No. 836,668. PATENTED NOV. 27, 1906.

A. CARLISS.

OPERATOR'S KEY.

APPLICATION FILED APR. 1, 1901.

Fig. 1.

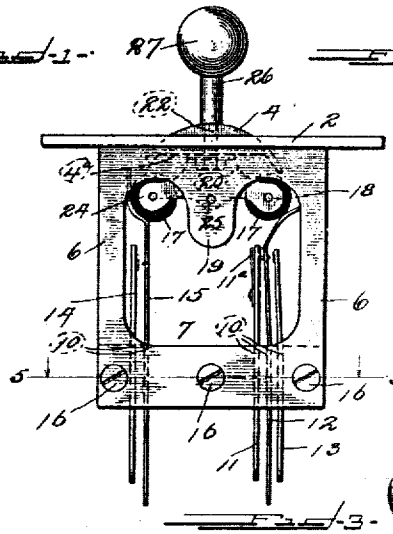


Fig. 2.

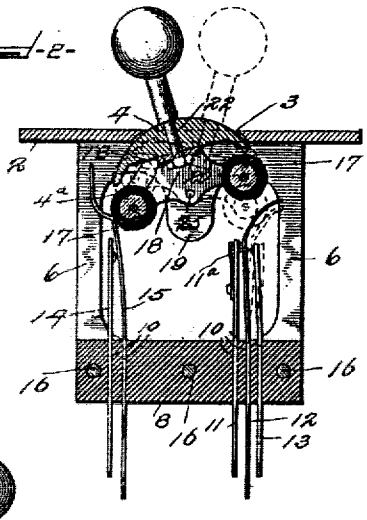


Fig. 3.

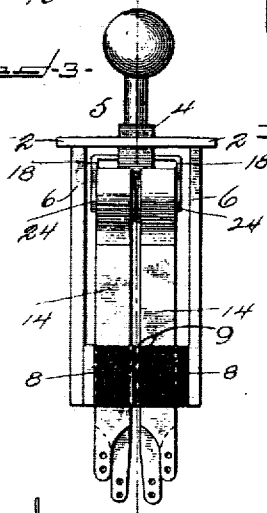


Fig. 4.

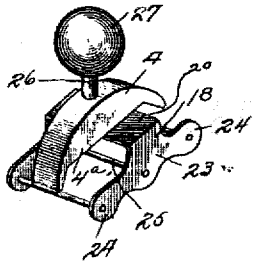


Fig. 5.

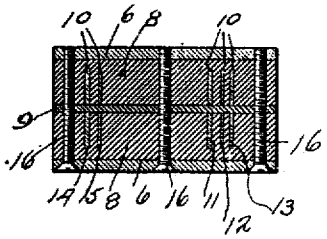
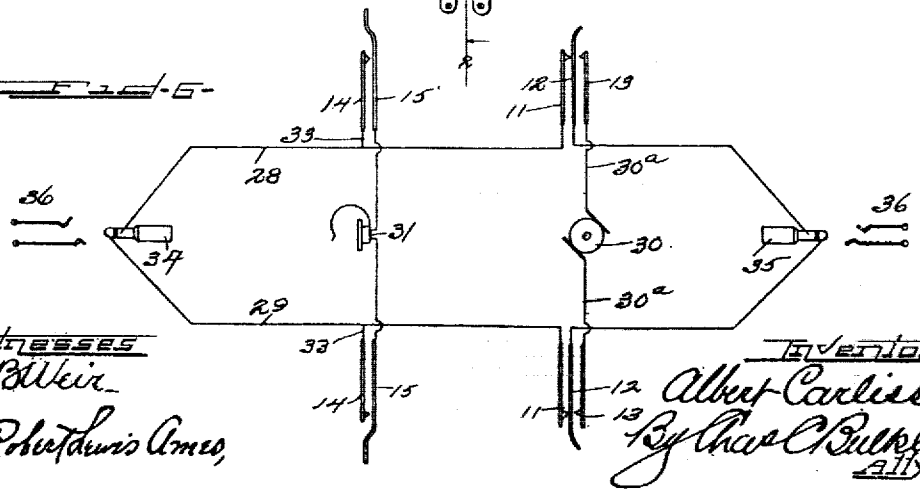


Fig. 6.



Witnesses

J. B. Weir

Robert Lewis Ames

Inventor

Albert Carliss

By Chas. C. Bulkley

Atty

UNITED STATES PATENT OFFICE.

ALBERT CARLISS, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN ELECTRIC TELEPHONE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION.

OPERATOR'S KEY.

No. 836,668. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed April 1, 1901. Serial No. 53,776.

To all whom it may concern:

Be it known that I, ALBERT CARLISS, a citizen of the United States of America, and a resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Operators' Keys, of which the following is a specification.

My invention relates to improvements in ringing and listening keys used in connection with operators' devices at central offices in telephone-exchanges, though it is apparent that it could be used for other switching purposes and in other relations.

It has for its objects the simplification of the construction and arrangement of instruments of the class specified whereby a cheaper and more efficient device is secured and one in which the listening-contacts will remain connected with the line or the cord-circuit without constantly holding it in connected position and in which the generator is thrown upon the line only so long as the key is held in ringing position.

A further object is the provision of a key having the above characteristics and in which the contacts are arranged vertically, whereby but a small space is required on the apron of the switchboard and the wiring is more easily attached thereto and requires but little space beneath the apron.

To these ends the invention consists in a switch or key having a small rectangular top or face plate having a slot therein, in which vibrates, so as to at all times fill the same, the segmental base of a key or switch lever that is pivoted beneath the plate in depending lugs forming part of the side plates of the switch-frame. The latter depend from the lower side or face of the top plate and are rectangular or square, as may be desired. The contact-springs are arranged vertically, so as to require small room and to obtain other advantages of construction, and are held near their lower ends in slots formed in insulating-blocks, and as there are two sets of such springs two such blocks are provided with the slots facing each other, and to bind the springs therein and at the same time insulate them a thin strip of insulation is placed between such blocks, when the whole is placed between the lower edges of the side plates and firmly clamped and secured therein by screws passing completely through all. The springs forming the movable contacts project above the others and are adapted to be engaged by insulating-rollers carried by the key-lever, the springs at one side of the key-lever being so formed as to hold the lever in its thrown position, but to return it to normal position as soon as released.

The invention further consists in the novel construction and combinations of parts hereinafter described and later pointed out in the claims, reference being had to the accompanying drawings, forming a part hereof, in which the same reference characters represent like parts throughout the several views, and in which—

Figure 1 is a side elevation of the switch or key. Fig. 2 is a sectional elevation of the same on the line 2 2 of Fig. 3. Fig. 3 is an end elevation of the device. Fig. 4 is a perspective view of the key-lever and its connected parts. Fig. 5 is a view showing in detail the means for holding the springs, and Fig. 6 is a diagrammatic view of a cord-circuit with the key applied thereto.

In the figures is seen the top plate 2 of the instrument, which consists of a rectangular piece of metal having a central slot 3, through which the segmental base 4 of the key-lever 5 projects and in which it is adapted to vibrate, the slot 3 being cut in the plate to closely fit the segmental base 4, both at its sides and on its periphery, whereby it is always filled, so that but little dust can work therethrough.

From the lower side of the plate 2 extend the side pieces or plates 6 of the instrument, which are formed integrally or otherwise with the said top plate 2 and are apertured, as at 7, to make a lighter construction and to open the same for purposes of inspection and repairs. Between the lower edges of these plates are secured insulating-blocks 8, which are slotted on their inner faces, said slots being arranged in groups, and between the strips is placed a thin strip 9, also of insulating material. Within these slots 10 are held the various contact strips and springs forming the switch-terminals, two pairs of three springs each, 11, 12, and 13, being shown on one side of the switch and two pairs of two springs each, 14 and 15, at the other side. They are placed vertically with their lower ends or nearly at their lower ends in the slots 10 in the insulating-pieces 8 and are separated by the thin strip 9 between the pieces, and the whole is clamped together

between the side plates 6 by screws 16 passing through the two side members 6 of the switch-frame. These springs project beneath the body of the switch for convenience in connecting the same with the circuit-wires, and, as shown, their ends are unevenly disposed to facilitate the same object. Their upper ends may have spring-pressed contact-points, as at 11ª in Fig. 2. One spring of each group is flexible and projects above the others and into the path of the insulating-rollers 17, mounted upon the tilting frame 18, which is centrally pivoted between lugs 19, forming part of the said side frames 6, and depending from the upper edges of the same down into the apertures 7 in the said side frames 6. This tilting frame 18 is made of a sheet-brass punching or of other material and in other ways and has a central flat web 20, centrally apertured for a bolt 22, and is secured to the lower edge of said segmental lever-base 4 by said bolt 22, a flattened and hollowed-out portion 4ª in said base 4 being provided for the purpose. At each end of the web the downwardly-bent flanges or webs 23 are provided, each of which have lugs or arms 24 projecting endwise or horizontally therefrom and between which the pairs of insulating-rollers 17 are journaled. The said side plates 23 have central pivot or journal holes, through which extends the pivot or journal 25, upon which the lever vibrates. This construction results in a simple yet strong and durable lever.

The upper ends of the longer springs are so bent as to be thrown over into contact with the outer set of terminals, which may be comparatively stiff, when the key is thrown over toward that side. On one side the springs 15 are so formed at their upper ends that when the key is thrown over to that side, as in full lines in Fig. 2, it remains in that position until positively returned or started on its return movement. The springs 15 press upon the rollers in such a way as to hold the key in its thrown position—that is, above a line joining the axis of the roller and the pivot 25; but as soon as the key is started back to its normal position the force of the spring assists in this action and it is returned to normal position. The other springs 12 are so formed as at all times to tend to return the key-lever to its normal position.

The key-lever 26 forms an extension of the bolt 22 and is provided with a handle or knob 27, of ebony or other desired material. This key is intended to be used, as stated, in an operator's cord-circuit, the two strands of the circuit 28 and 29 (see Fig. 6) being normally connected together through the spring-contacts 11 and 12 and are adapted to be broken by pressing said spring-contacts 12 over against the outside terminals 13, the latter being connected with the ringing-generator 30 by conductors 30ª. On the other side of the switch the spring-contacts 15 are designed to be connected with the operator's telephone 31 and to be thrown into contact with the outside terminals 14, which are connected by branch wires 33 with the cord-strands 28 and 29 to the plugs 34 and 35, which are adapted to be inserted in the jacks 36 of the subscribers' lines. It is obvious that the switch could be used in other relations than the one described, and I accordingly do not wish to be limited thereto.

From the above-described construction it will be seen that a convenient and efficient key is provided, one that consists of few parts and which is cheap to manufacture, and one that is durable under all conditions of use. Moreover, the fact that the contact-springs are arranged vertically enables the body of the key to assume small dimensions horizontally, which is an advantage in switchboard installations where the horizontal space is limited and the same arrangement permits better facilities for wiring when it is installed or removed for repairing. The insulating-rollers, besides offering an antifriction device, affords a complete insulation of the springs when operated upon.

To install the key, it is only necessary to provide a rectangular aperture in the switchboard apron or table of a size to fit the body of the key, which is then dropped therein and secured in place by screws passing through the top plate, one near each corner, into the apron, the circuit-wires being attached beneath the table to the lower ends of the contact-springs. The plate 2 would probably be let into the board flush with its upper surface, so that all that would project above the surface of the apron would be the handle 26 and knob 27.

It will be seen that the circuits in which the switch-springs are included do not include the rollers on the key-lever. These rollers are of insulating material and are consequently excluded from the switchboard-circuits.

I do not wish the invention to be limited to the precise details shown, as I hold it to include all such changes and modifications as fairly fall within the scope thereof; but

What I do claim, and desire to secure by Letters Patent, is—

1. A switch-key comprising a suitable body or bracket plate, a lever pivoted on said body or bracket plate, a pair of rolls mounted on the lower portion of said lever, said rolls being mounted at opposite sides of the pivotal point of said lever, one roll rising when the other falls, flexible contact-springs suitably mounted in insulation and extending vertically from their insulating-support, said springs being arranged in two groups, one for each roll, each roll being thus arranged to engage and operate the upper end of a group of springs, and suitable circuits excluding said lever and rolls and controlled by said springs.

2. In a combined ringing and listening key, the combination of a key or movable member, listening contact-springs adapted and arranged to be operated by said key or movable member, one or more of said listening contact-springs being adapted to maintain said key or movable member in a position to hold the listening-contacts closed, and also to hold said key or movable member in its normal position, ringing contact-springs arranged to be operated by said key or movable member, one or more of said ringing contact-springs being adapted to prevent the key or movable member from remaining in a position to hold the ringing-contacts closed, all of said springs rising vertically from a bottom of insulation, and suitable circuits excluding said lever and rolls and controlled by said springs.

3. A combined ringing and listening key comprising a pivoted hand-lever, listening contact-springs, one or more of said listening contact-springs being adapted to engage and hold said lever in its inclined position, and ringing contact-springs arranged in position to be operated by said lever, one or more of said ringing contact-springs being adapted to prevent said lever from remaining in an inclined position, all of said springs rising from a bottom of insulation, and suitable circuits excluding said lever and rolls and controlled by said springs.

4. In a combined ringing and listening key, the combination of four listening contact strips or springs, two for each side of the cord-circuit, a pivoted lever for operating said listening contact strips or springs, one or more of said listening contact-springs being adapted to maintain said lever in a position to hold the listening-contacts closed, six ringing contact springs or strips arranged to be operated by said lever, there being three ringing strips or springs for each side of the cord-circuit, one or more of said ringing contact-springs being adapted to prevent the lever from remaining in an inclined position, the ringing-contacts thereby being self-opening, all of said springs rising from a bottom of insulation, and suitable circuits excluding said lever and rolls and controlled by said springs.

5. A combined ringing and listening key comprising a pivoted hand-lever, listening contact-springs adapted and arranged to be operated by said lever, one or more of said listening contact-springs being adapted to hold said lever in a position to close the listening-contacts, and also to hold said lever in its normal upright position, ringing contact-springs adapted and arranged to be operated by said lever, one or more of said ringing contact-springs being adapted to prevent said lever from remaining in a position to close the ringing-contacts, all of said springs rising from a bottom of insulation, and suitable circuits excluding said lever and rolls and controlled by said springs.

6. A combined ringing and listening key, comprising a pivoted hand-lever, said lever having its lower portion formed with oppositely-projecting swinging arms, one arm being adapted to rise and the other to fall, listening contact-springs adapted and arranged to be operated by one of said arms, one or more of said listening contact-springs being adapted to hold said lever in an inclined position, and to also hold said lever in its normal or upright position, ringing contact-springs adapted and arranged to be operated by one of said arms, one or more of said ringing contact-springs being adapted to prevent the lever from remaining in an inclined position, and all of said springs rising from a bottom of insulation.

7. A combined ringing and listening key comprising a pivoted lever, a pair of oppositely-arranged rolls carried by said lever, said rolls being arranged one at each side of the axis of said lever, listening contact-springs arranged to be operated by one of said rolls, one or more of said listening contact-springs being adapted to hold the lever in an inclined position, so as to keep the listening-contacts closed, ringing contact-springs arranged to be operated by the other of said rolls, one or more of said ringing contact-springs being adapted to prevent the lever from remaining in an inclined position, said ringing-contacts thereby being self-opening, and all of said springs rising from a bottom of insulation.

8. In an operator's key, the combination with a top plate having an aperture therein, a key-lever pivotally supported on the plate and having outwardly-extending arms, rollers journaled in said arms, sets of contact-springs supported from said top plate and vertically arranged, their free ends being adjacent the said rollers, one spring of each set being adapted to be engaged by a roller on one of said arms when the lever is tilted in that direction, and one or more of said springs having a bent portion which presses against the roller above the center line of the roller and lever pivot when the lever is moved to that side, whereby the lever will remain on that side until positively released.

9. In an operator's listening and ringing key, the combination with a top plate, of side plates secured to the bottom of the top plate and depending therefrom, a key-lever pivoted between said side plates and having a segmental base projecting through said slot, a handle secured to said base, arms carried by said lever beneath the top plate, insulating-rollers journaled on said arms, insulating-strips having slots therein located between the lower edges of said side plates, and contact-springs in said slots extending vertically to a point adjacent said insulating-rollers, some of said springs projecting into the path of said rollers and adapted to be acted upon thereby, the said projecting springs on one side of the lever

being so formed as to hold the lever when it is thrown to that side.

10. In a listening and ringing key, the combination with a top plate, of side plates depending therefrom, insulating-strips secured between the lower edges of said plates, contact-springs carried by said strips and extending vertically therefrom, and a key-lever journaled between said side pieces and having insulating-rollers adapted to act upon the free ends of said contact-springs and having a segmental base extending through a corresponding slot in the top plate.

11. In an operator's ringing and listening key, the combination with a top plate having a slot therein, a pivoted key-lever having a segmental base portion projecting through said slot, and provided with a bracket carrying roller means, the ends of said slot being formed to closely fit the curved edge of the segmental base portion and the sides of the slot also closely fitting the sides of the segmental base portion, whereby dust is prevented from working through the slot, and switch-springs rising from a bottom of insulation, and operated by the said key-lever, said bracket having arms provided with said roller means for operating the springs, one arm rising when the other falls, and suitable provisions whereby the axis or axes of the roller means for operating the switch-springs extends or extend at an angle to a line or lines drawn from the axis of the operating-lever, said imaginary line or lines passing through said axis or axes, and the said axis or axes extending at an angle to the plane in which the said lever swings or rocks.

12. In an operator's listening and ringing key, the combination with a top plate having an elongated slot therein, of side plates depending from the lower side of said top plate, a key-lever comprising a segmental base adapted to fill said elongated slot at all times, a handle portion extending therefrom above the plate, a bottom portion secured to the lower side of said segmental base and having horizontally-extending arms and pivoted at its central portion between the side plates, insulating-rollers carried by said arms, vertical contact-springs supported at their lower ends by insulation between the lower portions of the side plates, said springs having upper ends extending into the path of the vibrating rollers.

13. In an operator's listening and ringing key, the combination with a top plate having an elongated slot therein, of side plates depending from the lower side of said top plate, a key-lever comprising a segmental base adapted to fill said elongated slot at all times, a handle portion extending therefrom above the plate, a bottom portion secured to the lower side of said segmental base and having horizontally-extending arms and pivoted at its central portion between the side plates, insulating-rollers carried by said arms, vertical contact-springs supported at their lower ends by insulation between the lower portions of the side plates, their upper ends extending into the path of the vibrating rollers, the upper ends of said springs on one side of the lever being bent so as to hold the roller when the lever is pressed to that side, and to return the roller to normal position when the lever is started back.

14. In an operator's ringing and listening key, the combination with a top plate having a slot therein, a pivoted key-lever having a segmental base portion projecting through said slot, and provided with a bracket, the ends of said slot being formed to closely fit the curved edge of the segmental base portion and the sides of the slot also closely fitting the sides of the segmental base portion, whereby dust is prevented from working through the slot, and switch-springs rising from a bottom of insulation supported below the said plate and operated by the said key-lever, the said bracket being provided with roller means for engaging said switch-springs, and suitable provisions whereby the axis or axes of the roller means for operating the switch-springs extends or extend at an angle to a line or lines drawn from the axis of the operating-lever, said imaginary line or lines passing through said axis or axes, and the said axis or axes extending at an angle to the plane in which the said lever swings or rocks.

Signed by me at Chicago, Cook county, Illinois, this 23d day of March, 1901.

ALBERT CARLISS.

Witnesses:

CHAS. C. BULKLEY,

H. P. CLAUSEN.