Sept. 16, 1924. 1,508,798

A. KLAY

KEY

Filed Aug. 23, 1920

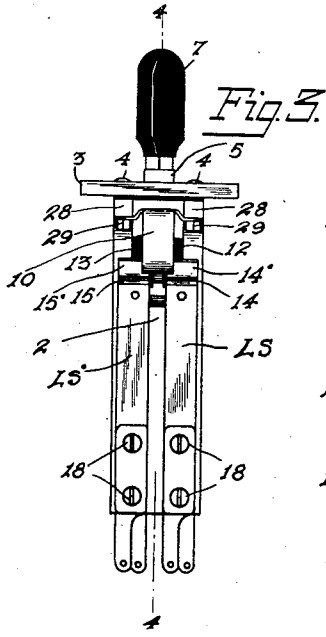



Fig. 3.

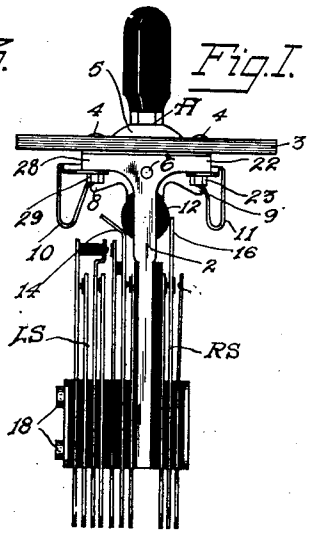



Fig. 1.

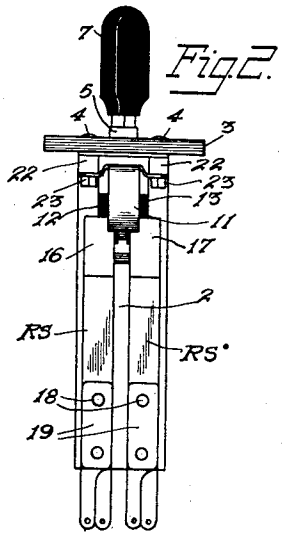



Fig. 2.

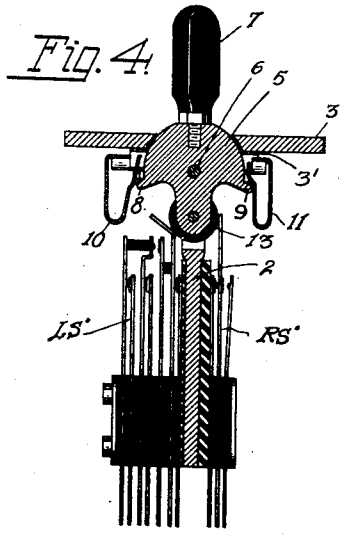



Fig. 4.

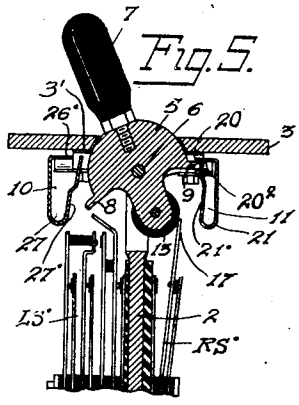



Fig. 5.

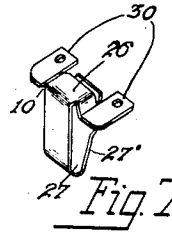



Fig. 7.

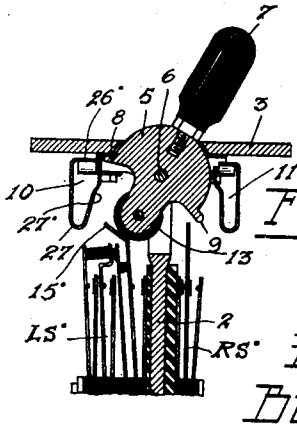



Fig. 6.

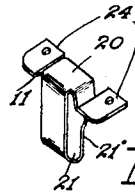



Fig. 8.

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# UNITED STATES PATENT OFFICE.

ALBERT KLAY, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## KEY.

Application filed August 23, 1920. Serial No. 405,220.

*To all whom it may concern:*

Be it known that I, ALBERT KLAY, a citizen of the United States of America, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Keys, of which the following is a specification.

My invention relates to telephone keys and has to do more particularly with what is known as ringing and listening keys, although applicable to keys of many different types.

Keys of the above type usually comprise two sets of contact springs, one set controlling the connection of the operator's set with the line, and the other controlling the connection of the ringing generator with the line. A key lever is usually provided for controlling the operation of the spring sets, and when the key lever is restored to its normal position after being in either its ringing or listening position, it is restored with what may be termed a snap action, due to the spring pressure of the springs of the contact set. When this occurs, the actuating roller, operatively associated with the key lever, is thrown against the springs of the opposite set, causing at times a momentary operation of these springs. This action is often undesirable for the reason that it disturbs the circuit arrangement controlled by the latter mentioned set of contact springs. This trouble, of course, is found with two-way keys and where the circuits controlled by the keys are such that they cannot be momentarily disturbed by the rebound or snap action of the key lever. Adjustment and careful operation of the key, of course, tends to overcome this objectionable operation.

An object of my invention is to provide cushioning means to prevent this rebound or blow of the actuating roller of the key lever when it is restored to its normal position.

A feature of my invention is the provision of resilient means in the form of a U-shaped member suitably secured to the key frame which is operatively associated with the cam member of the key lever, and which operates as a limiting stop.

Another feature of my invention is the provision of a member which is engaged by the cam member to prevent an improper operation of the contact springs when the said key lever is restored to its normal position from either of its actuated positions.

Another feature of my invention resides in the fact that the stop member is so constructed as to not only prevent an improper operation of the spring contacts, but also acts as a stop to either limit the movement of the key lever, or to entirely prevent a movement of the same.

It is a further object of my invention to produce an improved device of the class described which will embody desirable features and advantages, all in a simple, efficient and economical manner, and for a more complete understanding of my invention reference may be had to the accompanying drawing in which like reference characters in the several views denote like parts, and in which—

Fig. 1 is a side view in elevation of the preferred form of my invention.

Fig. 2 is a right end view of Fig. 1.

Fig. 3 is a left end view of Fig. 1.

Fig. 4 is a sectional view along the line 4—4 of Fig. 3.

Fig. 5 is a partial sectional view of the key, showing it in one of its positions.

Fig. 6 is a partial sectional view of the key, showing it in the other of its positions.

Figs. 7 and 8 are perspective views of the cushioning springs.

Referring now more in detail to my invention as illustrated, the preferred form of my key comprises a frame 2 of extruded metal T-shaped and a washer 3′ for deadening noise which are suitably fastened to an escutcheon plate 3 by means of the screws 4, the washer 3′ separating the T-shaped member from the escutcheon 3. A member A for actuating the various contact springs, comprises a pivoted body or cam 5 pivotally supported in the frame 2 by means of the pivot pin 6. The body portion of the cam 5 is semi-circular in shape and extends through a suitable opening in the escutcheon plate 3. A lever or handle 7 of suitable insulating material is provided with a stud which has screw-threaded engagement with a suitable tapped opening in the upper portion of the cam 5. I also provide stops 8 and 9 for the cam which are integrally formed therewith, and operatively asso-

ciated with the cushioning clips 10 and 11, and, the operation of the cam 5 in conjunction with the said cushioning clips will be more fully hereinafter described.

Mounted upon the lower end of the cam 5 are rollers 12 and 13 of suitable insulating material, rotatably secured thereto and positioned between the free ends of springs 14, 15 and 16, 17. For the purpose of illustrating my invention, I show four sets of springs secured to the frame 2. The spring groups associated with the springs 14 and 15, and the spring groups associated with the springs 16 and 17 are securely mounted on the frame 2 by means of insulated screws 18, the said screws passing through suitable openings in the frame 2 and having screw-threaded engagement with suitable tapped openings in the plates 19, thus securely clamping and holding the spring sets in place upon the frame 2.

The means provided for preventing an improper operation of the operating lever when restoring to its normal position from either of its actuated positions, is in the form of cushioning clips or springs 10 and 11 operatively associated with the stops 8 and 9 of the actuating cam 5. The cushioning spring 10 is associated with the spring units LS and LS' and the cushioning spring 11 is associated with the spring units RS and RS', respectively. The spring unit RS comprises a contact or actuating spring 16 and the unit RS' comprises a contact or actuating spring 17, which actuating springs 16 and 17 are adapted to be engaged respectively by the actuating rollers 12 and 13 which are rotatably secured to cam 5, as already described. When the operating lever 7 is moved to its position as shown in Fig. 5, the springs 16 and 17 are actuated or moved to their alternate position into engagement with their associated alternate contacts. The cushioning spring 11 associated with the ringing spring units RS and RS' comprises a channel shaped body portion 20, and provided with an integrally formed downwardly extending loop 21. The inner portion 21' of the loop 21 is adapted to be engaged by the stop 9 of the cam 5 for purposes as will presently be described. The cushion spring 11 is secured to the arm 22 of the frame 2 by means of the screws 4 and the nuts 23, the said nuts 23 having screw-threaded engagement with the said screws 4. The said screws also secure the frame to the escutcheon plate 3, as already described. The arms 24 of the body portion 20 of the cushion spring 11 are provided with suitable openings through which the screws 4 pass, and are of such a length as to bring the portion 20' of the cushion spring in the path of the stop 9 so that when the lever or handle 7 is moved to the left, the movement of the lever 7 and cam 5, as a whole, is limited by the stop 9 of the cam 5 engaging the surface $20^2$ of the body portion of the cushion 11.

The spring unit LS comprises a contact or actuating spring 14 and the unit LS' comprises a contact or actuating spring 15, and the actuating springs 14 and 15, are provided with integrally formed outwardly turned ends 14' and 15', which ends, 14' and 15' engage, respectively, the actuating rollers 12 and 13.

When the operating lever 7 is moved to its other position, the springs 14 and 15 are flexed so as to move the spring units LS and LS' to their alternate position. The cushioning spring 10 associated with the spring units LS and LS' comprises a channel shaped body portion 26 and is provided with an integrally formed downwardly extending loop 27 which inner portion 27 is adapted to be engaged by the stop 8 of the cam 5, for purposes as will presently be described. The cushion spring 10 is secured to the arm 28 of the frame 2 by means of the screws 4 and the nuts 29, the said nuts 29 having screw-threaded engagement with the said screws 4. The arms 30 of the body portion 26 of the cushion spring 10 are provided with suitable orifices through which the screws 4 pass, and the said arms 30 are of such a length so as to place the portion 26' of the cushion spring out of the path of the stop 8, so that when the lever or handle 7 is moved to the right, the movement of the handle 7 and cam 5, as a whole, is stopped when the stop 8 of the cam 5 engages the washer 3' secured to the bottom surface of the escutcheon plate 3, the washer 3' serving to deaden the noise which would otherwise occur and in which position the handle or lever 7 is held in its locked position to hold the spring units LS and LS' in their alternate positions.

Assuming now that the lever 7 is in its normal position, as illustrated in Fig. 1, and that it is moved to the left, as illustrated in Fig. 5. When this movement is started to the left, the actuating rollers 12 and 13 are moved into engagement with the springs 16 and 17 and force them into engagement with their alternate contacts. The stop 9 of the cam 5 engages the portion 21' of the loop 20 of the cushion member 11, and flexes it outward; this movement to the left of the handle 7, is limited by the stop 9 of the cam 5 engaging the surface $20^2$ of the body portion 20 of the cushion spring 11. Now when the pressure on the handle 7 is released, the combined spring tension of the actuating springs 16 and 17 and the flexed portion 21' of the loop 21 forces or snaps the handle 7 and cam 5 and its rollers 12 and 13, as a whole, back to its normal position. The inertia imparted to the cam 5 and its associated parts by the spring tension will

attempt to carry it beyond its normal position, and the stop 8 of the cam 5 will press against the portion 27′ of the loop 27 of the cushion spring 10, associated with the spring units LS and LS′, thereby producing a cushioning effect, at the end of the stroke. The cushioning effect absorbs the shock of the returning cam, and this prevents the opening of the contact spring units LS and LS′ that are in their normal position, thus eliminating any disturbance in the line connection.

Now when the lever 7 is moved to the right, the movement is transmitted to the cam 5 and its associated parts and the rollers 12 and 13 rotatably secured to the cam 5 engage respectively the outwardly turned ends 14′ and 15′ and force them outward so as to move the spring units LS and LS′ to their alternate positions. The stop 8 of the cam 5 engages the free portion 27′ of the loop 27 and flexes it outward, and the movement of the lever 7 is continued until the stop 8 of the cam 5 passes above the horizontal axis of the cam 5. The pressure of the flexed portion 27′ of the loop 27 forces it the rest of the way to place the stop 8 in engagement with the bottom surface of the escutcheon plate 3. The key lever 7 when in this position holds the spring units LS and LS′ in their alternate position. Now when the key lever starts back to its normal position, and when the stop 8 again in its travel is below the horizontal axis of the cam 5, the spring tension of the actuating springs 14 and 15 and the flexed portion 27′ of the loop 27 forces or snaps the lever 7, cam 5 and its rollers 12 and 13, as a whole, back to their normal position. The inertia imparted to the cam 5 and its associated parts by the spring tension of the actuating springs 14 and 15 and flexed portion 27′ of the loop 27, will attempt to carry it beyond its normal plane, and the stop 9 of the cam 5 will press against the portion 21′ of the loop 21 of the cushion spring 11 associated with the ringing spring units RS and RS′. A cushioning effect at the end of the stroke is thus obtained when the stop 9 strikes against the free portion 21′ of the loop 21. This cushioning effect absorbs the shock of the returning cam and thus prevents the opening of the contact springs of units RS and RS′. The cushioning springs, in addition to their uses as already described, will assist in balancing the key in normal position, as is readily apparent.

From the above description it may be seen that with the cushioning springs 10 and 11, no false operation of the spring units LS, LS′, RS and RS′ is brought about upon the release of the key lever from either of its actuated positions to normal thus preventing the disagreeable disturbances of the circuit as are usually produced.

It is at once apparent that the bridge member 20 of spring 11 may be so constructed as to be directly in the path of the stop 9 of the cam 5 thereby entirely preventing an operation of the key lever in one direction. It is thus seen that the springs 10 and 11 not only have a dampening or cushioning effect upon the key cam, but that they act as a stop to limit the movement of the key lever.

The key illustrated and described is only one of the various forms for carrying out my invention, and I do not wish to be limited to the exact structure and spring combinations as shown, but I am to cover all such changes and modifications as come within the scope and spirit of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. An operator's key including an escutcheon plate, a vertically disposed mounting plate secured to said escutcheon plate, sets of contact springs secured to the opposite sides of said mounting plate, a cam member pivotally secured to said mounting plate for actuating said springs, said cam member being provided with integrally formed ears for limiting the operation of the same, and auxiliary devices attached to said mounting plate for co-operation with the ears on said cam to prevent an overthrow operation of the cam when it is returned to its normal position from one of its operated positions.

2. In an operator's key, the combination with a T-shaped mounting plate provided with a slot attached to an escutcheon plate, of a cam member provided with integrally formed ears pivotally secured in the slot of said mounting plate and having a portion thereof extending through and above said escutcheon plate, said T-shaped mounting plate being composed of a single piece of material, an operating lever attached to said cam for moving the same to either of its operated positions or to its normal position, sets of contact springs secured to either side of said mounting plate and operable by said cam member, spring members secured to the extremities of the head of said T-shaped mounting plate for co-operation with the ears of said cam member when the cam member is returned to its normal position from one of its operated positions for preventing the snap action of the cam from actuating any of said contact springs.

3. In an operator's key, the combination with a mounting plate attached to an escutcheon plate, of a cam member pivotally secured to said mounting plate and having a portion thereof extending through and above said escutcheon plate, an operating lever attached to said cam for moving the

same to either of its operated positions or to its normal position, sets of contact springs secured to said mounting plate and operable by said cam member, a pair of ears upon said cam member beneath the said escutcheon plate, and spring members attached to said mounting plate normally tending to yieldingly hold said cam in its normal position, one of said spring members permitting said cam to be locked in one of its actuated postions and the other of said spring members preventing the locking of said cam in its other actuated position.

4. A device of the character described including an escutcheon plate, a T-shaped mounting plate secured thereto, sets of contact springs secured to either side of said mounting plate, a cam member pivotally supported in the head of said T-shaped mounting plate and provided with means for operating said sets of contact springs, and auxiliary spring means secured to either arm of the head of said mounting plate tending to yieldingly hold said cam member in its normal position.

5. A device of the character described including an escutcheon plate, a one piece T-shaped mounting plate attached thereto, sets of contact springs secured to either side of said mounting plate, a cam member pivotally supported in the head of said T-shaped mounting plate and provided with means for operating said contact springs, ears on said cam member, auxiliary spring members for attachment to the head of said T-shaped mounting plate for co-operation with the ears on said cam member tending to maintain said cam member in its normal position.

6. A device of the character described including an escutcheon plate, a one piece T-shaped mounting plate attached thereto, and having a slot provided in its head, sets of contact springs secured to either side of said mounting plate, a cam member pivotally supported in the slot of said T-shaped mounting plate provided with means for operating said contact springs, ears on said cam member, and auxiliary spring members for attachment to either side of said mounting plate for co-operation with the ears on said cam member tending to maintain said cam member in its normal position and for dampening the action of said cam member when it is returned to its normal position by the spring action of the contact springs thereby preventing an over-throw operation of the cam member.

7. A device of the character described including an escutcheon plate, a mounting plate attached thereto, sets of contact springs secured to said mounting plate, a pivotally supported cam member provided with means for operating said contact springs, ears on said cam member, auxiliary spring members for attachment to said mounting plate for co-operation with the ears on said cam member tending to maintain said cam member in its normal position and for dampening the action of said cam member when it is returned to its normal position by the spring action of the contact springs thereby preventing an over-throw operation of the cam member, one of said auxiliary members being also provided with means for co-operation with one of said ears on said cam member for limiting the operation of said cam member in one direction.

8. An operator's key of the character described including an escutcheon plate, a T-shaped mounting plate having a slot provided in its head, secured thereto, sets of contact springs attached to either side of the mounting plate, a pivotally supported cam secured in the slot of said mounting plate for operating said contact springs, and a spring member for preventing an over-throw operation of the cam member when it is returned to its normal position from one of its operated positions.

9. An operator's key of the character described including an escutcheon plate, a mounting plate, secured thereto, sets of contact springs attached to the mounting plate, a pivotally supported cam for operating said contact springs, and a spring member for preventing an over-throw operation of the cam member when it is returned to its normal position from one of its operated positions, said spring member also limiting the operation of said cam member in one position and the escutcheon plate limiting the operation of said cam member in the other position.

10. An operator's key including an escutcheon plate, a vertically disposed single piece T-shaped mounting plate secured at right angles to said escutcheon plate, vertically disposed sets of contact springs secured to either side of said mounting plate, a rocking cam pivotally secured to said mounting plate for actuating said contact springs, said cam having a normal and an operated position, a spring member attached to each extremity of the head of said T-shaped mounting plate for co-operation with said cam when said cam is returned to its normal position from its operated position to prevent an over-throw operation of the cam member, and a member secured between said escutcheon plate and said mounting plate to prevent said cam from directly engaging said escutcheon plate to avoid noise making.

11. A device of the character described comprising a mounting member provided with a slot, a plurality of associated springs secured to either side of said mounting member, a rocking cam pivotally supported

in the slot of the mounting member, rollers attached to said cam for operating said springs, on one side of said mounting plate when the cam is rocked in one position and to operate said springs on the other side of said mounting plate when said cam is rocked in the opposite position, and means attached to said mounting plate for preventing an over-throw operation of said rollers when they are returned to their normal position from an operated position, thereby preventing an operation of said springs.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 21st day of August, 1920.

ALBERT KLAY.