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ABSTRACT OF THE DISCLOSURE

A combination crimper and cutter tool for crimping ferrules and cutting cable protruding from the ferrule comprises a pair of jaws which have a crimping and cutting area such that the crimping and cutting operation is performed by the same set of jaws. The jaws are pivotal about axes which are symmetrical about a vertical plane between the jaws. The force applied on the jaws by the crimping and cutting operations creates a moment about the axes which varies in magnitude but is symmetrical about the axes allowing for enhanced operator performance with the tool.

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CABLE CRIMPER AND CUTTER METHOD AND APPARATUS

INTRODUCTION

This invention relates to a cable crimper and cutter method and apparatus and, more particularly, to a combination of the same in a single tool for use in the logging industry.

BACKGROUND OF THE INVENTION

To maintain a bundle of logs in a secure condition during transport and otherwise in logging operations, steel cables are typically used. An aluminum ferrule is slipped over one end of the cable and the cable is positioned so as to encircle the logs. The other end of the cable is inserted into the ferrule and pulled tight. The ferrule is crimped
longitudinally using a compressive force in several places by an appropriate tool so that the cable is held securely within the ferrule. The free end of the cable extending from the ferrule is then severed. The cable is severed when the destination is reached or the cable is no longer necessary.

Heretofore, the two operations, namely crimping and cutting, were carried out separately; that is, the crimping operation was accomplished with a first tool and the cable was severed with a second tool. The tools were typically pneumatically driven and since the tools must be robust to adequately crimp the ferrule about the cable and withstand the forces required, the tools were required to be strong and concomitantly heavy. Using two (2) tools, however, was inefficient and unnecessarily costly.

A combination tool which both crimps the ferrule and cuts the cable is described and illustrated in United States Patent 4,558,484 (Myers). This patent describes a tool which has a central vice type jaw for performing the crimping operation and a cable cutter comprising an anvil and a cutter which is mounted offset from the central axis of the tool for cutting the cable after the crimping operation. This tool operates satisfactorily
under many conditions but it does suffer disadvantages.

The tool is very heavy as described due to the rugged applications in respect of which the tool is used. In order to cut the cable following the crimping operation, the tool must necessarily be rotated about a vertical axis while it is being held by the user. While the crimping operation is conducted while the tool is held by the user in a straight ahead position and the forces resulting from the crimping operation are applied symmetrically on the user while holding the tool, the cable cutting operation is carried out with the tool held by the user asymmetrically. Since the tool is quite heavy, it creates a significant moment force on the user, particularly when the cutting operation is actually taking place. The moment created by the asymmetric force is disadvantageous and awkward.

SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided a combination crimer and cutter tool for crimping a ferrule and cutting a cable extending therefrom comprising a first set of crimper jaws for encircling and crimping said ferrule and a first set of cutter jaws for severing said cable
extending from said ferrule, each of said crimper and cutter jaws rotating about coincident axes.

According to a further aspect of the invention, there is provided a method of severing cable and crimping a ferrule positioned on said cable with a single tool comprising the steps of encircling said ferrule with a first pair of jaws rotating about a first axis, crimping said ferrule with said first pair of jaws in at least one location on said ferrule, moving said tool to encircle said cable extending from said ferrule with a second pair of jaws of said tool and closing said second pair of jaws to sever said cable, each of said first and said second pair of jaws being movable about coincident axes.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example only, with the use of drawings in which:

Figure 1 is a diagrammatic isometric view of the combination cable crimper and cutter tool according to the invention;
Figure 2 is a diagrammatic exploded view of the combination cable crimper and cutter tool of Figure 1;

Figure 3 is a diagrammatic plan view of the crimper and cutter tool of Figures 1 and 2 particularly showing the crimper and cutter jaws in their open position; and

Figure 4 is a diagrammatic plan view of the crimper and cutter tool similar to Figure 3 but illustrating the crimper and cutter jaws in their closed position.

DESCRIPTION OF SPECIFIC EMBODIMENT

Referring now to the drawings, a combination crimper and cable cutting tool is generally illustrated at 100 in Figure 1. It comprises a pair of handles 101 connected to the frame 105 of the crimper and cable cutting tool 100 with a push button 104 operated by the user of the tool 100 used for initiating operation of the tool. A pneumatic plenum chamber generally illustrated at 102 is positioned at the rearward end of the tool 100 which is operable to open and close the cutter and crimper jaws 103 which rotate about vertical axes as will be described. Crimper and cable cutting tool 100 is generally symmetrical about
a vertical plane A-A extending from the forward to the rearward end of the tool 100, it being understood that the directions given refer to the tool when the handles 101 are held by a user. Axes 110 are symmetrically located on opposite sides of plane A-A.

With reference to Figure 2, the pneumatic plenum chamber 102 includes a diaphragm 111 acting on an attached piston head 115 which has an attached piston 112 as best seen in Figures 3 and 4. The piston head and piston reciprocate under control of the diaphragm 111 and spring 113. Piston 112 is threadedly connected to movable link block 114 which reciprocates with piston 112. A pair of concave shaped circumferential clamps 116 (Figure 2) encircle the pneumatic plenum chamber 102, diaphragm 112 and a casing 117 to hold the various members together and in their correct operating relationship during operation.

A pair of links 120 are rotatably mounted within link block 114 by pins 121 and extend generally outwardly from the link block 114 to pivotally connect with crimpler and cutter jaws 122. Crimpler and cutter jaws 122, in turn, are mounted within upper and lower support frames 123, 124, respectively, and rotate under the influence of links 120 about pins 130 (Figure 3). A
series of bolts 131 (Figure 2) is used to connect the upper and lower support frames 123, 124 and a spacer 132 maintains the proper distance between upper and lower support frames 123, 124 to allow for movement of the crimper and cutter jaws 122 with adequate clearance within the support frames 123, 124. The upper and lower support frames 123, 124 are connected to support block member 125 which, in turn, is connected to casing 117 by bolt members 126 (see also Figure 3).

The crimper and cutter jaws 122 include a crimping portion 133 and a cutting portion 134. The crimping portion includes two concave areas which are adapted to encircle a ferrule (not illustrated) and apply a compressive force on the ferrule thereby to deform the aluminum material of the ferrule and crimp the ferrule securely against a cable within the ferrule. The cutting portion 134 has two cutters 140, which cutters are pin mounted in the jaws 122 by pins 135. The cutters 134 are used to sever the cable following the crimping operation and are replaceable as desired over time by removing pins 135.

The operator's handle 101 is connected to the upper support frame 123 and support block member 125 by bracket 126. Push button 104 is connected to the pneumatic plenum chamber 102.
by a pneumatic hose 106 and a coupling 107 between the hose 106 and the coupling 107.

**OPERATION**

In operation, it will be assumed that the crimper and cutter tool 100 is in the position illustrated in Figure 3; that is, that the crimper and cutter jaws 122 are in their open condition and that it is desired to crimp a ferrule encompassing a cable and, thereafter, to sever the cable following the crimping operation.

The user will connect a pneumatic line from a source of compressed air to the fitting 108 (Figure 2) below the push button control 104. Thereafter, the user will manipulate the crimper and cable cutting tool 100 by handle 101 and encircle the ferrule within which the cable is positioned with the crimper and cutter jaws 122. Specifically, the ferrule will be positioned such that the outside diameter of the ferrule is within the concave area of the crimping portion 133 of the jaws 122.

When the appropriate position of the tool 100 is obtained and the ferrule is properly positioned within the
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crimping portion 133 of jaws 122, push button 104 is pressed by
the operator. This allows compressed air to pass through fitting
107 and hose 106 to the pneumatic plenum chamber 102. The
compressed air will move diaphragm 111 outwardly toward the
forward portion of the tool 100 together with the piston head 115
and piston 112.

Piston 112 is connected to link block 114. Link block
114 will therefore move forwardly thereby driving links 120 and
crimper and cutter jaws 122 which rotate about pins 130 and
thereby exert a crimping force on the ferrule between the jaws
122. Following the application of the crimping force by the jaws
122, push button 104 is released. Spring 113 will return the
piston head 115 and piston 112 to its initial position thereby
opening the jaws 122 to the position illustrated in Figure 4 and
releasing the ferrule. The operation is repeated until the
ferrule has been crimped over several positions and the cable is
securely held within the ferrule.

The tool 100 is then moved toward the operator by the
use of handles 101 until the cable extending from the ferrule is
adjacent the cutters 140. Specifically, the tool 100 is
manipulated until the cable is nestled within the recess 141 of
the leftwardly mounted cutter 140 (as viewed by the user) as best
seen in Figure 3. Push button 104 is again pressed and, in the
same sequence as previously explained, the cutters 140 sever the
cable between the cutters 140. The pushbutton 104 is released
and the operation is then complete.

The force applied by the tool 100 during the crimping
and cutting operations is symmetrical about the pins 130 on which
the jaws 122 are mounted. The operator, therefore, is exposed to
a moment which is always exerted in the same direction, although,
of course, the magnitude of the force may vary during the
crimping and cutting operations. The manipulation of the tool is
not sidewise but, rather, it is simply moved inwardly or
outwardly depending on which of the crimping or cutting
operations is desired by the operator.

Many modifications will readily occur to those skilled
in the art. Rather than being pneumatically powered, of course,
hydraulic or even electrical operation is contemplated depending
on the location of use of the tool and the availability of
compressed air or hydraulic fluid. While the cutters 140 are
illustrated and described as being mounted outside the crimping
portion 133 of the jaws 122, the cutters 140 might also be
positioned inwardly of the crimping portion 133 without departing from the scope of the invention. Similarly, various link configurations could be used to power the jaws 122 during operation of the piston 112.

While the crimping and cutting jaws 122 in the embodiment described and illustrated are included in a single set of members 122, it is contemplated that the crimping and cutting jaws 122 may be separate members. In this instance, the two sets of members would rotate about coincident axes and the benefits of the invention of a symmetrical moment applied during the crimping and cutting operations would remain.

While the crimping and cutting tool 100 has particular applicability to logging operations, it is contemplated that the tool may have applications in other industries such as lumber mills or wherever a large number of heavy items must be maintained together using steel cable or, indeed, where it is desired to crimp a ferrule onto a steel cable and thereafter cut the cable extending from the ferrule.

Many additional modifications will readily occur to those skilled in the art to which the invention relates and the
specific embodiments described should be taken as illustrative of
the invention only and not as limiting its scope which should be
defined in accordance with the accompanying claims.
I CLAIM:

1. A combination crimper and cutter tool for crimping a ferrule and cutting a cable extending therefrom comprising a first set of crimper jaws for encircling and crimping said ferrule and a first set of cutter jaws for severing said cable extending from said ferrule, each of said crimper and cutter jaws rotating about coincident axes.

2. A tool as in claim 1 wherein said crimper and cutter jaws are included in a single set of jaws.

3. A tool as in claim 2 and further comprising a power source for applying power and moving said crimper and cutter jaws, said power source being pneumatic.

4. A tool as in claim 3 wherein said crimper and cutter jaws include a crimping area and a cutting area.

5. A tool as in claim 4 wherein said crimping area is defined by a concave area of said jaws and said cutting area is defined by a pair of cutters.
6. A tool as in claim 5 wherein said crimping area is inside said cutting area.

7. A tool as in claim 6 wherein said crimper and cutter jaws are generally symmetrical about a vertical plane in said tool extending, during operation, from the forward to the rearward portion of said tool.

8. A tool as in claim 7 wherein said pneumatic power source displaces a diaphragm and a piston operably connected to said diaphragm, said piston displacing a pair of links connected to said crimper and cutter jaws.

9. A tool as in claim 8 wherein each of said crimper and cutter jaws rotate about an axis symmetrically located on opposed sides of said vertical plane.

10. A method of severing cable and crimping a ferrule positioned on said cable with a single tool comprising the steps of encircling said ferrule with a first pair of jaws rotating about a first axis, crimping said ferrule with said first pair of jaws in at least one location on said ferrule, moving said tool to encircle said cable extending from said ferrule with
a second pair of jaws of said tool and closing said second pair of jaws to sever said cable, each of said first and said second pair of jaws being movable about coincident axes.

11. Method as in claim 10 wherein said first and second pairs of jaws are identical.

12. Method as in claim 11 wherein said coincident axes are generally symmetrically located on opposite sides of a vertical plane extending centrally between said first and second pairs of jaws.

13. Method as in claim 12 and further comprising a power source to move said first pair of jaws.

14. Method as in claim 13 wherein said power source is pneumatic.

15. Method as in claim 14 wherein said power source is hydraulic.
FIGURE 4