Nov. 4, 1941. F. O. NESIUS 2,261,809

SWITCH KEY

Filed Dec. 5, 1939

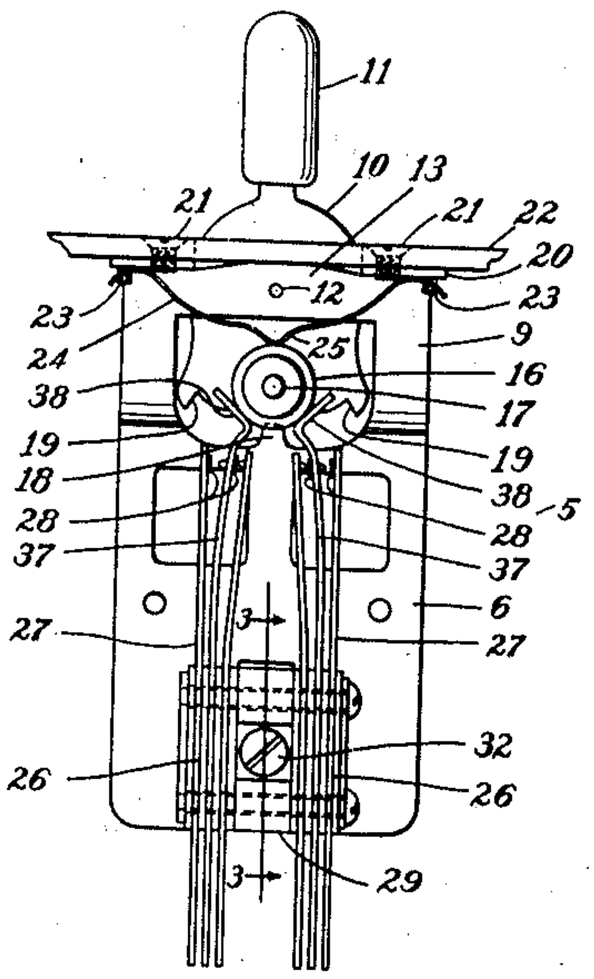

Fig. 1

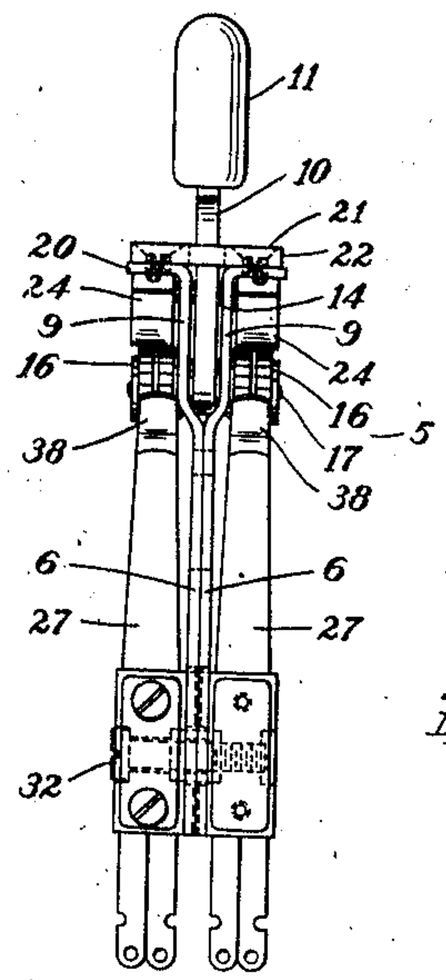

Fig. 2

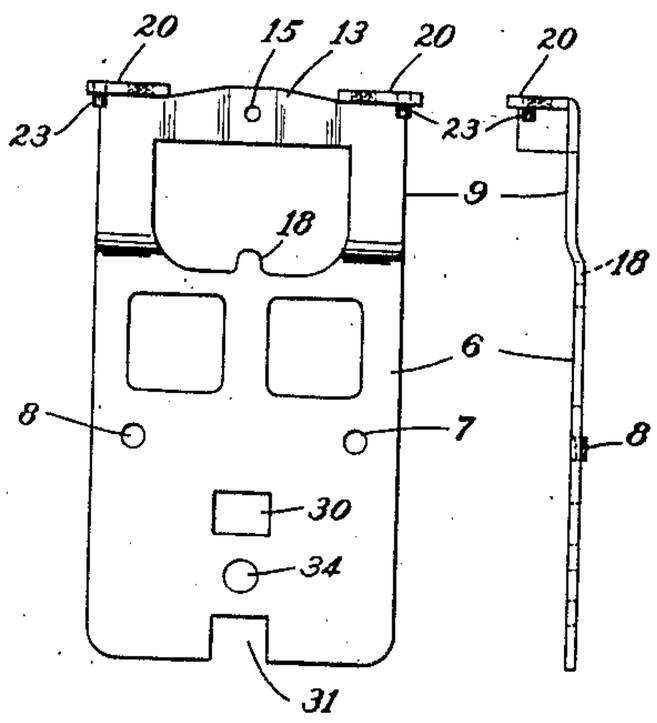

Fig. 4

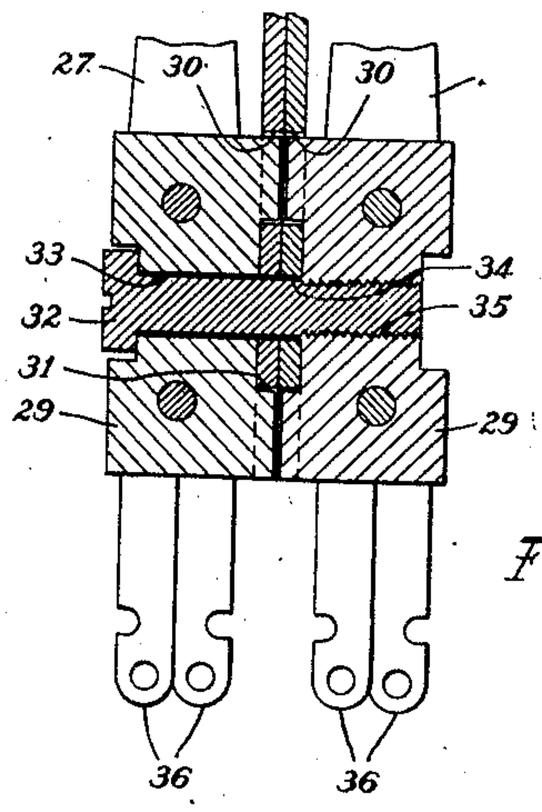

Fig. 3

Fig. 5

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SWITCH KEY

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7 Claims. (Cl. 200—1)

This invention relates to switch keys particularly adapted for use with telephone switchboards.

Manufacturers of two-way telephone switch keys have been confronted with the problem of preventing the switch lever from over-riding its center position on being released from one of its operating or switching positions. If the switch lever were free to pass its center position on being released from one switching position it might accidentally make or break the contacts between the switch springs at the other switching position of the switch. To prevent over-riding, it has been the practice to form the ends of certain of the switch springs, which are engaged and flexed by the switch lever, into various configurations such as loops which tend to prevent rapid release of the switch lever from its switching positions and thus keep the inertia of the switch lever as it approaches its central position at a minimum. While the known constructions have accomplished their purpose they have several disadvantages. Due to the peculiar configuration of these looped springs the strain from the repeated distortion of the looped portion of the spring is more or less concentrated in a limited region of the spring with the result that the life of the springs is usually shorter than the remaining elements of the switch key. Further, since these springs are a part of the switch spring assemblies it is necessary to disassemble a spring assembly to replace a broken or weakened spring.

It is accordingly a purpose of the present invention to provide an improved switch key with a buffer spring or springs incorporated therein to prevent the switch lever from passing its center position, when released from either of its switching positions, and thereby accidentally making or breaking contacts at the opposite position.

It is therefore an object of the invention to provide a switch key in which the buffer spring is mounted independently of the switch spring assemblies and which may be readily replaced without disturbing the switch springs.

It is another object of the invention to provide a switch key in which the strain on the buffer spring is distributed throughout substantially the entire length of the spring.

These and other objects of the invention will appear from the detailed description and claims when taken with the drawing in which:

Figs. 1 and 2 are side and edge views respectively of an improved switch key made in accordance with the present invention;

Fig. 3 is a vertical section taken on line 3—3 of Fig. 1 and illustrating certain details of the construction of the improved switch key; and

Figs. 4 and 5 are face and edge views respectively of one of the frame plates forming a part of the present switch key.

Referring to the drawing, reference character 5 generally indicates a switch key made in accordance with the present invention. This key comprises a pair of frame plates 6, which may be identical in shape, each having an aperture 7 and a struck out lug 8. The frame plates are secured in face to face relation as shown particularly in Fig. 2 with the lug 8 of each plate seating in the aperture 7 of the other plate whereby the plates are maintained in proper registry. The upper part 9 of each plate is offset as shown in Figs. 2 and 5 which provides, when the plates are assembled, a space within which the switch lever 10 is free to move. This lever is provided with a handle 11 at its upper end and is pivoted intermediate its ends on the pin 12 extending between the outwardly bowed strips 13 of the frame plates. A tubular bushing 14 fixed to the lever receives the pin 12 which is supported in apertures 15 in the frame plates but preferably is fixed to only one of the frame plates to facilitate dismantling of the switch key.

As shown particularly in Figs. 1 and 4 the upper part of each frame plate is cut out to provide clearance for the switch spring operating rolls 16 rotatably carried by the shaft 17 on each side of the lower end of the switch lever. The lugs 18 integral with the frame plate and projecting into the cutout portion thereof cooperate with the stops 19 on the switch lever to limit the movement of the lever about the pin 12.

The upper end of each frame plate is bent outwardly to provide right angular fastening flanges 20 having threaded apertures which receive the screws 21 extending through the slotted top plate 22. These flanges are provided with short pins 23 which depend from the lower surface thereof. These pins engage in holes (not shown) provided in the ends of the flat metal springs 24, to detachably support the springs in frictional engagement with the rolls 16. These springs act as buffers for the lever 10 and are of the configuration shown in Fig. 1, being bowed downwardly and having a depending humped portion 25 at the center thereof. While in the specific embodiment illustrated in the drawing, buffer springs 24 have been shown applied to each side of the frame assembly, if desired, only one spring need be provided. As will appear later, the en-

gagement of these springs with the rolls **16** is such that the switch lever **10** is prevented from moving by its own inertia beyond its central position (Fig. 1) when it has been released from either of its operating positions.

The switch spring assemblies **26** comprising the springs **27** having the usual contacts **28** are insulatedly carried on mounting blocks **29** at each side of the frame plate assembly. These mounting blocks are shaped to be secured in the openings **30** and **31** in the frame plates as shown in Fig. 3. A screw **32** extending thru a hole **33** in one of the blocks and holes **34** in the frame plates is threaded into the hole **35** in the other block to clamp the blocks to the frame plates and to maintain the frame plates in face to face relation. It will be understood that the lower ends **36** of the switch springs **27** are connected in the usual manner in the telephone circuits to be controlled by the switch key.

In the present embodiment of the invention as shown in Fig. 1, the upper end of the master or motor spring **37** of each spring assembly terminates in an angular portion **38** which engages the adjacent roll **16**. It will be seen from the construction thus far described, that on shifting the rolls **16** by moving the upper end of the switch lever to the right or to the left as viewed in Fig. 1, the rolls will force either the two left or the two right motor springs **37** to break the contact with the inner switch springs and to make contact with the outer switch springs. The limiting stops **19** in the embodiment illustrated are spaced a sufficient distance from the rolls **16** to permit the lever and rolls to be shifted to locked switching positions, that is, when the handle **11** is moved to the extreme left or to the extreme right it will remain in that position until manually released. However, the switch key may be of the non-locking type by having the limiting stops **19** closer together.

On manually releasing the key from either of its switching positions the motor springs which have been deflected, move the lever to its central position (Fig. 1) and the inertia of the lever and rolls tends to cause them to move past this central position. However, the buffer springs **24** which frictionally engage the rolls act as a brake to overcome this inertia and prevent the key from accidentally displacing the switch springs on the side opposite from the released position of the switch. It will be noted that the force, exerted by the motor springs **37** against the rolls **16** when they are released from a switching position, decreases as the lever approaches its central position and that the humped portion **25** of the buffer springs causes the counter force exerted by the buffer springs against the rolls to increase as the lever approaches its central position. The result of the decreasing force of the deflected motor springs and the increasing force of the buffer springs on release of the lever from a switching position is to cause practically all of the inertia of the lever and rolls to be absorbed by the time the lever reaches its central position (Fig. 1), thus preventing over-riding of the lever a distance sufficient to make or break the switch contacts on the other side of the key.

The present construction provides a switch key which may be readily assembled and disassembled by removing the single screw **32**. The distortion of the buffer springs during operation of the key is distributed throughout the length of the springs so that the strain is not concentrated at a single region thereof with the result that the life of the spring is relatively great. Further, these springs may be easily replaced without dismantling the key whereas heretofore the springs which were designed to accomplish the same purpose as the present spring have been incorporated in the switch spring assemblies necessitating dismantling of the spring assemblies when it was necessary to replace a broken or weakened spring.

What I claim is:

1. A switch key comprising a frame, a group of switching elements carried by said frame, a lever pivotally mounted on said frame, said lever being movable from a normal position to a switching position to deflect one of said elements relative to another element of the group, a bowed spring supported at its ends on said frame at opposite sides of the pivotal mounting of said lever, said spring continuously engaging said lever to retard the return of said lever from said switching position to said normal position.

2. A switch key comprising a frame, a lever pivoted on said frame, a roll carried on said lever, spaced groups of switch springs supported on said frame, one spring of each group being disposed in operative relation to said roll, said lever and roll being movable from a central position to selectively deflect said one spring of each group to a switching position, and a buffer spring supported at its ends on said frame at points symmetrically located with respect to the path of movement of said roll, said buffer spring continuously engaging said roll to retard the motion of said lever on release of a deflected spring from a switching position.

3. A switch key comprising a frame, a switch spring assembly including a motor spring supported on said frame, a lever pivoted on said frame and shiftable from a central position to a switching position, said lever having a part to deflect said motor spring as said lever is shifted from said central position to said switching position, a buffer spring anchored to said frame at points spaced an equal distance at opposite sides of said pivot, a portion of said buffer spring extending along the plane of movement of the lever into the path of said part and engaging said part at said central position whereby said buffer spring overcomes the inertia of said lever as it is released from said switching position and returns to said central position.

4. A switch key comprising a frame, a switch spring assembly including a motor spring carried by said frame, a lever disposed in operative relation to said motor spring, said lever being pivotally mounted on said frame and being shiftable from a central position to a switching position, said lever having a part to deflect said motor spring as said lever is shifted to said switching position, spaced fastening means carried by said frame at opposite sides of the pivotal mounting of said lever, a buffer spring having the ends thereof attached to said frame by said fastening means and at least a portion of said buffer spring extending into the path of said part and frictionally engaging said part at said central position to control the return of said lever from switching position to said central position.

5. A switch key comprising a frame, switch spring assemblies mounted in spaced relation on said frame, said spring assemblies each including a motor spring, a lever pivotally mounted on said frame and shiftable from a central position to opposite switching positions, said lever having

a member thereon disposed in operative relation to said motor springs to selectively deflect the same as said lever is shifted to said switching positions, a buffer spring extending in a direction common to the plane of movement of said lever and having its ends secured to the frame at points symmetrically located with respect to said motor springs, an intermediate portion of said spring extending into the path of said member and frictionally engaging said member at said central position to control the return of said lever from a switching position to said central position.

6. A switch key comprising a frame, switch spring assemblies mounted in spaced relation on said frame, said spring assemblies each including a motor spring, a lever pivotally mounted on said frame and shiftable from a central position to opposite switching positions, said lever having a member thereon disposed in operative relation to said motor springs to selectively deflect the same as said lever is shifted to said switching positions, a buffer spring having its ends secured to said frame at points symmetrically located with respect to said motor springs, said buffer spring being generally curved and extending into the path of said member, said buffer spring having a humped portion at an intermediate part thereof to project toward and to engage said member at said central position, said buffer spring frictionally engaging said member as it is shifted from said central position to a switching position, said humped portion preventing the lever from accidentally engaging one of said motor springs on being released from switching engagement with the other motor spring.

7. A switch key comprising a frame, a lever pivotally mounted on said frame, spaced switch springs carried by said frame, a portion of said lever being disposed between said switch springs, said lever being movable from a central position to deflect one or the other of said springs selectively to a switching position, a buffer spring anchored at its ends on said frame in symmetrical relation to said switch springs in a position to continuously engage said lever, said buffer spring acting to prevent the accidental displacement of one of said switch springs by said lever when it releases the other switch spring from switching position.

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