions, springs on said shafts for restoring them to their off positions, a latch plate common to said shafts adapted to retain
20 an operated shaft in its indicating position and to be actuated to release said shaft upon the operation of any other shaft.

3. In a switch key for a telephone switch-board, the combination with a framework,
25 of two parallel rows of vertical rotatable operating shafts adapted to rock in bearings in said framework, each of said shafts having an off position, an intermediate indicating position and a ringing position,
30 switch springs adapted to be operated by said shafts when rotated to their ringing position, a lever adapted to indicate the positions of said shafts and for rotating said
35 shafts to their ringing positions, means for restoring said shafts to their off positions,

a hinged latch plate common to each row of shafts adapted to retain an operated shaft in its indicating position, means carried by each shaft for actuating the plate common to its row, and a link connecting said plates; 40 whereby when a shaft is operated it will release any previously operated shaft in either row.

4. In a switch key for telephone switch-boards, the combination with a framework, 45 a plurality of vertical rotatable operating shafts adapted to rock in bearings in said framework, each of said shafts having an off position, an intermediate indicating position and a ringing position, horizontal operating
50 levers, adapted to indicate the positions of said shafts, carried by said shafts above said framework, switch springs supported in said framework and adapted to be operated
55 by said shafts when rotated to their ringing positions, cam-hooks carried by said shafts, a latch plate common to said shafts having projections adapted to be maintained normally in the path of said cam-hooks to
60 retain an operated shaft in its indicating position, but adapted, upon the operation of any other shaft, to be removed to release said first-operated shaft.

In witness whereof, I hereunto subscribe my name this 13th day of April A. D. 1909. 65

WILLIAM E. HARKNESS.

Witnesses:

RUSH F. NEWCOMB,
IRVING MACDONALD.