United States Patent

Werner et al.

[15] **3,681,512**

[45] **Aug. 1, 1972**

[54] ELECTRICAL CONNECTOR

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[73] Assignee: **AMP Inc.,** Harrisburg, Pa.

[22] Filed: **May 6, 1971**

[21] Appl. No.: **141,033**

Related U.S. Application Data

[63] Continuation of Ser. No. 18,152, March 10, 1970, abandoned.

[52] **U.S. Cl.**.....**174/84 R,** 24/81 PE, 24/126 R, 102/28, 174/90

[51] **Int. Cl.**.....**H02g 15/08**

[58] **Field of Search** ..174/84 R, 84 S, 88 S, 90, 94 R, 174/94 S; 24/81 TH, 81 PE, 126 R, 136 R; 102/28

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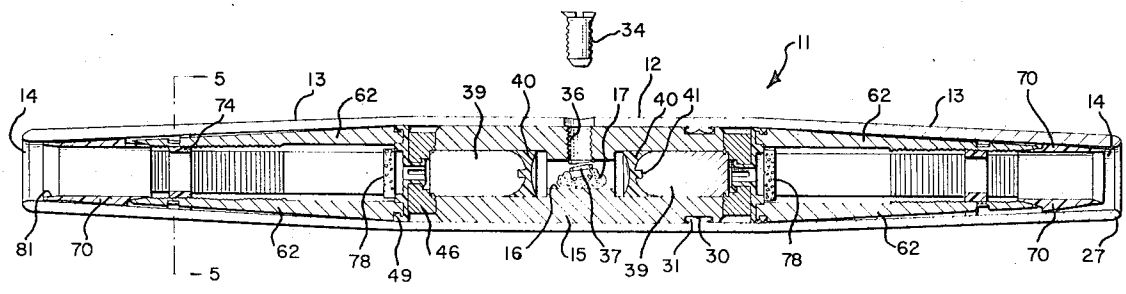
Primary Examiner—Darrell L. Clay
Attorney—Curtis, Morris & Safford

[57] **ABSTRACT**

This invention relates to a connector device for splicing or providing terminal anchoring means for large diameter electrical cables such as power transmission cables. The novel connector includes a shell which is tapered either on each end or on one end. Within the shell, a firing chamber is provided having either one or two pistons or projectiles driven outwardly towards the tapered end. These pistons are centrally and axially located in reference to the firing chamber and drive piston or ram plates thereby transmitting power to individually acting jaw means which upon firing an explosive charge securely engage the cable inserted from one or both ends of the opening. Various means by which the spacing and the prevention of a "bird cage" forming during the actual explosive, splicing operation takes place have also been disclosed. Additionally, the connector herein contains means for securing a steel core in an aluminum steel reinforced cable commonly employed in the utilities industry. The present device affords a convenient and practical means for splicing cables in remote locations without the necessity of providing elaborate hydraulically operated equipment previously employed in crimping large diameter cables.

A connector wherein only one end is swaged is used for dead-ending the power cables.

20 Claims, 16 Drawing Figures



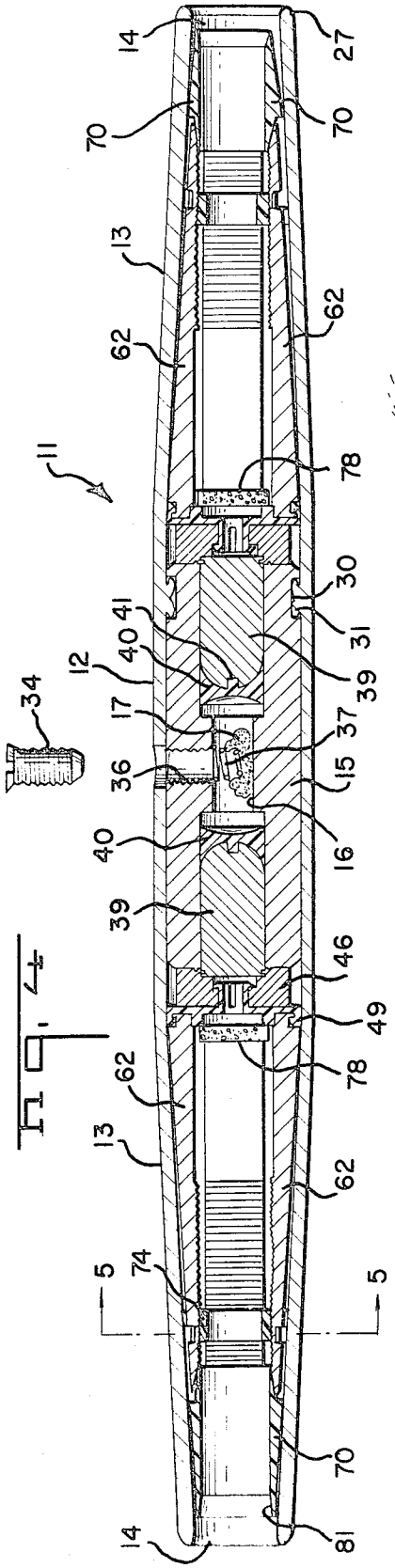


Fig. 4

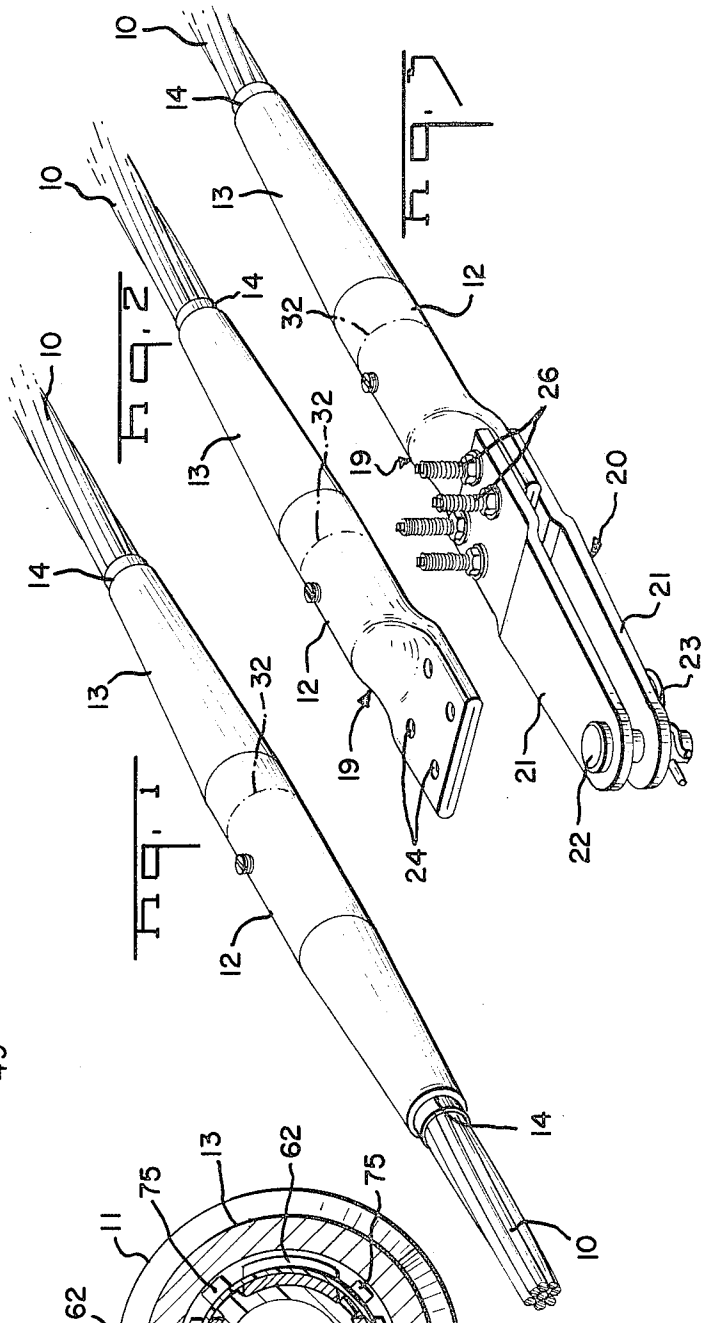


Fig. 1

Fig. 2

Fig. 3

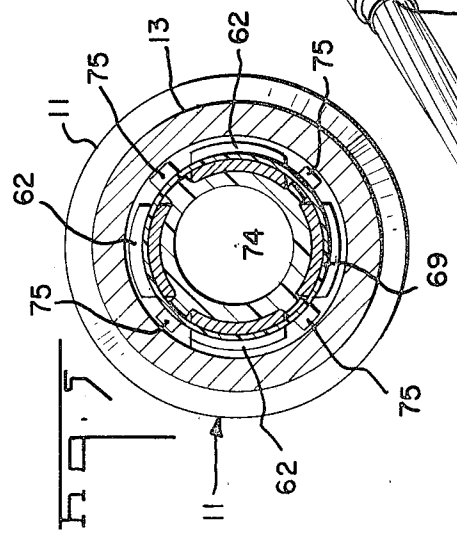


Fig. 5

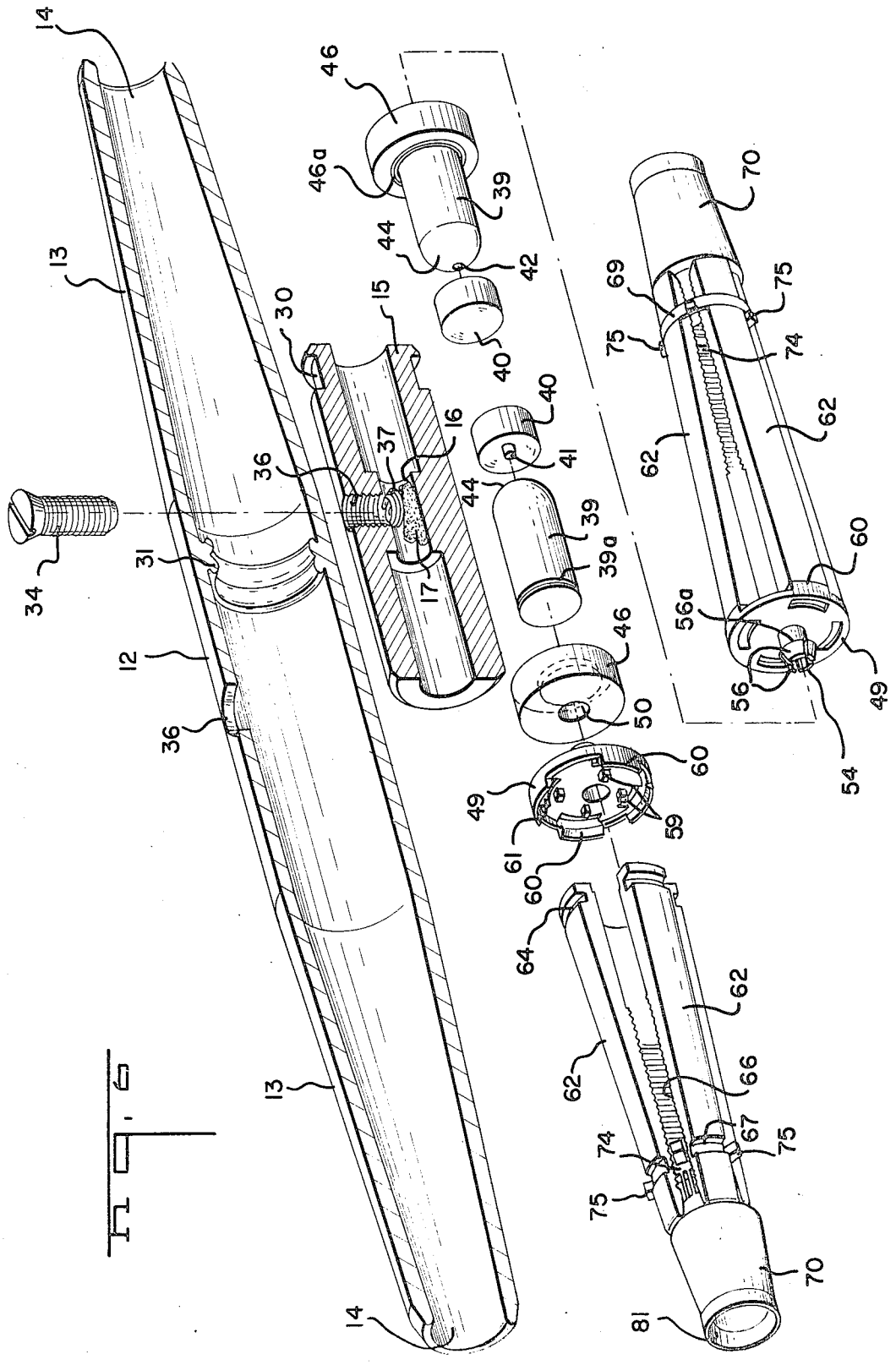

14
13
12
36
31
34
30
15
16
37
17
46
46a
39
44
42
40
41
39a
50
49
60
61
59
64
62
66
67
74
75
70
81
69
56
56a
54

FIG. 6

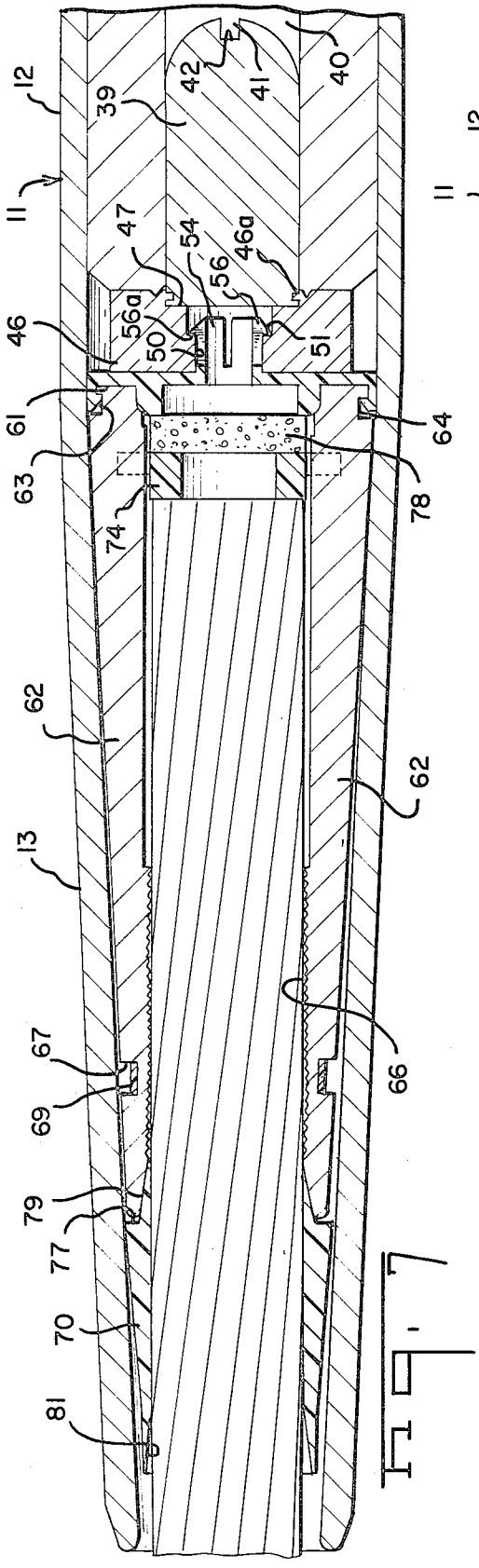

12
39
42
41
40
11
47
54
46a
56
56a
50
46
51
61
64
63
78
74
62
13
67
69
66
79
77
70
81

Fig. 7

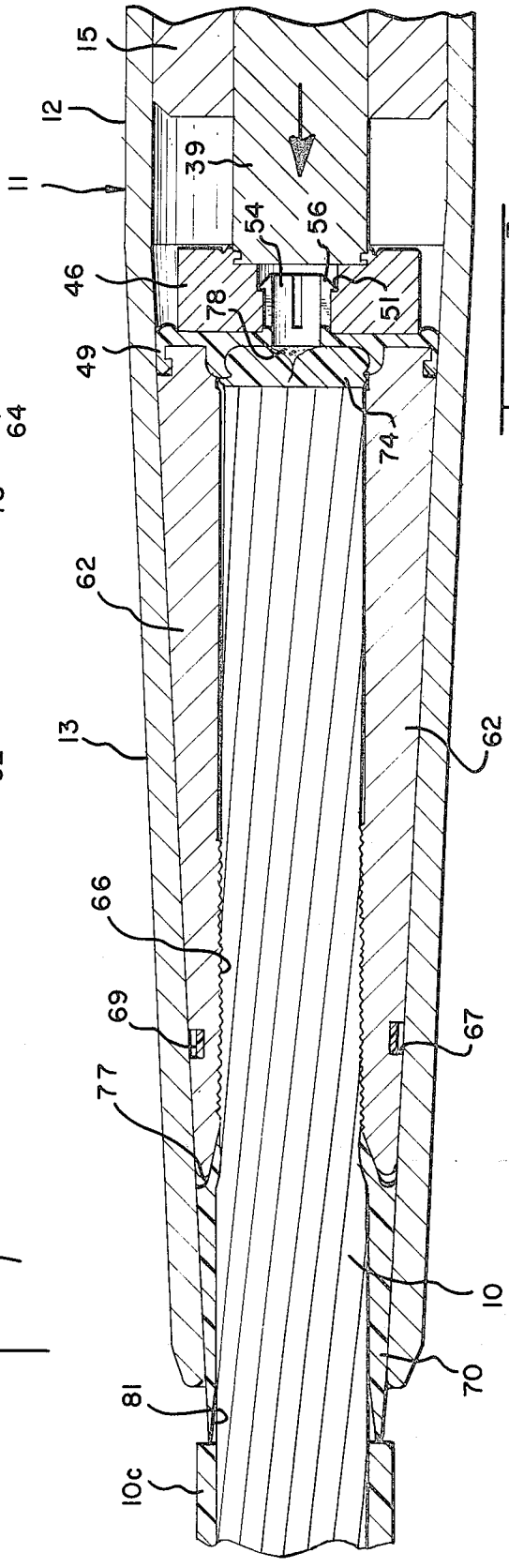
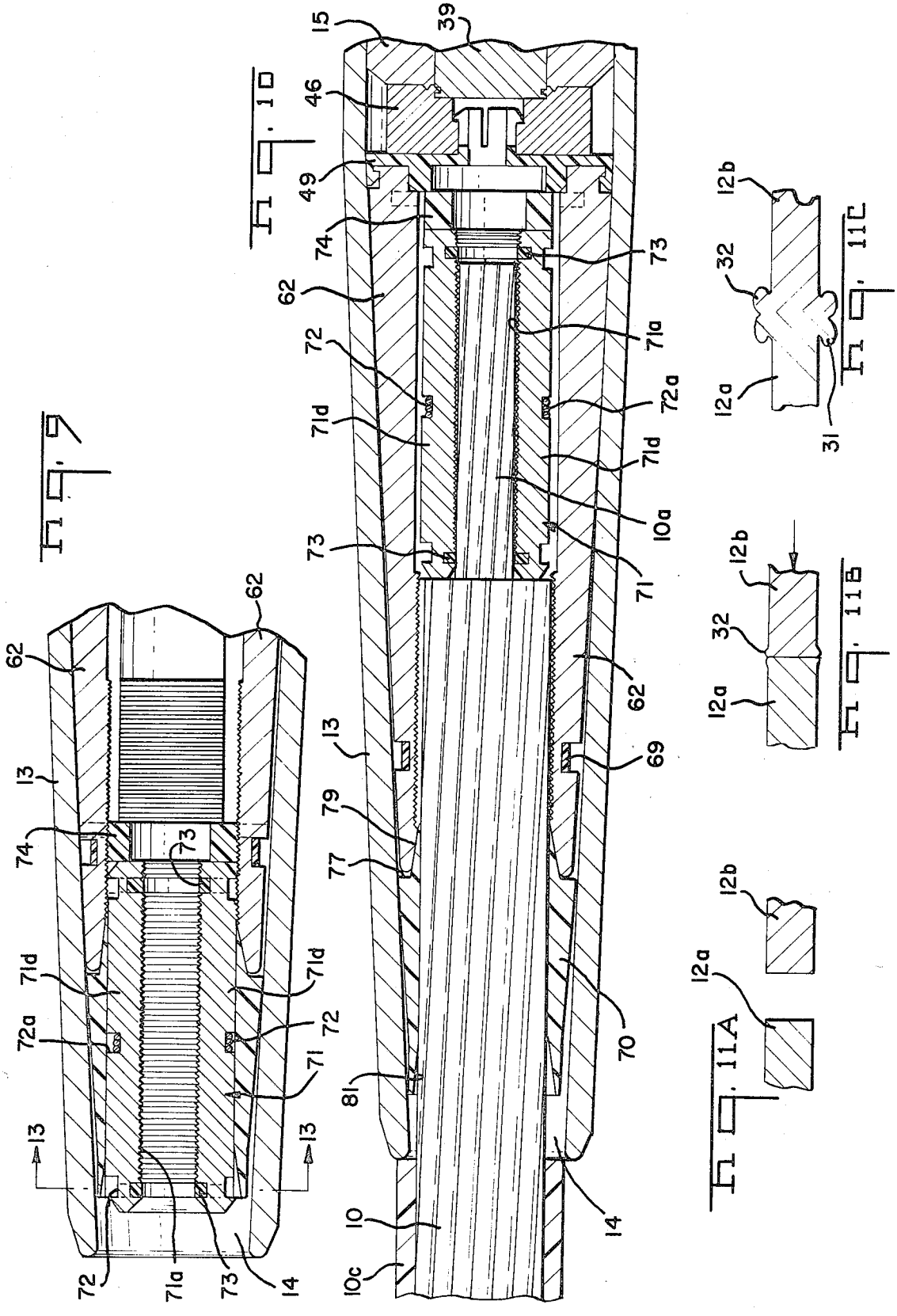

15
12
39
11
54
56
46
78
51
49
74
62
13
66
69
67
77
10
70
81
10c

Fig. 8


FIG. 9
FIG. 10
FIG. 11A
FIG. 11B
FIG. 11C
62
13
74
73
71d
72a
72
71
13
72
71a
73
14
15
39
46
49
74
73
62
72
71a
72a
71d
71d
10a
73
71
62
13
69
79
77
70
81
10
10c
14
12b
32
12a
31

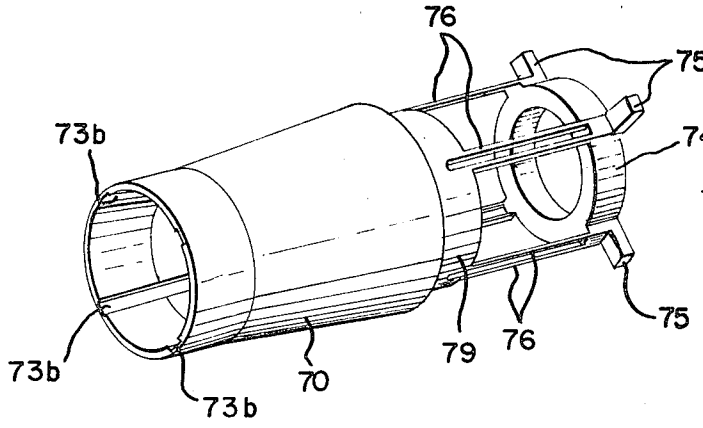

76
75
73b
74
75
79
76
73b
70
73b

Fig. 12

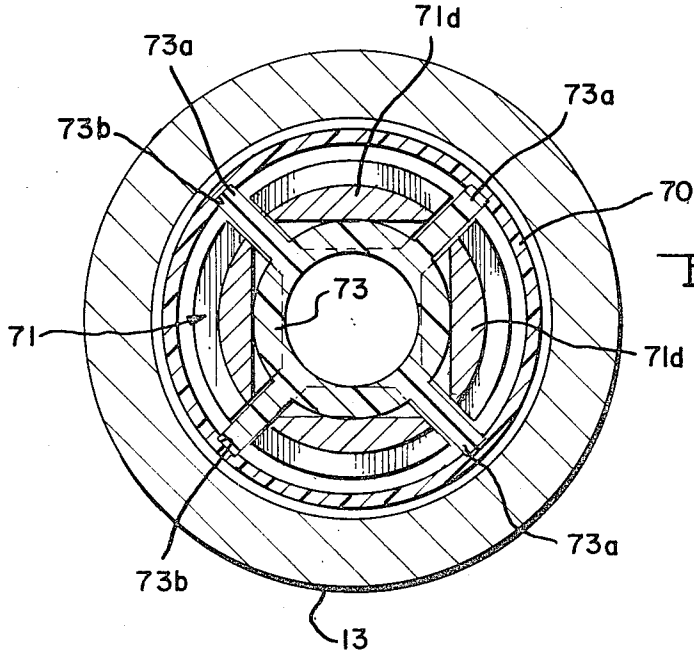

71d
73a
73a
73b
70
73
71
71d
73a
73b
13

Fig. 13

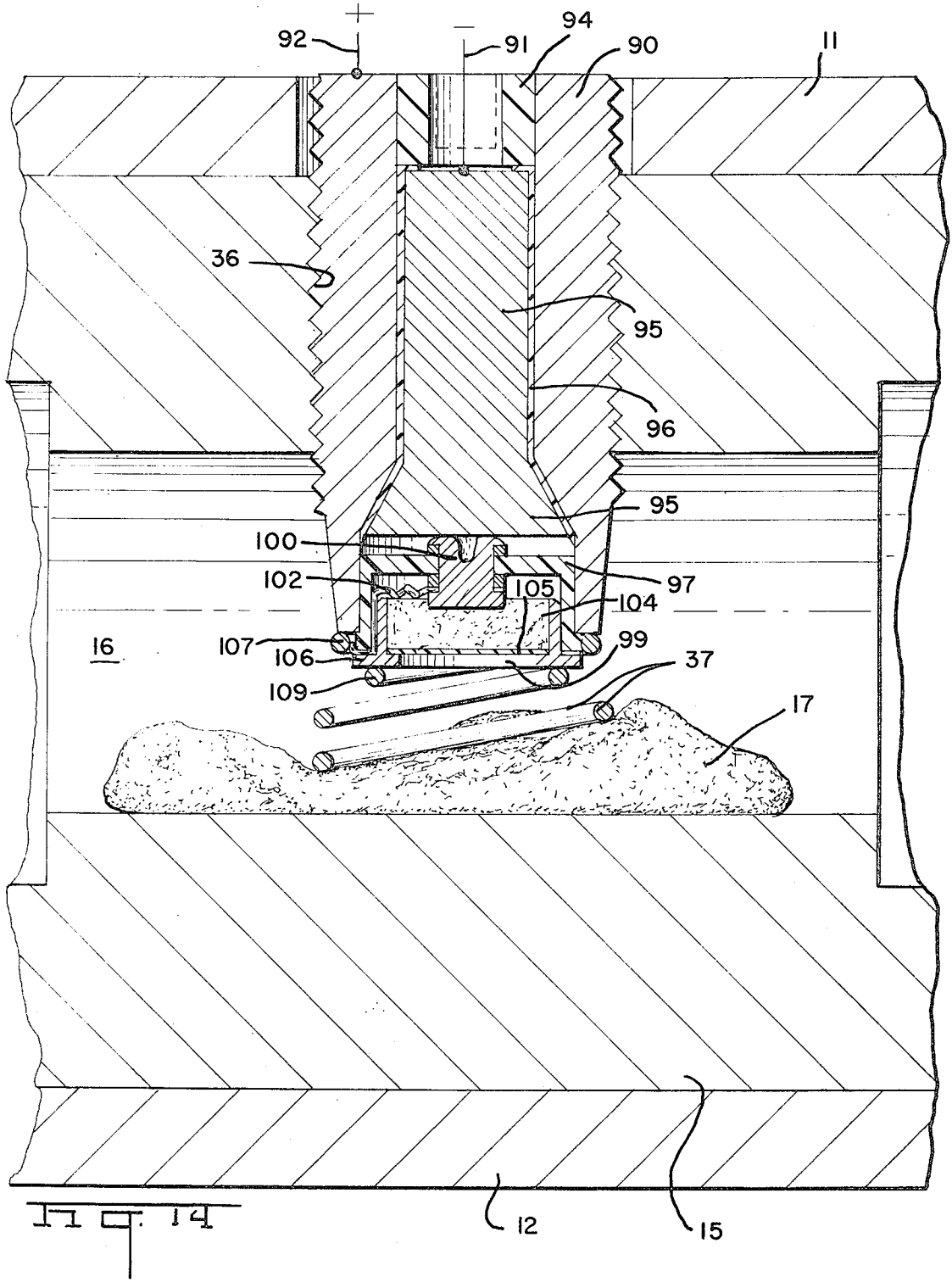

92
91
94
90
11
36
95
96
95
100
102
105
97
104
16
107
106
99
37
109
17
12
15

FIG. 14

ELECTRICAL CONNECTOR

This application is a continuation of our application Ser. No. 18,152, filed Mar. 10, 1970, now abandoned.

This invention relates to self-contained, explosively operated connectors employed for securing large diameter cables either as an interposed connector or as a terminal connector; more particularly, this invention relates to a self-contained, explosively operated connector which is especially adaptable for use in the splicing of utility cables in a more simplified and elegant manner. The invention also relates to novel means which are employed for activating the means securing the cable within the connector shell such as an explosively driven piston, a ram plate therefore, and means for securing the explosively activated jaws which have been properly positioned within the housing by novel means disclosed herein.

BACKGROUND OF INVENTION

In connecting two large electrical cables such as used for power transmission, it has been found desirable to provide connectors which would enable the splicing of these cables or provide a terminal point for the same by means such as can be readily available to the linemen in remote locations. However, the large cable diameters and the associated problems have prevented the successful utilization of the cold-forge technique in that the pressures which are required to be applied to the cables to effect a reliable or reliably crimped connection are of considerable magnitude. Tools which would provide these pressures are cumbersome and are mostly hydraulically operated and hence, difficult to use by linemen in remote locations or working high above ground on the transmission pylons. Hence, it has been the desideratum in the large cable splicing art to provide an easily operable connector, which would provide the desired securement of the large electrical cables and would be capable of functioning in a manner equivalent to the cable itself.

PRIOR ART

In U.S. Pat. No. 3,345,454 there has been disclosed an explosively driven, wedge type electrical connector which secures an electrical cable by explosively driving outwardly means which secure the cable. However, the manner in which the cable is secured differs in a number of respects from the present device and the present device represents a further improvement in the self-contained connector art for securing a cable by an explosively activated means grasping securely a cable.

Further, in U.S. application Ser. No. 752,194, now U.S. Pat. No. 3,515,794 filed Aug. 13, 1968, there has been disclosed another explosively driven cable securing assembly which represents a further improvement in the manner in which a cable may be secured by an explosively or forcefully driven wedge means. The present invention represents a further improvement of the means disclosed in this application especially in the manner in which the firing chamber is located, the pistons or projectiles are driven outwardly as well as in the manner in which the force is transmitted to the jaw means which are driven into the cable.

In developing the explosively driven connectors such as mentioned above, a number of problems have been encountered in that while the necessary forces may be generated by an explosive charge contained within an explosive chamber, the assembly, the reliability of proper positioning of the cable within the connector and the means which would assure a foolproof operation have necessitated a further change in the manner in which these devices are assembled and operated.

It has now been discovered that a tapered connector having either one or two tapered sections, which tapered sections contain the jaw means or means for reliably securing the cable to the connector and which connector is provided with properly positioned jaw means in respect to the firing chamber and the inserted cable achieves a proper splicing or termination of the cables. The novel device achieves an easier assembly of the self-contained connector, and also provides proper positioning and movement of the forwardly driven jaws such that upon completion of the splicing operation, the cable is fully secured and a "bird-caging" effect is prevented. By "bird caging" is understood the phenomenon associated with a spreading of the individual strands in the immediate vicinity of the connector whereby the cable appears to resemble a small, somewhat spherical shape, hence, the name "bird cage".

DESCRIPTION OF THE INVENTION

In reference to the figures herein which illustrates the connector embodying the principles of this invention and show the easily operated means by which two cables may be secured or a single cable terminated, the like elements in these figures functioning in the same or an equivalent manner have been designated by like numbers and wherein:

FIG. 1 illustrates a perspective view of a utility cable secured by means of the novel connector;

FIG. 2 illustrates a terminal end of a cable with a connector secured thereto, which connector is provided with a section used for appending thereto means used for securing the cable to other devices such as a transmission pylon;

FIG. 3 illustrates a terminal connector shown in FIG. 2 which has been provided with dead-end attachments such as required for securing a cable to an electrical transmission tower or pylon;

FIG. 4 shows a longitudinal cross section of the connector without the cables being inserted therein and the positioning of the explosively driven piston or projectile means, the jaw securing means, the jaw means and the "bird cage" preventing means;

FIG. 5 illustrates a transverse cross section in FIG. 4 along lines 5—5 showing the axial relationship of the jaw means employed for securing the cable within the connector as well as a plastic positioning device which is employed upon insertion of the cable into the connector to assure the proper placement of the jaw means;

FIG. 6 illustrates an exploded view of the device shown in FIG. 4 at various stages of semi-assembly in respect to the jaw positioning means employed herein;

FIG. 7 illustrates one end of the connector means having the cable inserted therein and the centrally located jaw positioning means engaged with the piston driven plate in a position representative of the device before the explosive force has driven the means securing the cable in the connector;

FIG. 8 illustrates the positioning of the cable after the explosively driven piston or projectile has secured the cable in the connector with the various positioning and securing devices illustrated as these appear after the completion of the explosive splicing operation;

FIG. 9 illustrates a steel core securing means used with an aluminum cable reinforced with steel core and the insertion of the steel core securing means in the connector;

FIG. 10 illustrates the manner in which the steel core reinforced aluminum cable is secured by the novel core securing means and positioned within the novel connector;

FIGS. 11*a* to 11*c* illustrate the manner in which an inertia welding technique is employed for joining the connector casing including the means which aid the securement of the shell in the explosive chamber in a proper location within the connector casing;

FIG. 12 illustrates the jaw positioning means at the cable receiving end thereof;

FIG. 13 illustrates a transverse cross section in FIG. 9 along lines 13—13 showing the axial relationship of the steel core securing means as it is positioned within the device illustrated in FIG. 12; and

FIG. 14 is a cross sectional view illustrating the device used to detonate the explosive charge in the firing chamber.

Referring now to FIG. 1, it illustrates an outer shell of the connector 11 consisting of a cylindrical center section 12, and two tapered or swaged outer portions 13 which are conical. An opening 14, at either end of the connector 11, is provided for inserting a cable 10 in the connector device 11. A terminal section which is used for securing the cables to suitable cable carrying devices such as transmission towers or pylons is shown in FIG. 2. This device operated in the same manner as the device in FIG. 1 except that one of the ends 19 is terminated such as by tapering or forging and as tapered used for a terminal section. The closed terminal end 19 may carry suitable holes 24 for securing this end to a transmission pylon or to a dead-end connection illustrated in FIG. 3 as 20. This dead-end connection consists of two identical bars 21 which are carried on opposite sides of the connector and secured by suitable bolts 26 to the connector 19. The bars 21 carry at the end thereof a pin 22 and a pin retainer 23.

The terminal connection such as illustrated in FIG. 3 is used for securing the cable to a transmission tower or pylon with the bolts 26 being used for either transmitting the power to the other side of the power line—"cable jumping" — or for other suitable means such as for carrying the current from the cable to some other location.

Referring now to FIG. 4, it shows in longitudinal cross section a firing barrel 15 which is a strong steel or aluminum chamber having a firing chamber 16 in which a charge 17 may be placed. Circumferentially and on one thereof this firing barrel carries a barrel retaining annulus or groove 30 which is employed for the purpose of positioning and securing the means contained within the outer shell 11 when the outer shell is assembled as further described herein.

In FIG. 4, the weld flow 31 which properly positions the firing barrel 15 in the cylindrical shell section 12 is shown in the barrel retaining annulus 30. Further, in referring back to FIG. 1, the weld flow which is removed from the exterior of shell section 12 is merely illustrated as a line 32. A detonator plug opening 36 is provided in the outer shell 11 as well as in the firing barrel 15 which is conveniently in a form of a threaded opening and closed with a threaded bolt or insert 34 when the connector is stored or shipped. The threaded opening affords sufficient strength for confining and retaining the charge within barrel 15 upon firing of charge 17. A detonator spring 37 is also inserted through the opening 36. The function of this detonator spring will be further explained herein.

An outwardly driven projectile or piston 39 is provided on either both or one end of the firing chamber such as when the connectors are of the types illustrated in FIGS. 1, 2, and 3 respectively. A piston seal 40 is placed on the projectile 39 towards the firing chamber and secured to the projectile 39 by means of a seal retaining pin 41 inserted into a receiving hole 42 in piston 39. The piston 39 has a spherical projector head 44 which in combination with the seal 40 assures a proper confinement and direction of the explosive force from the expanded gas volume originating when the explosive charge is ignited in firing chamber 16. It is noted that the explosive force exerts its force on the concave surface of the seal 41 and is in turn transmitted onto the convex surface of the piston 39.

The piston 39 is inserted into a ram plate or piston head 46 in a recessed cylindrical section 46 and resting on the recessed piston seating surface 47.

Piston 39 carries a circumferential groove 39*a* on its forward, flat head, which secures piston 39 to the piston head or ram plate 46 by peening or clinching the plate such as at location 46*a* shown in FIG. 7. The ram or piston plate 46 in turn abuts a plastic jaw securing plate 49 which is conveniently made of polyethylene or polypropylene to take advantage of the material's natural resilience. Plate 49 is lockingly secured or engaged to the ram head 46 through a communicating aperture 50 having a locking surface 51 in the piston head 46. The locking securement of the jaw securing plate 49 is obtained by a locking barrel 54 carried by the jaw securing plate 49. This locking barrel 54 has four latching hook segments 56 which in combination form a truncated cone having undercut surfaces 56*a* which because of the segmental nature of the barrel 54 allows the locking barrel 54 to be resiliently confined upon insertion into the aperture 50 thereby engaging the latch hook surface 56*a* with locking surface 51 on the piston plate or ram plate 46. The jaw securing plate 49 has spacer posts 59 which keep the jaws 62 confined in a jaw aperture 61 provided on plate 49. The jaws 62 are further secured by the jaw securing latch 60 protruding from the jaw securing plate 49. The jaw securing latch has a wedge-shaped lip 63 which engages the latch groove 64 on the jaw 62 by means of the resilient jaw securing latch 60. When thus secure, the spacer post 59 keeps the jaw 62 from dropping downwardly.

These jaws 62 are tapered outwardly in relation to the outer shell section 13 of the connector 11 such that when the camber on the jaws 62 as seen in FIG. 5 is in the permanently cable-engaged-position these jaws fully conform to the outer shell 13.

Thus as seen in cross-section in FIG. 5 in the cable receiving ready-to-be-fired position, the camber on the

jaws 62 is slightly more crowned than in the position in which the jaws 62 finally engage the cable such as seen in FIG. 8. Thus, in the engaged position illustrated in FIG. 8 the camber on the top of the jaws is equivalent to the concave shape of swaged end 13 of the outer shell 11. In order to prevent the "bird cage" formation by the sudden shock imparted to the end of cable 10 upon firing the charge, a collapsable material such as Styrofoam is inserted as a plug 78, in the connector resting between the guide collar 74 and jaw securing means 49 as shown in FIG. 7. In FIG. 8 it shows that the Styrofoam plug 78 has practically disappeared by compression or impact and the plastic in collar 72 and plate 49 have been distorted. In order to prevent a "bird cage" formation, which occurs apparently due to the inertial resistance of cable 10, the initial impact or momentum being transmitted outside the connector and transferred into the force necessary to form a "bird cage", the plug 78 and collar 74 act as a shock absorber. Additionally, a collar 10*c* which is a plastic pipe or a longitudinally slit tube, as shown in FIG. 8, may also be placed on the cable and used to confine the tendency of the individual wires to spread.

The jaw pieces 62 carry on the interior surface thereof teeth 66 which engage the cable when the piston 39 drives the jaws 62 forwardly. When the actual firing is driving the jaws forwardly, the forces are such that the jaws penetrate readily the thin oxide coating on the cable and engage the clean metal thus further improving the electrical connection between the jaws 62 and the cable 10. In the forward part of the jaws 62 and the cable 10. In the forward part of the jaws 62 these are spaced apart and spread out by spacer collar or plug 74 having four spreader posts 75, one each between adjacent jaw pieces 62 to allow the jaws 62 to receive the cable in the opening 14 defined by the cable receiving means 70.

The jaws 62 have on their forward portion thereof a groove 67 which has seated therein a spring 69. When the jaws are inserted in the connector shell 11 an elastomeric band or a spring 69 secures the receiving means 70 by urging convergingly the individual jaws 62 upon the guide collar 74. The spring 69, keeps the receiving means in place being positioned in front of posts 75. As mentioned before, the guide collar 74 has radially outwardly projecting posts 75 which keep the individual jaws 62 spaced apart as illustrated also in FIG. 5.

In the vicinity of each of the posts 75, the guide collar ring 74 is joined frangibly to the receiving means 70 by means of a pair of thin, easily tearable legs 76. Upon insertion of the cable into the opening 14 the end of the cable abuts the guide collar 74 and by exerting a slight push, the guide collar legs 76 are severed from the receiving means 70 by tearing these legs 76 from the receiving means 70. As the cable is urged forwardly, the collar 74 assures the proper positioning of the jaws 62, the proper insertion of the cable 10 through the opening 14, as well as the positioning of the cable into the connecting device and providing for the shock absorbing effect previously discussed.

The receiving means 70 as illustrated in FIG. 7 receives in the interior thereof the cable 10 and through the tearing action which takes place when the collar 74 is moved interiorly in the device, the receiving means 70 is also properly seated in the connector.

Further, it should be noted that when the elastic band or spring 69 urges radially inwardly the jaws 62 the jaws also come to rest against the surface 79 of receiving means 70. In this position the receiving means 70 rests within the swaged portion 13 of the outer shell as well as between the jaws 62 and thus in combination with the severable guide collar 74 completes the assembly of the connector 11.

The connector 11 may be readily transported with the end opening 14 closed with a cap (not shown); however, all of the means are sufficiently secured in the connector without these being dislocated or preventing these from proper acceptance of the cable 10.

Further, the receiving means 70 have a jaw engaging ledge 72 which upon the pistons 39 being driven forwardly as shown in FIG. 8 protrudes outwardly as shown therein. By determining the outward projection of the receiving means 70, it can be readily seen whether or not the jaws 62 have projected or engaged the cable in an acceptable manner. If the receiving means 70 does not protrude outwardly, it is obvious that the piston 39 has not driven the jaws sufficiently forwardly. On the other hand, if the receiving means 70 such as shown in FIG. 8 has projected for the approximately indicated distance, then the securement of the cable 10 is reasonably evident therefrom.

The receiving means 70 also has an interior reverse taper at the mouth thereof 81 which assures the proper reception of the cable within the receiving means 70.

In addition to the receiving function which the device 70 performs, it also performs a strain relief function when this device, after explosion of charge 17, is driven into an intimate contact with the cable. When placed in the operative position after firing, the device 70, without destruction, does relieve some of the problems associated with vibration and strain.

In reference to FIG. 9, this figure illustrates the securement of a cable commonly known as ACSR or "Aluminum Cable, Steel Reinforced". The steel core securing segment device 71 illustrated in FIG. 9 consists of four equal segments 71*d* which are positioned in the nose of the connector as shown in FIG. 9, the aluminum outer strands having been cut off previously approximately one-fourth inch shorter than the length of segment 71*d* as shown in FIG. 10. In cutting off the steel inner strand as indicated, i.e. shorter than the core securing jaws 71, the air gap in this embodiment acts similarily to the styrofoam plug 78, previously discussed. The cable 10 is inserted through the opening 14 in such a manner that severable guide collar 74 is torn from the legs 76 by the steel core securing device 71 upon insertion of the cable in the opening 14. The core securing device 71 is inserted in the connector during assembly and the cable 10 is inserted therein when introduced into the connector through the opening 14. These severable legs 76 and guide collar 74 function as if the core securing device 71 were a portion of the cable. Further, as shown in FIG. 13, these spreader posts 73*a* fit into spreader channels 73*b* in the receiving means illustrated in FIG. 13. The steel core securing segment 71*d* carries on its interior thereof teeth 71*a* which engage the steel cable when the jaws 62 and these securing segments 71*d*, acting as jaws 62, are urged forwardly. In order to prevent the four individual segments, i.e. 71*d* from falling apart and assure that these segments are fixed to the steel core suffi-

ciently tightly, springs **72** are circumferentially surrounding this steel core securing device **71**. The springs rest in grooves **72***a* and urge the four segments towards towards the steel core. In turn, to prevent the collapse of device **71**, two interior spreader rings **73** having four spreader posts **73***a* shown in FIGS. **9** and **13** are supporting segments **71***d*.

When the explosive charge **17** is set off and the steel core securing device **71** used, the circumferential grooves **72** are filled with a deformed metal bead (not shown) which originates from jaws **62**. Thus, not only is the steel core grasping achieved by means of the core securing device **71**, but also the steel core securing device **71** prevented from dislodging by being secured circumferentially by means of the jaws **62** acting in cooperation with the device **71**. A 0.020 off set in the aluminum jaws also help lock the steel core securing device **71**. Further, the spreader ring **73**, being of a deformable plastic such as polyethylene or polypropylene does not impair the axial collapse and hence locking of the device **71** around the steel cable **10***a*. Additionally, the spreader ring **73** insures that the jaws **62** will come down directly on top of the segments **71***d*.

In reference to FIGS. **11***a* to **11***c* and FIG. **4**, the outer shell **11** which is joined in the cylindrical region **12** and when joined secures the firing chamber **15** via the groove **30** to the outer shell **11**, also allows the proper positioning for the ready-for-field-use condition of the explosive connector **11** whereby the user is assured that all of the parts of the device are properly functioning and capable of producing the desired connection. In order to assure the proper position of firing chamber **15**, the threaded bolt **34** is in place in the outer shell **11** and firing chamber **15**. Thus, the joining of the outer shell **11** is effected when the one portion thereof is held stationary such as shown in FIG. **11***a*. The stationary part being designated **12***a* and the rotated part which is rapidly rotated and spaced apart from the stationary part has been designated as **12***b*. After a sufficient rotational momentum has been imparted to one of the parts it is being urged forwardly and because of the high rotational momentum one of the parts will engage the other, i.e. **12***b* and upon fusing and being urged with great force against the stationary part forms a weld bead **32** on the outer portion thereof as well as a weld bead **31** which fills the annulus or the groove **30** provided on the firing chamber **15**. This procedure then secures against rotation as well as axial movement of the firing chamber **15** within the shell **11** especially when plug **34** is removed as well as secures sufficiently the individual shell parts of the outer such that upon firing the charge **17**, the outer casing or shell is not torn apart. The outer bead **32** is conveniently ground off. The method which is used for welding these two pieces together is commonly well-known and is designated as inertia welding.

In reference to FIG. **14** the same illustrates a detonator employed with the connector and consisting of a detonator housing **90** having a negative electrode **91** and a positive electrode **92**. The negative electrode **91** is led through an insulator cap **94** to an interior transmission stem **95** which interior stem is insulated from the other housing **90** by means of an insulator **96**. The insulator **96** terminates in a conical portion of the transmission stem **95**. As mentioned before, the detonator plug **34** conveniently in the form of a bolt is removed from the shell **11**, and the detonator **90** is inserted into the outer housing which secures sufficiently strongly by the threads the detonator **90** and confines the charge **17** into the firing chamber **15**. When the connector device is loaded a spring **37** is first screwed into the opening bland and it is engaged with the explosive charge **17**.

Thereafter, the spring is engaged with the first contact spiral **107** with the positive portion of the detonator and with the second spiral **109** with a negative electrode **91** of the detonator **90**. The detonator holds a firing cap **99** insulated from the positive pole **92** by means of a plastic plug **97** which carries a contact rivet **100** engaging the transmission stem **95**. The contact rivet **100** in turn is in contact with the firing cap as well as the nicrome wire **102** which protrudes between the metallic firing cap holder **99** and the plastic plug **97** to engage the first contact spiral **107** of spring **103**. The primer is held in a primer holder **106** and insulated from outside interference by a thin firing membrane **105** such as shown in FIG. **14**.

The firing is effected by a triggering device disclosed in Ser. No. 18,150 filed Mar. 10, 1970. This device, when contact is made between the negative and the positive terminal **91** and **92** respectively, heats the nicrome wire **102** and triggers the detonating primer or primer substance **104** which in turn sets off the explosive charge **17**.

What is claimed is:

1. In an electrical connector capable of being secured electrically to an electrical conductor, and including at least one tapered shell and a plurality of jaws movable toward a narrow end internally of said tapered shell, said jaws also being movable radially inward to grip the end of an electrical conductor inserted in said shell, the improvement comprising: a plug received and slidable between said jaws, and a retaining member, said retaining member initially retaining said plug within the narrow end of said tapered shell prior to insertion of said electrical conductor within said shell, said plug being frangibly connected to said retaining member in order to be slidable between said jaws and guide said conductor internally of said shell and between said jaws.

2. The structure as recited in claim **1**, wherein said plug is fabricated of a resilient material to absorb shock when said jaws are forcibly driven toward the narrow end of said shell.

3. The structure as recited in claim **1**, wherein said retaining member is of sleeve configuration and capable of encircling said conductor to act as a strain relief therefor when the conductor is inserted internally of said shell.

4. The structure as recited in claim **1**, and further including: a plate, said jaws being connected to said plate and said plug being compressed against said plate when the jaws are forcibly driven toward the narrow end of said tapered shell.

5. The structure as recited in claim **4**, and further including: a compressible material between said plug and said plate to absorb shock when said jaws are forcibly driven toward the narrow end of said tapered shell.

6. The structure as recited in claim **4**, and further including: a resilient member encircling said jaws.

7. The structure as recited in claim 4, wherein said retaining member is of sleeve configuration and capable of encircling said conductor to act as a strain relief therefor when the conductor is inserted internally of said shell.

8. The structure as recited in claim 7, and further including: a compressible material between said plug and said plate to absorb shock when said jaws are forcibly driven toward a narrow end of said tapered shell.

9. The structure as recited in claim 4, and further including: a core member having a plurality of radially movable segments, said core member being freely insertable between said jaws and internally of said retaining member, said core member being disposed between said plug and the end of said conductor when said conductor is inserted between said jaws, and a portion of said conductor being received between said radially movable segments

10. The structure as recited in claim 1, wherein said plug is fabricated of a resilient material to absorb shock when said jaws are forcibly driven toward the narrow end of said tapered shell, and said retaining member is of sleeve configuration and capable of encircling said conductor to act as a strain relief therefor when the conductor is inserted internally of said shell.

11. The structure as recited in claim 1, and further including: a core member having a plurality of radially movable segments, said core member being freely insertable between said jaws and internally of said retaining member, said core member being disposed between said plug and the end of said conductor when said conductor is inserted between said jaws, and a portion of said conductor being received between said radially movable segments.

12. The structure as recited in claim 1, and further including: a force applying member and a detonation member for forcibly driving said jaws toward the narrow end of said tapered shell.

13. In an electrical connector capable of being secured electrically to an electrical conductor, and including at least one tapered shell and a plurality of jaws movable toward a narrow end internally of said tapered shell, said jaws also being movable radially inward to grip the end of an electrical conductor inserted in said shell, the improvement comprising: a plate, said jaws being connected to said plate, and a plug received between said jaws and compressed against said plate when said jaws are forcibly driven toward the narrow end of said tapered shell and a retaining member, said retaining member frangibly connected to and initially retaining said plug within the narrow end of said shell.

14. The structure as recited in claim 13, and further including: a compressible material between said plug and said plate to absorb shock when said jaws are forcibly driven toward the narrow end of said tapered shell.

15. The structure as recited in claim 13, and further including: a resilient member encircling said jaws.

16. The structure as recited in claim 13, wherein said retaining member is of sleeve configuration and capable of encircling said conductor to act as a strain relief therefor when the conductor is inserted internally of said shell.

17. The structure as recited in claim 13, and further including: a core member having a plurality of radially movable segments, said core member being freely insertable between said jaws and internally of said retaining member, said core member being disposed between said plug and the end of said conductor when said conductor is inserted between said jaws, and a portion of said conductor being received between said radially movable segments.

18. The structure as recited in claim 13, and further including: a compressible material between said plug and said plate to absorb shock when said jaws are forcibly driven toward a narrow end of said tapered shell.

19. The structure as recited in claim 13, and further including: a core member having a plurality of radially movable segments, said core member being freely insertable between said jaws and internally of said retaining member, said core member being disposed between said plug and the end of said conductor when said conductor is inserted between said jaws, and a portion of said conductor being received between said radially movable segments.

20. The structure as recited in claim 13, and further including: a force applying member and a detonation member for forcibly driving said jaws toward the narrow end of said tapered shell.

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