Oct. 16, 1956 D. L. KELLEMS 2,766,501

CABLE GRIPS

Filed May 22, 1951

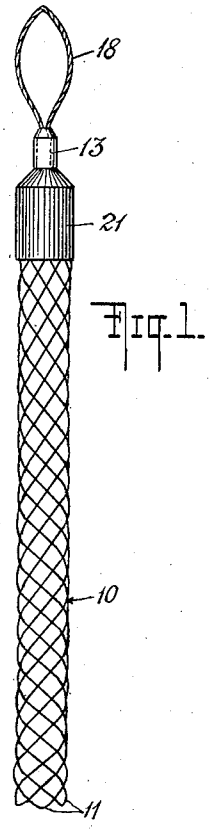


Fig. 1.

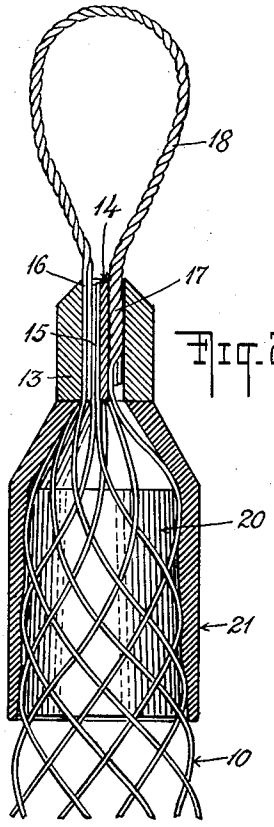


Fig. 2.

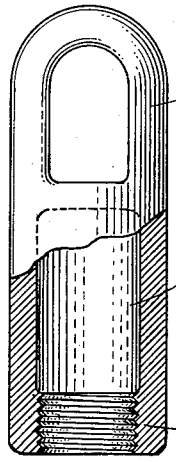
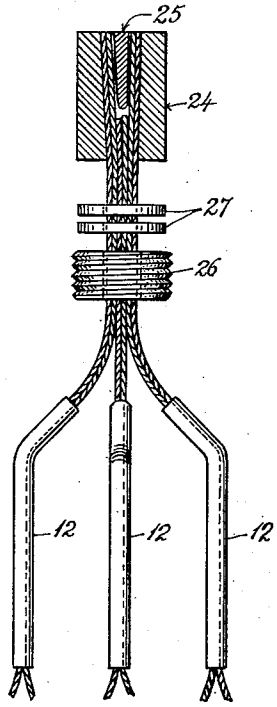


Fig. 3.



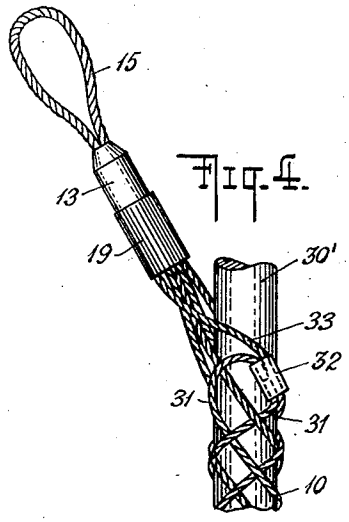


Fig. 4.

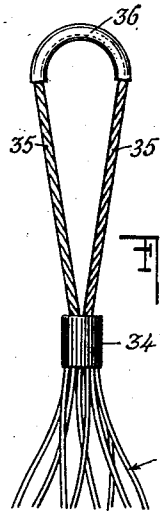


Fig. 5.

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CABLE GRIPS

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7 Claims. (Cl. 24—123)

This invention relates to braided, open mesh, wire cable grips, and more particularly to the end loops, eyes or endings of such devices, whereby a grip with an article gripped therein, may be attached to a pulling line or a supporting means.

Many attempts have been made in the past to produce satisfactory pulling eyes for open mesh cable grips, but while some of such prior eyes were advantageous in some respects, they possessed disadvantages in other respects, which detracted from their success in practical use. To operate properly in use, the pulling eye of a cable grip must be simple in construction, be of small size and at the same time be as strong as the open mesh tube or body of the grip. These factors are of especial importance where the grip is designed to pull cables through conduits.

The principal object of the present invention is to provide an improved cable grip eye, which will be exceedingly simple in construction, of small size and yet will enable the full strength of the grip to be utilized.

The above object is achieved in accordance with the invention, by selectively ending certain of the strands of which the body of the grip is formed, in a mechanically swaged collar, and by extending selected other strands of such body through such collar and weaving them either alone or with additional wires, into a rope or ropes suitable for forming the eye or eyes desired.

The invention also contemplates providing an improved cable grip in which the woven extended wires of the eye are evenly stranded into a smooth, perfect rope-shaped form.

A further object of the invention is to provide an improved cable grip with a simply constructed, completely successful, swivel eye.

Other objects of the invention as well as the advantages thereof will become apparent after a perusal of the following description when read in connection with the accompanying drawings, in which Fig. 1 is an elevational view of a cable grip constructed in accordance with the invention; Fig. 2 is a similar view of the upper portion of such grip, on an enlarged scale and partly in section to show the assembly more clearly; Fig. 3 is an exploded view, partly in section, showing the draft end of a grip made in accordance with the invention, but provided with a pulling eye, which will rotate or swivel relative to the body of the mesh; Fig. 4 is an elevational view of the draft end of a luffing or slack-type pulling grip with the same eye construction as shown in Figs. 1 and 2, and Fig. 5 is an elevational view of the draft end of another embodiment of the invention.

In the drawings, the reference number **10** indicates generally, the body of the grip in all of the several modifications of my invention. The body **10** of the grip is composed of a plurality of wire strands interlocked or interwoven to form an open mesh structure adapted to be placed in surrounding gripping relationship with an article and having any suitable form. Some examples of the forms in which the grip body **10** may be made are

illustrated in the E. E. Kellems Patent No. 2,017,625, issued October 15, 1935. The strands of the grip body **10** in all of the several embodiments are preferably formed with looped ends **11** and braided toward the pulling or draft end of the grip. The strands or wires at the pulling end of the grip are then gathered into a single group which extends through a tubular collar or sleeve, such as the collar **13** shown in Fig. 2 of the drawings. The strands or wires may also be grouped into pairs between the grip body **10** and the aforesaid single group thereof, and each such pair threaded through a tubular protecting member **12** (note Fig. 3). Each of the members **12** are straight for the major portions of their lengths and then are inclined inwardly toward the collar. By this construction, the neck of the grip is maintained as flexible as possible and the shoulders formed by the members **12** afford protection to the end of the gripped cable and to the pairs of strands or wires against wear and prevents the mesh from slipping forward in the use of the grip.

The collar **13** may be made of any suitable material, but it is preferred that it be made of a metal which readily lends itself to swaging, such as aluminum. In the form of grip shown in Figs. 1, 2 and 4 of the drawings, the upper end of the collar **13** is preferably tapered. The single group of wires enclosed by the collar **13** are composed of wires **15** which have been ended in such collar, and wires **16** which extend through the collar and are continued outward therefrom. The wires **16**, beyond the collar **13**, are twisted smoothly upon each other into rope form and the outer end **17** of such rope is turned back and inserted into the collar **13**, thereby forming a loop **18** at the draft end of the grip. A wedging pin **14** may be inserted in the remaining space in the collar **13**, so that a minimum reduction of the collar **13** will be required in the mechanical swaging operation which is next applied to the collar **13**. The collar **13** is swaged tightly upon and around the wires and wedging pin or pins **14**, preferably by rotary swaging, but may be accomplished by any other suitable method to produce the necessary reduction in diameter or to secure the wire ends **15** and rope end **17** in position within the collar **13**.

It will be understood from the foregoing that selected wires forming the body of the grip are ended in the collar **13** and that a selected number of other wires forming the body of the grip are continued through the collar **13** to form the loop **18**, as the number of wires used to form the mesh **10** of the body of the grip is greater than has been found necessary to form a loop or eye **18** of adequate strength. Furthermore, by ending a selected number of these wires in the collar, the number of wires remaining may be controlled so as to produce a smooth, tightly stranded rope of adequate strength and flexibility for forming the eye or pulling loop **18**. It has been found that the number of wires retained for stranding in the eye **18** should for best results be either seven or nineteen wires depending upon the number of wires that has been used in the construction of the mesh **10**. Thus, for example, if seven wires are selected, such wires can be twisted so that they provide a rope which is tightly stranded, yet smooth and perfectly round in cross-section, without sacrifice of strength or flexibility. Under certain conditions, such as when the number of wires in the mesh **10** are not sufficient for proper stranding, it may be necessary to add one or more additional wires having a length such as to enable them to start in the collar **13**, be stranded with the other wires into the rope of which the loop is formed, and ended with the rope end **17** in the collar **13**.

If it should be desired to increase the length of the wires between the body **10** of the grip and the collar **13** in order to attain increased flexibility in the neck portion of the grip, this may be accomplished without sacrifice

of the flexibility thus attained and without slipping of the mesh by employing a flexible tubular holding or retaining member **19** such as shown in Fig. 4 of the drawings. This flexible member **19** abuts against the lower end of the collar **13** and cooperates with the latter to hold or retain the wires in proper position at the neck of the grip, but because of its flexible nature and the increased length of the wires in such region, it makes for greater flexibility in the neck of the grip. The flexible member **19** may be made of any suitable material. For example, it has been found that a piece of braided neoprene hose of standard design functions satisfactorily.

If the wires are not to be lengthened between the collar **13** and the body **10** of the grip, I have found that the employment of resilient means in such region enables the accomplishment of other advantageous results. In Figs. 1 and 2 of the drawings, such means is shown as being composed of an inner resilient member **20** and an outer resilient member **21**. The member **20** may be made of rubber or other suitable resilient material and is slightly tapered upwardly. The outer member **21** is in the nature of a sleeve made of molded neoprene and of such dimensions that it tightly compresses the wires about the inner member **20** and between the latter and the collar **13**, such compression being sufficient to hold the inner member securely in position without the necessity of additional holding means. By reason of this construction, the wires of the grip in the region of such members are held securely in position so that the mesh body **10** will retain its full diameter without collapsing or necking-down at the pulling end, thereby facilitating more rapid assembly of the grip or cable ends. In addition to coacting with the inner member **20** to attain this result, the outer member **21** protects the corners from abrasion at the shoulder and provides a smooth, flexible leading portion or shoulder to the grip to facilitate the threading of the grip through electrical conduits.

In the embodiment shown in Fig. 3 of the drawings, the wires of the mesh body **10** are all ended in a collar **24** which forms part of a swivel unit. As in the construction shown in Fig. 2, an internal wedging member **25** may be inserted in the collar **24** to take up the space remaining after insertion of the wires to minimize the required reduction of the collar in swaging such parts together. It has been found that the wedge **25** will give best results if it is slightly tapered and is inserted from the outer end, as shown. The slight taper in the pin or wedge **25** not only makes it easy to insert and increases the wedging action, but after the collar **24** is reduced by swaging, such taper also causes a gradually increased binding action on the wires so that the full strength of the mesh body **10** is maintained with a minimum size of collar **24**. This minimum size is essential to the construction illustrated in order to produce a pulling eye which is free to rotate on the collar **24** and at the same time is compact enough to pass freely through the limited space of an electrical conduit. Mounted on the neck of the grip between the collar **24** and the grip body **10** are a threaded member or internal nut **26** and a pair of anti-friction discs or washers **27**, which are threaded on the neck of the grip before the collar **24** is mounted on the wire ends. The collar **24** and thrust washers **27** have a cross-sectional area such that they may be passed through the internally threaded end **28** of a pulling eye **29** provided with an internal chamber **30** for the reception of such parts. The nut **26** is then screwed into threaded engagement with the end **28** of the pulling eye and locked in place therein by peaning or in any other suitable manner. It will thus be understood that the pulling eye unit, composed of the members **26** and **29** will freely rotate upon and about the collar **24**, thereby producing a swivel pulling eye of compact design and substantial strength.

It will be noted that the cable grip shown in Fig. 4 of the drawings has a draft end which is offset from the grip body **10** in order to enable the gripped cable **30** to be extended therethrough. This type of grip is of special advantage for removing cables from a conduit or for pulling up slack near the end of the cable. It has been found that in the use of such a grip, certain of the wires of the body **10** are not placed under tension by the pulling force exerted on the grip. Such wires may be ended in the eye collar **13** in the manner previously explained, but in order to reduce the number of wires gathered together in such collar, certain of such slack wires may be cut short and ended in the upper end of the grip body **10**. Thus, as shown in Fig. 4, the slack wires **31**, **31** have been cut short and their ends secured together and to a lead wire **33** which extends into the collar **13**, by means of a tubular clip **32** which after such wires have been enclosed thereby, is flattened to permanently secure them together. By this construction the mesh at this point of the grip, will retain its shape and the lead wire **33** is prevented by the clip **32** from cutting into the jacket of the cable.

In the embodiment shown in Fig. 5 of the drawings, certain selected wires are ended inside the collar **34**, and certain selected wires are extended through such collar **34** as in the constructions of Figs. 2 and 4. The grip shown in Fig. 5 differs in the respect that the extended wires are formed into two branches, **35**, **35** and the wires in each branch are woven into rope form. The ends of the ropes formed by the wires in branches **35**, **35** are inserted into the opposite ends of a U-shaped metal tube **36**, preferably so that the ends of such branches are in overlapping relation within the tube **36**. The metal tube **36** is then tightly compressed upon the overlapping ends of the branches **35**, **35** thereby forming with such branches, an open-shaped loop or eye by which the cable grip may be pulled. It will be understood that instead of dividing the extended wires into two branches to form one loop as shown in Fig. 5, the extended wires may be divided into more groups to form two or more of such loops depending upon the purposes for which the grip is made. It will also be understood, that by so ending a selected number of the wires in the collar **34** and dividing the selected extended wires into two or more branches, each branch can be made up of the proper number of strands or wires which will enable the formation of a perfect rope. Thus, this construction not only enables the production of an eye having uniform perfect stranding, but as a consequence thereof, provides an eye of improved appearance and increased strength. In this connection also, it may be advisable in some cases, to extend all of the wires of the grip body **10** through the collar **34** and utilize all of such wires for stranding, and even add additional wires which begin inside of the collar **34** and extend outwardly therefrom in order to provide in each branch a number of wires which can be formed into a perfect rope, as has previously been explained.

While I have hereinabove described and illustrated in the drawings, preferred embodiments of my invention, it will be apparent to those skilled in the art that changes and modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. In a gripping device of the character described, a plurality of wire strands interwoven to form an open mesh body portion adapted to be placed in surrounding gripping relation with an article, the strands at one end of said body being grouped together, a collar surrounding said grouped strands and securing the same together, all of the strands forming said body portion entering into the inner end of said collar, a selected number of such entering strands ending in said collar before extending beyond the outer end of said collar, and a selected number of such entering strands extending beyond the outer end of said collar and being formed into a draft loop and said collar being constituted of metal material compressed in a radial direction to hold the wires enclosed by said collar securely in clamped relation by a circumferential gripping action.

2. In a gripping device of the character described, a plurality of wire strands interwoven to form an open mesh body portion adapted to be placed in surrounding gripping relation with an article, the strands at one end of said body being grouped together, a collar surrounding said grouped strands and securing the same together, all of the strands forming said body portion entering into the inner end of said collar, a selected number of such entering strands ending in said collar before extending beyond the outer end of said collar, and a selected number of such entering strands extending beyond the outer end of said collar, the strands extending beyond said collar being woven into rope form, and the end of said rope being inserted into the outer end of and secured within said collar and said collar being constituted of metal material compressed in a radial direction to hold the wires enclosed by said collar securely in clamped relation by a circumferential gripping action.

3. In a gripping device of the character described, a plurality of wire strands interwoven to form an open mesh body portion adapted to be placed in surrounding gripping relation with an article, the strands at one end of said body being grouped together, a collar surrounding said grouped strands and securing the same together, a selected number of said grouped strands ending in said collar, and a selected number of said grouped strands extending beyond said collar, the strands extending beyond said collar being separated into branches, each of said branches being woven into rope form, and means securing the outer ends of said branches together to form at least one draft loop.

4. In a gripping device of the character described, a plurality of wire strands interwoven to form an open mesh body portion adapted to be placed in surrounding gripping relation with an article, the strands at one end of said body being grouped together, means enclosing said grouped strands and securing the same together, a first resilient member contained within the upper end of said body portion, a second resilient member enclosing the upper end of said body portion and said first resilient member and exerting a compressive force on the latter, said second resilient member extending above said first resilient member into abutting relation with said enclosing means, and a draft eye connected to said enclosing means.

5. In a gripping device of the character described, a plurality of wire strands interwoven to form an open mesh body portion adapted to be placed in surrounding gripping relation with an article, the strands at one end of said body being grouped together, means enclosing said grouped strands and securing the same together, a plug of resilient material contained within the upper end of said body portion and having an external diameter substantially equal to the normal internal diameter of said body portion, a resilient sleeve enclosing said plug and the upper end of said body portion and exerting a compressive force on said parts such that said plug is securely retained in position within the body portion, said sleeve extending above said plug and securing the strand portions intermediate said plug and enclosing means against displacement, and a draft eye connected to said enclosing means.

6. In a gripping device of the character described, a plurality of wire strands interwoven to form an open mesh body portion adapted to be placed in surrounding gripping relation with an article, substantially all of the strands forming said body portion being grouped together at one end of the latter, means comprising a collar enclosing said grouped strands and securing the latter together, said collar being constituted of metal material compressed in a radial direction to hold the grouped strands securely in clamped relation by a circumferential gripping action, some at least of the grouped strands entering the inner end of said securing means terminating in such means before extending beyond the outer end of such means, the strands extending beyond the outer end of said securing means extending therefrom as a single group and then being returned as a single group to form a draft eye beyond said securing means, the end portions of said grouped strands forming an inner terminal part of said draft eye divisible and set apart from the portions of the entering strands contained in said securing means and being connected by the latter to said strand portions to effect a draft eye on said body portion, said inner terminal part being connected with an inner surface of said securing means and coacting with the latter to transmit at least one half the longitudinal forces exerted on said draft eye to said securing means inwardly of the outer end of the latter and through said securing means to said strand portions.

7. In a gripping device of the character described, a plurality of wire strands interwoven to form an open mesh body portion adapted to be placed in surrounding gripping relation with an article, the major portion at least of the strands at one end of said body being grouped together, a collar enclosing said grouped strands and securing the same together, a plurality of said body strands ending at the upper end of said body portion and below said collar, means connecting the ends of such ended strands to at least one strand extending into said collar, and a draft loop formed from the grouped strands enclosed by said collar, the number of strands in said draft loop being less than the number of strands extending upwardly from the other end of said body portion to form the mesh thereof and entering the inner end of said collar from said body portion, said collar being constituted of metal material compressed in a radial direction to hold the grouped strands securely in clamped relation by a circumferential gripping action, and said draft loop being secured to said collar so that longitudinal forces exerted on said draft loop are transmitted to said collar inwardly of the outer end of the latter and through such inner portions of the collar substantially uniformly to all of the strands enclosed by said collar.

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