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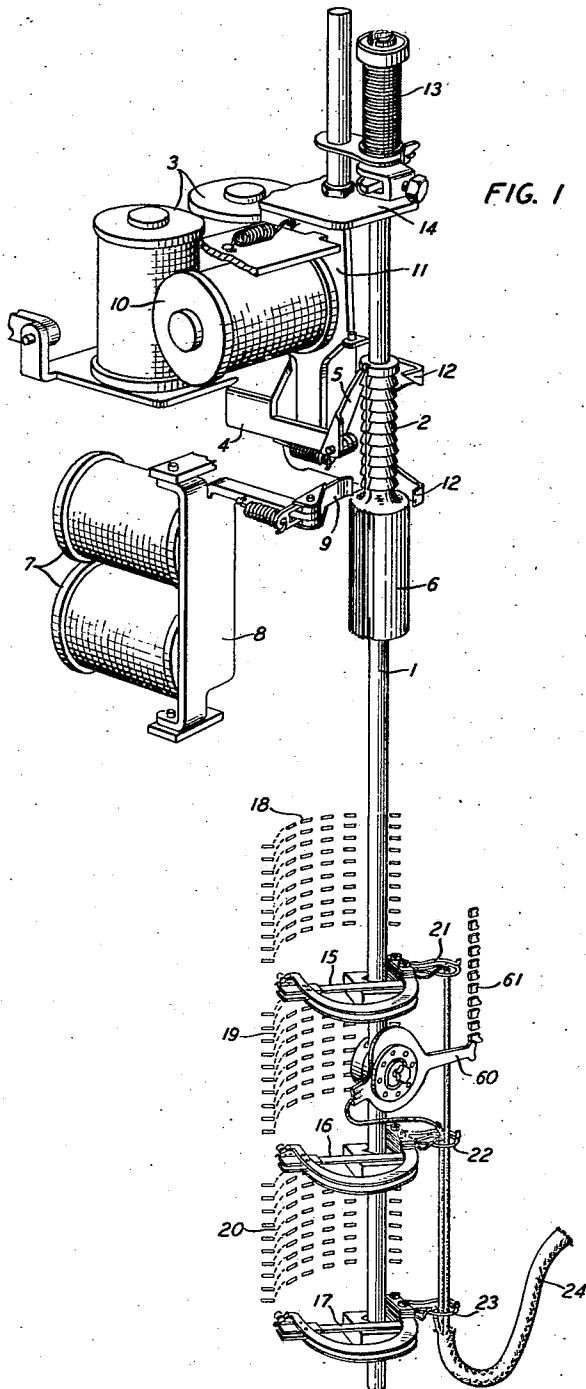
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2,457,588

SPLIT RING CORD GUIDE FOR STEP-BY-STEP SWITCHES

Filed Dec. 18, 1946

3 Sheets-Sheet 1



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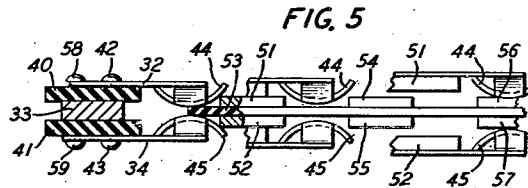
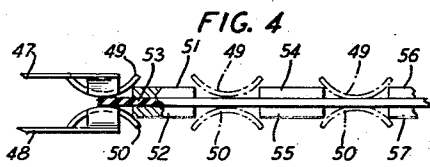
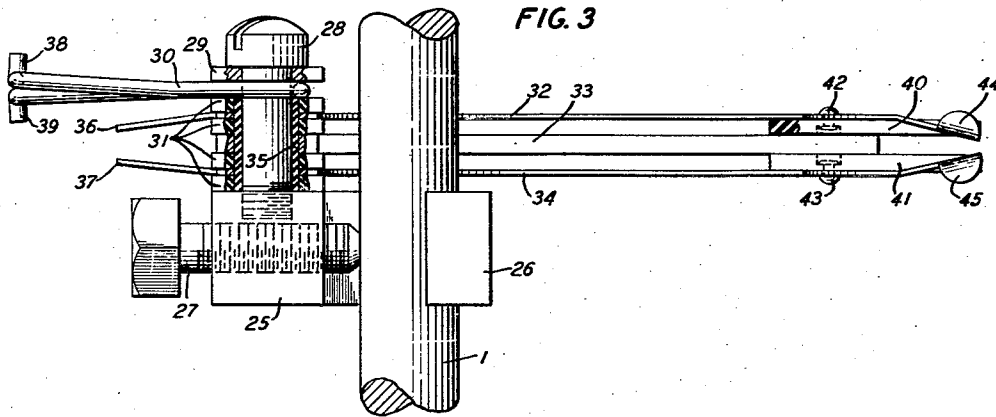
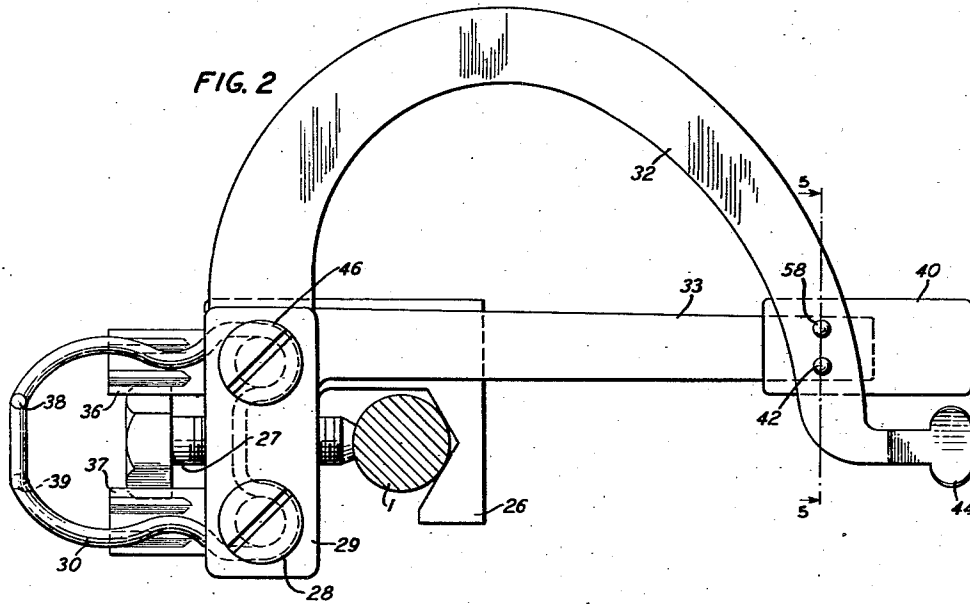
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SPLIT RING CORD GUIDE FOR STEP-BY-STEP SWITCHES

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3 Sheets-Sheet 2



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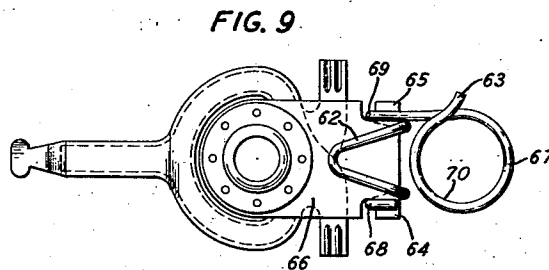
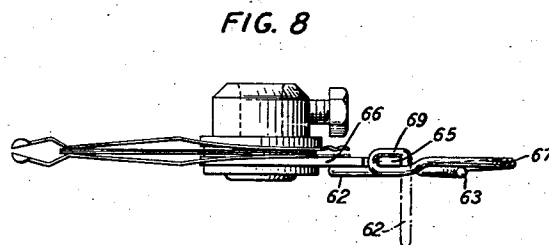
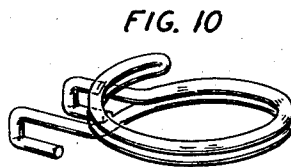
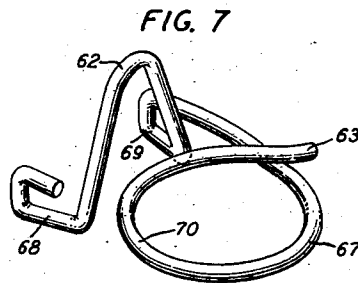
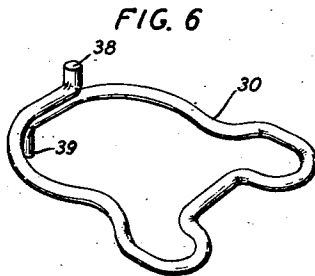
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SPLIT RING CORD GUIDE FOR STEP-BY-STEP SWITCHES

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3 Sheets-Sheet 3



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2,457,588

SPLIT RING CORD GUIDE FOR
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Application December 18, 1946, Serial No. 717,052

3 Claims. (Cl. 179-27.52)

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This invention relates to electrical switching devices and particularly to improvements in switches used for the establishment of connections between subscribers' lines in automatic telephone systems.

The object is to simplify and improve from operation, installation and replacement stand-points, certain parts of automatic switching devices.

Heretofore in automatic switches, particularly of the step-by-step type having wiper assemblies and mechanism for guiding such wipers over contacts to establish telephone connections, cord guides have been used to confine the cords or conductors associated with the wiper assemblies. These cord guides usually consist of either eye-lets integral to said assemblies through which said cords or conductors must be threaded or they consist of closed rings detachably connected to said assemblies but still requiring the aforementioned threading of cords or conductors. The former type, whenever an assembly requires replacement, necessitates unsoldering of all cords above said assembly and of those connected thereto and unthreading of these cords from all assemblies above and including the defective one, followed by rethreading and resoldering of all of said cords subsequent to replacement of the defective assembly. The latter type of prior art cord guide mentioned above enables assemblies to be replaced without requiring unsoldering of any cords except the ones attached to the defective assembly and without any unthreading or rethreading but requires removal of cords from the defective assembly and removal therefrom of said guide ring.

The present invention provides on each wiper assembly a split ring type of cord guide detachably fixed to said assembly. By use of this device the only operations required in replacing an assembly, as far as cords are concerned, is unsoldering of only those cords which are connected to the defective assembly and releasing of all cords of the switch from the guide of the defective assembly in a manner similar to that in which a key is commonly removed from a key ring of the split-ring type. This arrangement is simpler than either of the previously mentioned prior types and represents fewer installation and maintenance problems.

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

Fig. 1 shows an automatic step-by-step switch of the Strowger type in a simplified form with

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the invention applied to the wiper assemblies on the shaft.

Fig. 2 illustrates an enlarged plan view of the wiper assembly shown in Fig. 1.

Fig. 3 is an elevation of Fig. 2 partly in section. Figs. 4 and 5 illustrate, in connection with subsequent description, an operating feature of the type of wiper assembly disclosed in previous figures.

Fig. 6 shows in perspective the form of the present invention used in connection with the wiper assembly of Figs. 2 and 3.

Fig. 7 shows in perspective another form of the invention.

Figs. 8 and 9 show the use of the cord guide of Fig. 7 with a well-known type of wiper assembly.

Fig. 10 shows in perspective another form of the invention suitable for use with such well-known wiper assemblies as shown in Figs. 8 and 9.

Referring now to the drawings, and particularly to Fig. 1 thereof, the Strowger switch shown in this figure is illustrated in a somewhat simplified form for the sake of clearness. The usual central wiper carrying shaft 1 has been shown with the vertical ratchet 2. A vertical magnet 3, an armature 4 operated thereby and an actuating pawl 5 engaging the ratchet 2 have been shown for lifting the shaft in a vertical direction. Below the ratchet 2 is shown a rotary ratchet 6, rotary magnet 7, armature 8 and actuating pawl 9 engaging the ratchet 6 to rotate the shaft for locating the wipers at the desired terminals. Release magnet 10 has been shown with its armature 11 and double-dog pawl 12 operated by the armature 11 to release the shaft from an actuated position. The retractile spring assembly 13 is shown attached to the upper end of the shaft 1, one end of this spring being connected to the shaft and at the other end to the frame 14.

At the lower end of the shaft 1 has been shown wiper assemblies 15, 16 and 17 and corresponding banks of terminals 18, 19 and 20 to which connections may be made by the corresponding wipers being lifted in a vertical direction and then rotated to engage the desired terminals. The usual arrangement is for the wipers 15 to establish connections for the sleeve conductors, and wipers 16 and 17 for tip and ring conductors. These wipers are assembled with guide rings 21, 22 and 23, respectively. Into the guide rings cords 24 may be inserted and soldered to projections on the wipers as will hereinafter be described.

Figs. 2 and 3 as previously mentioned are enlarged plan and elevation views respectively of one of the wipers such as 15 of Fig. 1. The main body 25 of this wiper assembly is constructed of suitable material such as metal having a viselike extension 26 and adapted by means of set screw 27 threaded in a suitably tapped hole in the body 25, to clamp the wiper assembly about the shaft 1 as shown. The opening in the jaw of this body member between the main member 25 and the extension 26 thereof is dimensionally suited to allow the shaft 1 to be easily inserted therein without requiring relative motion between said body member 25 and said shaft 1 in a direction axial to said shaft. In a spring pile-up assembly on the wiper body 25 and fastened thereto by means of screws 28 and 46 are a metal retaining plate 29, a cord guide ring 30 separately shown in Fig. 6, suitable insulating strips 31, an upper wiper arm 32, a lower wiper arm 34 and an intermediate resilient metallic member 33 which is separated from said wiper arms by means of two of said insulator strips 31. This member 33 may be of any suitable resilient material, metal being merely exemplary for the sake of the disclosure. The wiper arms 32 and 34, as illustrated best in Fig. 2, are curved to present the least twisting force to these arms as the wiper assemblies are rotated clockwise as viewed in Fig. 1. The resilient metallic member 33, as best illustrated in Fig. 2, is a straight portion extending directly from the pile-up assembly to the proximity of the wiper tips 44 and 45. This member acts not only as a separator for the wipers but also as a damping member to inhibit chatter or rebound of said wipers. In the proximity of the wiper tips, such as 44 and 45 for wiper arms 32 and 34 respectively, there is riveted or otherwise attached to each wiper arm an insulator member such as 40 for wiper arm 32, and 41 for wiper arm 34. These insulators are seen normally to rest upon member 33 by reason of the pretensioning of the respective wiper arms towards each other. These insulators 40 and 41 are hereinafter referred to as "trailing shoes." The guide ring 30 is seen to be detachably mounted in the pile-up assembly and constructed similarly to a split key-ring. The material used for this guide ring is preferably metal and preferably resilient. The projections 38 and 39 represent two free circumferential ends of the guide ring 30 pretensioned to engage each other with appreciable force. These ends are arranged such that by a slight pressure, such as applied by a person's fingers, they will separate to allow cords such as 24 in Fig. 1 to be inserted therein.

The form of the invention as shown by Fig. 7 is particularly adapted to be used with the prior type of wiper assemblies shown in Figs. 8 and 9. This well-known type of wiper assembly is disclosed in Patent 2,259,103, granted to P. B. Drake on October 14, 1941. The form of the invention as shown in Fig. 7 permits the improvement embodied therein to be applied to the old type of wiper assembly without modification to said assembly. This procedure may be desirable where a complete change from the old type of assembly of Figs. 8 and 9 to the newer type of Figs. 2 and 3 has not become economically practical.

The cord guide 67 of Fig. 7 is provided with two suitable bent portions 68 and 69 connected to each other by a resilient portion 62. The whole cord guide 67 may be made of resilient material if desired in which case a length of re-

silient wire suitably formed as shown will accomplish the purposes of the invention. A ring-like portion 70 extends from bent portion 69 and is arranged to form a closed loop whereupon the end 63 thereof may overlap the main portion of the cord guide 67. As previously explained, the overlapping feature permits ready insertion or removal of wires or cords from the cord guide without requiring removal thereof from the wiper assembly to which same is attached.

In accordance with the well-known type of wiper assembly shown in Figs. 8 and 9, a plate 66 is provided having two laterally opposite ear-like portions 64 and 65. The cord guide 67 of Fig. 7 may be attached to such an assembly by springing apart the bent portions 68 and 69 and engaging these portions with respective ear-like portions 64 and 65 of plate 66 as shown. The resilience of member 62 will permit the spreading apart of portions 68 and 69 to enable same to engage the ears 64 and 65 of the plate 66 and will also permit said portions 68 and 69 to remain tightly connected to said plate after having once been connected thereto. If the upright portion 62 of Fig. 7 is found to interfere with cords or other mechanism near the assemblies of Figs. 8 and 9, said portion may be bent to assume the position shown by solid lines in Figs. 8 and 9. The position of this portion of the cord guide is immaterial to the scope of the invention and may be altered to fit circumstances.

The cord guide shown in Fig. 10 similarly to that of Fig. 7, is adapted to be used with the type of wiper assembly illustrated in Figs. 8 and 9. This modification corresponds to the type shown in Fig. 7 and its construction is obvious in view of preceding description of the other type disclosed herein. In the type of cord guide shown by Fig. 10, it is to be noticed that no sharp edges or ends are present which might damage the insulation on cords inserted into the spiral ring-like enclosure for same. The resilient member, such as 62 of Fig. 7, is not available on the cord guide of Fig. 10 but it will be appreciated that the resilience required to hold the bent portion to the ears, such as 64 and 65 of plate 66 of Figs. 8 and 9, adapted therefor on the types of wiper assembly illustrated in Figs. 8 and 9, is inherent in the particular overlapping spiral construction shown.

Heretofore in the art, with reference to Fig. 4, the wiper arms, such as 47 and 48 with tips 49 and 50 respectively, when passing across a horizontal group of contacts in such a bank of terminals as illustrated by 18 in Fig. 1, have a tendency to wear and present the possibility of short-circuiting contacts such as 54 and 56 or 55 and 57. The dotted position of wiper tips 49 and 50 shown between contacts 54 and 56 and between 55 and 57 have been shown as worn at their contact area to illustrate that this wear may allow these tips to bridge these contact pairs. The previously mentioned trailing shoes prevent or eliminate possibility of this undesirable condition. As indicated in Fig. 5, the trailing shoes 40 and 41 for wiper arms 32 and 34 respectively have interposed therebetween the resilient metallic member 33. Upon the passing of the wiper tips 44 and 45 across contacts such as 51 and 52, suitable electrical contact will be made thereto. Subsequent to having passed across contacts 51 and 52, the wiper tips 44 and 45 will be prevented from dropping too far into the space between contacts, such as between contacts 51 and 54, to thereby eliminate any possibility of short-circuit-

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ing these contacts by bridging same as illustrated may happen in previous arrangement as per Fig. 4. It is seen that the trailing shoes 40 and 41 provide this feature by respectively resting upon and sliding across contacts 51 and 52 as the wiper tips 44 and 45 leave these contacts.

Referring now to Fig. 1, in connecting the cords 24 through the guide rings 21, 22 and 23 to the respective wiper assemblies, the cord may consist, as shown, of seven individual conductors. All of these are inserted into the lower guide ring 23 and then two of these conductors are connected individually to projections such as 36 and 37 of the wiper 17, these projections being illustrated in Figs. 2 and 3. The remaining conductors are inserted into the guide ring 22 and then two of the conductors are connected to the wiper 16 in the same manner. Then an additional conductor is extended to be connected to the special wiper 60. This wiper and corresponding contact bank 61 are provided in certain types of step-by-step switches as is well known. The remaining two conductors are then inserted into the upper guide ring 21 and connected to the wiper 15.

It is readily seen that by reason of the particular type of guide ring disclosed, any number of individual conductors in the cords 24 may be removed from or inserted into any of the guide rings on any wiper assembly without necessitating removal of either wiper assemblies or rings.

It is also apparent that any wiper assembly such as 15 may be readily detached from the shaft 1 by virtue of its vise-like construction without necessitating removal from said shaft of any other wiper.

It will readily be appreciated by those skilled in the art that wiper assemblies embodying the improvements disclosed herein will lend operating, installation and maintenance advantages to the switches to which they are applied.

The trailing shoe arrangement disclosed herein is disclosed and claimed in my copending application Serial No. 717,053, filed December 18, 1946, and allowed July 21, 1948.

What is claimed is:

1. In a switch comprising a shaft, contact banks, wiper assemblies secured to said shaft and having projections thereon, means for actuating said shaft to cause the wipers of said assemblies to engage contacts in said banks and conductors connected to said assemblies, guide rings for confining said conductors therein, said guide rings detachably connected to said assemblies, each of said guide rings comprising a piece of spring wire formed into a substantially circular loop by resiliently overlapping one end of said wire with a portion of said wire intermediate its ends, the other end of said wire being bent to form two hook portions separated by a resilient portion by means of which resilient portion said guide may be secured to said assembly, said resilient portion permitting said hook portions to be resiliently separated for attachment thereof to said projections on said assembly, said overlapping sections of said wire adapted to be separated resiliently to permit said conductors to be inserted therethrough to be confined within said ring and to be removed therethrough to be free from said ring without necessitating removal of said ring from said assembly and without necessitating removal of said assembly from said shaft and without necessitating disturbance of other

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assemblies, their rings or conductors on said shaft.

2. In a switch comprising a shaft, contact banks, wiper assemblies secured to said shaft and having projections thereon, means for actuating said shaft to cause the wiper of said assemblies to engage contacts in said banks, and conductors connected to said assemblies, guide rings for confining said conductors therein, said guide rings detachably connectable to said assemblies, each of said guide rings comprising a piece of spring wire bent back upon itself throughout the greater part of its length and formed into a substantially circular loop by resiliently overlapping the end of the doubled portion of said wire with another section of said double portion, the free ends of said wire being formed into hook portions by means of which hook portions said guide may be secured to said assembly, said hook portions retaining a resilience therebetween due to the doubling of said wire, said hook portions capable of being resiliently separated for attachment thereof to said projections on said assembly, said overlapping sections of said wire adapted to be separated resiliently to permit said conductors to be inserted therethrough to be confined within said ring, and to be removed therethrough to be free from said ring without necessitating removal of said ring from said assembly and without necessitating removal of said assembly from said shaft and without necessitating disturbance of other assemblies, their rings or conductors on said shaft.

3. In a switch comprising a shaft, contact banks, wiper assemblies secured to said shaft and having projections thereon, means for actuating said shaft to cause the wipers of said assemblies to engage contacts in said banks and conductors connected to said assemblies, guide rings for confining said conductors therein, said guide rings detachably connectable to said assemblies, each of said guide rings comprising a split ring, the free end of one section of said split ring circumferentially resiliently overlapping another section of said split ring, other sections of said split ring formed into hook portions by means of which hook portions said guide ring may be secured to said assembly, said hook portions having a resilience therebetween due to the configuration of said ring whereby said hook portions may be separated resiliently for attachment thereof to said projections on said assemblies, said overlapping sections of said ring adapted to be resiliently separated to permit said conductors to be inserted therethrough to be confined within said ring and to be removed therethrough to be free from said ring without necessitating removal of said ring from said assembly and without necessitating removal of said assembly from said shaft and without necessitating disturbance of other assemblies, their rings or conductors on said shaft.

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The following references are of record in the file of this patent:

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