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LINE SPLICES AND ANALOGOUS CONNECTORS

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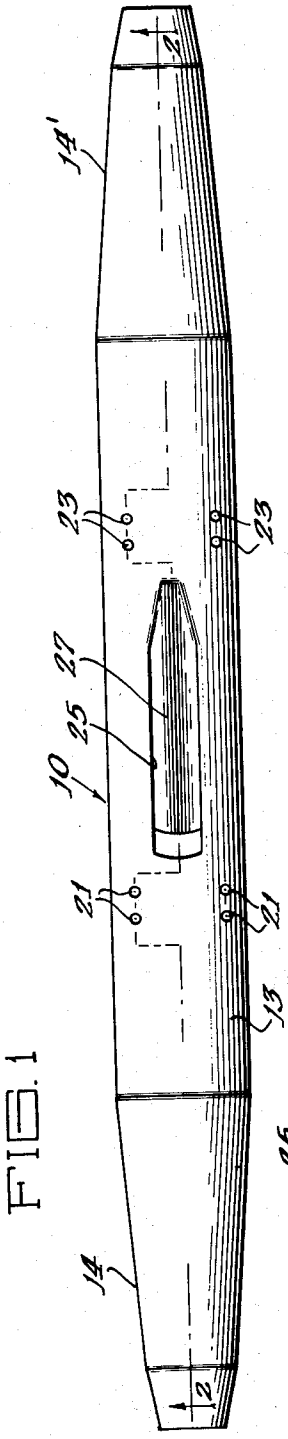

FIG. 1

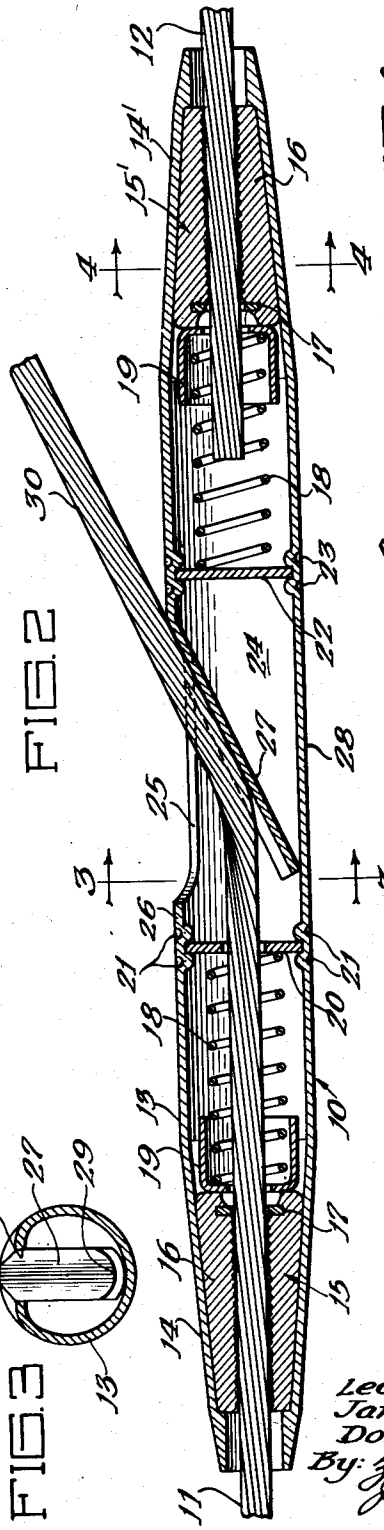

FIG. 2

FIG. 3

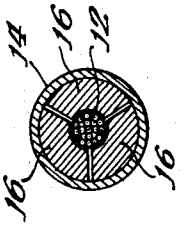

FIG. 4

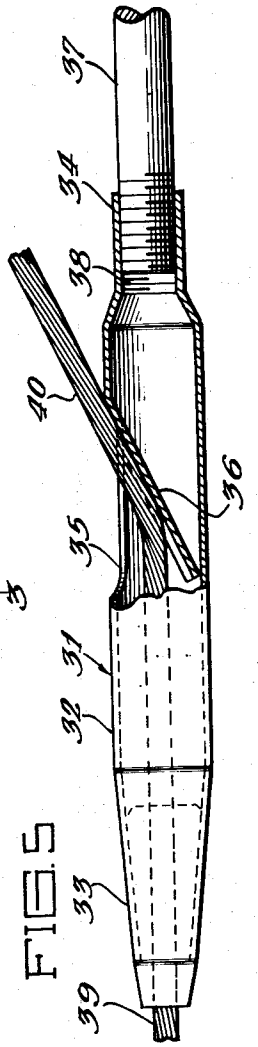

FIG. 5

Inventors:
Leonard L. Jugle
James J. Saul
Donald J. Smith
By: Zyhl, Baker, York, Jones & Duthaler
Attorneys

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LINE SPLICES AND ANALOGOUS CONNECTORS

Leonard L. Jugle, Elmhurst, Donald J. Smith, Sleepy Hollow Manor, and James J. Saul, La Grange Park, Ill., assignors to Reliable Electric Company, Franklin Park, Ill., a corporation of Illinois

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The present invention relates to improvements in line splices of the general type shown in Fotsch Patent No. 2,138,913, granted December 6, 1938, and to analogous types of connectors.

This type of line splice comprises a shell which is tapered at both ends, and which contains within it a tapered jaw assembly at each end. The ends of the two wires to be spliced are inserted in each end of the shell, and the tension on the wires, in cooperation with the coaction of the tapered parts, causes the jaw assembly to firmly grip the cable.

In replacing a section of power line, the new section is connected to the old section by such a line splice. The length of the new section depends on the tension desired; however, it is very difficult to determine the exact length by calculation. In practice, the new section is cut sufficiently longer than the estimated length to permit the adjustment of length and tension by cut and try. This is a laborious process.

It is an object of our invention to provide an improved line splice or other connector which permits the wire to be tensioned after the splice has been installed.

Another object of our invention is to provide an improved line splice which permits one to adjust the tension of the spliced span from time to time, even though the original installation was made long prior to the time of the desired adjustments.

Another object is to provide an improved splice which permits a tap to be made at the splicing point.

Our invention is also applicable to splices or connectors which connect a wire to a rigid tension member such as a rod. According to this aspect of the invention, it is possible to provide a connector which is suitable for anchoring guy wires or for deadending conductors and which is characterized by simplicity of construction and by low manufacturing costs due to the fact that no clevis or bale is required. The tension adjusting arrangement shown herein maintains the cable and the anchor element in axially aligned arrangement in the same manner that a line splice does.

Other objects, features and advantages will become apparent as the description proceeds.

With reference now to the drawings in which like reference numerals designate like parts:

FIG. 1 is a side elevation showing a preferred embodiment of our invention;

FIG. 2 is a section taken along line 2—2 of FIG. 1, and also showing the wire;

FIG. 3 is a transverse section taken along line 3—3 of FIG. 2, with the wire omitted;

FIG. 4 is a transverse section taken along line 4—4 of FIG. 2; and

FIG. 5 is a view similar to FIG. 2 but showing a modified form of our invention.

In FIGS. 1 and 2, the reference numeral 10 designates a line splice which mechanically and electrically connects two wires 11 and 12. The wires may be in the form of stranded conductors commonly used in power line work.

The splice 10 comprises a hollow shell 13 which is provided with two tapered end portions 14 and 14'. Located within the shell 13 are two tapered jaw assemblies 15 and 15', one at each end. Since these jaw assemblies and their associated parts are of identical construction, the same reference numerals are applied to the identical parts of each, but only the left hand jaw assembly 15 will be described in detail.

The jaw assembly 15 comprises a plurality of tapered jaw elements 16 which are associated with each other at one end by a connecting washer 17. There are preferably three jaw elements to the jaw assembly, and the jaw elements are provided with suitable wire gripping surfaces. When tension is applied to the wire 11, the jaw assembly 15 moves outwardly to the left, and the taper of each jaw element cooperates with the taper 14 of the inner surface of the shell to urge the jaw elements 16 into gripping engagement with the wire 11. The washer 17 provides means for maintaining the relative longitudinal positions of the jaws without interfering with their radial movement.

The jaw assembly 15 is urged to the left and into contracted position by means of a coil spring 18 which is confined between the rear end of the jaw assembly 15 and a suitable spring abutment 20 in the form of a ring. The ring 20 is secured in place by staking, as evidenced by the depressions 21.

A bearing cup 19 may be interposed between the spring 18 and the jaw assembly 15 so that the end of the spring will not get caught between the jaw elements 16.

The spring abutment for the right hand jaw assembly 15' is in the form of a disc 22 which is also staked in position by the depressions 23.

The spring abutments 20 and 22 are spaced from each other by a substantial distance to provide a chamber 24 which occupies the middle portion of the line splice 10.

An opening 25 is formed in the wall portion 26 of the shell 13, and a tongue 27 extends diagonally across the chamber 24 so that its free end terminates adjacent the opposite wall portion 28. Preferably, the opening 25 and tongue 27 are formed by a stamping operation, the tongue 27 being stamped out of the material of the wall portion 26. The tongue 27, thus forms a ramp which will deflect the end of the wire 11 as it is pushed through the jaw assembly 15 and through the opening in the ring-shaped spring abutment 20. Thus, the end of the wire 11 is brought out of the line splice 10 at about the midpoint of the splice to provide a free end portion 30. The tongue 27 is preferably of convex cross section as indicated by the reference numeral 29 in FIG. 3 so that it will guide the wire 11 through the opening 25.

The spring abutment 22 is in the form of a solid disc so that the end of the wire 12 will not pass into the chamber 24, thus avoiding interference or tangling between the two wires 10 and 11.

The advantage of this arrangement is that when splicing the wire 11 to the wire 12, the wire 11 can be cut somewhat longer than tentatively calculated length so that after the two wires have been spliced, the tension can be increased by grasping the free end portion 30 and pulling it through the jaw assembly 15 until the required tension is obtained. Then any excess length in the projecting free end portion 30 may be cut off.

However, it may be desirable to leave a free end portion 30 of substantial length so that the tension of the span can be relaxed, if necessary, at some future time. Furthermore, the free end portion 30 can be used to make tap connections to the power line 11—12.

FIG. 5 shows a modified device 31 which is suitable for making a splice connection between two tension members, one of which is a flexible tension member, such as wire 39, and the other one of which is a rigid tension member, such as an anchor rod 37.

The connector 31 comprises a shell 32 which is provided with one tapered end portion 33, and a straight end portion 34. The middle portion of the shell is provided with an opening 35 and a tongue 36 which are the same

as the opening **25** and tongue **27** of the line splice **10**. In other words, the left hand portion of the connector **31** is identical to the left hand portion of the line splice **10**, including the jaw assembly and the spring biasing means therefor.

The right hand end, however, is different in that it is constructed so as to receive or interlock with an anchor bolt **37**. As shown in FIG. 5, the straight end **34** is swaged inwardly, as evidenced by the reduced outer diameter in order to provide internal screw threads **38**. In operation, the connector **31** may first be screwed onto the threaded end of the anchor bolt **37**, and then the wire **39** is pushed through the tapered end portion **33** so that the end of the wire **39** extends outwardly through the opening **35** to provide a free end portion **40**, in the same manner as described in connection with the line splice **10**. The free end portion **40** permits adjustment of tension after installation.

The connector **31** thus described is suitable for anchoring guy wires and the like, or may be used for dead-ending an electrical conductor, the anchor bolt **37** being connected to a suitable insulator. When used in connection with electrical conductors, the free end portion **40** can also be used for tap connections.

A screw threaded mandrel (not shown) is inserted in the tubular end portion **34**, and the latter is reduction swaged around the mandrel to provide a thickened internally threaded portion which provides an extremely strong screw threaded part. After swaging, the mandrel is removed by unscrewing the same.

The increased thickness and the partial work hardening resulting from the swaging enable us to fabricate from copper or aluminum alloy a connector which is capable of withstanding the high tensile stresses encountered in power line and guy wire work.

Although only preferred embodiments of our invention have been shown and described herein it will be understood that various modifications and changes may be made in the constructions shown without departing from the spirit of the invention as pointed out by the appended claims.

We claim:

1. In a line splice having a shell and two tapered jaw assemblies located in said shell, said shell being tapered at its opposite ends for cooperation with said jaw assemblies, the combination of a separate spring abutment for each tapered jaw assembly, a spring confined between each spring abutment and its corresponding jaw assembly, said spring abutments being spaced from each other to provide a chamber therebetween, and there being an opening in the side wall of said shell located at a point between said spring abutments, one of said spring abutments being in the form of a ring, so that the end of a wire which is received within one of said tapered end portions will pass through said ring shaped spring abutment into said chamber and can be brought out of said shell through said opening to provide a free end portion to facilitate adjustment of the tension of said wire, and a deflector member extending diagonally across said chamber and providing for said wire a guide which extends substantially from said ring shaped spring abutment to the remote side of said opening.

2. A line splice as claimed in claim 1 in which said deflector member is in the form of a tongue stamped from the material of the side wall of said shell.

3. A line splice as claimed in claim 1 in which said deflector member is concave in cross section.

4. A line splice as claimed in claim 1 in which the other one of said spring abutments is a disc.

5. A connector device comprising a hollow shell, one end of which is a tapered end portion, there being an opening in the side wall of said shell at an intermediate point so that the end of a wire which is received within said tapered end portion can be brought out of said shell through said opening, a tapered jaw assembly located within said tapered end portion and adapted to engage said wire in gripping relationship, said tapered jaw assembly and the inner wall of said tapered end portion cooperating with each other to cause said jaw assembly to provide a firm gripping engagement when said wire is tensioned, a ring shaped spring abutment mounted within said shell rearwardly of said tapered jaw assembly, a spring confined between said spring abutment and said tapered jaw assembly, and a deflector member located rearwardly of said spring abutment and extending diagonally across said shell and providing for said wire a guide which extends substantially from said ring shaped abutment to a side of said opening.

6. A connector device as claimed in claim 5 in which the other end of said shell is of cylindrical shape and is internally threaded for cooperation with the threaded end of a tension member.

7. In a connector having a shell and at least one tapered jaw assembly located in said shell, said shell being tapered at at least one end for cooperation with said jaw assembly, the combination of an annular spring abutment for said tapered jaw assembly, a spring confined between said annular spring abutment and said jaw assembly, there being an elongate opening in the side wall of said shell located at a point between said spring abutment and the remote end of said shell, and a tongue extending from the remote edge of said opening inwardly into said shell and toward said spring abutment, so that the end of a wire which is received within said tapered end portion will pass through said annular spring abutment and can be brought out of said shell through said opening to provide a free end portion to facilitate adjustment of the tension of said wire.

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