

- [54] **HAND TOOL FOR TENSIONING AND CUTTING WIRE TIE STRAPS**
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- [51] Int. Cl. **B21f 9/02**
- [58] Field of Search **140/93 A, 93.2, 123.6; 267/74, 172, 175, 177; 254/51**

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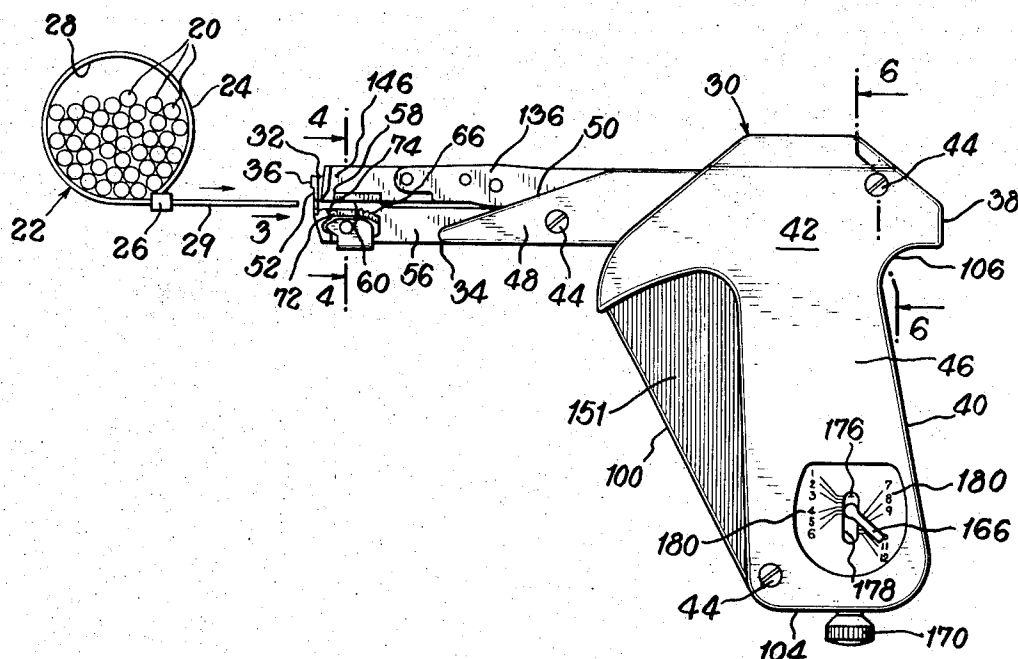
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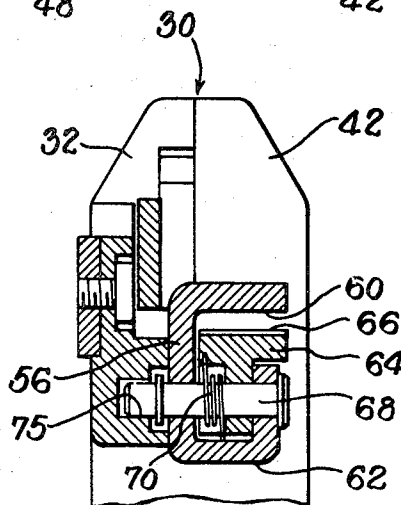
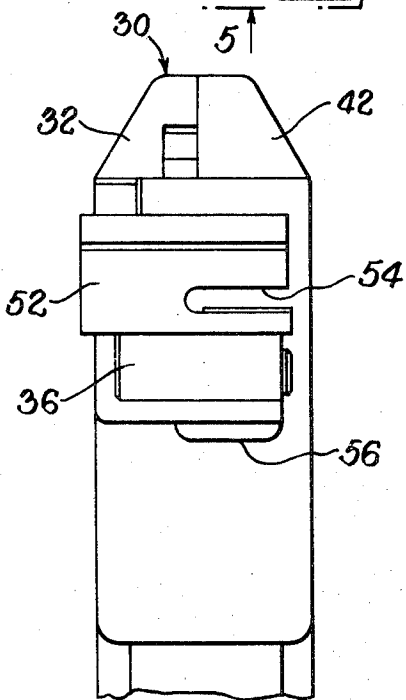
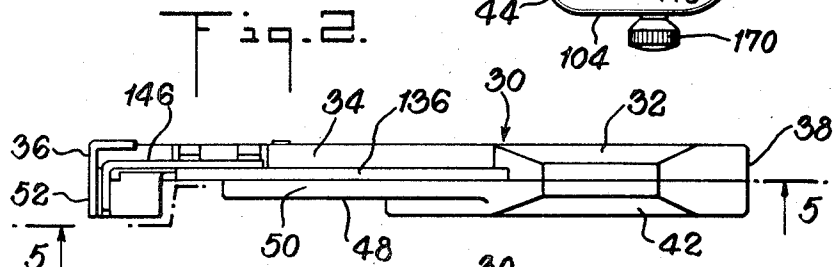
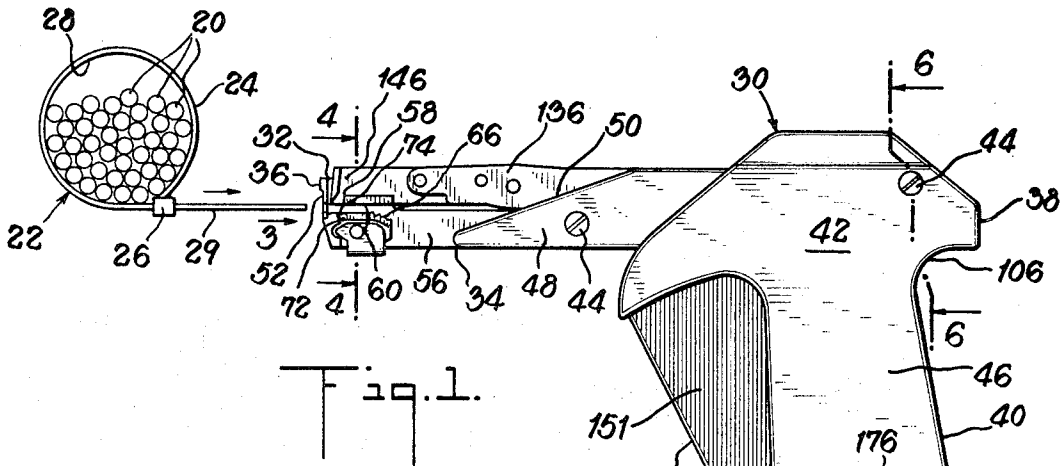
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[57] **ABSTRACT**

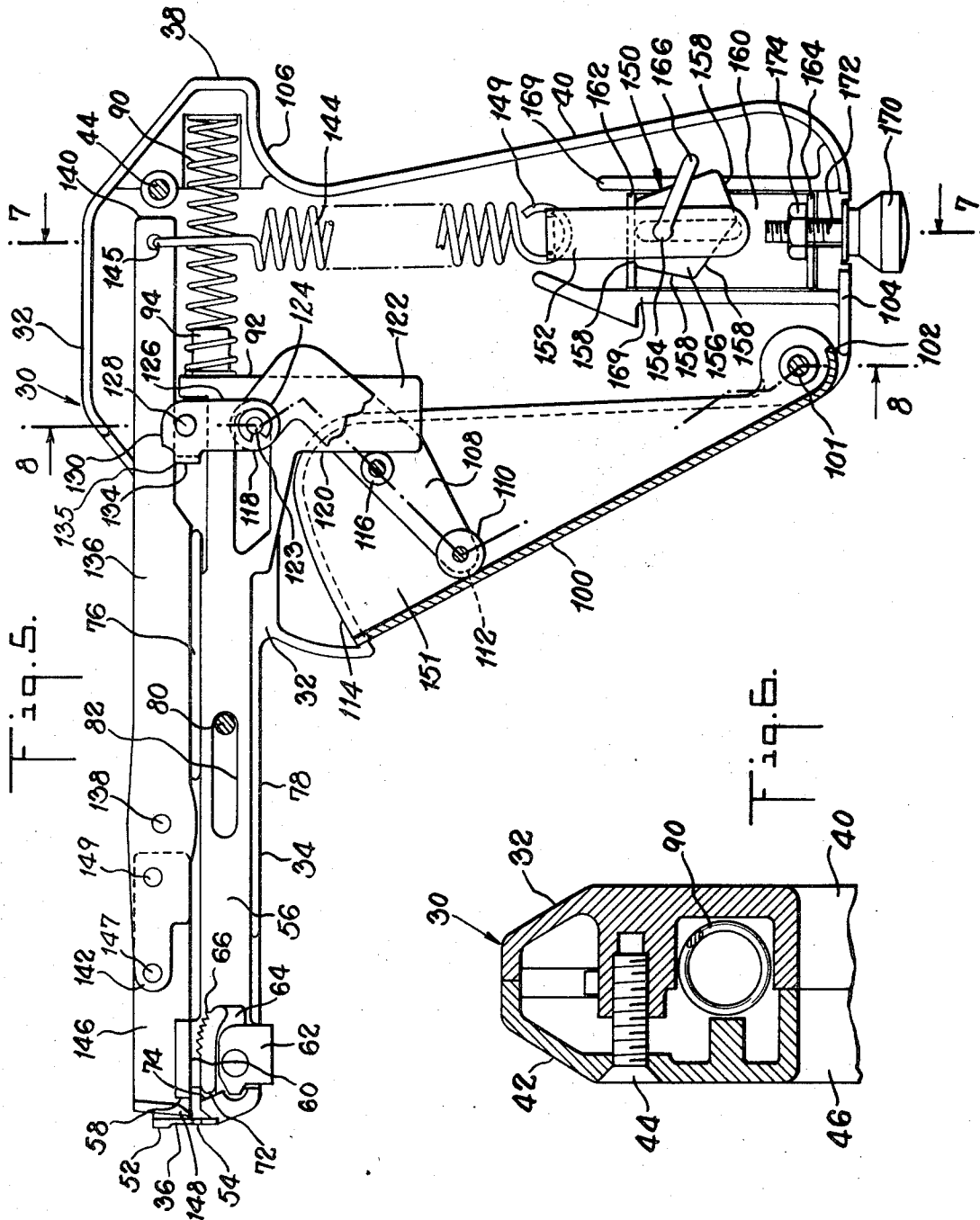
A hand tool for tensioning and cutting the strap of a wire tie, the tool having a draw bar for drawing the strap to a predetermined tension and a toggle-like linkage system for actuating a strap cutting means when the strap is drawn to a predetermined tension. Means are provided for selectively adjusting the predetermined tension in finite fixed increments and for providing a vernier or fine adjustment of the predetermined tension with reference to each finite fixed increment. An operating lever adapted to actuate the toggle-like linkage system is pivotally attached to the tool's handgrip near the remote bottom portion thereof so that the pivot point of the actuating lever is generally located below the operator's hand when the tool is in operation.

21 Claims, 11 Drawing Figures

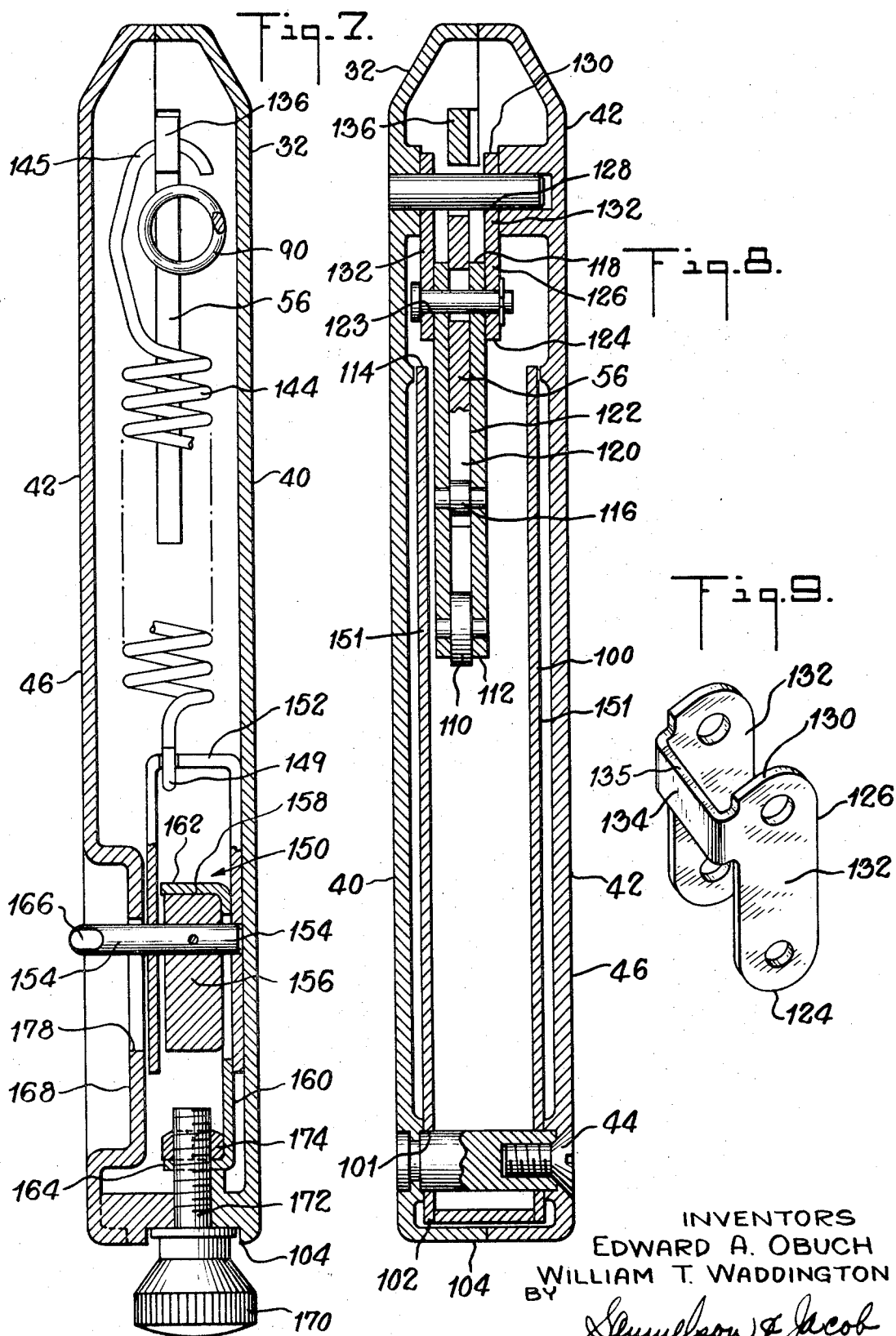




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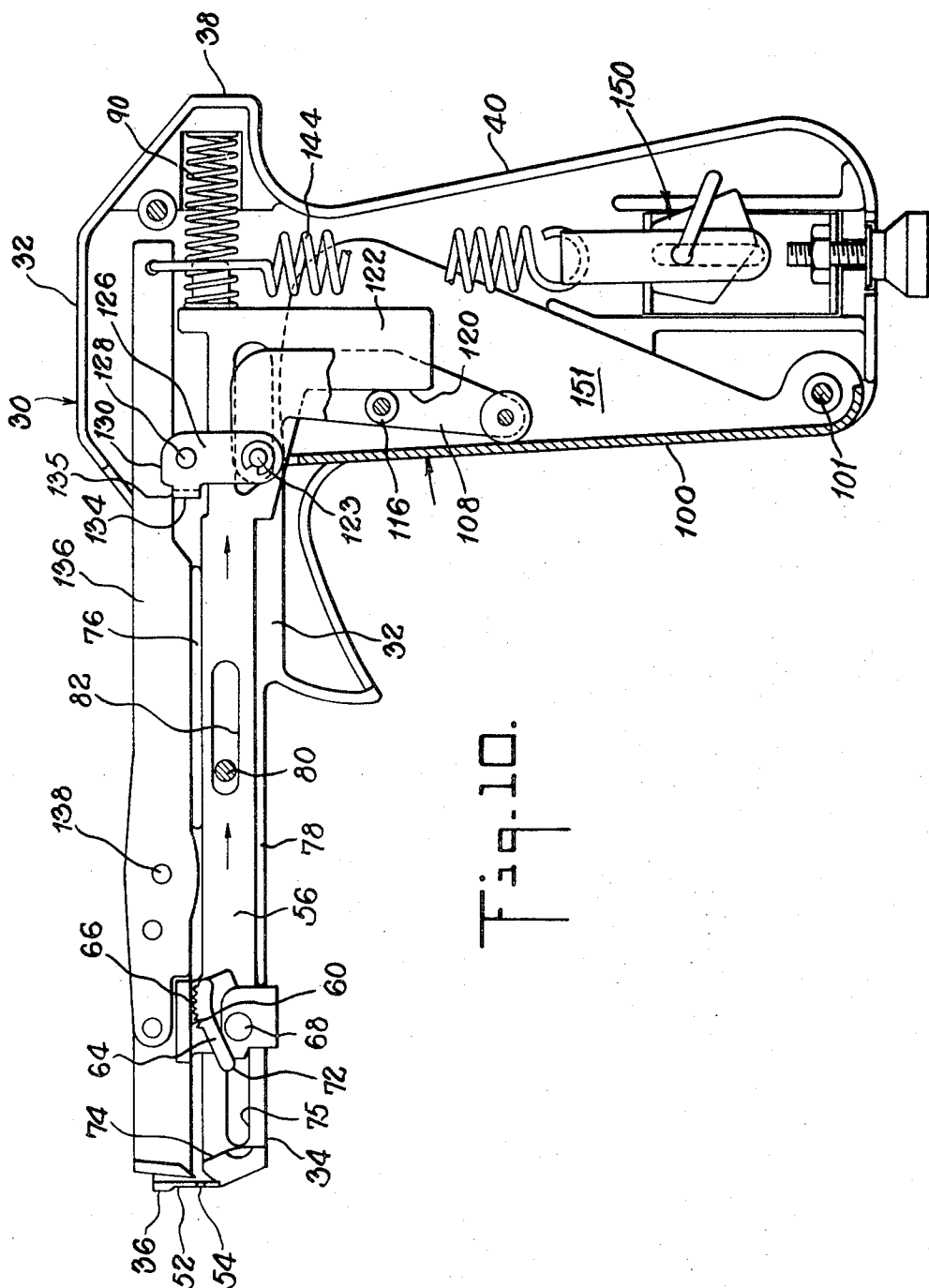


Fig. 10.

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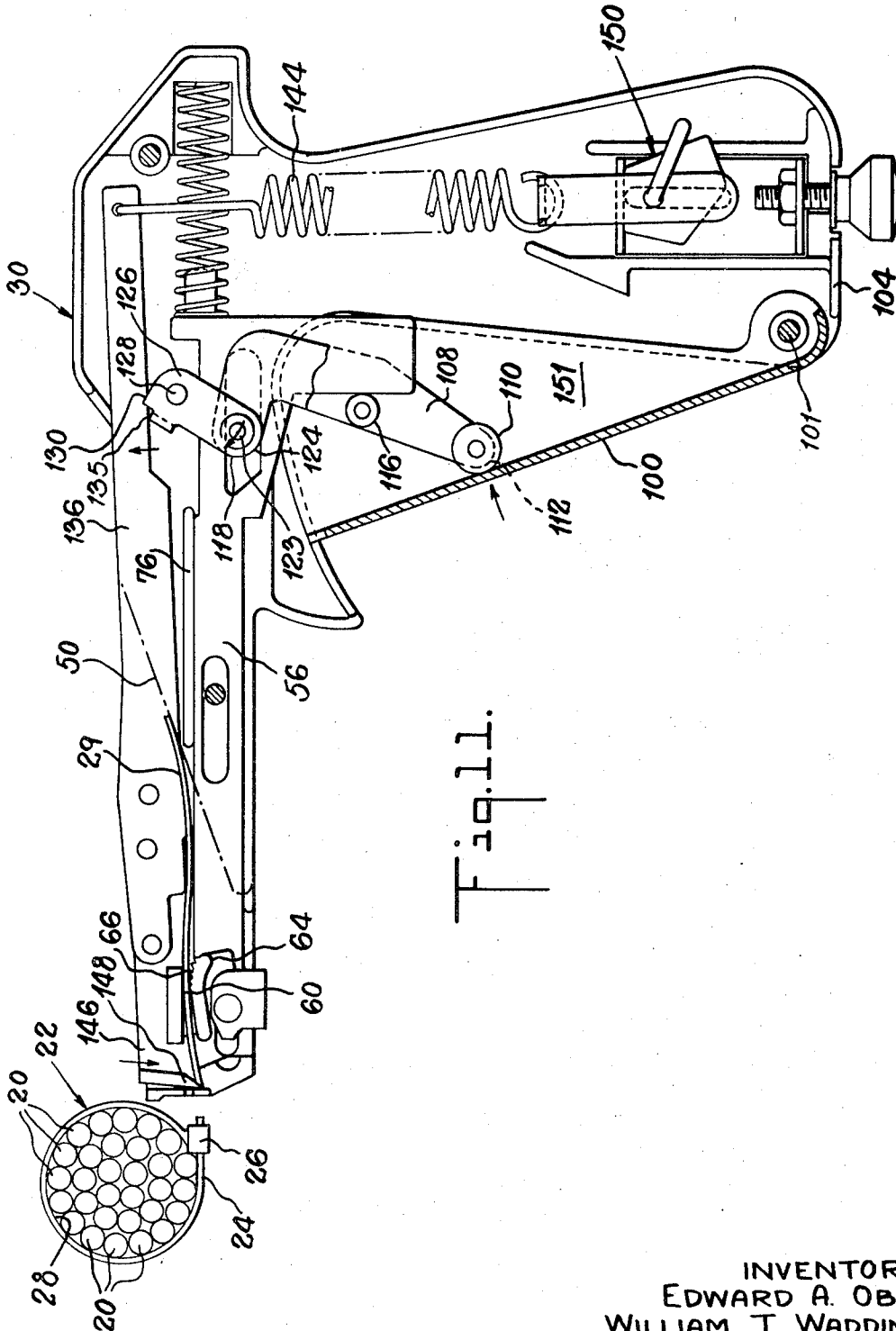


Fig. 11.

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HAND TOOL FOR TENSIONING AND CUTTING WIRE TIE STRAPS

The present invention relates generally to hand tools and more specifically, pertains to a hand tool for tensioning and cutting wire tie straps.

Wire ties have found wide acceptance in a variety of applications where it is desired to bundle a plurality of wires, cables, or other filament-like elements. Ordinarily, such wire ties include a strap portion which is threaded through an integral head to form a loop around the wires to be bound and the loop is drawn tight to bind the wires into a bundle. A locking mechanism in the head locks the strap in the tightened position. The excess length of strap which extends beyond the loop may then be severed from the loop.

Hand tools have been made available which facilitate such operations by grasping the strap of the wire tie and pulling the loop tight. The desired tightness in the loop is obtained by sensing the tension in the strap as the loop is tightened and discontinuing the pull on the strap in response to the attainment of a predetermined tension. Continued operation of the tool actuates a cutter which severs the excess length of strap.

It is an important object of the invention to provide a hand tool for tensioning the strap of a wire tie to a predetermined tension with increased accuracy and increased ease of operation.

Another object of the invention is to provide a hand tool which, upon tensioning the strap of a wire tie to a predetermined tension, will sever the excess strap with increased ease and with a committant decrease in operator fatigue.

Still another object of the invention is to provide a hand tool for tensioning a strap to a predetermined tension which may be selected from a wide range of accurately adjusted tension settings.

A further object of the invention is to provide a hand tool for wire ties which is capable of tensioning and severing a wider range of wire tie sizes over a wider range of accurately predetermined, selected tension settings than heretofore available in such tools.

A still further object of the invention is to provide a hand tool as described above which is compact, easy to use, and which employs a minimum number of component parts of simplified configuration for economical construction.

The above objects, as well as still further objects and advantages, are attained by the invention which may be described briefly as a strap tightening and cut-off tool wherein a draw bar draws a strap to a predetermined tension and a cut-off means is actuated in response to the attainment of the predetermined tension to sever the strip, the tool comprising a frame, a cut-off bar mounted upon the frame for movement between a rest position and a cut-off position and including the cut-off means for cutting the strap in response to movement of the cut-off bar from the rest position to the cut-off position, means on the frame for resiliently biasing the cut-off bar toward to rest position, a cut-off link having opposite ends and pivotally mounted upon the frame at one of the ends, the cut-off link including means engaging the cut-off bar and retaining the link against pivotal movement in at least one direction when the cut-off bar is held in the rest position by the biasing means, an actuating link having opposite ends and pivotally mounted at one of the ends thereof upon the cut-off

link between the one end of the cut-off link and the other end of the actuating link, means coupling the actuating link intermediate the ends thereof with the draw bar such that pivotal movement of the actuating link relative to the cut-off link will move the draw bar to tension the strap to the predetermined tension, whereupon further movement of the draw bar will cease in favor of the toggle-like pivotal movement of the cut-off link about the one of the ends thereof to move the cut-off bar toward the cut-off position thereof against the force of the biasing means.

The invention will be more fully understood, while still further objects and advantages thereof will become apparent, in the following detailed description of a preferred embodiment of the invention illustrated in the accompanying drawing, in which:

FIG. 1 is a partially diagrammatic, side elevational view illustrating a hand tool constructed in accordance with the invention;

FIG. 2 is a top plan view of the hand tool of FIG. 1;

FIG. 3 is an enlarged, fragmentary front elevational view taken in the direction of the arrow in FIG. 1;

FIG. 4 is a similarly enlarged cross-sectional view taken along line 4—4 of FIG. 1;

FIG. 5 is an enlarged elevational view of the hand tool, similar to FIG. 1, but with portions of the tool removed or sectioned to reveal the internal working components thereof;

FIG. 6 is an enlarged, cross-sectional view taken along line 6—6 of FIG. 1;

FIG. 7 is a similarly enlarged cross-sectional view taken along line 7—7 of FIG. 5;

FIG. 8 is an enlarged, cross-sectional view taken along line 8—8 of FIG. 5;

FIG. 9 is a perspective view of a component part of the hand tool;

FIG. 10 is a side elevational view similar to FIG. 5, but with the component parts of the tool in another operating position; and

FIG. 11 is a side elevational view similar to FIG. 10, but with the components parts in still another operating position.

Referring now to the drawing, and especially to FIGS. 1 and 2 thereof, a plurality of wires 20 are to be bound together in a bundle by a wire tie 22 which includes a strap 24 with an integral head 26. The strap 24 is looped around the wires 20 and is passed through the head 26. The loop 28 thus formed by the strap 24 is to be tightened around the wires 20 by drawing the strap through the head 26 in the direction of the arrow. Once the loop 28 is tightened around the wires 20 with a predetermined tension in the strap 24, the excess length 29 of strap which extends beyond the head 26 of the wire tie 22 will be severed.

In order to facilitate the establishment of the predetermined tension in the strap 24, which indicates that the wires 20 are properly bundled, and to subsequently sever the excess length 29 of strap 24, a hand tool 30, constructed in accordance with the invention, is provided for drawing the strap through the head 26 to establish the desired predetermined tension and for subsequently severing the excess length 29 of strap 24. Hand tool 30 has a frame 32 which includes a first frame portion 34 extending longitudinally from the front 36 of the tool 30 to the rear 38 of the tool and a second frame portion 40 extending laterally downwardly adjacent the rear 38 of the tool. A cover 42 is

coextensive with the second portion 40 of the frame 32 and is affixed to the frame by means of three screws 44 such that the second portion 40 of the frame, together with a corresponding portion 46 of the cover 42 provides a hand grip enabling the hand tool 30 to be held by an operator in one hand. A longitudinal portion 48 of the cover 42 is partially coextensive with the first frame portion 34 and terminates short of the front 36 of the tool to provide an inclined ramp 50 for purposes which will be explained hereinafter.

Referring now to FIGS. 3 and 4, as well as to FIGS. 1 and 2, a nose-piece 52 is carried by the frame 32 at the front 36 of the tool 30 and includes a transverse slot 54 for receiving the strap 24 of the wire tie 22. A tensioning or draw bar 56 is carried by the frame 32 and terminates behind the nose-piece 52. The terminal end 58 of the draw bar 56 includes an upper clamping surface 60 and an integral support 62 located below the clamping surface. The support 62 carries a pawl 64 having a serrated surface 66 opposite the clamping surface 60. The pawl 64 is mounted for pivotal movement upon a pin 68 retained in the support 62, and a small coil spring 70 resiliently urges the serrated surface 66 toward the opposite clamping surface 60. However, when the draw bar 56 is in its initial position, as shown in FIG. 1, the front edge 72 of the pawl 64 rest against a camming surface 74 on the frame 32 so that the serrated surface 66 is spaced from the clamping surface 60 and is retained in such spaced relationship to enable the strap 24 to be inserted through the slot 54 and between the clamping surface 60 and the pawl 64 until the nose-piece 52 rests against the head 26 of the wire tie 22. Pin 68 projects beyond the support 62 and extends into a groove 75 in the frame 32 to provide lateral support for the terminal end 58 of the draw bar 56.

Turning now to FIGS. 5 and 6, the draw bar 56 is carried upon the frame 32 for longitudinal movement relative to the frame between a pair of parallel guides 76 and 78 which are integral with the frame 32. A stationary pin 80 passes through a slot 82 in the draw bar 56 to aid in guiding the longitudinal movement of the draw bar between an initial position (as illustrated in FIG. 5) and a final position (as seen in FIG. 10). The draw bar 56 is normally urged into its initial position by a helical return spring 90 which engages the rear end 92 of the draw bar 56 and which is retained in place by a projection 94 extending from the rear end of the draw bar.

The draw bar 56 is moved from its initial position toward its final position against the bias of the helical return spring 90 by depressing an actuating lever 100 mounted for clockwise pivotal movement upon the frame 32 at a location 101 adjacent the bottom end 102 of the lever 100 and the far end 104 of the second portion 40 of the frame, that is, the portion 40 of the frame 32 which together with cover 42 forms the handgrip and which extends from the near end 106 to the far end 104. The actuating lever 100 is coupled to the draw bar by means of an actuating link 108 having a first roller 110 rotatably journaled at one end 112 thereof with the roller 110 engaging the actuating lever 100 in the proximity of the latter's upper end 114. A second roller 116 rotatably journaled on the actuating link 108 intermediate ends 112 and 118 thereof engages the forward surface 120 of a downwardly depending leg 122 of the draw bar 56. As best seen in FIG. 8, as well as in FIG. 5, the end 118 of the actuating link is pivotally connected at 123 to the lower end 124 of a tension or cut-

off link 126 which latter is pivotally mounted to the frame 32 at a point 128 adjacent its upper end 130.

As best seen in FIG. 9, as well as in FIG. 5, the cut-off link 126 includes a pair of arms 132 interconnected by a pressure plate 134. The upper edge 135 of the pressure plate 134 abuts a pressure bar or a cut-off bar 136 pivotally mounted upon the frame 32 at 138 intermediate the ends 140 and 142 of the cut-off bar 136. The cut-off bar 136 is normally urged in a clockwise direction about the pivot at 138 by resilient biasing means shown in the form of a helical tension spring 144 one end 145 of which engages the end 140 of the cut-off bar 136 and urges that end downwardly into a first or rest position where the cut-off bar 136 rests against the upwardly facing surface of guide 76 and upper edge 135 of pressure plate 134 as seen in FIG. 5. The opposite end 142 of the cut-off bar 136 carries a knife member 146 affixed thereto by means of screws 147 and 149 with the member 146 including a downwardly depending knife blade 148 disposed substantially at a right angle thereto adjacent the nose-piece 52, the knife blade 148 lying above the transverse slot 54 when the cut-off bar 136 is in the rest position. As best seen in FIG. 7, as well as in FIG. 5, the other end 149 of the tension spring 144 is anchored to the frame 32 through an adjustment means 150 (to be explained in greater detail hereinafter) such that the tension in the spring 144 may be varied to selectively adjust the force with which the cut-off bar 136 is biased into its rest position.

Turning now to FIGS. 10 and 11, upon clockwise movement of the actuating lever 100 from its initial position (See FIG. 5) the actuating link 108 will rotate in a counter-clockwise direction about its pivotal connection 123 with the cut-off link 126, and the second roller 116 will, in turn, bear against the forward surface 120 of the downwardly depending leg 122 of the draw bar 56 so as to cause the draw bar to move longitudinally to the right against the bias of the helical return spring 90. It is noted that the roller 116 of the actuating link 108 will traverse the forward surface 120 of the leg 122 of the draw bar 56 in a lateral or downward direction as viewed in FIGS. 5 and 10 thereby assuring that the draw bar 56 moves in a linear fashion along the longitudinal direction. Such movement disengages the front edge 72 of the pawl 64 from camming surface 74 and enables the pawl 64 to be rotated by the coil spring 70 so that the serrated surface 66 of the pawl will move upwardly to grip the strap 24 (see FIG. 11) of the wire tie 22 and clamp the strap between the serrated surface 66 and the clamping surface 60. Thus, the strap 24 will be drawn to the right with the longitudinal movement of the draw bar 56 to the right. The biasing force provided by the tension spring 144 is great enough to maintain the cut-off bar 136 in the rest position and, hence, maintain the cut-off line 126 stationary by virtue of the abutting contact between the upper edge 135 of pressure plate 134 and the cut-off bar 136. Upon release of the actuating lever 100, the return spring 90 will return the draw bar 56 and the actuating lever 100 to their respective initial positions, as shown in FIG. 5. During return movement of the draw bar 56, the pawl will be released from the strap 24 so that the draw bar will move relative to the strap. The entire cycle may be repeated for as many times as are necessary to pull the strap tight around the wires 20, the excess length 29 of strap 24 being guided along the first portion 34 of the frame 32, upwardly along the inclined ramp 50 pro-

vided by the cover 42, and eventually out of the tool 30.

As best seen in FIG. 11, when the loop 28 in the wire tie 22 is drawn tightly around the wires 20, the strap 24 will be tensioned and upon reaching a predetermined tension, further movement of the draw bar 56 to the right will cease. Continued clockwise rotation of the actuating lever 100 about its pivot point 101 will then cause the actuating link 108 to pivot counterclockwise about the second roller 116 thereby causing the cut-off link 126 to pivot in a clockwise direction about its pivot 128 with the result that cut-off bar 136 is urged in a counterclockwise direction about its pivot 138 against the bias force of the tension spring 144 and into a second, or cut-off position. Thus, the knife blade 148 will be lowered and the excess length 29 of the strap 24 will be severed from the wire tie 22. The added support provided by the engagement of pin 68 in groove 75 assures that the terminal end 58 of the draw bar 56 will be retained in longitudinal alignment to attain a complete, clean severance of the excess length 29 from the remainder of strap 24. It is noted that the actuating link 108 and the cut-off link 126 provide a toggle-like linkage system for actuating the cut-off mechanism of the hand tool 30 with a high degree of effectiveness. That is, when the draw bar 56 is prevented from further movement to the right by virtue of the predetermined tension in strap 24, the cut-off link 126 is pivoted at 128 while the actuating link 108 is pivoted at the second roller 116 to move the pivotal connection 123 between end 118 of the actuating link 108 and end 124 of the cut-off link 126, which pivotal connection 123 lies between the opposite end 130 of the cut-off link 126 so that the actuating link and the cut-off link move in a toggle-like fashion. With the foregoing toggle-like arrangement of the cut-off link and the actuating link there is provided a compact linkage system which can operate effectively to sever straps having a wide range of thicknesses. In addition, by locating the pivot point 101 of actuating lever 100 at the far or bottom end 104 of the hand grip, the pivot point may be located below and at a relatively greater distance with respect to the operator's index and middle fingers when the hand is in the gripping and operating position. This advantageous arrangement naturally requires the strongest part of the hand, i.e., the upper part or index and middle finger portion of the hand, to exert most of the squeezing pressure on the actuating lever thereby resulting in considerably reduced operator fatigue. In prior art hand tools of the class described herein, the pivot point for the actuating member or trigger is usually located above the hand gripping position of the tool and very near to the operator's index and middle fingers. As a result, the operator finds that in order to actuate the tool considerable pressure must be exerted by the lower portion of the hand comprising the ring finger and small finger which is most cases is much weaker than the upper portion of the hand comprising the index and middle fingers thus rapidly inducing operator fatigue.

Moreover, as may be seen to best advantage in FIGS. 1, 5, 8, 10 and 11, actuating lever 100 includes integrally therewith a pair of parallel spaced side walls or skirt portions 151 the respective peripheral extremities of which extend into the interior space of the hand grip portion of the tool formed by the second portion of frame 32 and the corresponding portion 46 of the cover

42. Accordingly, when the actuating lever is in the initial position (FIGS. 1 and 5) and in all other operating positions of the tool, the extremities of the side walls 151 of actuating lever 100 are always telescopically engaged with respect to the handgrip portion of the tool thus overcoming the safety hazard inherent in the open construction of the conventional trigger-like device where there is the possibility of catching the operator's hand between a trigger-like actuating lever and the handgrip.

Since the point at which movement of the draw bar 56 will cease in favor of actuating of the cut-off bar 136 is governed by the biasing force provided by the tension spring 144, hand tool 30 provides means generally indicated by reference numeral 150 for accurately selectively adjusting the biasing force over a wide range in order to accommodate a wide range of operating conditions in the field. Thus, as best seen in FIGS. 1, 5, and 7, the remote bottom end 149 of tension spring 144 is affixed to a yoke 152 which carries a shaft 154 journaled therein, and a cam 156 is affixed to the shaft 154 for rotation therewith. The cam 156 has a plurality of flat cam surfaces 158. In the preferred embodiment there are four such surfaces, each surface 158 being located at a different radial distance away from the axis of shaft 145. The cam 156 lies within the confines of a bracket illustrated in the form of a channel member 160 having a pair of flanges 162 and 164 and engages the flange 162 of the channel member 160. In this manner, the yoke 152 is located relative to the channel member 160. A lever arm 166 is integral with the cam shaft 154 and is accessible to the operator so that the cam shaft 154 may be rotated to locate any one of the four flat cam surfaces 158 against the upper flange 162 of the channel member 160. Thus, the yoke 152 may be located in any one of the four angular positions of the cam 156 and the biasing force provided by the tension spring 144 may be correspondingly adjusted in four fixed increments. It is noted that the lever arm 166 is located in a recessed portion 168 of the cover 42 in order to assure that the lever arm 166 will not interfere with the hand grip provided by portion 46 of the cover 42 and the second frame portion 40.

In order to obtain a vernier or fine adjustment of the biasing force relative to each of the fixed increments provided by the cam adjustment described above, the channel member 160 itself may be moved relative to the frame 32 within guides 169 provided thereon by rotation of an adjustment knob 170 integral with the end of threaded shaft 172 which latter engages a complementary threaded member 174 affixed to the other flange 164 of the channel member 160. Thus, once the position of the yoke 152 is fixed relative to the channel member by a selected position of the cam 156, the knob 170 may be rotated to displace the channel member 160 and the yoke 152 as a unit relative to the frame 32 and to thereby provide a vernier or fine adjustment of the biasing force with respect to each finite fixed increment provided by rotation of the cam. Hence, rotation of the cam 156 achieves a quick change in relatively large increments of biasing force while rotation of the knob 170 attains precise fine adjustments. Such precise adjustments may be obtained repetitively by virtue of an index mark 176 (FIG. 1) on the yoke 152 which can be observed through an indicator slot 178 in the cover 42. The position of the index mark 176 is indicated by scales 180. Thus, the biasing force may be

adjusted over a wide range to accommodate a wide range of conditions encountered in the field.

It is to be understood that the foregoing detailed description of a preferred embodiment of the invention is provided by way of example only. Various details of design and construction may be modified without departing from the true spirit and scope of the invention as set forth in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A strap tightening and cut-off tool wherein a draw bar draws a strap to a predetermined tension and a cut-off means is actuated in response to the attainment of said predetermined tension to sever the strip, said tool comprising:

a frame;

a cut-off bar mounted upon the frame for movement between a rest position and a cut-off position and including said cut-off means for cutting said strap in response to movement of the cut-off bar from the rest position to the cut-off position;

means on the frame for resiliently biasing the cut-off bar toward the rest position;

a cut-off link having opposite ends and pivotally mounted upon the frame at one of said ends, said cut-off link including means engaging the cut-off bar and retaining the link against pivotal movement in at least one direction when the cut-off bar is held in the rest position by said biasing means;

an actuating link having opposite ends, said actuating link being pivotally mounted at one of the ends thereof upon the cut-off link at a point located between said one end of the cut-off link and the other end of the actuating link;

means coupling the actuating link intermediate the ends thereof with the draw bar such that pivotal movement of the actuating link relative to the cut-off link will move the draw bar to tension the strap to said predetermined tension, whereupon further movement of the draw bar will cease in favor of a toggle-like pivotal movement of the actuating link about said coupling means and pivotal movement of said cut-off link about said one of the ends thereof to move the cut-off bar toward the cut-off position thereof against the force of said biasing means.

2. The invention of claim 1 wherein the cut-off bar is mounted upon the frame for pivotal movement between the rest position and the cut-off position and the cut-off means is actuated in response to pivotal movement of the cut-off bar from the rest position to the cut-off position.

3. The invention of claim 1 wherein the tool includes an actuating lever having opposite ends and pivotally mounted upon the frame at one of said ends and wherein said actuating link is mounted between said one end of the cut-off link and said one end of the actuating lever, the other end of the actuating link engaging the actuating lever adjacent the other end of the actuating lever such that the actuating link will pivot in response to pivotal movement of the actuating lever.

4. The invention of claim 3 wherein the cut-off bar is mounted upon the frame for pivotal movement between the rest position and the cut-off position and the cutting means is actuated in response to pivotal move-

ment of the cut-off bar from the rest position to the cut-off position.

5. The invention of claim 4 wherein the frame includes a hand grip portion extending laterally from a near end adjacent the actuating link to a far end, and said one end of the actuating lever is pivotally mounted adjacent said far end.

6. The invention of claim 4 wherein said draw bar extends longitudinally along said frame and includes a laterally extending surface and said actuating link engages said lateral surface to move the draw bar in a longitudinal direction, and including means on said frame engaging the draw bar for confining movement of the draw bar to the longitudinal direction.

7. The invention of claim 4 including means for selectively adjusting said resilient biasing means, said adjusting means comprising:

first means for selectively changing the biasing force of said resilient biasing means in fixed increments; and

second means for effecting selective vernier adjustment of the biasing force with respect to each of said fixed increments.

8. The invention of claim 4 wherein the resilient biasing means includes

a spring engaging the cut-off bar to exert a force biasing the cut-off bar to the rest position thereof;

a bracket mounted upon the frame;

a yoke mounted for movement relative to the bracket and coupled to the spring such that movement of the yoke will change the force of the spring upon the cut-off bar; and

a cam member coupling the yoke and the bracket and being selectively rotatable between at least two predetermined angular positions to selectively move the yoke relative to the bracket whereupon the force of the spring is selectively changed in fixed increments corresponding the selected positions of the yoke.

9. The invention of claim 8 wherein the cam includes a flat surface for each predetermined angular position, the flat surfaces being spaced at different radial distances from the center of rotation of the cam, one of said flat surfaces engaging the bracket when the cam is in a corresponding angular position to locate the retain the yoke relative to the bracket.

10. The invention of claim 9 wherein the bracket is mounted for movement relative to the frame when the cam is in any of its said corresponding angular positions such that the force of the spring may be further selectively varied relative to each said fixed increment of change.

11. A strap tightening tool wherein a draw bar draws a strap to a predetermined tension only, said tool comprising:

a frame;

a pressure bar mounted upon the frame for movement between a first position and a second position;

means on the frame for resiliently biasing the pressure bar toward the first position;

a tension link having opposite ends and pivotally mounted upon the frame at one of said ends, said tension link including means engaging the pressure bar and retaining the link against pivotal movement in at least one direction when the pressure bar is held in the first position by said biasing means;

an actuating link having opposite ends, said actuating link being pivotally mounted at one of the ends thereof upon the tension link at a point located between said one end of the tension link and the other end of the actuating link;

means coupling the actuating link intermediate the ends thereof with the draw bar such that pivotal movement of the actuating link relative to the tension link will move the draw bar to tension the strap to said predetermined tension, whereupon further movement of the draw bar will cease in favor of a toggle-like pivotal movement of the actuating link about said coupling means and pivotal movement of said tension link about said one of the ends thereof to move the pressure bar toward the second position thereof against the force of said biasing means.

12. The invention of claim 11 wherein the pressure bar is mounted upon the frame for pivotal movement between the first position and the second position.

13. The invention of claim 11 wherein the tool includes an actuating lever having opposite ends and pivotally mounted upon the frame at one of said ends and wherein said actuating link is mounted between said one end of the tension link and said one end of the actuating lever, the other end of the actuating link engaging the actuating lever adjacent the other end of the actuating lever such that the actuating link will pivot in response to pivotal movement of the actuating lever.

14. The invention of claim 13 wherein the pressure bar is mounted upon the frame for pivotal movement between the first position and the second position.

15. The invention of claim 14 wherein the frame includes a hand grip portion extending laterally from a near end adjacent the actuating link to a far end, and said one end of the actuating lever is pivotally mounted adjacent said far end.

16. The invention of claim 14 wherein said draw bar extends longitudinally along said frame and includes a laterally extending surface and said actuating link engages said lateral surface to move the draw bar in a longitudinal direction, and including means on said frame engaging the draw bar for confining movement of the draw bar to the longitudinal direction.

17. The invention of claim 18 including means for se-

lectively adjusting said resilient biasing means, said adjusting means comprising:

first means for selectively changing the biasing force of said resilient biasing means in fixed increments; and

second means for further selectively changing the biasing force relative to said finite increments.

18. The invention of claim 14 wherein the resilient biasing means includes

a spring engaging the pressure bar to exert a force biasing the pressure bar to the first position thereof; a bracket mounted upon the frame;

a yoke mounted for movement relative to the bracket and coupled to the spring such that movement of the yoke will change the force of the spring upon the pressure bar;

a cam member coupling the yoke and the bracket and being selectively rotatable between at least two predetermined angular positions to selectively move the yoke relative to the bracket in fixed increments and retain the yoke at a selected position relative to the bracket whereupon the force of the spring is selectively changed in fixed increments corresponding the selected positions of the yoke.

19. The invention of claim 18 wherein the cam includes a flat surface for each predetermined angular position, the flat surfaces being spaced at different radial distances from the center of rotation of the cam, one of said flat surfaces engaging the bracket when the cam is in a corresponding angular position to locate and retain the yoke relative to the bracket.

20. The invention of claim 19 wherein the bracket is mounted for movement relative to the frame such that the force of the spring may be further selectively varied to effect a vernier adjustment with respect to said fixed increments of change.

21. The invention of claim 15 wherein said actuating lever includes a pair of spaced parallel sidewalls integral therewith, and said hand grip portion includes an interior recess and an opening communicating therewith for receivably engaging the side walls of said actuating lever whereby said sidewalls are respective telescopically engaged with respect to said hand grip portion during pivotal movement of said actuating lever.

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