Sept. 18, 1956 C. C. BARBER 2,763,737

DAMPING DEVICE FOR LEVER TYPE KEYS

Filed Aug. 16, 1954

FIG. 1

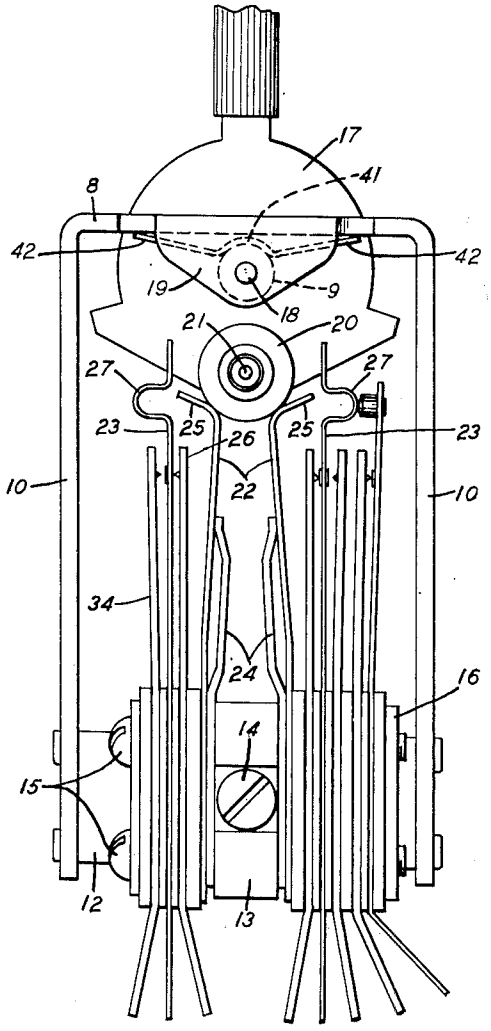


FIG. 2

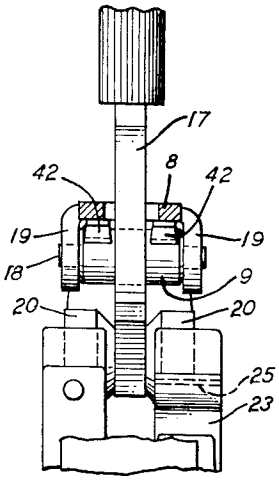
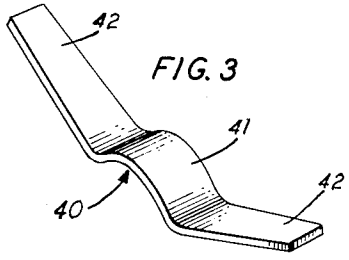


FIG. 3



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DAMPING DEVICE FOR LEVER TYPE KEYS

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6 Claims. (Cl. 200—1)

This invention relates to switching keys and particularly to three-position lever-type keys.

Three-position switching keys are used extensively on telephone switchboards and similar instrumentalities as ringing keys, listening keys, and the like. Such keys comprise, generally, a manually controlled lever which is operable in either direction from a normal central position to effect the closure, and/or opening of electric circuit controlling, spring-mounted contacts. Because of inherent design characteristics of such keys which require that the control lever normally be held in a central position with respect to the set of contact springs it functions with, and be automatically restored to such position when released from either of its operate positions, such levers tend to overshoot the central position upon release from either operate position, thereby occasioning the false operation of the contact springs normally controlled by the lever when actuated to the other operate position. The elimination of false contact operation resulting from such lever overthrow has been a problem with which key designers have been confronted for many years and numerous expedients have been resorted to in its solution. Such expedients frequently resulted in key designs requiring complicated spring configurations and other structural complexities which, while effective, were so costly from initial manufacturing and maintenance viewpoints as to render their adoption for general use impractical.

It is one object of this invention to provide a simple, inexpensive and highly practicable means, in a lever-type switch key, for substantially eliminating overthrow of the operating lever beyond its non-operate position when propelled toward such position from an operate position under the influence of restoring means.

This object is attained in accordance with a feature of the invention by incorporating, in a three-position lever-type key structure, a brake spring which functions to retard the lever-carrying means in its rotary movements in either direction from its operate positions. More particularly, the brake spring of this invention comprises a sample, flat sheet spring having a portion thereof contoured to frictionally embrace an appreciable area of the lever-supporting means and which is confined in such a manner with respect to such means as to be in constant tensioned engagement therewith.

In accordance with another feature, the brake spring of this invention is floatingly supported on the switch structure in the sense that it requires nothing in the nature of screws, rivets, pins or other equivalents to fixedly locate it in the key assembly. More particularly, the brake spring is so configured and located with respect to the switch frame and to the lever-carrying means as to be held in frictional engagement with the latter solely by its own self-generated tension.

A still further feature of the invention contemplates a brake spring which can be assembled and maintained in new key structures as well as in keys already in service,

with a minimum of effort and by relatively unskilled and inexperienced personnel.

These and other features of the invention will be readily understood from the following detailed description when read with reference to the accompanying drawing, in which:

Fig. 1 is a front elevation of a three-position lever-type key embodying, in its structure, a pair of brake or buffer springs according to the present invention. Only one such spring appears in this figure;

Fig. 2 is a fragmentary view, partly in section, of the key shown in Fig. 1 and discloses the double brake aspect of the invention; and

Fig. 3 is an enlarged perspective view of the brake spring itself.

The key embodying the features of this invention, as disclosed in the drawing, comprises an inverted U-shaped frame having a pair of oppositely disposed, downwardly extending arms **10** which are joined near their extremities by a bridging member **12** staked or otherwise suitably secured thereto, as shown. The bridging member **12** supports a block **13** on either side thereof by means of a screw **14**. The blocks **13** are centrally located on the bridge member **12** and each serves to mount two sets of springs, one on either side thereof. Each two sets of springs are secured to their corresponding block by means of suitable screws **15** which pass through the various components of the spring sets and the mounting block, and screw into a clamping plate **16**. This construction insures the spring sets being rigidly located on the bridge member **12** and in correct position with respect to a centrally disposed operating lever **17**.

The lever **17** is supported on a shaft structure comprising a pin **18** which is fixed in suitable apertures in oppositely disposed depending ears **19** of the frame crosspiece **8** and a bushing or sleeve **9** to which the lever is fixed. The pin **18** and bushing **9** are snugly fitted together in telescopic relation in such a manner that the bushing is free to rotate on the pin. It is apparent therefore, that whenever the lever **17** is actuated, the bushing **9** rotates on the pin **18** as the lever is moved in either direction from its normal central position, or from its operate positions when returning to its normal position.

At its lower extremity and at either side thereof the lever **17** carries a roller **20** of insulating material, each roller being supported on a pin **21** which projects at right angles from the lever at a point below the pivot axis thereof.

Each set of springs comprises a plunger spring **22**, a booster or master control spring **23**, a rigid back stop or abutting member **24** and a number of circuit controlling springs all insulated one from the other and from the frame. In the drawing, the circuit controlling springs at left, by way of example, are shown consisting of a transfer combination comprising a make spring **34** and a break spring **26**, it being understood that other contact spring combinations may also be incorporated in the switch structure as shown, for example at the right of Fig. 1. It is understood however, that regardless of the spring combinations employed, the make and/or break operations of the springs are controlled by the booster spring **23** which, in turn, is controlled by the lever-borne roller **20**.

Each plunger spring **22** is provided with an integral offset portion or lip **25**, which projects from the upper end of the plunger spring in the general direction of the master spring **23** of the corresponding set of springs. The plunger springs are so tensioned initially that the lips of two adjacent springs abut the roller **20** on either side thereof at points on its periphery located to the right and left of the vertical axis of the roller, viewing Fig. 1.

Thus the plunger springs, by virtue of the engagement of the lips thereof with the roller **20** cause the roller, and therefore the lever **17** to assume a normal upright or vertical position, and to oppose any movement of the lever in either direction from such position.

The construction of the booster spring **23** with respect to the concavity **27**, and of the plunger spring **22** with respect to the lip **25** are described in detail and their functions set forth in my copending application, Serial No. 350,954, filed April 24, 1953, now Patent No. 2,727,103, issued December 13, 1955. No further reference to these structural details in this application is deemed necessary.

The pivot pin **18**, in effect, constitutes a shaft upon which lever **17** and bushing **9** are rotatably mounted. Thus, any pivotal movement of the lever results in a corresponding rotational movement of the bushing. Obviously, therefore, any force which may be applied to retard the rotational movement of the bushing will function also to retard the movement of the lever.

The brake spring **40** which is stamped or otherwise formed of flat sheet metal stock consists of two diverging arms **42** extending laterally from a central arcuate portion **41**. The arms **42** are bent upward slightly from the plane of the two edges of the arcuate portion, while the latter is contoured to accommodate a similarly dimensioned area of the periphery of bushing **9**. The brake spring is set upon the bushing **9** with the inner surface of the arcuate portion **41** pressing heavily upon the bushing and the outer extremities of the projecting arms **42** abutting the under surface of the crosspiece **8** of the U-shaped frame. Because of the original set of the arms **42** and the confinement of the extremities thereof by the frame, the arcuate portion of the brake spring is held in frictional engagement with the bushing **9** thereby tending to exert a restraining influence on the bushing in its movement and thereby on the lever **17** itself.

Lateral shifting of the brake on the bushing is prevented by the inner faces of the depending ears **19** of frame crosspiece **8** and the outer faces of the lever, it being clear from Fig. 2 that the width of the brake spring is such as to be just comfortably accommodated by the bushing portions located between the frame ears and the lever.

It will be noted that no fastening means, in the nature of screws, rivets, pins or the like is required to secure the brake spring in its correct position as a component part of the switch structure. Actually, the brake is held in position by its own tension resulting from the impinging of the outer extremities of the spring arms **42** on the under surface of the crosspiece **8** of the switch frame. Because of this confinement of the brake spring between the bushing **9** and the crosspiece **8** of the frame, the arcuate portion **41** of the brake is held in tensioned engagement with the periphery of bushing **9**. Thus the brake, through its frictional engagement with the bushing tends to retard or oppose the movement of the bushing and therefore, of the lever, with the result that, when the lever is released from an operate position and returns to normal position under the action of a plunger spring **22**, any tendency the lever may have to overshoot its normal center position is eliminated because of the frictional dissipation, by the spring brake, of energy which otherwise would cause overthrow of the lever. It is apparent that any overshooting of its normal center position by the lever which results in the engagement of the roller **20** with either of the booster springs **23** would result in untimely and false operation of the associated contact springs. Since such overshooting by the lever is eliminated by the spring brake of this invention, false and untimely contact operation is also eliminated.

What is claimed is:

1. In a switching key, a frame, contact springs carried thereby, a lever for controlling the operation of said contact springs, means oscillatably mounting said lever on said frame comprising a shaft-supported bushing fixedly associated with said lever, and means for retarding all movements of said lever comprising a stationary brake frictionally engaging said bushing.

2. In a lever-type key in which a shaft-carried lever functions, when operated in either direction from a normal center position, to actuate contact springs, a frame mounting the contact springs, means for restoring the lever from an operate position, and means independent of said restoring means for preventing overthrow of said lever under the action of said restoring means comprising a brake band in frictional engagement with the lever-carrying shaft.

3. A lever-type key in accordance with claim 2 in which said brake band is equipped with integrally formed extending arms which abut said frame to maintain the frictional engagement of said spring with said shaft.

4. In a switching key, a frame comprising a crosspiece having a pair of oppositely disposed depending integral projections, contact springs supported by said frame, a lever, means carried by said lever and engaging certain of said springs for operating said springs under control of said lever, means oscillatably mounting said lever on said frame comprising a shaft supported on the depending projections of said crosspiece and a bushing rotatably mounted on said shaft and fixed to said lever, and means for influencing rotational movement of said bushing comprising a brake spring confined under tension between the under surface of the crosspiece of said frame and a peripheral portion of said bushing and having a section in continuous contiguous association with the said peripheral portion of said bushing.

5. In a switching key, a U-shaped frame comprising a pair of oppositely disposed parallel arms and a connecting crosspiece, contact springs carried by said frame, a lever for controlling the operation of said springs, means oscillatably supporting said lever on said frame including a shaft carried by said frame in spaced relation to the crosspiece of said frame, and means for retarding the movement of said lever comprising a brake spring confined within the spacing between said shaft and the crosspiece of said frame and having a central portion thereof contoured to embrace a peripheral area of said shaft and integral arms projecting from said central portion and impinging the under surface of the crosspiece of said frame.

6. In a lever-type key, a frame, contact springs mounted on said frame, a lever operable in either direction from a normal center position and carrying a roller moveable with said lever to engage and operate said contact springs when said lever is operated, a shaft carried by said frame and rotatably mounting said lever on said frame, and means for continuously retarding said lever when moved to or from its normal position comprising a sleeve fixed to said lever and coaxially mounted on said shaft so as to rotate thereon when said lever is operated, and a brake band having a center portion contiguously encircling an appreciable peripheral area of said sleeve and a pair of oppositely projecting arms which abut said frame to thereby hold the said center portion of said band in tensioned engagement with said sleeve.

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