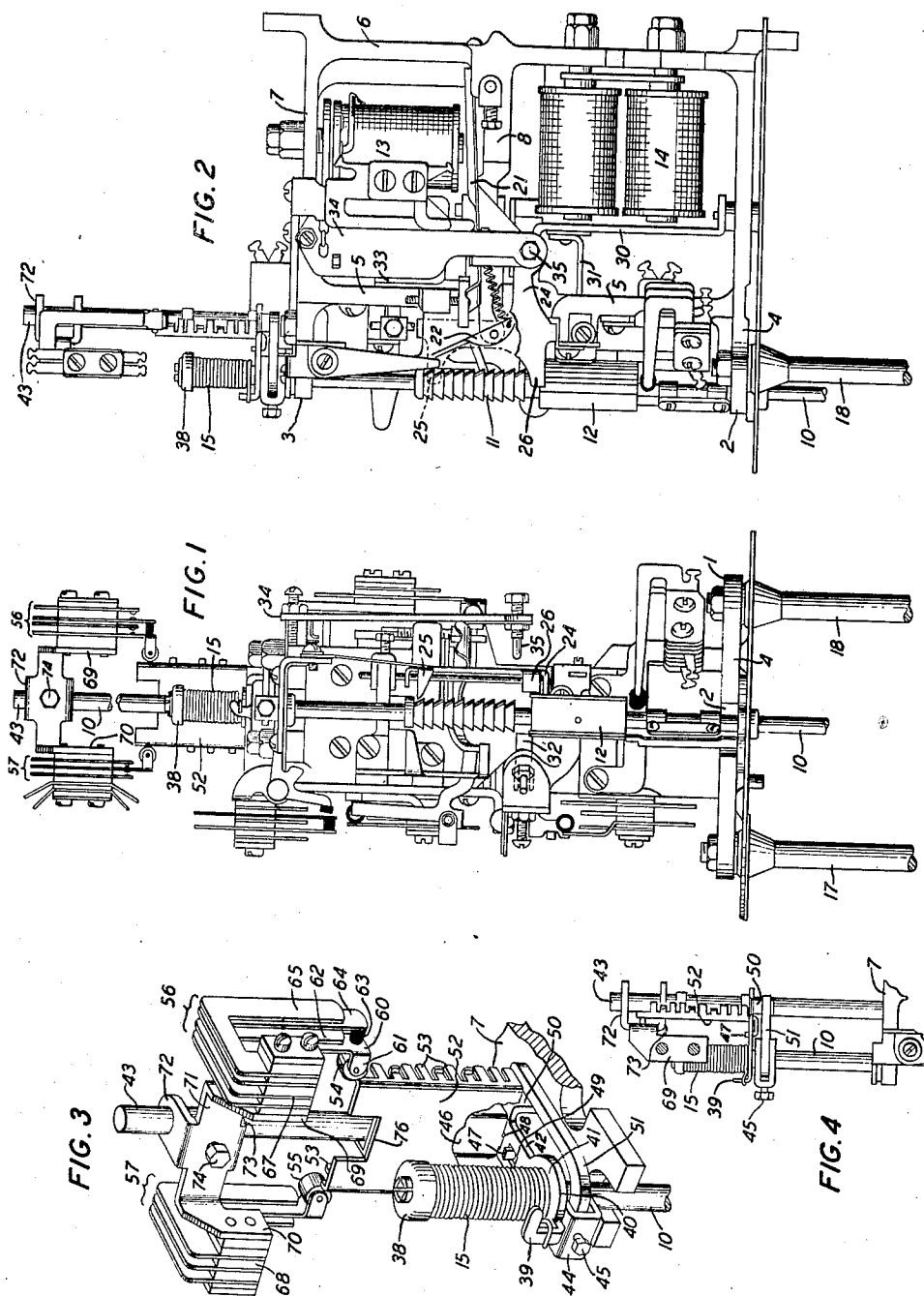


Feb. 1, 1944.

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SWITCHING MECHANISM
Filed Oct. 23, 1941

2,340,811



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2,340,811

SWITCHING MECHANISM

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Application October 23, 1941, Serial No. 416,173

8 Claims. (Cl. 179—27.52)

This invention relates to switching mechanisms and particularly to such mechanisms as are employed in telephone systems.

An object is to simplify and improve structural details of switching mechanisms; and another object is to decrease the space requirements for these mechanisms.

Heretofore switching mechanisms have been employed of the so-called Strowger type in which a shaft is raised and rotated by a step-by-step mechanism to cause brushes on said shaft to selectively connect with terminals in switching banks to establish electrical connections. Associated with such switching mechanisms are usually provided so-called normal post assemblies for establishing special connections during the raising of the shaft. Such assemblies usually consist of a post connected to the frame structure of the switch on which a bracket is mounted having contact springs secured thereto and a toothed rack or cam members connected to the shaft so that when the shaft is raised, teeth on this rack will operate on rollers on the contact springs to actuate them as required. In these previous normal post assemblies the operating space is of considerable height and requires an over-all length equal to the length of the rack plus the length of the contact springs and the portion of the bracket supporting the springs. The mounting space for the complete switch mechanism on the usual mounting rack is therefore rather extensive.

It is a feature of the present invention to so construct the normal post assemblies of these general types so that this mounting space may be considerably reduced and to this end the toothed rack, the contact springs and the bracket for these springs are so arranged that the rack when raised telescopes the bracket while the springs are maintained at the same length for flexibility by being formed or bent over themselves and connected to the bracket so that the position of the bracket does not interfere with the rack in its raised position.

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

Fig. 1 shows the front view of a switch of the Strowger type to which the applicant's invention has been applied;

Fig. 2 shows a front view of the switch shown in Fig. 1;

Fig. 3 is a detailed perspective view of the applicant's invention as applied to this switch showing the normal post spring assembly; while

Fig. 4 shows this normal post spring assembly with the rack in raised position.

Referring now to the drawing, the switch to which applicant's invention has been applied consists in general of the following parts. A frame structure 1 which is provided with forwardly projecting members 2 and 3, a bottom member 4, a front member 5, a rear member 6 and a top member 7 and an intermediate cross member 8 on which members the various stationary and movable parts of the mechanism are mounted. Through apertures in members 2 and 3 is journaled an operating shaft 10 having a vertical ratchet 11 and a rotary ratchet 12 by means of which the shaft 10 is lifted and rotated by armatures and pawls as controlled by the vertical and horizontal magnets 13 and 14. At the upper end of the shaft 10 is mounted a spring 15 to return the shaft from a rotary position to normal. At the lower end of shaft 10 are mounted sets of brushes (not shown) but which may be lifted and rotated to establish connections with terminal banks (not shown) but generally mounted on posts 17 and 18 which are secured to the bottom member 4. To lift the shaft vertically, the vertical magnet 13 is mounted on the member 7 and operates on an armature 21 provided with a pawl 22 which engages the ratchet 11 each time the armature is operated. When this armature 21 operates, it releases the usual double dog holding pawl 24 which is provided with an upper pawl member 25 engaging the ratchet 11 when this holding pawl is released to hold the shaft in raised position and a lower pawl member 26 which engages the ratchet 12 when the holding pawl is released to hold the shaft in an advanced rotary position. On the rear member 6 is mounted the rotary magnet 14 which operates on an armature 30 having a forwardly extending bracket 31 on which the pawl 32 is mounted to engage the ratchet 12 and rotate it when the magnet 14 is operated. To release the shaft to normal position after having been operated by the vertical and rotary magnets 13 and 14 the release magnet 33 is provided and mounted on frame member 8. This magnet operates on the armature 34 having a pin 35 which acts on an extension of the holding pawl 24 to cause the pawls 25 and 26 to release the shaft 10. The shaft 10 is rotated back to normal under tension of the spring 15 and returns from its vertical position by means of gravity. This mechanism may be controlled by first operating the vertical magnet 13 to raise the shaft to a desired level and then operating the rotary magnet 14 to rotate

the shaft on this level to cause the brushes connected to the shaft to engage the desired terminals in associated banks.

Referring now to the parts of this mechanism arranged in accordance with the applicant's invention and particularly to Figs. 3 and 4, it will be noted that the rotary return spring 15 is mounted at its upper end by means of a collar 38 connected to the shaft 10 and at its lower end connected over a hook 39 forming part of a member 40. This member 40 at 41 is provided with an opening through which the shaft 10 may be free to rotate and is extended rearwardly by an extension 42 which is provided with an opening (not shown) through which the normal post 43 mounted on the frame member 7 may freely pass. To hold the member 40 in its proper position in relation to the shaft, a bracket 44 is secured to the shaft by means of the screw 45. It is evident that the opening in extension 42 of the bracket through which post 43 passes will hold the bracket 40 from rotating and that the clamp 44 causes the bracket 40 to rise with the shaft 10. The bracket 40 therefore serves the purpose of tensioning the spring 15 when the shaft 10 is rotated and to travel with the shaft when raised or lowered. To the bracket 40 is secured a sleeve 46 of a square cross section by means of the bent extension 47 thereon projecting through an opening 48 in the portion 42 downwardly and up through another opening 49 upwardly. Extending from the bracket extension 42 is a downwardly extending member 50 which normally engages a backstop 51 secured between the screw 45 in bracket 44 and the shaft 10 to limit and adjust the normal position of the shaft in regard to its rotary movement. Welded or otherwise secured to the sleeve 46 is the rack 52 having toothed members such as 53 and others extending at right angles rearwardly from the main portion of the bracket of the rack 52. Some or all of these teeth 53 may be bent at right angles outwardly in various combinations to control the normal post springs by having the rollers such as 54 and 55 engage the bent teeth and be actuated thereby to operate normal post springs accordingly.

These normal post springs of which there are two groups 56 and 57 are controlled respectively by rollers 54 and 55 as follows. The group 56 consists of four springs, one of these springs 60 being provided at its extreme free end with projections or ears such as 61 between which the roller 54 is mounted. The movement of the roller 54 outwardly will consequently cause the spring 60 to engage the spring 62 and cause through the stud 63 the spring 64 to engage the spring 65. Thus each time the roller 54 engages a bent-out tooth on rack 52 two separate electrical connections may be established in the group of springs 56. Similarly the roller 55 will operate the associated spring assembly 57 when teeth bent outwardly engage it as the rack 52 is raised. It will be noted that the individual springs in the assemblies 56 and 57 run for a short distance upwardly, then forwardly and then downwardly to provide a suitable length for the desired flexibility of these springs. The extreme end of these springs are mounted at 67 for the assembly 56 and at 68 for the assembly 57 at the right angle projections 69 and 70, respectively, that extends from the bracket 71. This bracket 71 has lugs 72 and 73 which are provided with openings through which the post 43 is passed and held by means of the screw 74. It should be noted, particularly in Fig. 4, that when the rack 52 is moved upwardly

it will partly telescope the bracket 71 due to the cut-in portion 76 in the rack 52 while the rack 52 will also telescope between the rollers 54 and 55 and between the projections 69 and 70 of bracket 71 without interfering with the spring assemblies.

By this arrangement it is evident that the over-all length of the normal post will be considerably less than in previous normal post assemblies of this general type where the entire bracket and the operating springs had to be located above the rack 52. Hence the functional operating space in this switch is materially reduced with a consequent reduction in mounting space required for the switch.

What is claimed is:

1. In an automatic switch, a frame, a wiper shaft, means for moving said shaft longitudinally in a step-by-step manner into a plurality of positions, a post secured to said frame, two contact spring assemblies secured to said post on the opposite sides thereof in line with the post, and a member attached to said shaft for actuating said contact springs, said assemblies and said member being so constructed that said member, when moved by the shaft to actuate the contact springs, will enter between the two assemblies and straddle the support of the assemblies on said post.

2. In an automatic switch, a frame, a wiper shaft, means for moving said shaft longitudinally in a step-by-step manner into a plurality of positions, a post secured to said frame, two sets of contact springs secured to said post on the opposite sides thereof with the springs parallel and in line with the post, a member attached to the shaft and having two series of projections arranged respectively between the post and the two sets of springs, and parallel to the post, for entry between the posts and the sets of springs when the member is moved by the shaft longitudinally, said two sets of springs being so arranged in relation to the post and to the said member that the member as it is moved longitudinally for the actuation of the springs may be moved to straddle the support of said springs on the post.

3. In an automatic switch, a frame, a wiper shaft, means for moving said shaft longitudinally in a step-by-step manner into a plurality of positions, a post secured to said frame, a bracket secured to said post, two sets of contact springs secured to said bracket and located on opposite sides of said post and in line therewith, a member carried by said shaft for operating the two sets of contact springs in response to the longitudinal movement of said shaft, said bracket and said member being so constructed that the member will engage the contact springs at positions between the post and the two sets of contact springs and be permitted to travel so as to straddle the support of said bracket on said post during these engagements.

4. In an automatic switch, a frame, a wiper shaft, means for moving said shaft longitudinally in a step-by-step manner into a plurality of positions, a post secured to said frame, a U-shaped bracket secured to said post, a set of contact springs secured to each side member of said U-shaped bracket, said springs being shaped so as to be located on opposite sides of and in line with the axis of the post, a U-shaped member attached to said shaft and having its side members extending respectively between the opposite sets of contact springs and the post, said side mem-

bers having projections for actuating the adjacent set of contact springs during the longitudinal movement of the shaft.

5. In an automatic switch, a frame, a wiper shaft, means for moving said shaft longitudinally in a step-by-step manner into a plurality of positions, a post secured to said frame, a bracket secured to said post, two sets of contact springs secured to said bracket and located on opposite sides of said post and in line therewith, an operating member for each set of contact springs attached to one of the springs thereof, a member secured to the shaft, two groups of operating projections on said member extending respectively between the operating members for said springs and the post for actuating said operating members to control the spring operations on the longitudinal movement of the shaft towards the springs, said operating projections being so constructed that during the longitudinal movement to actuate the operating members said projections may be shifted beyond the supporting point of the sets of springs on the bracket and straddle the bracket where it is supported on the post.

6. In an automatic switch, a frame, a wiper shaft, means for moving said shaft longitudinally in a step-by-step manner into a plurality of positions, a post secured to said frame, a bracket secured to said post, two contact spring assemblies secured to said bracket and located on the opposite sides of the post and in line therewith and a U-shaped member attached to said shaft, having its side members arranged to actuate said sets of springs when the shaft is moved, said side members being located on opposite sides of the post and in line therewith, said U-shaped member being further so located and cut that towards the end of its movement it telescopes the bracket.

7. In an automatic switch, a frame, a wiper shaft, means for moving said shaft longitudinally in a step-by-step manner into a plurality of positions, a post secured to said frame, a U-shaped bracket having extensions from the bottom mem-

ber extending in one direction and secured to said post and having its side member extending in the opposite direction away from the post, a set of springs secured to each side member and bent back towards the post to occupy positions on opposite sides of the post and in line therewith, a U-shaped member attached to said shaft and having its side members extending respectively between the opposite sets of contact springs and the post, said side members having projections for actuating the adjacent set of contact springs during the longitudinal movement of the shaft and the bottom member of said U-shaped member being cut so that at the end of its longitudinal movement it may partially telescope the extensions on the said U-shaped bracket so that each side member of said U-shaped member may enter freely between its associated set of springs and the said extensions.

8. In an automatic switch, a frame, a wiper shaft, means for moving said shaft longitudinally in a step-by-step manner into a plurality of positions, a post secured to said frame, a U-shaped bracket having ears extending from the bottom side thereof in a direction toward the post and secured to said post and having its side members extending away from said post, two sets of U-shaped springs each set being secured at one of their side members to a separate side member of said bracket with the other side members of both sets extending parallel to, on opposite sides of and in line with the shaft, a U-shaped member attached to said shaft having its bottom member extending parallel with the bottom member of said bracket and located between said bottom member and said post and its side members extending respectively between the opposite free side members of the two sets of springs and said post, said side members of the U-shaped member being provided with projections for actuating the adjacent set of springs during the longitudinal movement of the shaft.

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