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E. A. LINK

2,391,428

CONDUCTOR TAP-OFF CLAMP

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Fig. 1.

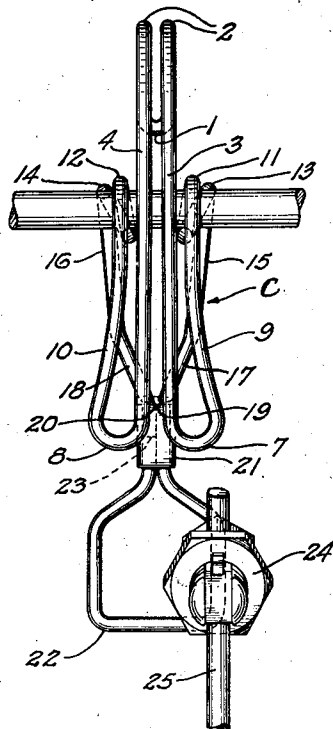


Fig. 2.

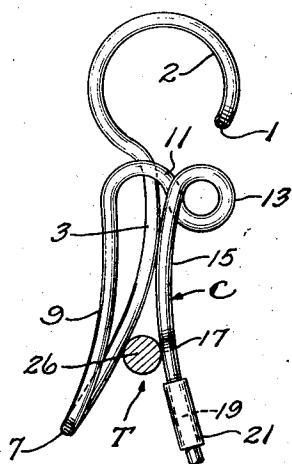
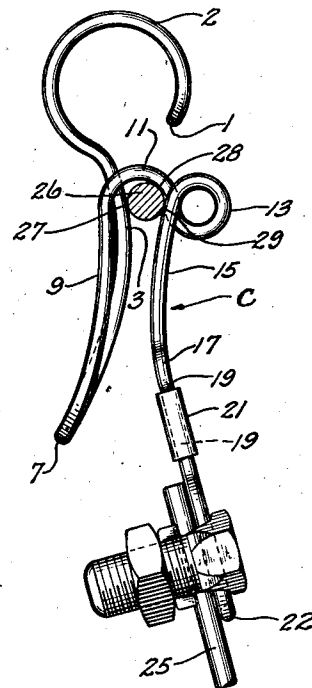


Fig. 4.

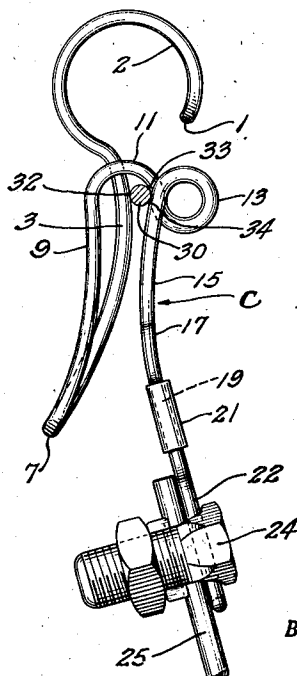


Fig. 3.

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CONDUCTOR TAP-OFF CLAMP

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11 Claims. (Cl. 173-273)

This invention relates to improvements in conductor tap-off clamps and more particularly to connector clamps characterized by a resilient wire for gripping a conductor in latching engagement therewith.

Clamps of this type are commonly known as "hot line" clamps and are particularly useful in rural areas where protected type transformers and lines of reasonably high distribution voltages are used. They are frequently used with a tap wire to establish a connection between a transformer and a line.

My spring type clamp has been expressly designed to incorporate all of the desirable features of previous vice and jaw type "hot line" clamps and to provide the additional feature of easy installation and removal.

It is necessary that clamps of this character be provided with means for insuring a constant and certain latching action for engaging conductors. To attain a desirable latching action, however, is not enough because the same means which provides the latching action must provide a positive and continuous contact between the clamp and the conductor with which it is to be engaged.

A single piece of resilient wire, preferably spring wire having a copper coating, is used to form my clamp. Its advantages, which will be readily apparent from the description that follows, are attained through the novel arrangement of bends and coils in the clamp.

It is an object of this invention to provide a spring type wire clamp comprising a length of resilient wire formed to provide a portion which affords a six-point gripping contact with a conductor engaged thereby and latches the clamp to the conductor, thereby preventing the clamp from becoming disengaged by reason of swaying motion or vibratory conditions.

Another object of my invention is to provide a spring type wire clamp formed from a single piece of wire which will have the desirable features of the vice and jaw type clamps, which can be produced at a comparatively lower cost, and which is easily installed on or removed from a conductor wire.

Fig. 1 is a front elevational view of my improved resilient wire clamp;

Fig. 2 is a side elevational view of the clamp in engagement with a large conductor;

Fig. 3 is a side elevational view of the clamp in engagement with a small conductor; and

Fig. 4 is a fragmentary side elevational view of the clamp showing it as it is being placed on a conductor.

In the drawing the clamp, designated generally by the reference letter C, is formed of a single length of inherently resilient material, preferably spring wire having a copper coating.

The clamp is formed by folding the wire, as shown at 1, to provide two substantially parallel portions which are then looped to provide an open tool receiving hook 2 and arcuately, in the direction opposite to that in which the hook is formed, to provide substantially parallel downwardly extending clamping portions 3 and 4. Each of the clamping portions 3 and 4 are then respectively bent upwardly and slightly inwardly at 7 and 8 to form connecting portions 9 and 10 arched outwardly as indicated in Figs. 2 and 3 and terminating respectively in the semi-circular portions 11 and 12 immediately below the hook 2. The semi-circular portions respectively merge into relatively small single turn coils 13 and 14 offset laterally and axially from the semi-circular portions. The wire is then further formed to provide downwardly extending clamping portions 15 and 16 which are arched outwardly of the clamp, reversely relative to the connecting portions 9 and 10. The clamping portions 15 and 16 are then converged toward each other at 17 and 18 to provide adjacent parallel sections 19 and 20 which are held together by means of the clip 21.

As indicated in Fig. 1, the tool receiving loop 22, with its axis transverse to the axis of hook 2, is formed by an extension of the parallel section 19 which terminates at 23 within the clip 21 in end to end relation to the section 20. As will be understood, the clip 21 is formed in tight gripping relation to the sections 19 and 20 and terminus 23 and may be further securely anchored as by soldering. Furthermore, the joint formed between the ends of the wire may be strengthened as by welding or soldering the section 20 and terminus 23 together.

Mounted on loop 22 is a split bolt connector 24 which is shown clamping the tap wire 25. The connector 24 establishes an electrical and mechanical connection between the clamp C and the tap wire 25 and it may be positioned on any one of the three sides of loop 22.

In Fig. 2 the clamp C is shown engaging a large conductor 26. The drawing clearly illustrates the function of each of the curved portions 3-4, 11-12, and 15-16. These curved portions provide for the clamp six spaced points of contact on the conductor 26 and are arranged in two corresponding sets of three. One of the sets is clearly shown in the side view of Fig. 2. The other set corresponds to that shown in Fig. 2.

The curved portion 3 engages the conductor 26 at point 27; the curved portion 11 engages it at point 28; and the curved portion 15 engages it at point 29. Similarly, at the other side of the clamp (not shown) the curved portions 4, 12, and 16, respectively engage the conductor 26.

Fig. 3 shows the clamp C engaging a smaller conductor 30. As in Fig. 2, the curved portions 3, 11, and 15 are shown engaging the conductor 30 respectively at points 32, 33, and 34. Similarly, on the other side of the clamp C (not shown) curved portions 4, 12, and 16 engage the conductor 30 at three distinct points about the conductor.

In Fig. 4 the clamp C is shown as it is being placed on a conductor. This view is shown to bring out more clearly the novel spring action of the clamp.

As the conductor 26 is received in the throat T of the clamp C it is engaged by curved portions 3 and 4 and portions 17 and 18. As tool receiving loop 22 (shown in Fig. 1) is given its initial downward pull by means of a hot line stick (not shown), curved portions 3 and 4 have only slight movement, the principal movement being that of connecting portions 9 and 10, which move in a direction away from the curved portions 15 and 16. In this initial movement connecting portions 9 and 10 pivot about semi-circular portions 11 and 12 and coils 13 and 14.

After clamp C has been pulled partially onto conductor 26, the curved portions 3 and 4 move in a direction away from curved portions 15 and 16. In this movement curved portions 3 and 4 pivot about points 7 and 8 respectively.

When the clamp C reaches its final position on conductor 26, the throat T is closed by the movement of curved portions 3 and 4 and connecting portions 9 and 10 in a direction toward curved portions 15 and 16. Thus the conductor 26 is kept from slipping out of the clamp. In addition it is to be noted that the conductors 26 and 32 in Figs. 2 and 3 are seated in a V groove formed by semi-circular portions 11 and 12 and coils 13 and 14. This seating of the conductor also helps to hold the clamp in a locked position on the conductor.

It is readily apparent that clamp C is adaptable to various size conductors and that its spring action will be the same regardless of the size of the conductor.

It is to be noted that the small coils 13 and 14 are positioned close to the gripping or latching means, thereby securing a maximum gripping action upon a conductor. Furthermore, the relationship of the curved gripping surfaces is such that when the clamp is mounted as shown, they tend to prevent creeping. Actually, any lateral swaying motion of the clamp will cause it to be reseated as shown after each reversal of the swaying motion.

The looped portions 2 and 22 are designed for engagement by a so-called hot line stick (not shown). Loop 22 is used to pull the clamp onto a line conductor and loop 2 is used to remove the clamp from a line conductor.

When loop 2 is engaged by a hot line stick and forced upwardly, there is a tendency for the curved portions 3 and 4 to release their grip from the conductor because there is a slight pulling of these portions from the conductor. This is more suitably described as an unlatching action.

From the foregoing description it is apparent that I have provided a hot line clamp of the in-

herently resilient type which is designed to position a line conductor in latching engagement with its gripping means and to make a six point contact therewith. The construction of the clamp is obviously simple and inexpensive and the clamp lends itself to easy mounting and dismounting.

I claim:

1. A connector clamp comprising a single length of resilient wire bent intermediate its ends to provide two adjacent clamping sections each of which includes an open hook at its upper end adjacent said bend, a downward extension extending from said hook curved outwardly relative to a vertical plane, a connecting part extending upwardly from the lower extremity of said extension to a point adjacent said hook and curved over in a clockwise direction through said plane, a coil extending from the curved portion of said part and terminating in a second downward extension upon a side of said plane opposite that upon which the first mentioned extension is situated, said second extension terminating in a tool receiving loop formed by the ends of said wire, said extensions and curved portion of said part providing three spaced points of clamping contact about a conductor on each of said clamping sections when engaged therewith.

2. A connector clamp comprising a single length of resilient wire bent intermediate its ends to provide two adjacent clamping sections each of which includes an open hook at its upper end adjacent said bend, a downward extension extending from said hook curved outwardly relative to a vertical plane, a connecting part extending upwardly from the lower extremity of said extension to a point adjacent said hook and curved over in a clockwise direction through said plane, a coil extending from the curved portion of said part and terminating in a second downward extension upon a side of said plane opposite that upon which the first mentioned extension is situated, said second extension terminating in a tool receiving loop formed by the ends of said wire, said extensions and curved portion of said part providing three spaced points of clamping contact about a conductor on each of said clamping sections when engaged therewith, said downward extensions curving toward each other below said points of contact and then curving away, whereby to provide an entrance for a conductor and a retainer to prevent creeping of said clamp upon a conductor engaged thereby.

3. A connector clamp comprising a single length of resilient wire bent intermediate its ends to provide two adjacent clamping sections each of which includes a hook at its upper end adjacent said bend, a first downward extension extending from said hook, a connecting part extending upwardly from the lower extremity of said first extension to a point adjacent said hook and curved over in a clockwise direction beneath said hook and terminating in a coil upon a side of a vertical plane opposite that upon which said first extension is situated, a second downward extension on said opposite side of said plane extending from said coil and terminating in a tool receiving loop formed by the ends of said wire, said extensions and curved portion of said part providing three spaced points of contact with a conductor engaged by said clamp.

4. A connector clamp comprising a single length of resilient wire bent intermediate its ends to provide two adjacent clamping sections each

of which includes a hook at its upper end adjacent said bend, a first downward extension extending from said hook, a connecting part extending upwardly from the lower extremity of said first extension to a point adjacent said hook and curved over in a clockwise direction beneath said hook and terminating in a coil upon a side of a vertical plane opposite that upon which said first extension is situated, a second downward extension on said opposite side of said plane extending from said coil and terminating in a tool receiving loop formed by the ends of said wire, said extensions and curved portion of said part providing three spaced points of contact with a conductor engaged by said clamp, at least one of said extensions curving toward the other below said points of contact and then outwardly therefrom.

5. A connector clamp comprising a single length of resilient wire formed to provide a loop at its upper end, a first downward extension on one side of a vertical plane, a second downward extension on the other side of said plane, a tool receiving loop at the lower end of said second extension, a coil at the upper end of said second extension intermediate said loops, and a connection between the lower extremity of said first extension and said coil, said extensions and connection providing the spaced points of clamping contact.

6. A connector clamp comprising a single length of resilient wire formed to provide a tool receiving portion at its upper end, a pair of downward extensions forming a gripping portion and having their outermost extremities formed back on themselves substantially parallel to said gripping portion, the upper ends of said substantially parallel portions being bent laterally to form conductor stops, and a second pair of downward extensions from said lateral portions connected directly with said stops immediately beneath said tool receiving portion and forming a second gripping portion, said first and second gripping portions being formed to provide an offset restricted throat, the lower extremity of said throat providing a conductor receiving guide and the upper extremity providing wedge contact surfaces which grow progressively larger from said throat to said lateral stops, whereby a conductor positioned between said gripping portions is forced against said stops.

7. A connector clamp comprising a single length of resilient wire formed to provide a tool receiving portion at its upper end, a pair of downward extensions forming a first gripping portion and having their outermost extremities formed back on themselves substantially parallel to said first gripping portion, the upper ends of said substantially parallel portions being bent laterally to form conductor stops, and a second pair of downward extensions from said lateral portions forming a second gripping portion, said second downward extensions connected directly with said stops immediately beneath said tool receiving portion and terminating in a second tool receiving portion at the lower end of said clamp, said first and second gripping portions be-

ing formed to provide an offset restricted throat, the lower extremity of said throat providing a conductor receiving guide and the upper extremity providing wedge contact surfaces which grow progressively larger from said throat to said conductor stops, whereby a conductor positioned between said gripping portions is forced against said stops.

8. A connector clamp comprising a single length of resilient wire formed to provide a loop at its upper end, a first downward extension on one side of a vertical plane, a second downward extension on the other side of said plane, a tool receiving loop at the lower end of said second extension, a coil at the upper end of said second extension intermediate said loops, and a connection between the lower extremity of said first extension and said coil, said extensions providing an offset restricted throat operative at its narrow or lower end to guide a conductor into its wider or upper end and operative at its upper end to act as a wedge to hold a conductor against said connection.

9. A connector clamp comprising a single length of resilient wire bent intermediate its ends to form two adjacent clamping sections each of which includes an open hook at its upper end, a downward extension extending from said hook and having its outermost extremity formed back on itself substantially parallel thereto, the upper end of said parallel portion being bent laterally to form a conductor stop, and a second downward extension connected with said stop beneath said hook extending from said lateral portions and terminating in a second tool receiving portion, said extensions providing contact portions for gripping a conductor, said contact portions forming an offset restricted throat, the lower extremity of said throat providing a conductor receiving guide and the upper extremity providing wedge contact surfaces operative to force a conductor against said conductor stop.

10. A connector clamp comprising a single length of resilient wire bent intermediate its ends to provide a tool receiving portion at its lower end, a pair of upward extensions extending from said tool receiving portion and terminating in a pair of coils, a pair of curved portions extending from said coils, and a second pair of extensions extending upwardly and connected with said curved portions and with a loop at the upper end of said clamp, said coil positioned intermediate said loops and immediately below the loop at said upper end.

11. A connector clamp comprising a single length of resilient wire bent intermediate its ends to provide a tool receiving loop at its lower end and two adjacent clamping sections each of which includes an upward extension extending from said loop, a coil extending from said extension, a curved portion extending from said coil, and a second extension extending upwardly and connected with said curved portion and with a second tool receiving loop at the upper end of said clamp immediately above said coil.

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