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3,118,473

TIGHTENING AND CUT-OFF TOOL FOR CABLE STRAPS

Filed May 3, 1962

2 Sheets-Sheet 1

Fig 1

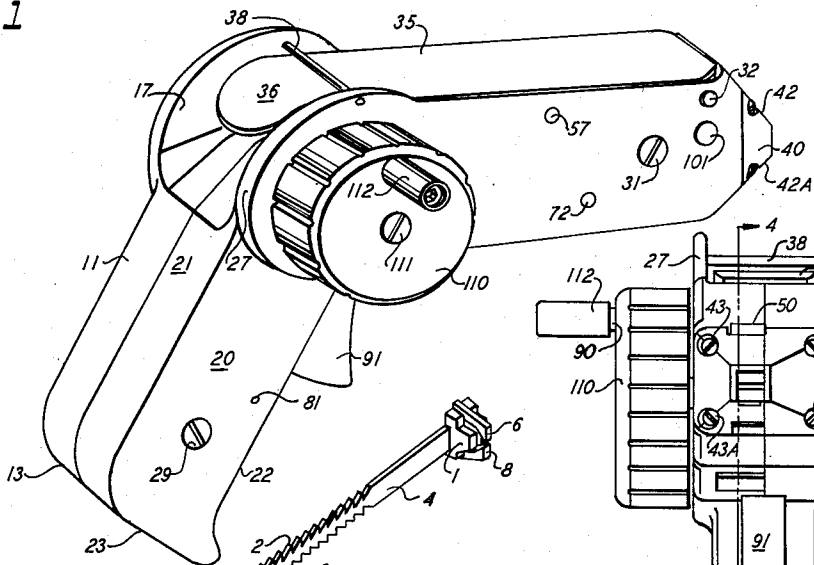


Fig 2

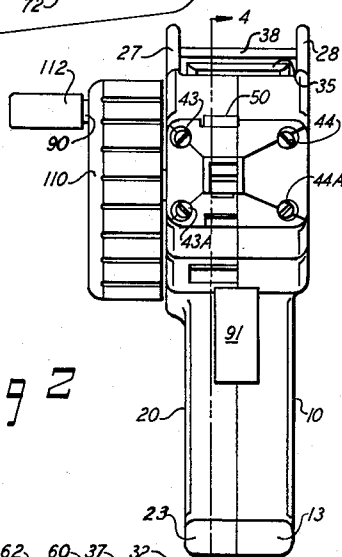


Fig 3

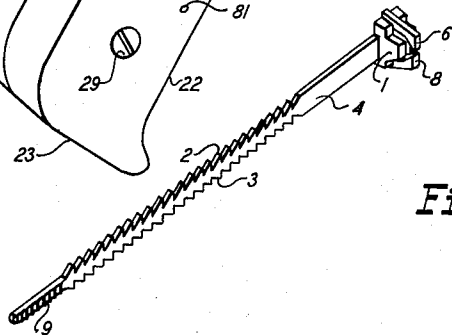
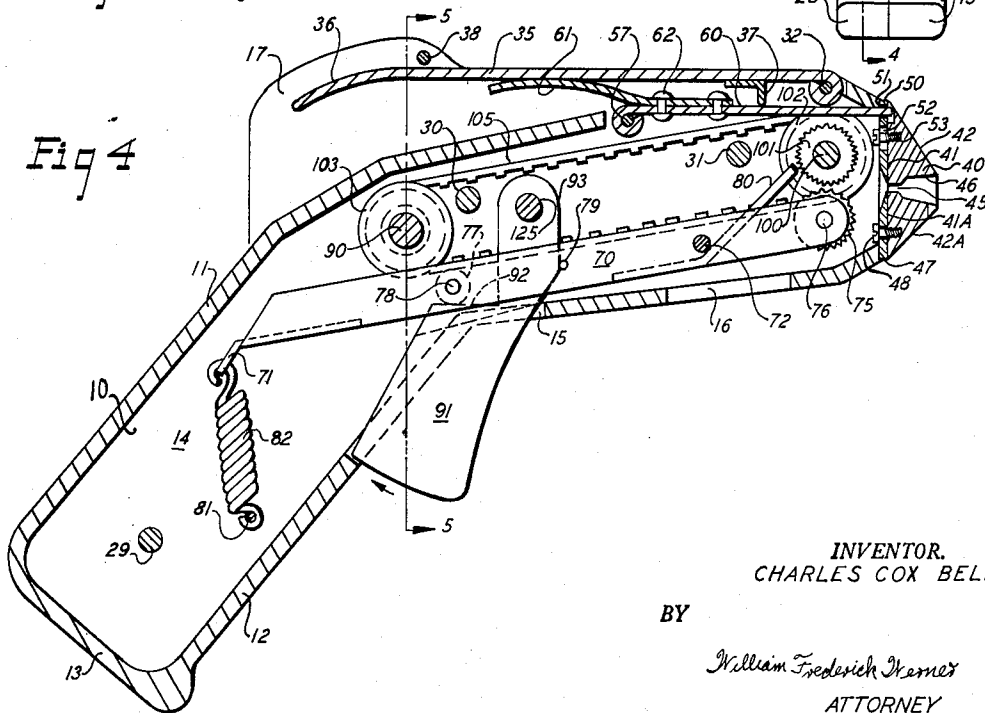


Fig 4



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2 Sheets-Sheet 2

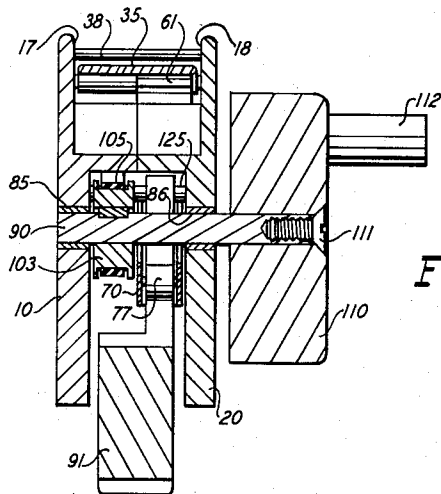


Fig 5

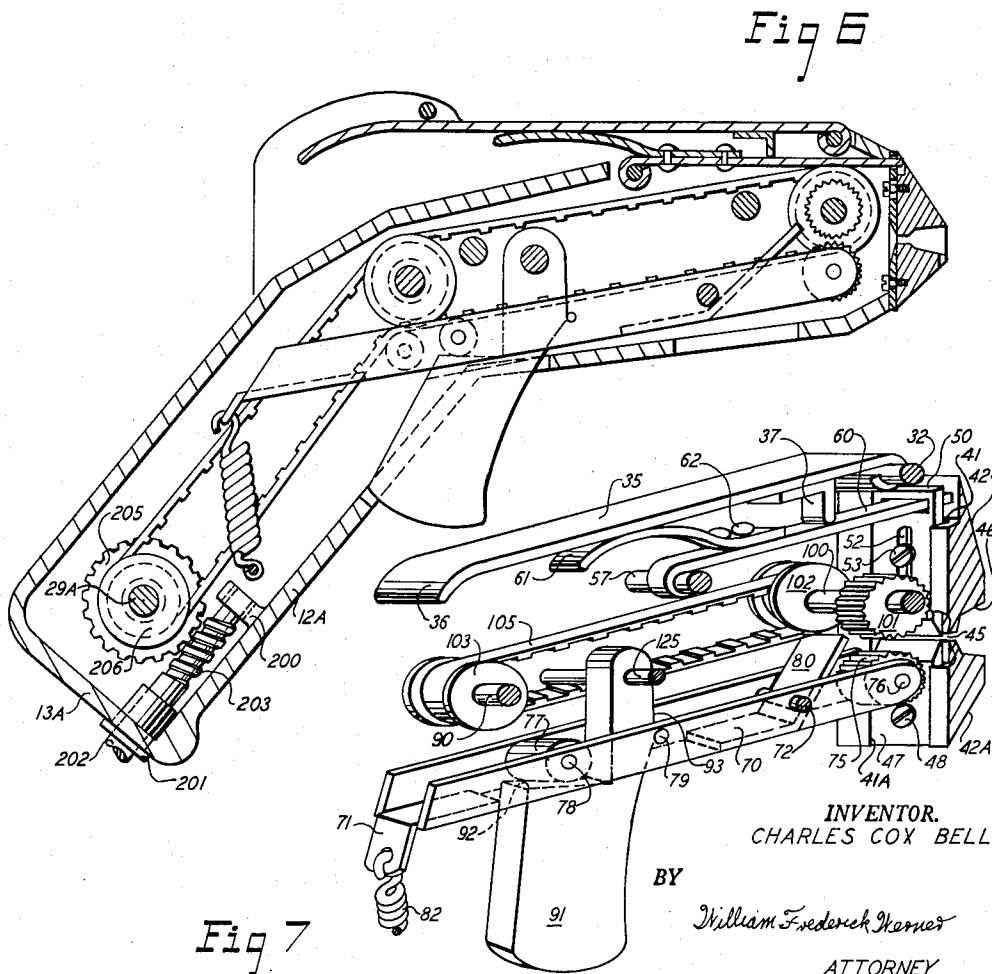


Fig 6

Fig 7

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TIGHTENING AND CUT-OFF TOOL FOR
CABLE STRAPS

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This invention relates to a tightening and cut-off tool for cable straps and more particularly to a tool for drawing into a tight loop a strap binding a plurality of strands and for cutting off the excess length of strap.

An object of the present invention is to provide a light weight, rapidly acting tool for pulling a self-locking cable strap into a loop, whereby strands of material are bound together and the length of cable strap beyond the locking point is cut off.

Another object of the present invention is to provide a tool in the form of a hand gun which is adapted to receive the specially designed head of a self-locking cable strap and whereby mechanism both manually operated or automatically operated located within said hand gun pulls said cable strap into a locked binding loop around strand material after the other end of the cable strap is manually placed through said specially designed head and into engagement with said mechanism.

A form of cable strap referred to is the subject of United States patent application, Serial No. 128,509, filed August 1, 1961, by Charles Cox Bell.

Other objects of the present invention will become apparent in part and be pointed out in part in the following specification and claims.

Referring to the drawings wherein like reference characters refer to like parts:

FIGURE 1 is a perspective view of the new and improved tightening and cut-off tool for cable straps.

FIGURE 2 is a front elevational view of FIGURE 1.

FIGURE 3 is a perspective view of the self-locking cable strap adapted to be used with the present tightening and cut-off tool.

FIGURE 4 is a vertical sectional view taken on line 4-4 of FIGURE 2.

FIGURE 5 is a vertical cross sectional view taken on line 5-5 of FIGURE 4.

FIGURE 6 is a view similar to FIGURE 4 showing a modified form of strap pulling mechanism.

FIGURE 7 is a perspective view, partly in section, of the movable parts without the gun shaped housing.

In proceeding with this invention, reference is made to the drawings wherein a gun shaped hollow housing is illustrated as comprising two similar sections. The left hand section consists of a left side wall 10, and projecting therefrom are an upper wall 11 and a lower wall 12 integrally connected by a bottom wall 13. These walls take the general shape of a hand grip or gun. Lower wall 12 is provided with two recesses 15 and 16. Side wall 10 is integrally provided with a flange 17. The right hand section consists of a right side wall 20, and projecting therefrom are an upper wall 21 and a lower wall 22 integrally connected by a bottom wall 23. These walls take the general shape of a hand gun and they mate respectively, with upper wall 11, lower wall 12 and bottom wall 13 to provide chamber 14 open at the front end. Right side wall 21 is integrally provided with a flange 27. Flange 27 is diametrically opposite flange 17. Three screws 29, 30, 31 fasten the left side wall 10 to the right side wall 20. A pintle 32 is secured on opposite ends to left side wall 10 and right side wall 20, respectively. A lever 35 having a thumb section 36 and an angle shaped bracket 37 is pivotally connected to pintle 32. Bracket 37 is fastened to lever 35 as by welding. A

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rod 38 secured on opposite ends in flanges 17, 27, respectively, limits the upward pivotal movement of lever 35.

A face piece 40 provided with an upper 41 and lower 41A vertical slot is tapered at 42, and 42A. Screws 43, 43A fasten face piece 40 to right side wall 20. Screws 44, 44A fasten face piece 40 to left side wall 10. Axially, face piece 40 is provided with a rectangular slot 45 adapted to receive the saw tooth body of the self-locking cable strap. An entrance or throat 46 is generally rectangular in shape and tapered outwardly from rectangular slot 45. A lower knife blade 47 is fastened in lower vertical slot 41A by means of screw 48. An upper knife blade 50 provided with an opening 51 and an elongated slot 52 is slidably mounted in upper vertical slot 41 by means of screw 53.

A pin 57 is secured on opposite ends in left side wall 10 and right side wall 20. A knife actuating lever 60 is pivotally mounted upon pin 57 and projects through opening 51. A leaf spring 61 fastened to knife actuating lever 60 by means of rivets 62 abuts lever 35 to yieldingly hold lever 35 against rod 38. Angle shaped bracket 37 is adapted to engage knife actuating lever 60 to cause upper knife blade 50 to move toward lower knife blade 47 in a cutting or shearing action.

A U-shaped beam lever 70 provided with an extension 71 is pivotally mounted upon a stub shaft 72 fastened on opposite ends in left side wall 10 and right side wall 20. A lower, knurled or friction, gripping wheel 75 is rotatively mounted upon a pintle 76 fixed on opposite ends in U-shaped beam lever 70. A roller 77 is rotatively mounted upon a rod 78 fixed on opposite ends in U-shaped beam lever 70. A stopping pin 79 is fixed on opposite ends in U-shaped beam lever 70. A deflecting strip 80 is fastened to U-shaped beam lever 70 by means of welding. A spring pin 81 is secured in left side wall 10. A coil spring 82 is fastened on opposite ends to spring pin 81 and extension 71, respectively.

A stem 125 is fastened on opposite ends in left side wall 10 and right side wall 20. A trigger finger 91 provided with a cam surface 92 is pivotally mounted upon stem 125 with roller 77 engaging cam surface 92 and with front surface 93 of trigger finger 91 abutting stopping pin 79 in a rest or inoperative position under the influence of spring 82. Trigger finger 91 is located in recess 15.

A stub shaft 100 is fastened on opposite ends in left side wall 10 and right side wall 20. An upper, knurled or friction drive, wheel 101 and a belt pulley 102 are fastened upon stub shaft 100 with upper knurled or friction drive wheel 101 operatively positioned above lower, knurled or friction, gripping wheel 75.

Left side wall 10 is provided with a bushing 85. Right side wall 20 is provided with a bushing 86. A main shaft 90 is rotatively mounted in bushings 85, 86. A second belt pulley 103 is fastened to main shaft 90. A belt 105 rotatively engages belt pulley 102 and second belt pulley 103. A hand wheel 110 is fastened to main shaft 90 by means of a drive fit and screw 111. A crank handle 112 is fastened to hand wheel 110, as by means of welding, brazing or the like.

The self-locking cable strap illustrated in FIGURE 3 comprises a flat strip 4, provided with ratchet teeth 2, 3 on opposite sides thereof, and a hollow tapered head 1 having horizontal pawls 6, 8, on one end and a knurled tongue 9 on the opposite end. Tongue 9 is passed through hollow tapered head 1 with pawls 6, 8 engaging ratchet teeth 2, 3 respectively, to hold flat strip 4 in a loop.

The essential function of the present tightening and cut-off tool is to tightly draw flat strip 4 in a loop around strand material, such as the cable ends in a telephone switchboard panel and then cut the excess length of flat

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strip 4 extending beyond the pawls 6, 8 engaging the ratchet teeth 2, 3 in locking position.

This function is accomplished by pressing hollow tapered head 1 into throat 46. The taper of throat 46 is adapted to accommodate the taper of hollow tapered head 1. Tongue 9 is then manually passed through hollow tapered head 1 and through rectangular slot 45 so that tongue 9 passes between upper knurled wheel 101 and knurled gripping wheel 75. Tongue 9 may be passed between wheels 101 and 75 when trigger finger 91 is pressed in the direction of the arrow in FIGURE 4 whereby cam 92 acting through roller 77 pivots U-shaped beam lever 70 against the torque or tension of spring 82. The tension of spring 82 exerted on lower knurled gripping wheel 75 wedges tongue 9 between wheels 101 and 75.

Crank handle 112 is manually rotated, whereby main shaft 90, and second belt pulley 103 are rotated and through belt 105, belt pulley 102, stub shaft 100, and upper knurled wheel 101 are rotated. In this manner tongue 9 and flat strip 4 are drawn against deflecting strip 80 until the resistance of flat strip 4 overcomes the pulling effect of upper knurled wheel 101. The action described is accomplished with one turn of hand wheel 110.

The operative, manually with thumb pressure, will engage thumb section 36 of lever 35 to pivot said lever 35 on pintle 32 against the tension of leaf spring 61. This action causes bracket 37 to pivot knife actuating lever 60 around pin 57 with the end of knife actuating lever 60 forcing upper knife blade 50 downwardly, whereby flat strip 4 is cut or sheared by upper and lower knife blades 50, 47. The cut off excess end of flat strip 4 will drop through recess 16.

Trigger finger 91 is pressed in the direction of the arrow, whereby roller 77 engages cam surface 92, as trigger finger 91 pivots on stem 125. Cam surface 92 lifts roller 77 and rod 78 upwardly to pivot U-shaped beam lever 70 on stub shaft 72 and thereby pivot knurled gripping wheel 75 away from upper knurled wheel 101 to release flat strip 4 which releases the excess end allowing the end to drop through recess 16. The locked looped strap is now withdrawn from throat 46. The tightening and cut off tool is now ready to receive another self-locking cable strap.

In FIGURE 6 there is shown a form of power drive to be used in place of manually turning hand wheel 110. Lower wall 12A is provided with a boss 200. Bottom wall 13A is provided with a bushing 201. A flexible shaft 202 provided with a worm gear 203 is rotatively mounted in both boss 200 and bushing 201. A shaft 29A is rotatively mounted on opposite ends in left side wall 10 and right side wall 20. A worm wheel 205 and a belt pulley 206 are fixed to shaft 29A with worm wheel 205 engaging worm gear 203. A belt 105A rotatively engages pulleys 206, 103A and 102A. Pulleys 102A and 103A are identical to pulleys 102 and 103 in FIGURE 4. In all other respects the structure illustrated in FIGURE 6 is the same as the structure illustrated and described in FIGURE 4. The only change being the elimination of hand wheel 110 in FIGURE 6. A source of motive power (not shown) is attached to flexible shaft 202.

Having shown and described preferred embodiments of the present invention by way of example, it should be realized that structural changes could be made and other examples given without departing from either the spirit or scope of this invention.

What I claim is:

1. A tightening tool for cable straps consisting of a hollow housing open on the front end, a face piece provided axially with a throat terminating in a slot, means fastening said face piece to said hollow housing at the open front end, a stub shaft rotatively mounted in said hollow housing, a pulley, an upper friction drive wheel, means fastening said pulley and upper friction drive wheel

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to said stub shaft, a main shaft rotatively mounted in said hollow housing, means rotating said main shaft, a pulley fastened to said main shaft, a belt providing a driving connection between said first mentioned pulley and said second mentioned pulley, a U-shaped beam lever, a stub shaft fixed in said hollow housing pivotally mounting said U-shaped beam lever, spring means fixed on one end to said hollow housing and on the other end to said U-shaped beam lever, a pintle fixed in said U-shaped beam lever, a lower friction gripping wheel rotatively mounted on said pintle and yieldingly engaging said upper friction drive wheel under the influence of said spring means, a roller rotatively mounted in said U-shaped beam-lever, a stem fixed in said hollow housing, a trigger finger, provided with a cam surface, pivotally mounted on said stem with said roller engaging said cam surface, whereby said trigger finger pivots said U beam lever, through said cam surface and roller, to move said lower friction gripping wheel away from said upper friction drive wheel, said throat terminating in a slot providing access to said upper friction drive wheel and lower friction gripping wheel.

2. A tightening and cut-off tool for cable straps consisting of a hollow housing open on the front end, a face piece provided axially with a throat terminating in a slot, means fastening said face piece to said hollow housing at the open front end, an upper knife blade, means slidably connecting said upper knife blade to said face piece at said slot, a lower knife blade, means fastening said lower knife blade to said face piece at said slot, a knife actuating lever provided with a leaf spring, means pivotally mounting said knife actuating lever in said hollow housing, means pivotally connecting the end of said actuating lever to said upper knife blade, a lever provided with an angle shaped bracket, means pivotally mounting said lever in said hollow housing with said leaf spring abutting said lever and said angle bracket adapted to engage said knife actuating lever in operative position, a stub shaft rotatively mounted in said hollow housing, a pulley, an upper friction drive wheel, means fastening said pulley and upper friction drive wheel to said stub shaft, a main shaft rotatively mounted in said hollow housing, means rotating said main shaft, a pulley fastened to said main shaft, a belt providing a driving connection between said first mentioned pulley and said second mentioned pulley, a U-shaped beam lever, a stub shaft fixed in said hollow housing pivotally mounting said U-shaped beam lever, spring means fixed on one end to said hollow housing and on the other end to said U-shaped beam lever, a pintle fixed in said U-shaped beam lever, a lower friction gripping wheel rotatively mounted on said pintle and yieldingly engaging said upper friction drive wheel under the influence of said spring means, a roller rotatively mounted in said U-shaped beam-lever, a stem fixed in said hollow housing, a trigger finger, provided with a cam surface, pivotally mounted on said stem with said roller engaging said cam surface, whereby said trigger finger pivots said U-shaped beam lever, through said cam surface and roller, to move said lower friction gripping wheel away from said upper friction drive wheel, said throat terminating in a slot providing access to said upper and lower knife blades and to said upper friction drive wheel and lower friction gripping wheel.

3. A tightening tool for cable straps consisting of a hollow housing shaped to provide a hand grip and having an open front end, a face piece having a tapered throat terminating in a slot, means fastening said face piece to said hollow housing at the open front end, a stub shaft rotatively mounted in said hollow housing, an upper friction drive wheel fastened to said stub shaft, means driving said upper friction drive wheel, a second stub shaft fixed in said hollow housing, a U-shaped beam lever pivotally mounted on said second stub shaft and provided with a pintle and a rod, a lower friction gripping wheel rotatively mounted on said pintle, a roller mounted on said rod,

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resilient means connecting said U-shaped beam lever to said hollow housing with said lower friction gripping wheel yieldingly engaging said upper friction drive wheel in alignment with said slot, a trigger finger provided with a cam surface, pivotally mounted in said hollow housing with said roller engaging said cam surface, whereby pivotal movement of said trigger finger pivots said lower friction gripping wheel away from said upper friction drive wheel against the torque of said resilient means through the pivotal movement of said U-shaped beam lever.

4. A tightening and cut-off tool for self locking cable straps consisting of a hollow housing shaped to provide a hand grip and having an open front end, a face piece having a tapered throat terminating in a slot, means fastening said face piece to said hollow housing at the open front end, an upper knife blade, means slidably connecting said upper knife blade to said face piece at said slot, a lower knife blade, means fastening said lower knife blade to said face piece at said slot, a knife actuating lever pivotally mounted in said hollow housing, means pivotally connecting said knife actuating lever to said upper knife blade, a lever provided with a bracket, pivotally mounted in said hollow housing, resilient means interposed between said knife actuating lever and said lever whereby said bracket engages said knife actuating lever in opposition to said resilient means, a stub shaft rotatively mounted in said hollow housing, an upper friction drive wheel fastened to said stub shaft, means driving said upper friction drive wheel, a second stub shaft fixed in said hollow housing, a U-shaped beam lever pivotally mounted on said second stub shaft and provided with a pintle and a rod, a lower friction gripping wheel rotatively mounted on said pintle, a roller mounted on said rod, resilient means connecting said U-shaped beam lever to said hollow housing with said lower friction gripping wheel yieldingly engaging said upper friction drive wheel in alignment with said slot, and said upper knife blade and said lower knife blade, a trigger finger provided with a cam surface, pivotally mounted in said hollow housing with said roller engaging said cam surface, whereby pivotal movement of said trigger finger pivots said lower friction gripping wheel away from said upper friction drive wheel against the torque of said resilient means through the pivotal movement of said U-shaped beam lever.

5. A tightening and cut-off tool for cable straps consisting of a hollow housing open on the front end, a face piece provided with an upper and lower vertical slot, a rectangular slot provided axially in said face piece, a rectangularly shaped tapered throat extending axially and outwardly from said rectangular slot, means to fasten said face piece to the front end of said hollow housing, an upper knife blade provided with an opening and an elongated slot, screw means fastened to said face piece to slidably mount said upper knife blade in said upper vertical slot through said elongated slot, a lower knife blade, means fastening said lower knife blade in said lower vertical slot, a knife actuating lever provided with a leaf spring, means pivotally mounting said knife actuating lever in said hollow housing with the end of said knife actuating lever located in said opening, a lever, means pivotally mounting said lever in said hollow housing, rod fastened in said hollow housing, said leaf spring abutting said lever to yieldingly force said lever against said rod, an angle shaped bracket, means fastening said angle shaped bracket to said lever whereby pivotal movement of said lever pivotally actuates said knife actuating lever through said angle shaped bracket to move said upper

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knife blade downwardly in said upper vertical slot, a stub shaft rotatively mounted in said hollow housing, a pulley and an upper knurled wheel fixed to said stub shaft, a main shaft rotatively mounted in said hollow housing, means to rotate said main shaft, a pulley fixed to said main shaft, a belt connecting said first mentioned pulley with said second mentioned pulley, a U-shaped beam lever provided with an extension, a stub shaft fixed in said hollow housing, said U-shaped beam lever pivotally mounted on said stub shaft, a coil spring fixed on one end to said extension, means to fasten the other end of said coil spring to said hollow housing, a pintle fixed in said U-shaped beam lever, a lower knurled gripping wheel rotatively mounted on said pintle and yieldingly engaging said upper knurled gripping wheel under the influence of said coil spring, a roller rotatively mounted in said U-shaped beam lever, a stem fixed in said hollow housing, a trigger finger, provided with a cam surface, pivotally mounted on said stem with said roller engaging said cam surface, whereby actuation of said trigger finger pivots said U-shaped beam lever through the action of said roller on said cam surface to move said lower knurled gripping wheel away from said upper knurled gripping wheel, said rectangular shape tapered throat and rectangular slot providing access to said upper and lower knife blades and to said upper and lower knurled gripping wheels.

6. A tightening tool for cable straps consisting of a hollow housing open on the front end, a face piece, means fastening said face piece to said hollow housing at said front end, means in said face piece for removably securing a strap head, a lever, means pivotally mounting said lever in said hollow housing, resilient means biasing said lever in one direction, a friction drive wheel, means rotatively mounting said friction drive wheel in said hollow housing, a strap gripping wheel secured to said lever, a trigger finger, means pivotally mounting said trigger finger in said hollow housing, means connecting said trigger finger to said lever whereby pivotal movement of said trigger finger pivots said lever in a direction opposite to said resilient means, and means for moving said strap gripping wheel into contact with said friction drive wheel.

7. A tightening and cut-off tool for cable straps consisting of a hollow housing having an open end, a face piece provided with means for holding the head of a cable strap, means fastening said face piece to said hollow housing at said open end, strap gripping means and strap pulling means located in said hollow housing, a lever pivotally mounted in said hollow housing, means connecting said lever with said strap gripping means, a trigger finger mounted in said hollow housing, cam means connecting said trigger finger and said lever whereby movement of said trigger finger pivots said lever to actuate said strap gripping means, means actuating said strap gripping means, means actuating said strap pulling means, strap cut-off means located in said hollow housing, and means actuating said strap cut-off means for severing a cable strap held on one end by said gripping means and on the other end by said face piece.

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