

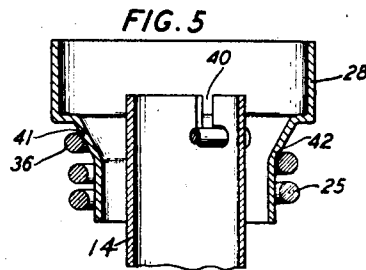
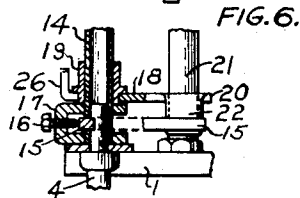
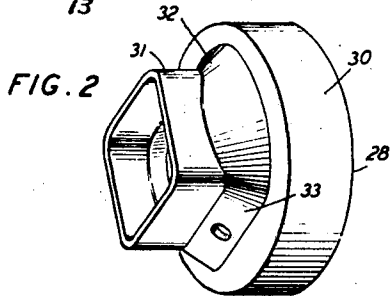
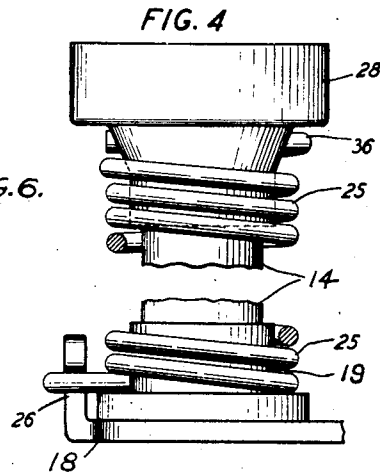
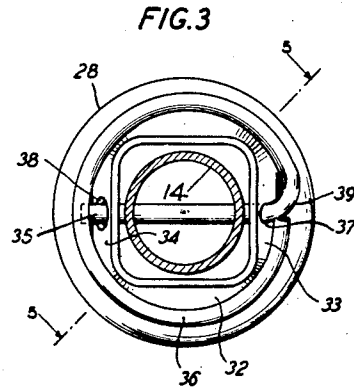
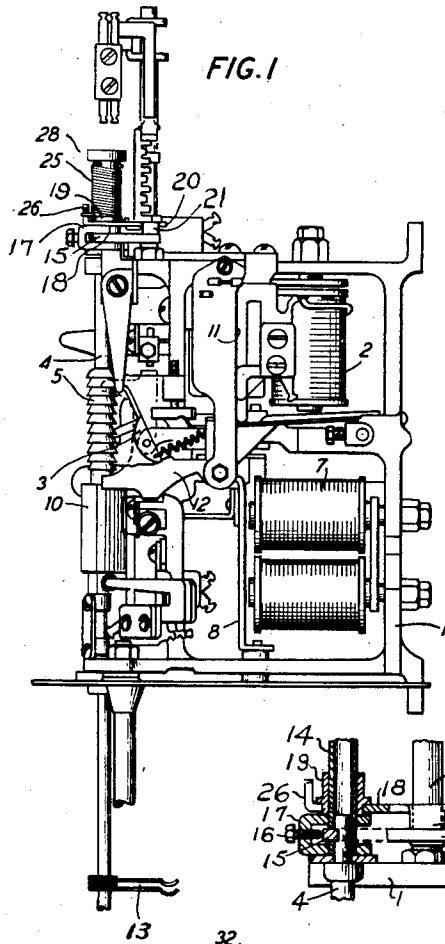
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SWITCHING MECHANISM

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SWITCHING MECHANISM

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4 Claims. (Cl. 267—1)

This invention relates to improvements in switching mechanisms and particularly to automatic switches employed in the telephone art.

An object is to simplify and reduce the cost of manufacturing restoring spring assemblies as employed in such switches and to facilitate the assembling and adjusting of said assemblies.

The invention is particularly applicable to automatic switches in which wipers mounted on a central shaft are caused to establish connections with terminals in the banks by the lifting and rotating of the shaft. To return the shaft and wipers to normal from the rotated position, it has been the practice to employ a restoring spring assembly including a bushing surrounding a sleeve extension on the shaft. This bushing is connected at the top to a cap and a helical spring surrounding the bushing. The bushing is secured to the sleeve extension by means of a straight pin extension from the spring which protrudes diagonally across the bushing through slots therein and in the sleeve. In this case the bushing serves to maintain the spring more or less in concentric relation with the shaft, and the cap serves as an engagement surface for the winding of the spring to the proper tension.

The present invention relates to a simplified restoring spring assembly of this general character for returning the shaft in switches of this kind to normal position, and a feature thereof is an arrangement including merely a single cap which may be drawn from a tubing to form an upper cylindrical top portion and a lower square-shaped bottom portion connected by an intermediate cone-shaped portion which is somewhat flattened out on two opposite sides. The straight pin extension on the spring is threaded through holes in the cone-shaped section and engages the slot in the sleeve extension of the shaft. The upper or last turn of the spring in accordance with the applicant's invention is wrapped tightly around the cone-shaped section of the cap so that when the spring is wound, this turn will be pressed up against the cone-shaped section and thereby force the succeeding turns of the spring to maintain themselves concentric with each other on the sleeve. The upper cylindrical portion of the cap serves as an engagement surface for winding the spring. Advantages of substituting the present invention in place of the cap and bushing in the prior art return spring assemblies are to reduce the cost of manufacture and cost of material and to simplify the assembling and adjusting of the mechanism and at the same time maintain the spring turns concentric with each other

on the sleeve without the aid of the prior art cap and bushing assembly which, as stated, consists of two machined parts which must be assembled together with the spring and which contain considerably more material.

The invention has been illustrated in the accompanying drawing, in which:

Fig. 1 shows an automatic switch to which the applicant's invention has been applied;

Fig. 2 shows a perspective of the cap portion of the applicant's invention;

Fig. 3 shows this cap with a part of the spring and sleeve extension attachment looking from the bottom of the cap;

Fig. 4 shows the cap, a portion of the upper end of the spring, the sleeve extension and the lower end of the spring connected to a stationary member;

Fig. 5 is a cross section taken on line 5—5 of Fig. 3; and

Fig. 6 shows partially in section the connecting means between the main shaft and the sleeve extension thereof.

Referring now to the drawing, Fig. 1 illustrates a typical step-by-step switching structure employed in automatic telephone systems to establish connections between lines and consists essentially of a frame 1, a vertical stepping magnet 2 having an armature and a pawl 3 for lifting the shaft 4 by engaging the toothed rack 5 on the shaft. A rotary magnet 7 is provided having an armature 8 and a pawl (not shown) attached thereto for rotating the shaft 4 by engaging the ratchet wheel 10 on the shaft 4. A release magnet may also be provided which is not visible as it is hidden by its armature 11. This armature operates on pawls such as 12 for releasing the shaft to return to a normal position, first by rotating back to normal and then by dropping down by gravity from its lifted position. To the shaft 4 are connected wipers, one group of which has been shown at 13 that may engage terminals in a switch bank (not shown). The restoring spring assembly in accordance with the applicant's invention has been applied to this shaft 4 for restoring it to normal in the rotary direction. As shown in Figs. 1 and 6 in particular, the shaft 4 terminates at the top inside the extension sleeve 14, to which it is secured by means of a rotary stop member 15 that engages a key slot in the sleeve and a similar key slot in the shaft. This stop member 15 is held in place by a screw 16 which is inserted in a bracket or clamp 17 surrounding said sleeve. Resting on top of the clamp 17 is a bracket 18 secured to a collar 19

rotatably mounted on sleeve 14. This bracket has an extension 20 through an aperture of which is passed a stationary post 21. This extension 20 is bent downwardly at 22 to engage the stop member 15 when in normal position. The restoring spring 25 is hooked at its lower end to an extension 26 on the bracket 18, while the upper end of the spring is connected to the cap 23 and the sleeve 14 in accordance with the applicant's invention as will be described hereinafter. When the shaft has been lifted and rotated, the spring 25 is tensioned by having its upper end connected to the cap 23 and the sleeve 14 and the lower end anchored in the bracket 18 which is maintained stationary as far as any rotary movement is concerned but travels with the shaft upwardly while engaging the stationary post 21. This tension in spring 25 will, therefore, cause the shaft to rotate back to normal when released by the release pawl 12.

Referring now specifically to Figs. 2 to 5, the specific construction and function of the cap 23 will be described. This cap consists of an upper cylindrical top portion 30, a square-shaped bottom portion 31 and an intermediate cone-shaped portion 32 connecting the portions 30 and 31. It will be noted that this cone-shaped portion 32 is slightly flattened out at two opposite sides, of the square portion 31, as shown at 33 and 34. To assemble this cap with the spring 25 and sleeve 14, the spring is provided with a straight pin extension 35 extending diagonally across the last turn 36 of the spring which is threaded through holes 37 and 38 in the sides 33 and 34 of the square-shaped portion 31 and caused to engage slots such as the slot 40 in the sleeve 14. The sides 33 and 34 permit the extension 35 to be bent from the spring at an easy curve from the last turn 36 as shown at 39 and this extension may also protrude a certain distance from the hole 38 without interference and to prevent the spring from becoming disconnected from the cap. The cap 23 and spring 25 are thereby secured to the sleeve 14 for rotation therewith. The lower end of the spring 25 is as stated anchored to an extension 26 of the bracket 18 and surrounds at its lower end the collar 19. It should now be observed that the upper or first complete turn 36 of the spring 35 engages closely the cone-shaped portion 32 as shown particularly in Figs. 3 and 5. In Fig. 5 this turn 36 is shown engaging at 41 and 42 this cone-shaped portion 32. It has been discovered that all the coils in the spring 25 are by this means always maintained concentric with each other on the sleeve 14 while the spring is tensioned, as the pressing upward of the turn 36 on the cone-shaped portion 32 gives to the succeeding turns of the spring 25 a certain torque or tension which enables them to maintain themselves in this concentric relation to each other on the sleeve 14 during the tightening as well as during the unwinding of the spring. This cap 23 may be manufactured by drawing or stamping the metal from which it is made into the desired shape. This is a simple operation. The upper part of the upper cylindrical portion is employed as heretofore as engagement surfaces in tightening the spring originally to give it the desired tension for returning the shaft to normal. The inside dimension of the square-shaped portion 31 is but slightly larger than the outside diameter of the sleeve 14, so that the cap and the spring will be maintained practically concentric with the sleeve.

What is claimed is:

1. In combination, a shaft, a sleeve connected to said shaft having diametrically opposite slots at the free end thereof, a bracket associated with said sleeve, a helical spring surrounding said sleeve having one end secured to said bracket, a collar having an enlarged end and a smaller opposite end and an intermediate cone-shaped connecting portion, the opposite end of the spring being connected to said collar and sleeve by the wrapping of a last turn of the spring around the cone-shaped portion and by having the end of the spring straight and running diametrically across the sleeve through the opposite slots therein and corresponding apertures in the cone-shaped portion of the collar, said spring being thereby, when wound, tensioned against the cone-shaped portion of the collar to position its succeeding turns concentrically with each other on the sleeve.

2. In combination, a shaft, a sleeve connected to said shaft having diametrically opposite slots at the free end thereof, a bracket associated with said sleeve, a helical spring surrounding said sleeve having one end secured to said bracket, a collar having an enlarged circular end, a smaller square end and an intermediate connecting portion with two opposite sides cone-shaped and the other two opposite sides flat and slanting, the opposite end of said spring being wrapped around said connecting portion and ending in a straight end, threaded diametrically across the opening in said collar through apertures in the opposite flat sides on the connecting portion and engaging the diametrically opposite slots in said sleeve to lock said end of the spring and the collar to the sleeve, the opening in the square portion of the collar being slightly larger than the outside diameter of the sleeve to prevent the collar from binding on the sleeve, the cone-shaped connecting portion of the collar being at its base larger in diameter than the inside diameter of the spring so that when the spring is wound it will be tensioned against this cone-shaped portion to position its turns concentrically with each other and with the collar, the large circular end of the collar serving as a hand-engagement surface for winding the springs.

3. In combination, a shaft, a sleeve connected to said shaft, having diametrically opposite slots at the free end thereof, a bracket associated with said sleeve, a helical spring surrounding said sleeve having one end secured to said bracket, a collar drawn into a large cylindrical top portion, a smaller square bottom portion and an intermediate connecting portion having two conically-shaped opposite portions extending from the top portion and merging into two opposite surfaces of the square portion and two flat slanting opposite portions connecting the other two opposite surfaces of the square portion with the top portion, the opposite end of the spring having one turn wrapped around the cone-shaped portions and extending in a straight end diametrically across the sleeve through the opposite slots therein and through opposite apertures in the flat portions and locked in the slots in said sleeve to secure the spring to the collar and to the sleeve, said one turn of the spring serving when the spring is wound to tighten itself around the cone-shaped portions and thereby tension the succeeding turns of the spring so that they will be held concentric to each other on the sleeve.

4. In combination, a shaft, a sleeve connected

at one end to said shaft, having diametrically opposite slots at the opposite free ends thereof, a bracket mounted on said sleeve, means for holding said bracket from rotating on said sleeve and for causing it to move with said sleeve in a longitudinal direction, a helical spring loosely surrounding said sleeve and having one end secured to said bracket, a collar drawn into an upper large cylindrical top portion, a smaller square bottom portion and an intermediate connecting portion, said connecting portion having two diagonally opposite cone-shaped sides extending with their wide ends from the top portion and merging into corresponding opposite sides of the square portion and having two diagonally opposite flat sides slanting from the top portion to merge with the corresponding diagonally opposite

other sides of the square portion, the opposite end of said spring having the last turn wrapped around the cone-shaped sides and extending from this last turn by an easy curve into a straight end which lies diagonally across said last turn and is threaded through the opposite slots in the sleeve, and through diagonally located opposing apertures in the flat sides of the intermediate connecting portion of the collar to lock said spring in the slots in said sleeve and to secure the spring to the collar and to the sleeve, said last turn of the spring serving when the spring is wound to tighten itself around the cone-shaped sides of the collar and thereby cause the remaining turns of the spring to align themselves concentrically to each other around said sleeve.

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