United States Patent [19]

Sholler

[11] **3,824,653**

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[54] **WIRE GRIP**

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[52] **U.S. Cl.** ..... **24/134 KB,** 254/135 R, 294/104

[51] **Int. Cl.** **B25b 25/00**

[58] **Field of Search** ..... 294/92, 101, 102, 104, 294/116; 24/134 KB, 134 L, 134 M, 134 N, 136 R, 136 B, 263 DL, 263 DH; 254/76, 135

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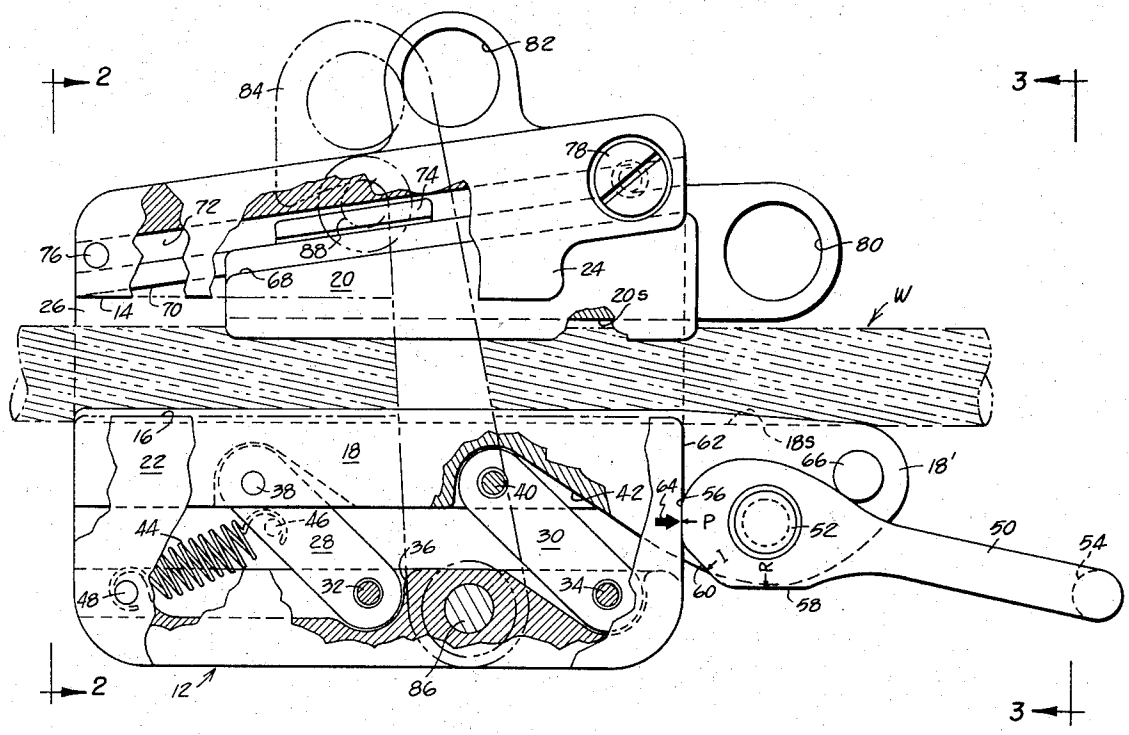
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Assistant Examiner—James L. Rowland
Attorney, Agent, or Firm—Robert Charles Hill

[57] **ABSTRACT**

A grip for wires and cables for use by linemen when applying tension to such wires and cables during installation thereof. The grip includes a rigid housing that defines a laterally accessible pathway for the wire. Wire engaging jaws are disposed on opposite sides of the pathway for movement toward the pathway so as to grip a wire residing therein. One jaw is supported on a four bar linkage arrangement that maintains the jaw surface in parallelism with the pathway. Associated with such jaw is a bail to which tension is applied when pulling the wire so that the force on the wire is proportional to the tension applied to the bail. The other jaw is wedge shaped and the housing has a diverging bearing surface so that movement of the second jaw along the surface moves the wire gripping portion of the second jaw into engagement with wire in the pathway. The second jaw is provided in a variety of sizes so that one grip can be used on a wide range of wire diameters. The mounting for the first jaw includes a spring for biasing the first jaw away from the wire pathway and a cam member for positioning the first jaw against the force of the spring so that the grip will remain on the wire in the absence of tension and until intentionally dislodged by movement of the cam.

5 Claims, 6 Drawing Figures



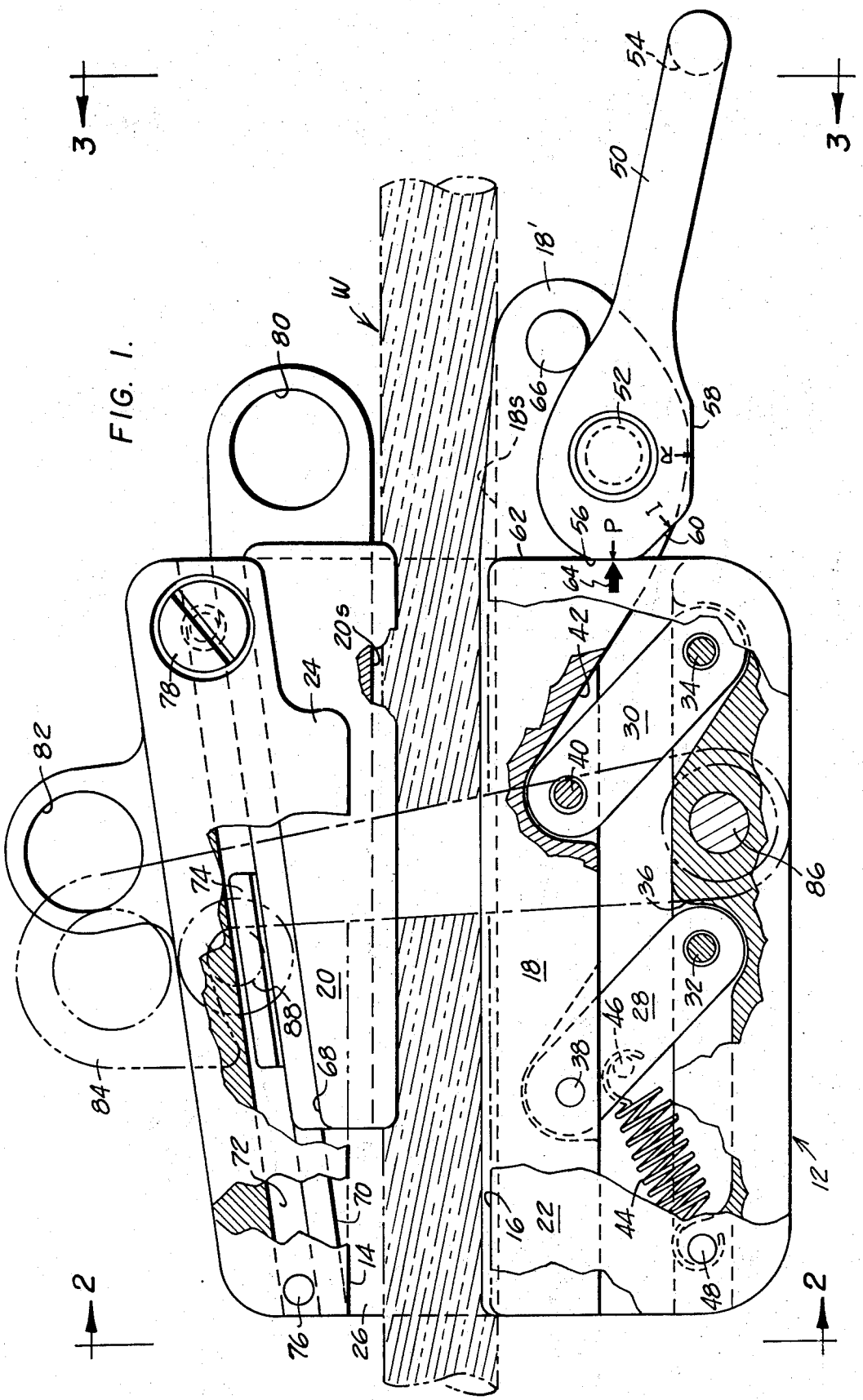

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FIG. 1.

FIG. 2.

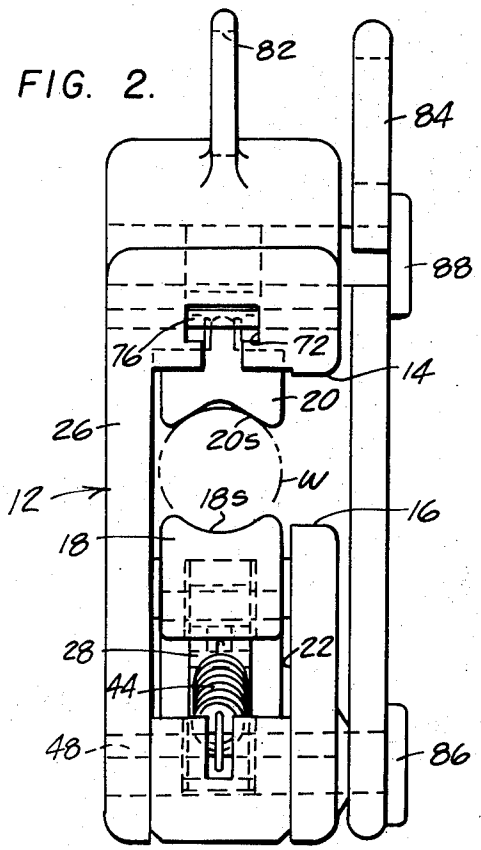


FIG. 3.

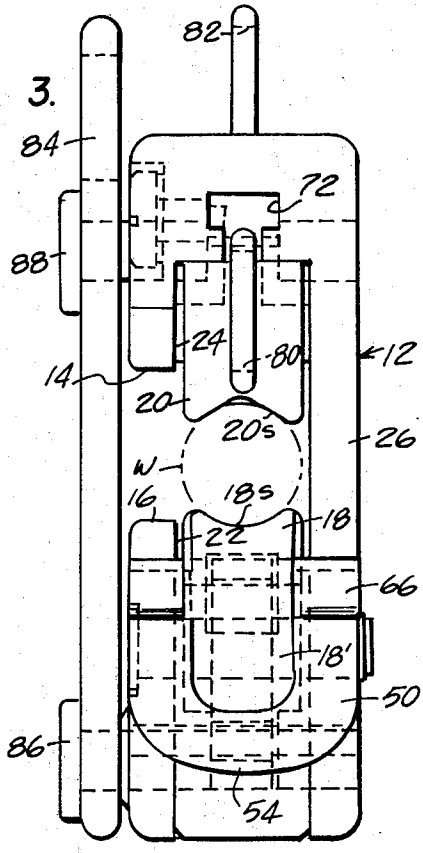


FIG. 4A

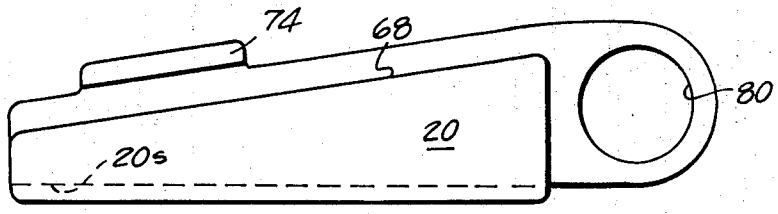


FIG. 4B

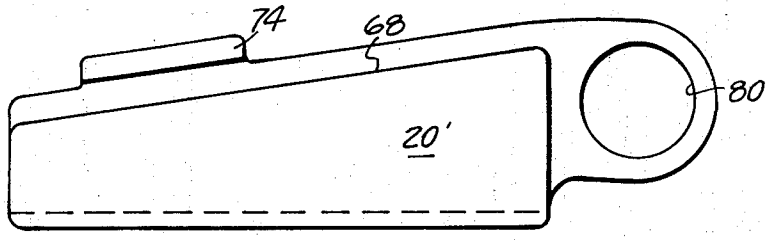
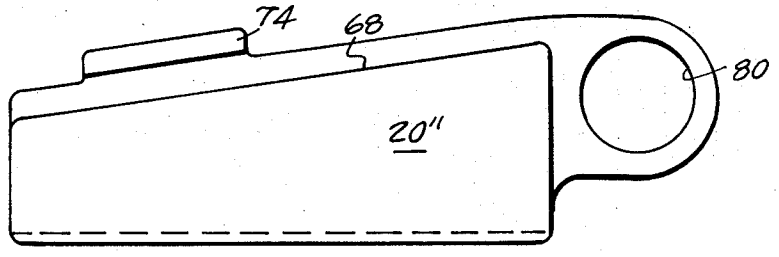


FIG. 4C



WIRE GRIP

BACKGROUND OF THE INVENTION

The invention relates to a wire grip of the type used by linemen for gripping wire conductors and cables so that tension can be applied to such wires and cables during installation thereof. More particularly, the invention relates to a grip that contains a replaceable jaw member so as to adapt the grip to a wide range of wire diameters.

Wire grips or "come alongs" have been part of a lineman's tool kit at least as early as 1895 when U.S. Pat. No. 531,700 was granted. The clamp disclosed in such patent, although well serving its intended function, is limited to a very narrow range of wire diameters and typically falls from the wire on which it is clamped when tension is released therefrom.

A wire clamp that does not fall from the wire on release of tension is disclosed in U.S. Pat. No. 904,863 which employs a wedge shaped member that fits in a tapered housing. This type of wire clamp is inconvenient to use since it takes substantial force and time to dislodge the wedge and permit removal of the clamp from the wire.

A two part clamp is disclosed in U.S. Pat. No. 2,146,575 and partially ameliorates the difficulty of removing a wedge. The structure disclosed in the last cited patent however requires disassembly for removal of the wedge, a time consuming and sometimes difficult procedure.

SUMMARY OF THE INVENTION

According to the present invention, one of the wire engaging jaws is supported by a parallelogram linkage which constrains the wire engaging surface of such jaw for movement toward and away from the pathway through which the wire extends in a direction that is always parallel to such pathway. Because this arrangement does not employ wedging action and the high friction forces consequent thereupon, rapid disengagement of the clamp from the wire is promoted. This construction thus achieves one important object of the present invention which is to provide a wire grip that is easy both to install onto and to remove from the wire or cable that is to be pulled.

Another object of the present invention is to provide a wire grip that remains in place on the wire or cable without the necessity for applying tension thereto. This object is achieved by spring biasing the parallelogram linkage in one direction and providing a rotatable camming member that positions the wire engaging portion of the parallelogram linkage against the force of the spring. Thus, rotation of the cam moves the jaw engaging portion of the parallelogram linkage into the wire pathway and into engagement with the wire.

A feature and advantage of the present invention is that the member to which pulling force or tension is supplied is embodied in a bail at one end of which is a loop and at the other end of which is the above mentioned camming surface. Thus, movement of the camming surface to the position at which the wire is engaged also positions the bail for application of tension to the device. Upon removal of the tension on the bail, the cam remains in place until purposefully rotated to a position at which the clamp can be disengaged from the wire or cable.

A further object of the present invention is to provide a wire clamp that can be adapted to a wide range of wire diameters. The present object achieves this advantage by providing opposite the wire engaging jaws associated with the parallelogram linkage a wedge shaped jaw that has a wire engaging surface on the opposite side of the pathway. The wedge shaped jaw can be moved longitudinally of the grip housing in order to vary the distance between the respective wire engaging surfaces. Moreover, the wedge shaped jaw member is quickly removable for replacement by a similar wedge shaped member having slightly different dimensions to accommodate different diameters of wires.

Because the present invention achieves the last mentioned object, a well equipped lineman can work on wires having diameters up to about 0.974 inch with 12 large sized grips and 12 small sized grips as contrasted with a total of **81** grips made in accordance with the prior art. Moreover, the grip of the present invention is much easier to use than any known grip because it maintains its position on a wire until intentionally dislodged and because such intentional dislodgement is quickly effected without the use of a tool.

The foregoing together with other objects and advantages will be more apparent after referring to the following specification and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view of a wire grip according to the present invention with portions being broken away to reveal certain internal details.

FIG. **2** is a cross sectional view taken along line **2—2** of FIG. **1.**

FIG. **3** is a cross sectional view taken along line **3—3** of FIG. **1.**

FIGS. **4***a*, **4***b*, and **4***c* are views of a jaw for relatively large wire, a jaw for intermediate wire diameters, and a jaw for relatively small diameters, respectively.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings reference numeral **12** indicates a housing which has a laterally accessible wire pathway defined by edges **14** and **16.** A wire W is disposed in the pathway and is engaged between a lower jaw member **18** and an upper jaw member **20.** The jaw members have wire engaging surfaces **18S** and **20S**, respectively, which as seen in FIG. **2** are concave so as to engage a portion of the peripheral surface of the wire.

Housing **12** defines a lower channel **22** in which jaw member **18** is disposed and an upper channel **24** in which jaw member **20** is disposed. Opposite the pathway defined between edges **14** and **16,** housing **12** includes a back wall **26,** the inner surface of which constitutes a boundary of channels **22** and **24.**

For supporting jaw member **18** within channel **22** of housing **12** a pair of pivot arms **28** and **30** are provided. The lower ends of the arms, as viewed in FIG. **1,** are pivotally mounted to housing **12** by means of pivot pins **32** and **34,** respectively. Housing **12** is excised within channel **22** as at **36** to afford pivotal movement of arms **28** and **30.** The upper ends of arms **28** and **30** are pivotally secured to jaw member **18** by means of pivot pins **38** and **40,** respectively, the jaw member being excised as at **42** to permit pivotal movement between the jaw member and the arms. The distance between pins **32**

and 34 is equal to the distance between pins 38 and 40 and pivot arms 28 and 30 are of equal length so that a parallelogram linkage is provided that constrains the wire engaging surface of jaw member 18 for movement into and out of the wire pathway in parallelism with the pathway. Thus, at all positions of jaw member 18, the entire wire engaging surface thereof contacts the wire.

In order to facilitate introduction of wire W into the pathway, jaw member 18 is resiliently biased away from the pathway. For this purpose, a tension spring 44 is disposed in channel 22 and extends at one end thereof from a pin 46 that is fastened to pivot arm 28 to a pin 48 that extends through a complemental bore in housing 12.

Jaw member 18 includes a portion 18' that extends exteriorly of housing 12 in a direction from which tension is applied to the clamp when in use. A bail 50 is mounted for pivotal movement on externally extending portion 18' by means of a retaining pin 52. Bail 50 is a U-shaped member having integral therewith a cross piece 54 around which a hook, rope, or cable is disposed for application of tension to the device. As will be clear from FIG. 1, such tension is applied in a direction opposing spring 44. Bail 50 has a camming region surrounding the axis of retaining pin 52; the camming region includes a relatively long radial cam surface portion 56, a relatively short radial cam surface portion 58 and an intermediate radial cam surface portion 60. Such cam surface portions cooperate with the end face 62 of housing 12 which end face is on the end of the housing to which tension is applied in using the clamp. Housing 12 adjacent end face 62 has an index mark 64 which cooperates with index markers on the cam region of bail 50. More specifically, there is an index marker P on cam surface 56, an index marker R on cam surface 58, and an index marker I on cam surface 60. The indicia associated with each of the index markers is intended to suggest to the user of the device that when the P marker is opposite index marker 64, bail 50 is in a position for pulling; when the index marker R is in alinement with index marker 64, the device is in a position to release the clamp from wire W; and when the index marker I is alined with index marker 64, the device is in a position to be installed on to the wire preparatory to pulling the wire. Jaw portion 18' is also provided with a stop pin 66 which limits the upward movement of bail 50 during application of tension thereto.

Jaw member 20, as can be seen in FIG. 1, is generally wedge shaped and has a bearing surface 68 opposite wire engaging surface 20S. In one clamp designed according to the present invention, an angle of about 8° between bearing surface 68 and wire engaging surface 20S has been found suitable. Housing 12 within channel 24 has a complemental bearing surface 70. It will be noted from FIG. 1 that bearing surface 70 diverges outwardly in the direction of the end of the device to which the pulling force is applied. For retaining jaw member 20 within channel 24 a slot 72 is defined inward of the bearing surface 70. As seen in FIG. 3, the slot has a T-shaped cross section; jaw member 20 has an enlargement 74 thereon that is shaped to fit in slot 72. For preventing inadvertent dislodgement of jaw member 20 from housing 12, one end of slot 72 is blocked by a cross pin 76 which is force fitted in a suitable bore in the housing. The other end of slot 72 is blocked by a threaded screw 78 which can be removed when it is desired to remove jaw member 20 from slot 72. The end of jaw 20 in the direction from which tension is applied is provided with an opening 80 which facilitates removal and storage of the jaw member. Housing 12 has a similar opening 82 so that the device can be more easily stored when not in use and can be hoisted to alinement on a hand line or the like.

The clamp of the present invention operates as follows: bail 50 is rotated so that index marker I on cam surface 60 is opposite index marker 64 on housing 12. In this position, the wire engaging surface 18S of jaw member 18 is positioned in approximate alinement with edge 16 so that wire W can be easily inserted into the pathway. Before insertion of the wire jaw member 20 is moved away from the pathway by movement in a rightward direction as viewed in FIG. 1 so that the pathway is totally unobstructed. Wire W is then introduced into the pathway and jaw member 20 is moved to the left as viewed in FIG. 1 until the wire engaging surface 20S lightly contacts the surface of wire W and urges the wire into similar contact with surface 18S of jaw member 18. Relatively slight finger pressure on jaw member 20 is sufficient to effect the foregoing. With the elements of the device in the position described above, bail 50 is rotated to the position at which index marker P is opposite index marker 64 on housing 12. Movement of the bail to this position moves jaw member 18 to the right as viewed in FIG. 1 and the parallelogram linkage formed in part by pivot arms 28 and 30 constrains jaw member 18 for movement toward wire W so as firmly to grip the wire. In such position, as shown in FIG. 1, the structure is firmly retained on the wire without intervention by the user of the device. This expedites attachment of a cable or line to cross member 54 in bail 50 and as the amount of force on the bail increases, the amount of force that jaw member 18 applies to wire W correspondingly increases. Pin 66 prohibits bail 50 from rotating beyond the position shown in FIG. 1, so that the bail does not enter the pathway and does not contact wire W. Any tendency for the wire to slip is resisted because jaw member 20 tends to move toward the left as viewed in FIG. 1 which also applies more pressure to wire W. When the pull is complete the cable or other tension applying member can be removed from bail 20 and the wire clamp will remain in place. For dislodging or removing the clamp from the wire, bail 50 is rotated so that index marker R is opposite index marker 64 on housing 12. In this position, spring 44 pulls jaw member 18 well into channel 22 so that the wire can be easily removed even though jaw member 20 may have been drawn well to the left as viewed in FIG. 1.

Because jaw 20 can assume any one of a number of positions along channel 24, the clamp of the invention can be satisfactorily employed on a wide range of wire sizes. For relatively large wire sizes jaw member 20 will be positioned toward the right hand extremity of the housing; for relatively small wire sizes the jaw member will be positioned toward the left end of the housing as viewed in FIG. 1.

For further increasing the range of wire sizes that the clamp of the present invention can accommodate a set of different size jaw members 20 can be employed.

FIG. 4*a* shows jaw 20 in equivalent scale to jaw 20' shown in FIG. 4*b* and jaw 20'' shown in FIG. 4c. Because the supporting structure for each of the jaws is

identical, identical reference characters for those parts are employed in FIGS. 4*a* – 4*c*. In one set of jaws designed according to the present invention, jaw member **20** accommodates wires in the diameter range of 0.974 – 0.724 inch, jaw member **20'** accommodates wires in the diameter range of 0.724 – 0.447 inch, and jaw member **20''** accommodates wires in the diameter range of 0.447 – 0.232 inch. The radii of the respective wire engaging surfaces are for jaw member **20** ¼ inch, for jaw member **20'** 7/32 inch, and for jaw member **20''** 3/32 inch. The radius of wire engaging surface **18S** in such exemplary embodiment is about ½ inch and, when used with the appropriate jaw member **20,** affords adequate engagement with wire W to produce excellent results.

In order to avoid undue stress on back wall **26** during use of the grip, a hook **84,** shown in phantom lines in FIG. **1,** is provided on the side of housing **12** opposite from back wall **26.** Hook **84** is mounted for pivotal movement with respect to the housing on a pin **86.** The free end of the hook when in the position shown in FIG. **1** engages a pin **88** which is on the opposite side of the wire pathway from pin **86** so that the loads imposed in a direction perpendicular to the wire pathway are shared by hook **84** and back wall **26.** To afford unrestricted access to the pathway, hook **84** can be pivoted in a clockwise direction as viewed in FIG. **1,** so that it does not inhibit insertion or removal of the wire with respect to the pathway.

Thus it will be seen that the present invention provides a wire clamp or "come along" which adapts itself to a wide range of wire sizes and which is convenient to use in that it will remain on the wire before and after the application of pulling force and until intentionally dislodged therefrom. Because of the presence of the parallelogram mounting structure for jaw member **18,** a plurality of different size jaw members **20** can be employed so as further to extend the range of wire diameters that can be accommodated.

Although one embodiment has been shown and described, it will be obvious that other adaptations and modifications can be made without departing from the true spirit and scope of the invention.

What is claimed is:

1. A wire grip for applying tension to a piece of wire in a given direction axially of the wire comprising a rigid housing defining an elongate wire receiving laterally accessible pathway therein, said housing including first and second channels confronting one another across said pathway, a first jaw member disposed in said first channel, said first jaw member having a wire engaging surface, means for mounting said first jaw member for movement toward and away from said pathway while retaining said wire engaging surface in parallelism with said pathway, said mounting means acting to constrain said first jaw member for composite movement toward said given direction and into said pathway, and a second jaw member disposed in said second channel, said second jaw member having a wire engaging surface, means supporting said second jaw member so that the wire engaging surface thereof confronts in parallelism the wire engaging surface of said first jaw member, said supporting means including means for constraining said second jaw member for composite movement opposite said given direction and into said pathway, a bail for affording engagement of said first jaw member for applying tension thereto in said given direction, means for resiliently biasing said first jaw member in a composite direction opposite said given direction and away from said pathway, said bail being arranged so that tension applied thereto acts against said biasing means, means for affording pivotal movement of said bail relative said first jaw member between a pull position at which said bail is generally parallel to said pathway, and a release position at which said bail is oblique of said pathway, said bail having a camming surface adjacent said pivotal movement affording means and eccentric thereof, said housing having a surface abutting said camming surface and cooperating therewith so that the wire engaging surface of said first jaw member is in said pathway when said bail is in said pull position and remote from said pathway when said bail is in said release position.

2. A wire grip according to claim **1** including a stop member on said first jaw member for prohibiting movement of said bail beyond said pull position.

3. A wire grip according to claim **2** wherein said camming surface has a portion for cooperation with said abutting housing surface that positions said first jaw member in an install position intermediate said pull position and said release position.

4. A wire grip according to claim **3** wherein said housing adjacent said abutting surface has a visible index marker and wherein said bail adjacent said camming surface has index markers corresponding respectively to said pull position, said install position, and said release position so as to afford a precise visual indication of the position of said bail and said first jaw member.

5. A wire grip according to claim **1** wherein said second jaw member is replaceable whereby a plurality of different size second jaw members can be employed to accommodate a wide range of wire sizes.

* * * * *