Jan. 15, 1952 J. F. SORENSON 2,582,800

SWIVELING DEVICE FOR ELECTRIC CURRENT

Filed Nov. 22, 1946

Fig. 1

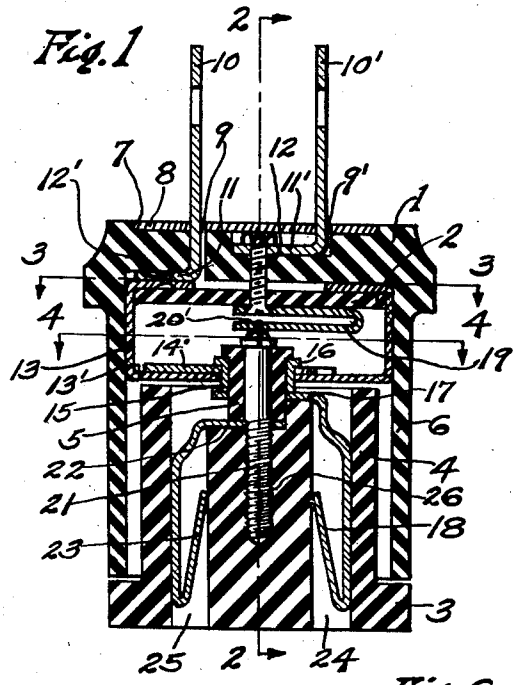


Fig. 2

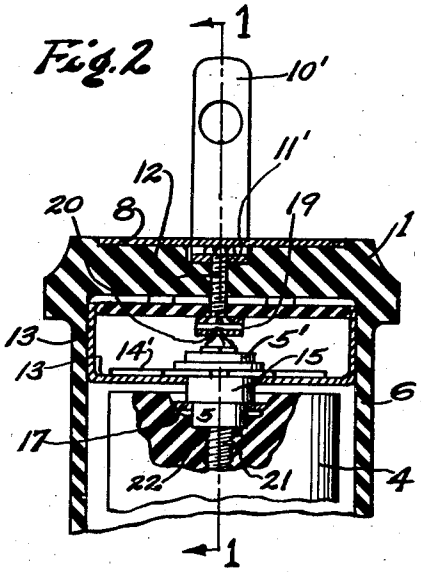


Fig. 9

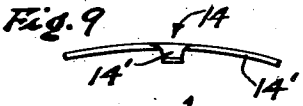


Fig. 3

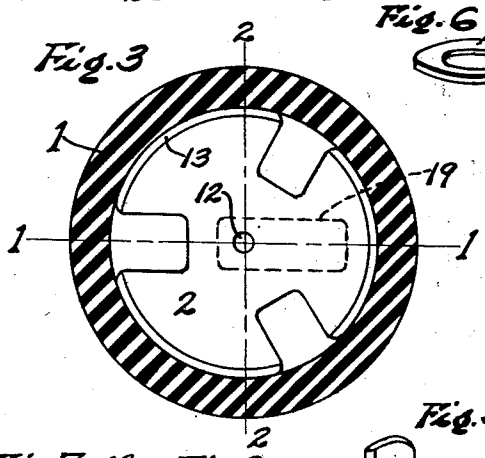


Fig. 6



Fig. 4

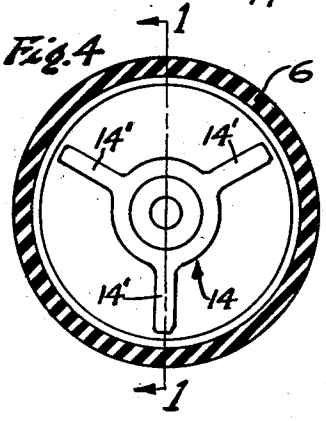


Fig. 5

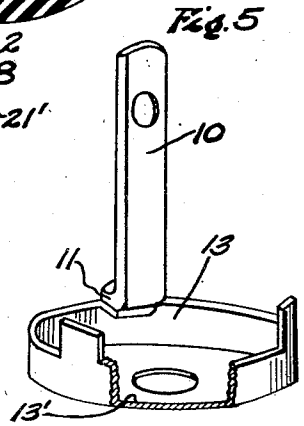


Fig. 7



Fig. 8

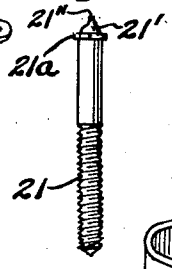


Fig. 10

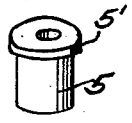
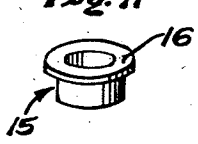


Fig. 11



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Patented Jan. 15, 1952 2,582,800

UNITED STATES PATENT OFFICE

2,582,800

SWIVELING DEVICE FOR ELECTRIC CURRENT

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Application November 22, 1946, Serial No. 711,671

4 Claims. (Cl. 173—324)

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This invention relates to swivel means by which two parts of an electric circuit may be mechanically connected for relative rotation without interruption of circuit through paths that are electrically isolated from each other in the swivel; and the invention is applicable for such connection between such parts irrespective as to whether such parts are both flexible, or both rigid, or one rigid and the other flexible.

Objects of this invention are: to provide an electric current swiveling device that is superior in simplicity, lightness, ease of manufacture and ease of assembly, and that will afford a practical anti-friction connection without use of ball or roller bearings; to provide an electric current swiveling device adapted for practical application in telephone receivers at a minimum cost and that is applicable for use for electric cord connections with hair clippers, curling irons, smoothing irons, and electric lamps, electric drills and in fact applicable in all devices in which it may be desirable to turn one part of the electrical conductor of a circuit axially relative to an adjacent part.

A feature of this invention is that the electrical connection between the relatively revolvable parts of each of the two electrical paths inside the swiveling device is made through resilient pivoting members, and I have in one instance provided an axial pivot contacting with a conductive spring having a contact seat for the axis of the pivot, and in the other instance, have also provided a conductive spring having anti-friction points of contact, and in each instance the spring that maintains the electrical connection between the ends of a conductive series also forms a part of the mechanical holders of the relatively insulated conductors.

An advantage of the invention is that the parts may be made of conventional screws, light stampings of metal, and mouldings of phenolic condensation material, insulating fiber or other insulating material, and that the assembly can be made quickly and perfectly by workmen without technical training.

I have discovered that by constructing the device in accordance with this principle, the swiveling action remains perfect and the contact unbroken.

It is understood that the terminals at each end of the device and also the various parts may be constructed without departing from the spirit of the invention; but the form shown is at present deemed most desirable for illustration of the invention.

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Other objects, advantages and features of invention may appear from the accompanying drawings, the subjoined detailed description and the appended claims.

The accompanying drawings illustrate the invention mainly on an enlarged scale.

Figure 1 is an elevation mainly in axial section, of an interchangeable electric current swivel constructed in accordance with this invention and having push plug terminals at one end and spring terminals at the other end; lines 1, Figs. 2, and 3 and 4 on enlarged scale indicates the plane of section.

Fig. 2 is a fragmental view largely in section on a vertical plane at right angles to that of Fig. 1, and indicated by line 2—2, Figs. 1 and 3.

Fig. 3 is a section view taken on line 3—3, Fig. 1.

Fig. 4 is a section on line 4—4, Fig. 1, and also shows a plan view of the anti-friction spring contact bearing.

Fig. 5 is a detached perspective view of the first conductive plug terminal and the intermediate conductive cage element fixed thereto.

Fig. 6 is a perspective view of the first spring socket terminal detached.

Fig. 7 is a perspective view of the second spring socket terminal detached.

Fig. 8 is a detached view of the conductive pin.

Fig. 9 is a detached edge view of the antifriction spring contact bearing which is shown constrained in Figs. 1 and 2, and is shown free in this view.

Fig. 10 is a perspective view of the central insulating sleeve member.

Fig. 11 is a perspective view of the central conductive collar member detached.

In the invention shown there are two relatively revolvable mechanically connected insulating parts and two electrical paths isolated from each other and each extending through both said insulating parts.

The first contact holder comprises a housing cap 1 and a disk 2. The second contact holder is a single piece made up of a base 3 and a hub 4.

The insulating sleeve 5 is central to the hub 4 and the housing shell 6 incloses the hub and fits between the base 3 and the housing cap 1.

The housing cap has a recess 7 in which is fitted the finish plate 8, and the finish plate and the cap have orifices forming channels 9, 9' to accommodate the stems of the conductive plug contacts 10, 10' which are respectively bent and perforated to form retainers shown as feet 11, 11', through which are passed a screw bolt 12 and a rivet 12' that secures the contact, the screw bolt

passes through the cap of the housing and engages bent conductive spring 19, that contacts the conductive bolt 21 which engages a conductive V-contact spring 23.

The plug contacts 10, 10' form push plug terminals respectively at the ends of two isolated electric paths extending through the swivel.

One of such paths may be traced through the plug contact 10 and its retaining foot 11, through the rivet 12' and the conductive cage 13, 13' to the conductive floating spring consisting of an annulus or ring 14 and having three radial arms 14' which rest upon the transverse web or bottom plate 13' of the cage, through the conductive sleeve 15, that is provided at its top with a flange 16 which is in electrical contact with, and is antifrictionally supported by, the conductive floating spring 14 and acts upon said radial arms to compress the spring onto the transverse web 13' of the cage, and such electrical path continues thence through the ring 17 that is connected to the inner end of the socket spring-contact 18, the body of which is the conventional well known V-spring form of socket contact spring.

The non-conductive flange 5' of the insulating 5, holds the conductive sleeve 15 in position with its flange 16 contacting with floating contact spring 14, and with its lower end contacting with the ring 17, so that there is a rocking antifriction connection between the web 13' of the cage and the top of the flange 16.

The second electrical path may be traced through the contact plug 10', and its retaining foot 11' that is fastened by the screw bolt 12 on top of a bent conductive radial leaf-spring 19 which is mainly free but rests at one end upon the insulating disk 2 into which the screw bolt 12 is screwed, and which spring is bent so that its free portion 19 extends under, and is free from the disk 2 to a point beyond the center of such disk, and is provided on its under side with a pivot seat formed by a circular dent 20, that is centrally perforated as at 20' to antifrictionally rest upon the top of the conductive bolt 21 which has a rounded top 21' and a central guide pin 21''; said guide pin extending through the perforation 20' so as to prevent lateral displacement of the spring 19 relative to the conductive bolt 21, which extends through the eye 22 of the conductive V-contact spring 23 and screws into the hub 4 of the insulating base 3. The conductive bolt 21 being provided with a flange 21*a*.

Said insulating base 3 with its hub 4 is provided with contact spring channels 24, 25 for the V-contact springs 18 and 23, and has a central bore 26 in which the conductive bolt 21 is screwed and thus fixed against axial displacement.

I have discovered that the bent conductive radial spring 19 contacting with the pivotal end of the axial conductive bolt 21 affords a superior conducting antifriction bearing for maintaining electrical contact with the conducting bolt 21 and allows a flexible, adjustable rocking contact connection for the second electrical path through the swivel. It is thus seen that I have provided a swiveling device having therethrough two electrical paths, each of which has a rocking pivotal electrical connection, and have provided effective insulation in such device for both of such paths.

I claim:

1. An electrical path for an electric current swiveling device including an axial conducting bolt provided with a rounded top and a guide pin that fits into a circular dent of a conducting radial leaf spring housed in a conductive cage having a bottom plate, and a conductive flanged sleeve mounted therein; a conductive floating spring formed of a stamping of spring sheet metal and comprising an annulus having radial arms extending aslant on the out side of the annulus, the said conductive parts being housed in a contact holder and held in alignment by a housing shell and insulating disc so that when said conductive floating spring is placed with its resilient radial arms upon the bottom plate of the conductive cage, the radial arms tend to maintain close electrical contact between the conductive flanged sleeve on one side, and the conductive cage on the other side and said conductive radial leaf spring contacting the pivotal top end of the axial conductive bolt affords a superior conducting antifriction bearing maintaining electrical contact with said conducting bolt and allows a flexible adjustable rocking contact connection.

2. An electric current swiveling device including a contact holder comprising a housing cap, a second holder comprising a single piece made up of a base and a hub having two electrical paths therethrough, one of such paths comprising an annulus having three radial spring arms to move said annulus in one direction contacting a bottom plate of a conductive cage through a rivet in a retaining foot of a plug contact to form an electrical contact in said path; a bent leaf contact spring in the other electrical path to resist the upward thrust of said spring arms; a conductive bolt in said other path that permits the free end of the bent leaf contact spring to anti-frictionally rest upon the top of said conductive bolt.

3. An electric current swiveling device including a contact holder comprising a housing cap, a second holder comprising a single piece made up of a base and a hub; an insulating sleeve central to the hub through which is guided a conductive bolt; a shell enclosing the hub and fitted between the base and the cap; said housing cap having orifices forming channels to accommodate the stems of coductive plug contacts respectively bent to form retainer feet; said plug contacts forming plug terminals respectively at the ends of two isolated electric paths extending through the swivel; one of such paths comprising a conductive cage; a conductive screw bolt extending through the cap and a contact retainer foot; an insulating disc into which said screw bolt traverses; an anti-friction bearing conductive spring having three radial arms which rest upon the bottom plate of the conductive cage; a socket spring contact; a ring connected to said socket spring contact; a sleeve in electrical contact with the ring; a second electrical path comprising a contact conductive bolt; a conductive bent leaf spring resting on the insulating disc connected with said plug contact through said screw bolt and extending in a spring limb under and free from such disc to the center of the disc and there provided with a pivot seat; said contact screw bolt extending through the top of the spring contact that is in pivotal contact with the seat in the bent leaf spring that gives a swiveling action and unbroken contact.

4. In an electric current swiveling device of the character set forth comprising a contact holder having a housing shell and cap, a second holder comprising a single piece made up of a

base and a hub and said housing shell fitting over the hub of said second holder to form a housing for the contact parts and swivel; an electric path comprising a contact plug, a bent leaf spring contacting with the plug through a screw bolt and provided with a seat formed by a circular dent in its underside and having a central perforation in the dent, and a conductive bolt having a rounded head in the seat, and also having a central guide pin in the perforation so as to prevent lateral displacement, and said parts being encased in the housing shell.

JESSE F. SORENSON.

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