

March 22, 1966

F. P. BARICEVIC ETAL

3,241,204

WIRE GRIPPING DEVICE

Filed Oct. 15, 1964

FIG. 1

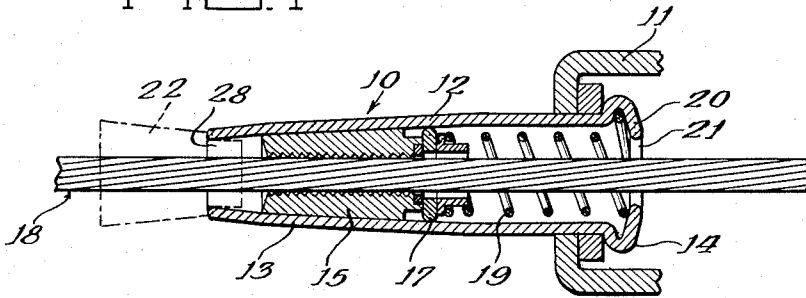


FIG. 4

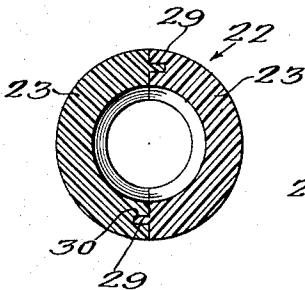


FIG. 2

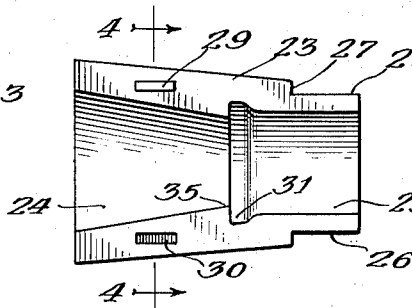


FIG. 3

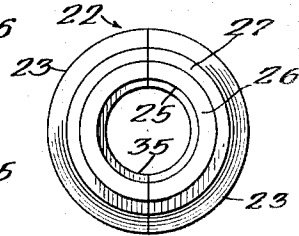


FIG. 5

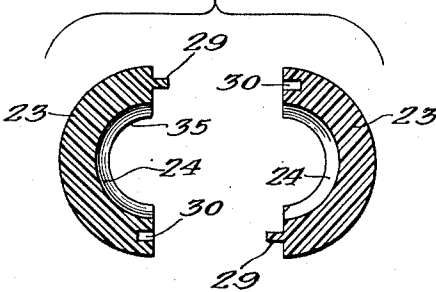


FIG. 6

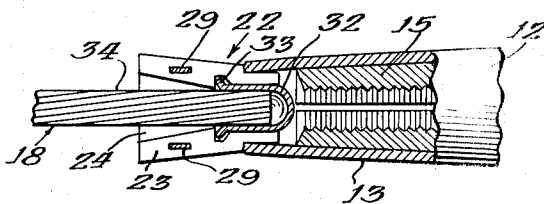


FIG. 7

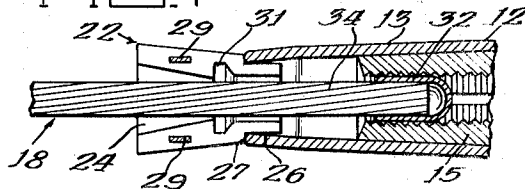
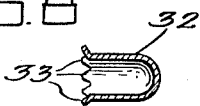


FIG. 8



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3,241,204

## WIRE GRIPPING DEVICE

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Filed Oct. 15, 1964, Ser. No. 404,036  
9 Claims. (Cl. 24-126)

This application is a continuation-in-part of our co-pending application Serial No. 295,346, filed July 16, 1963, now Patent No. 3,172,180, which shows a wire gripping device having a strand guide which is made in two pieces to facilitate removal after insertion of the cable.

The present invention relates to wire gripping devices such as line splices and deadends and is particularly applicable to line splices and deadends of the sliding jaw type. These are sometimes installed manually, but frequently they are installed by "hot stick" technique, in which it is desirable to minimize the number of manipulative steps involved.

With the development of aluminum cable, it has been necessary to use a pilot cup in this type of wire gripping device in order to protect the jaws from the tangs of the strands. When aluminum cable is cut, it is sufficiently soft so that a pronounced tang will be provided for each strand. In inserting the cable between the jaws, the tangs will catch on the jaw and interfere with the smooth action of the device, resulting either in a chattering action or a relative longitudinal displacement of one jaw with respect to the others, or a canting of the whole jaw assembly. If the tang projects into the space between two jaws, it is very possible that the jaws cannot be contracted into gripping relationship. If the cable end passes through the jaw satisfactorily, then the possibility arises that the tang will catch on a spring convolution in which event no gripping action can be developed.

It is for the foregoing reasons that a pilot cup has been proposed which serves as a nose or a shield for the cable end as it passes both through the jaws and the spring.

However, the use of the pilot cup in itself does not solve the problem of entry unless the pilot cup is considerably larger than the cable diameter; this, in turn, calls for a larger shell diameter than would otherwise be necessary, thus increasing the overall cost of the device. Such problems were not encountered with the relatively much harder copper cable for the reason that the ends of the jaws could be flared, thus facilitating the entry of the cable between the jaws with a minimum of manipulative steps, and the absence of a pronounced tang in the case of the harder copper cable did not require the use of a pilot cup.

According to our invention, we provide a removable strand guide which is mounted on the end of the shell, and which has a funnel-shaped opening, the minimum diameter of which is less than the diameter of the pilot cup. The funnel shape of the guide thus serves to realign the strands of the cable with respect to the overall dimension thereof including any tangs, and to center the cable end as realigned with respect to the pilot cup. Due to the fact that the opening is smaller than the cup diameter, any cable that passes through the opening will readily be received within the cup.

With respect to more pronounced tangs, the strand guide will function more in the nature of a go-no-go gauge, thus indicating immediately to the operator that the tangs are too large and that the cable end must be recut or otherwise reshaped.

The specific manipulative problem encountered, and which is solved by the use of my strand guide, is that in order to insert the cable end into the cup, it is necessary the grip the cable end, perhaps a half inch from the end surface so as to compress the strands and permit entry thereof into the pilot cup, assuming that the tangs are not

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pronounced. As soon as initial entry has been effected, it is not possible to release the hot-stick clamp because then the cable would pull out of the cup; rather, it is necessary to apply a second hot-stick clamp perhaps one-half inch behind the first, then remove the first clamp and push the cable in another half inch, and a succession of such short moves is required before it is possible to apply the clamp at a point several inches from the end of the shell and give one long shove to push the cable through the cartridge and out of the other end, in the case of a feed through deadend, and which ultimate relationship is required before the jaws are able to perform their required gripping function.

Merely to perform the above operation manually, that is with the fingers, requires at least a minute due to the series of progressive short moves required, and by hot-stick technique several minutes can be consumed. When the tang is pronounced, the manipulation is more involved since it requires angular inclination of the cable with respect to the axis of the wire gripping device in order to get the tangs into the cup prior to the cable end as a whole.

However, when the wire gripping device is provided with a guide according to our invention, the cable can be gripped several inches from the end, and a single movement will suffice to cause the cable to pass through the guide and into the pilot cup, and cause subsequent release of the pilot cup and the initial feeding movement of the cable through to its home position in the case of a line splice, or to the feed-through position in the case of a deadend.

A second feature of our invention is the fact that after the guide has served its purpose it may be removed. According to this aspect of our invention, the guide is made in two pieces which are mounted on the shell and which are maintained in cable receiving relationship by the mounting arrangement. After the cable has been fully inserted, then the guide is gripped by a hot-stick device and yanked away from the shell. This permits the two parts to drop free of the power line.

It is undesirable to provide a guide of this type as a permanent part of the shell because the smaller diameter of the opening interferes with the desired stress distribution at the outer ends of the jaws. Putting it another way, the cable should not be engaged by any portion of the wire gripping device other than the jaws themselves.

Since the shell is often fabricated by a swaging operation, it is not possible to impart the desired configuration to the open end of the shell so that it could function as an integral type of guide, even if this were permissible from the stress distribution viewpoint.

Therefore, it would appear that a nonintegral construction is indicated both from the viewpoint of stress distribution and also from the viewpoint of manufacturing technique.

However, the difficulty encountered in having a strand guide which is fabricated separately from the wire gripping device, and secured thereto by suitable interlocking or adhesive means, is that there is a danger of separation of the parts. In such event, the guide, being ring-shaped, would slide down the power line and come to rest at the bottom of the span, where it would collect dirt or foreign matter and serve as a locus of corrosion. Also, movement of the guide with respect to the line may set up radio and television interference in the vicinity. The two part arrangement of our invention solves the foregoing problems because it permits removal of the strand guide not only from the shell of the wire gripping device but also from the power line itself.

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

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

FIG. 1 is a sectional view showing an installed dead-end, with the removed strand guide shown in broken lines;

FIG. 2 is an enlarged view showing one of the strand guide parts in elevation;

FIG. 3 is a rear end view of the strand guide;

FIG. 4 is a sectional view of both parts of the strand guide, taken along line 4—4 of FIG. 2;

FIG. 5 is a view similar to FIG. 4 but showing the parts separated from one another;

FIG. 6 is a sectional view of the front end of the wire gripping device showing the parts at the time of initial insertion;

FIG. 7 is a view similar to FIG. 6, but showing the parts in a changed position; and

FIG. 8 is a sectional view of the pilot cup.

In FIG. 1 the wire gripping device 10 is a cartridge for a feed through deadend, the nature of the same being more fully described in Schweitzer Patent No. 3,098,275, granted July 23, 1963. The cartridge 10 is interlocked with a clevis 11, the clevis forming a part of the deadend assembly and having means for connection to an insulator or other support, not shown.

The cartridge 10 as shown in FIG. 1 comprises a shell 12 having a tapered front portion 13 and an enlarged rear portion comprising the head 14. A tapered jaw assembly 15 is located within the shell 12 and comprises a plurality of jaws which are associated with each other at one end by a connecting washer 17. There are preferably three jaws to the jaw assembly, and they are provided with suitable conductor gripping surfaces. When tension is applied to the cable 18, the jaw assembly moves to the left, and the taper of each jaw cooperates with the taper 13 of the inner surface of the shell to urge the jaws into gripping engagement with the cable 18. 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 conductor gripping position by means of a coil spring 19 which is confined between the rear end of the jaw assembly 15 and a spring abutment 20 in the form of an inwardly directed flange formed integrally with the shell 12. The spring abutment 20 defines the rear opening 21 of the shell through which the slack end of the conductor extends.

The invention is also applicable to certain other jaw and spring arrangements, such as that shown in our co-pending application Serial No. 315,256, filed October 10, 1963.

The strand guide 22 is a hollow cylindrical member made in two halves 23 which are formed of a suitable resin, such as nylon. As shown in FIGS. 2, 6 and 7, the strand guide has a flared opening 24 at the front end and a counterbore 25 at the rear. The rear portion of the strand guide is in the form of a shank 26 of reduced diameter, there being a shoulder 27 which separates the shank from the main body portion. The shank 26 is received within the front opening 28 of the shell 12 with the shoulder 27 abutting against the edge of the opening 28. The meeting edges of each half 23 are provided with lugs 29 and cooperating sockets 30 which maintain the two halves in registry. Preferably each half 23 has one lug and one socket so that the two shoulders 23 will be identical parts, made from the same die.

The inner end of the counterbore 25 is radially enlarged to provide a groove 31, shown in FIGS. 2 and 7. The pilot cup 32 is disposed within the counterbore 25 and has flared marginal portions 33 which extend into the groove 31. The arrangement is such that when the end portion 34 of the cable 18 is inserted into the pilot cup 32 and a moderate degree of pressure applied, the

flared portions 33 will readily be deformed and permit inward movement of the pilot cup as shown in FIG. 7.

It will be observed that the minimum diameter or neck 35 (FIG. 2) of the flared opening 24 is smaller than the diameter of the counterbore 25, and at least as small as the inner diameter of the pilot cup 32. Thus any cable end 34 which passes through the flared opening 24 will be easily accommodated within the pilot cup 23, and the act of insertion causes a centering of the end portion 34 with respect to the cup 32. The diameter of the opening neck 35 in turn is slightly larger than the nominal diameter of the cable 18 so as to pass any tangs which may be formed on the cable end 34 incident to the cutting thereof. Even where the over all cable diameter due to the presence of a tang is slightly larger than the neck opening, insertion is possible with a very small increase in the degree of force required due to the softness of the aluminum strands and due also to the smoothness and surface hardness of the material from which the strand guide material is fabricated. However, where the size of the tang is such that insertion is difficult, the cable is recut in the hope that a new cut will result in a smaller tang.

Once the end portion 34 passes through the opening 24 and is received within the pilot cup 32, the relative movement of the parts is continued until the cable is projected all the way through the deadend into the gripping position of the parts shown in FIG. 1. At this time, the strand guide 22 is yanked out of the shell opening 28, then the two halves 23 will separate and fall away.

To summarize the operation, as previously detailed in connection with the description of the separate parts, the strand guide 22 is first assembled with the pilot cup 32, and the three part assembly is then inserted into the front opening 28 of the shell 12. If a reasonably tight fit between the shank 26 and the opening 28 is provided, no adhesive will be necessary; as a result of which, the strand guide parts 23 are maintained in their desired relationship by the cooperation between the shank 26 and the shell 12, with the strand guide parts 23 holding the pilot cup 32 in the desired position.

Then, the cable end 34 is inserted through the strand guide 22 into the pilot cup 32, and thence into the shell 12 as previously described. Since in the present invention, the two halves 23 are entirely separate from each other, no problems are encountered or special tools required in removing the strand guide from the power line after the shank 26 has been withdrawn from the opening 28, and, similarly, no special interlocking means are required which would impede separation of the two halves.

It will also be observed that since the neck 35 is at least as small as the inner diameter of the pilot cup 32, the strand guide 22 serves not only as a locating device and a go-no-go type gauge, but also as a strand compressor. Spreading of the outer the outer aluminum strands is particularly prevalent in the case of ACSR due to the set taken by the steel core when wound on the storage reel.

The present invention is equally applicable to a line splice and other types of line splicing or dead-ending equipment when it is necessary to insert the line strand into the opening of a sleeve or shell.

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

We claim:

1. A wire gripping device comprising a tapered tubular shell having at one end a cable receiving opening, a tapered jaw assembly slidably mounted within said shell, a strand guide mounted on said shell and comprising a cylindrical member having a flared opening extending inwardly from one end, and having a reduced diameter

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shank at the other end received within said shell opening, said shank having a counterbore extending inwardly from said other end, an annular groove formed in the wall of said counterbore, and a pilot cup disposed in said counterbore and having flared deformable marginal portions extending into said groove, said cylindrical member comprising a plurality of separable segments which are maintained in cylindrical arrangement by the engagement of said shank with the opening of said shell.

2. A wire gripping device as claimed in claim 1 in which the minimum diameter of said flared opening is no greater than the inner diameter of said pilot cup.

3. A wire gripping device as claimed in claim 1 in which the meeting edges of said separable segments are provided with intermeshing lugs and sockets.

4. A wire gripping device as claimed in claim 1 in which said separable segments are molded products formed of a synthetic resin.

5. In a wire gripping device comprising a tapered tubular shell having at one end a cable receiving opening, and a tapered jaw assembly slidably mounted within said shell, the combination of a strand guide having a shank extending into said opening and comprising two semi-cylindrical halves arranged in edge to edge engagement to provide a hollow cylindrical member, said halves being shaped to provide a flared opening extending inwardly from one end of said hollow cylindrical member, and a counterbore extending inwardly from the other end, an annular groove formed in the wall of said counterbore, and a pilot cup disposed in said counterbore and having flared deformable marginal portions extending into said groove.

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6. A wire gripping device as claimed in claim 5 in which the minimum diameter of said flared opening is less than the inner diameter of said pilot cup.

7. A wire gripping device as claimed in claim 5 which includes means for maintaining said halves in axial registry with each other when said shank is received within said opening in said shell.

8. A wire gripping device as claimed in claim 5 in which said semi-cylindrical halves are molded products formed of a synthetic resin.

9. In a wire gripping device comprising a tapered tubular shell having at one end a cable receiving opening, and a tapered jaw assembly slidably mounted within said shell, the combination of a strand guide having a shank portion extending into said opening and comprising two semi-cylindrical halves arranged in edge to edge engagement to provide a hollow cylindrical member, said halves being shaped to provide a flared opening extending inwardly from one end, and said halves being maintained in edge to edge engagement only by the engagement of the shank portions thereof with the opening of said shell, whereby removal of said two part hollow cylindrical member from said opening by an axial withdrawal thereof will cause said halves to separate and to drop away from a cable extending through said strand guide and shell.

#### References Cited by the Examiner

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WILLIAM FELDMAN, *Primary Examiner*.