

Dec. 5, 1944.

E. G. J. PEDERQUIST

2,364,095

TERMINAL

Filed Sept. 30, 1943

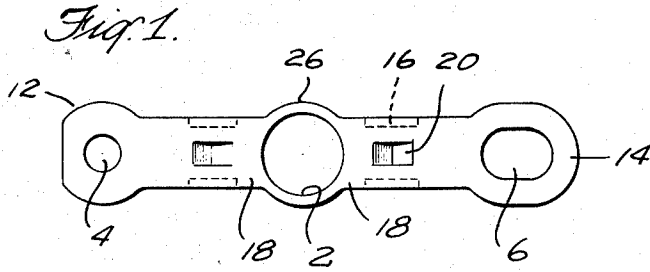


Fig. 3.

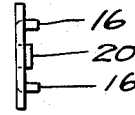
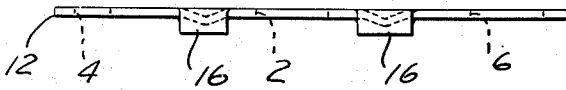
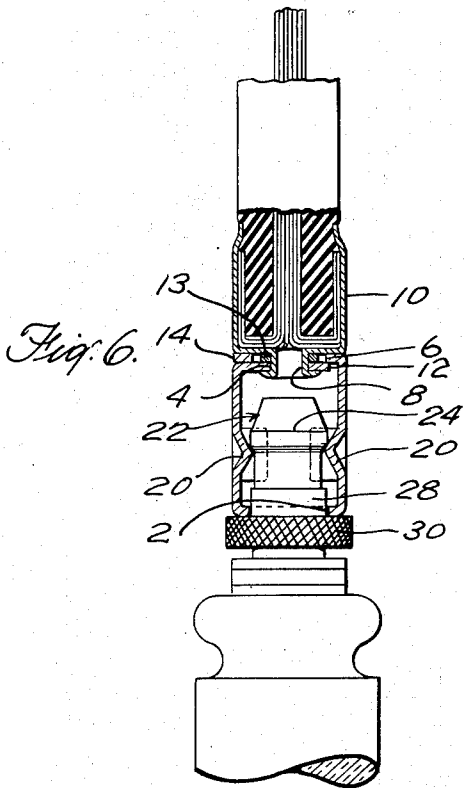
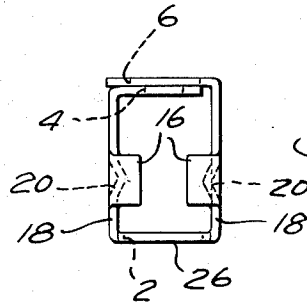
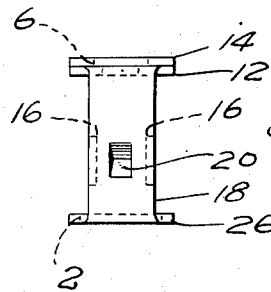


Fig. 2.



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2,364,095

TERMINAL

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Application September 30, 1943, Serial No. 504,344

7 Claims. (Cl. 173-269)

This invention relates to electrical connectors or terminals and particularly to terminals of the type known to the trade as "spring snap terminals."

Spring snap terminals comprise usually a ferrule and a spring snap contact member riveted or otherwise connected to said ferrule as, for example, by means of a hollow rivet extension formed integral with the base of the ferrule such as shown in U. S. Letters Patent to Robert A. Bell, No. 2,024,814, granted December 17, 1935. To insure long life and proper functioning, the spring snap contact member must be made of a good quality of spring metal. This is particularly true when the contact members comprise a plurality of fingers having free ends.

In that type of spring snap terminal in which the spring contact member has an end completely surrounding the post, over the knobbed end of which the terminal is to be snapped, difficulty has been encountered in the manufacture of the contact members, particularly where they are formed, as in some cases, from seamless steel tubing, from the side walls of which portions of the tubing are punched to provide the structure with relatively movable resilient parts.

A general object of the present invention is to provide a spring snap terminal of the type which has an end completely surrounding the terminal post and resilient side walls so engaging the post as to maintain the terminal and the post engaged thereby in coaxial relation to each other, which can be more readily manufactured and assembled than terminals of this general type heretofore made. More particularly the invention aims to provide a spring snap terminal which can be stamped up from a flat strip of spring metal with a minimum number of operations, easily performed by relatively unskilled labor, and which will have all of the advantages of the terminals of this general type of the prior art which are more difficult to manufacture.

An important feature of the invention is the arrangement of the spring contact members of the spring snap terminal so that there is provision for a limited relative movement of the ends thereof which are adjacent to the ferrule. This gives to the structure any advantages to be found in the spring finger type of spring snap terminal but prevents excessive spreading of the spring members and thus insures the desired contact.

A further important feature of the invention is the construction and arrangement of the spring contact members which permits resilient deflec-

tion between the ends of the spring members when the swinging springing movement thereof permitted by the relatively movable ends is not sufficient to provide the required spread of the contacts to accommodate the post.

Other objects and important features of the invention will appear hereinafter when the following description and claims are considered in connection with the accompanying drawing in which—

Figure 1 is a plan view of a stamped blank for making the spring snap contact member of the present invention;

Figure 2 is a side elevation of the blank shown in Figure 1;

Figure 3 is an end elevation thereof;

Figure 4 is a side elevation of the spring snap contact member after it has been bent up from the blank shown in Figure 1;

Figure 5 is a side elevation at right angles to Figure 4;

Figure 6 is a section through an assembled terminal embodying the present invention.

As hereinabove suggested, an important feature of this invention is the provision for relative movement of those ends of the side walls of the spring snap contact member which are adjacent to the ferrule. It will be seen that when the blank shown in Figure 1 is stamped up out of a strip of spring metal, the strip, at the end of the first operation, is provided with three openings 2, 4 and 6, the opening 2 being of a size suitable to receive the terminal post of the spark plug or other structure to which the electrical connection is to be made and the opening 4 being of a size to receive an integral hollow extension 8 on the ferrule 10, said extension 8 serving as a hollow rivet by which the overlap 12, hereinafter to be more fully described, is permanently connected to the ferrule in positively spaced relation thereto. As shown in Figure 6, it will be seen that the positive spacing of the overlap 12 from the base of the ferrule may be obtained by fitting a washer 13 about the rivet extension 8, said washer being of sufficient thickness to give the desired or required positive spacing. The opening 6 in the other overlap portion 14 of the blank is of a size both to embrace the washer and to permit a movement of said overlap 14 relatively thereto as more fully described hereinafter.

At the same time that the holes 2, 4 and 6 are punched in the metal strip to form the blank, lugs 16 are stamped up from the sides of the strip, the formation of these lugs helping to form waist portions 18 in the strip which in the fin-

ished contact member constitute the resilient side walls thereof. Also as a part of the first step in the manufacture of the contact member, contacts 20 are pressed up from the original surface of the spring metal, these contacts 20 being raised sufficiently above the original surface of the metal so that when the connection is made they will engage the sides of the post 22 below the knob or enlarged end portion 24 thereof.

The stamped blank, shown in Figure 1, having been made by the first stamping operation, the next steps are those required to bend it into the shape shown in Figures 4, 5 and 6. As will be seen from an inspection of Figure 4, the overlaps 12 and 14 are formed by bending the blank ends about the junctions between these overlap portions and the waist portions 18. As a part of the same continuous operation, if desired, the blank is then bent about the junctions between the waist portions 18 and the central part 26 of the blank which forms the post receiving end of the finished contact member. This completes the formation of the contact part of the terminal. As will be seen from an inspection of Figure 4, the overlap 12 is now located on the inner side of the overlap 14. Since the overlap 12 has formed therein the rivet hole 4 and it is desired so to connect the contact member of the terminal to the ferrule 10 that relative movement of the overlaps 12 and 14 is permitted during the springing of the side walls 18 to permit the contacts 20 to be snapped over the knob 24, this connection must be so made as to provide a positive spacing of the overlap 12 from the base or socket end of the ferrule 10. As hereinabove suggested, this positive spacing may be effected by inserting a washer 13, which fits about the rivet extension 8 on the ferrule 10, between the base of the ferrule and the overlap 12. This washer is, of course, of a diameter sufficiently small so that it fits within the smaller dimension of the hole 6 and allows movement of the overlap 14 relative to the overlap 12 to the extent permitted by the lengthwise dimension of the hole 6. The washer 13 is obviously thick enough to provide a spacing of the overlap 12 from the ferrule 10 sufficient to permit comparatively free movement of the overlap 14 relative to the overlap 12.

From the foregoing description the operation of the spring snap terminal will readily be understood. The usual terminal post 22 provided for use with spring snap terminals such as hereinabove described comprises, as above pointed out, a tapered or frusto-conical knob portion 24 and, preferably adjacent the lower end thereof, a cylindrical portion 28 of a diameter substantially the same as that of the major diameter of the knob 24. There is thus a part of the post between the knob 24 and the cylindrical portion 28 which is of reduced diameter and with which the contacts 20 are designed to engage. The diameter of the post-receiving opening 2 is preferably substantially that of the cylindrical part 28 of the post so that when the contact member has been snapped into connecting relation to the terminal the end 26 will fit snugly about the cylindrical part 28 of the post. In order to guide it quickly into this coaxial relation to the post and to assist in maintaining the parts in coaxial relation, the lugs 16 are provided. It will be obvious that all of these parts help to establish a good electrical contact between the contact member of the terminal and the post over which it is snapped. In other words, wherever the lugs 16

engage the post they help to maintain an electrical contact and at the same time the end portion 26 of the contact member is maintained in electrical contact with the cylindrical part 28 of the post.

A shoulder or flange 30 at the base of the post 22 serves as an abutment against which the end 26 of the contact member may be said to be maintained by the engagement of the lugs 16 with the under side of the knob 24. All of the elements of the structure, therefore, cooperate not only to insure good electrical contact between the spring snap terminal and the post over which it is snapped, but to hold the parts in a definite and preferably coaxial relation to each other requiring the exercise of a considerable force to disturb.

It will be seen that in snapping the terminal of the present invention over the knob 24 of the post 22 the engagement of the contacts 20 with the frusto-conical face of the knob will gradually spread the side walls 18 and that this movement of the side walls will cause a springing thereof in the nature of a bodily swinging about their junctions with the end 26. At the same time there will be a relative movement of the overlaps 12 and 14, the extent of this being determined by the length of the opening 6 in the overlap 14. If the spreading of the side walls 20, permitted by the length of the opening 6, be sufficient to permit the contacts 20 to pass over the greatest diameter of the knob 24, then the entire action of the side walls will be a swinging springing thereof about their junctions with the end wall 26. If, however, the opening 6 does not have a length sufficient to permit such passage of the contacts 20 over the knob 24 before the relative movement of the overlaps 12 and 14 is stopped the additional spreading of the contacts 20 then required will involve a springing of the side walls between their then anchored ends without any bodily swinging thereof.

From the foregoing description it will thus be seen that the spring snap contact member of the present invention combines, to a limited extent, the springing action of the spring finger type of contact, in which the ends of the fingers are free, together with the springing action of the type of spring snap terminal in which both ends of the resilient contact members are anchored.

What I claim as new is:

1. A spring snap terminal adapted to be sprung into engagement with the knobbed terminal post of a spark plug or similar part to which an electrical connection is to be made, said terminal having, in combination, a ferrule, a spring snap contact member connected thereto and comprising resilient post-engaging side walls, an end wall integral with said side walls and provided with a post-receiving opening, and returned overlaps on the ends of said side walls remote from said aforementioned end wall, the inner of said overlaps being rigidly connected to said ferrule in positively spaced relation thereto and the other overlap being provided with an elongated opening through which said ferrule connection extends, said opening being elongated in the direction of the springing movement of said side walls to permit relative movement of said overlaps, together with said side walls, during the post-engaging and disengaging movements of the terminal.

2. A spring snap terminal according to claim 1 in which the side walls of the contact member

are provided with integral internally projecting post-engaging electrical contacts.

3. A spring snap terminal according to claim 1 in which lateral lugs on the side walls of the contact member are arranged to engage the post and insure coaxial relative movements of the terminal and post and also maintenance of the coaxial relation when the connection is completed.

4. A spring snap terminal according to claim 1 in which the inner overlap is riveted to the ferrule and in which a washer surrounds the rivet to provide the desired spacing to permit relative movement of the overlaps.

5. A spring snap terminal according to claim 1 in which the end of the ferrule is provided with a hollow rivet integral therewith for effecting the connection of the inner lap thereto and in which a washer, surrounding said hollow rivet, serves to effect sufficient permanent spacing of said ferrule and said inner lap to permit the outer lap to move therebetween to the limits determined by its elongated opening.

6. A spring snap terminal adapted to be sprung into engagement with the knobbed terminal post of a spark plug or similar part to which an electrical connection is to be made, said terminal having, in combination, a ferrule and a spring snap contact member connected to said ferrule and comprising a spring metal stamping designed and bent to form opposed resilient post-

engaging side walls and an integral end wall connecting the side walls and provided with a post-receiving opening, the ends of said stamping being inturned and overlapped to form the other end of a resilient, substantially rectangular structure having the inner one of said overlaps rigidly connected to said ferrule in positively spaced relation thereto and having the other overlap provided with an opening through which said ferrule connection extends and which opening is sufficiently elongated in the direction of the springing movement of said side walls toward and away from each other to permit relative movement of said overlaps, together with said side walls, during the post-engaging and disengaging movements of the terminal.

7. A blank stamping for forming the spring snap terminal of claim 6 comprising a strip of spring metal having a post-receiving opening formed intermediate between its ends, a rivet-receiving opening formed near one end, an elongated rivet embracing opening formed near its other end and post centering lugs stamped up from its sides and helping to form two waist portions between the end openings and the intermediate opening, said stamping being also provided with post-engaging electrical contacts stamped up from the body of said blank in substantial alignment with said aforementioned openings.

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