United States Patent [19]

Angarola et al.

[11] **3,844,317**

[45] **Oct. 29, 1974**

[54] **STRAP TENSIONING TOOL**

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[22] Filed: **June 18, 1973**

[21] Appl. No.: **370,941**

[52] **U.S. Cl.** **140/93.2,** 140/123.5

[51] **Int. Cl.** **B21f 9/02,** B25b 25/00

[58] **Field of Search** ..... 100/29, 30; 140/93 A, 93.2, 140/93.4, 123.5, 123.6; 254/51

[56] **References Cited**

UNITED STATES PATENTS

2,199,744	5/1940	Gerrard	140/123.6
2,638,314	5/1953	McFerren et al.	140/93.2
3,205,916	9/1965	Willis	140/123.6
3,309,061	3/1967	Plattner	140/93.2

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[57] **ABSTRACT**

A push-type strap tensioning tool includes an elongated frame which provides an anvil section at a first end on one side thereof with the anvil section being positioned in opposed relationship with a strap feeding assembly pivoted on the frame. The strap feeding assembly includes a knurled feed wheel biased toward the anvil. A tension handle also pivoted upon the frame rotates the knurled wheel by means of a ratchet gear and pawl drive mechanism. A lift arm in the form of a lever is pivoted on the frame rearwardly of the strap feeding assembly and the lever has one arm movable along an arc which intersects an abutment portion of the strap feeding assembly. The lever includes a second lever arm positioned in the path of travel of an abutment on the tension handle to pivot the strap feeding assembly and move the feed wheel away from the anvil to allow a strap to be easily inserted therebetween for tensioning. As the strap is tensioned, the strap feeding assembly is progressively loaded to make it increasingly difficult for the lift arm to pivot the strap feeding assembly.

14 Claims, 5 Drawing Figures

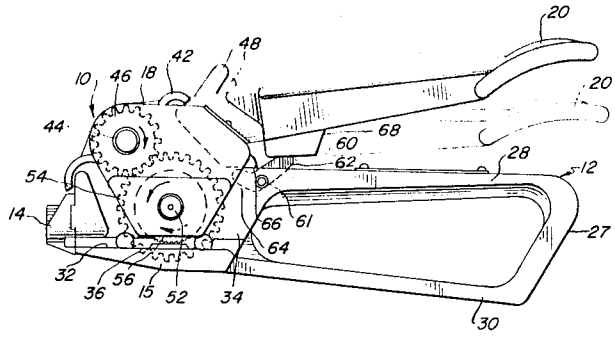


FIG. 1

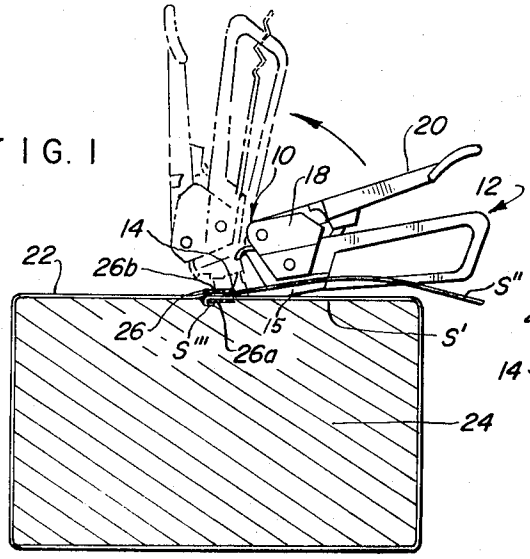


FIG. 3

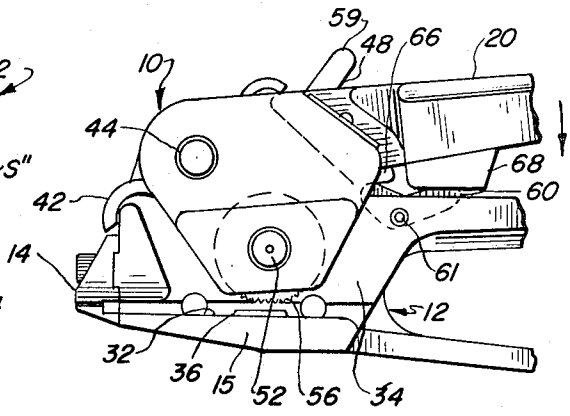


FIG. 2

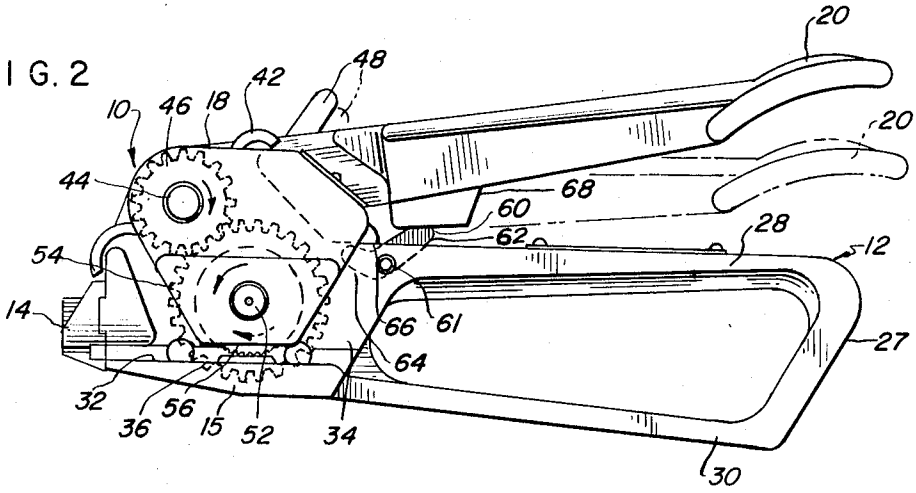


FIG. 4

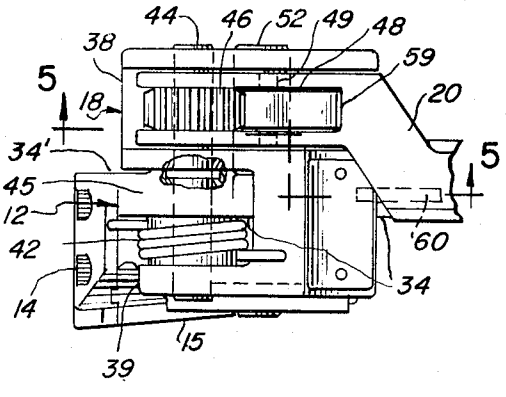
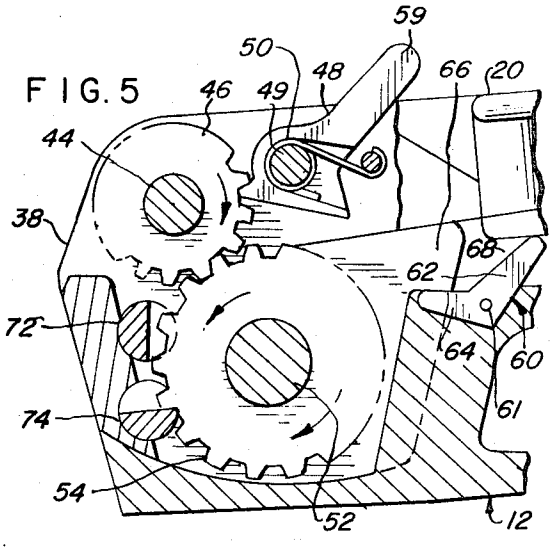


FIG. 5



STRAP TENSIONING TOOL

BACKGROUND OF THE INVENTION

This invention relates to tensioning tools for tightening loops of metallic strapping around packages in order to bind and secure such packages. More specifically, the invention relates to a push-type tensioner which achieves tension by pushing against a seal after the seal is threaded on a strap, and the end of the strap is bent back under the seal.

Strap tensioning tools have long been used to tighten bands of strapping around objects of all kinds and have performed very well in difficult packaging situations, so that they have achieved a high level of acceptance. With the wide use of such tools has come the desire to maximize the speed with which the tools can be used in order to afford optimum production levels for packaging operations. Many tools commonly in use at the present time, while quite effective for their basic purpose, cause delays through a tendency to accidentally release the tension in the strap during the course of the tensioning operation. Accordingly, a need has remained for a tool which preserves all of the advantages of previous designs, yet allows quick loading of the tool without danger of sudden loss of tension and the consequent need to repeat the operation.

SUMMARY OF THE INVENTION

In accordance with the invention, a strap tensioning tool is provided which includes a frame having an anvil section and engageable at one end thereof with the seal. The upper overlapping strap portion protruding beyond the seal and loop is positionable over the anvil, and tensioning means, also carried upon the frame, includes a movable tension handle, a strap feeding assembly having a strap-engaging member, means mounting the assembly for movement relative to the frame toward and from the anvil section, and means biasing the strap feeding assembly toward the anvil section to capture the protruding strap portion between the strap engaging member and the anvil section.

In order to provide a quick and effective separation between the anvil and the strap engaging member, to facilitate insertion of the strap portion protruding beyond the strap loop, the tool also includes means for moving the strap feeding assembly away from the anvil, said means including a lift arm in the form of a lever pivoted on the frame at a point removed from the gripping assembly. The lever has a first arm extending into the path of the tension handle, and a second arm movably engaging the strap feeding assembly and which upon movement of the handle into engagement with the first arm overcomes the strap feeding assembly biasing means and moves the strap feeding assembly relative to the frame to permit the protruding strap portion to be accepted between the anvil section and the strap engaging member, in this manner facilitating the initial loading of the tool.

The tool further includes a drive mechanism connected between the handle and strap engaging member to transmit a tensioning force in a direction away from the seal to the strap engaging member when the handle is moved relative to the frame. In this manner, once the free end of the strap is bent under the seal, the strap portion beyond the strap loop is fed through the seal and the loop and the strap portion between the seal and the strap engaging member is progressively tensioned. As the tensioning of the loop progresses, the reaction force applied to the strap feeding assembly through the strap engaging member also increases to further bias the gripping assembly toward the anvil section. Such biasing of the gripping assembly toward the anvil quickly increases with the tensioning to become far greater than any force which it is possible to exert by the means for moving the gripping assembly, rendering such means effectively inoperable as the tension on the strap is increased.

Since the same handle is used to open a clearance between the anvil section and strap engaging member, and thereafter to tension the strap once the tool has been loaded, a great savings of time and effort results. At the same time, no lost time and effort is experienced because accidental separation of the strap engaging member and the anvil section by the accidental striking of the first arm of the lever by the handle is made nearly impossible due to the rapid build-up of reaction forces rendering such an accidental impact inconsequential.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

FIG. **1** is a side elevational view of the strap tensioner tool of the invention showing the manner of its use with a package having a strap loop and seal, with the tool gripping the protruding free end of the strap loop and with the seal being shown in cross-section;

FIG. **2** is an enlarged side elevational view of the tool of FIG. **1** illustrating the tensioning handle in full lines in the strap gripping position and in broken lines in the strap loading position;

FIG. **3** is a partial side elevational view of the tool of FIGS. **1** and **2**, showing the tool in the strap loading position;

FIG. **4** is a top plan view of the tool of FIGS. **1** through **3**; and

FIG. **5** is an enlarged cross-sectional view taken generally along line **5—5** of FIG. **4**.

DETAILED DESCRIPTION

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail a preferred embodiment of the invention, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawings, FIG. **1** shows the improved strap tensioning tool **10** which in general comprises a main frame **12** of elongated and generally narrow upright configuration which at the leading end thereof has a nose **14**, and anvil portion **15** inwardly of the nose, and a gripping and feeding assembly **18** immediately above anvil portion and in opposed relationship thereto. The feeding and gripping assembly **18** is pivoted to main frame **12** and carries a tension handle **20** extending outwardly therefrom and generally over main frame **12.** As will be described hereinafter, in addition to a strap tensioning function, handle **20** is also used to pivot assembly **18** between a strap loading position (FIG. **3**) to a strap gripping and feeding position (FIG. **2**).

The tensioning tool **10** is shown as it appears in use with a strap **22** disposed completely around a package or article **24** and a seal **26** for securing the strap loop in place. Strap **22** is preferably metal, as is known in the art, while seal **26** is of the push-type also known in the art. Such seals have legs **26***a* folded over and parallel with back **26***b* and spaced therefrom so that strap can be fed through the seal during the tensioning process. As can be seen from FIG. **1** in use the free end of the strap is fed through seal **26**, and the strap arranged in a loop about article **24** to provide an outer portion S'' overlapping an inner portion S'. An end section S''' of inner strap S' is folded under seal **26** so that it is held entrapped between the upper surface of package **24** and the facing lower surface of seal **26** as the strap is tensioned. Outer strap portion S'' is positioned between anvil portion **15** and tensioner assembly **18** and the nose **14** of the tool butted against seal **26** to hold the seal against movement as the strap loop is tensioned by oscillation of handle **20**.

For more details of the construction of the tool, reference may now be made to FIGS. **2** through **5**. Main frame **12** is relatively narrow in plan view compared to tensioner assembly **18**, as may be seen in FIG. **4**, and at the end **27** thereof opposite nose **14**, it is manually graspable by the operator, with a gap being provided therefor between upper and lower longitudinal supports **28** and **30**. Immediately inwardly of nose **14** and generally in alignment with lower longitudinal frame member **30**, frame **12** includes anvil portion **15** extending orthogonally outwardly from one side **34** of frame **12**. Anvil portion **15** includes an upwardly facing surface **32** upon which is mounted wear plug **36**, and which, when the tool is in use, supports the portion of outer portion S'' of the strap which protrudes beyond seal **26**.

The strap feeding assembly **18** is pivoted at the end of main frame **12** immediately inwardly of nose **14** and upwardly of anvil portion **15**, and has drive section **38** (FIG. **4**) and strap engaging section **39**, respectively, on sides **34** and **34'** of main frame **12**. Thus, strap feeding assembly section **39** is generally in opposed relationship with anvil portion **15**, while the strap feeding assembly pivots in a limited arc transversely to the longitudinal direction of frame **12**. Spring **42**, one end of which bears against a portion of frame **12**, and the other end of which bears upon strap feeding assembly **18**, serves to strongly bias the tensioner assembly toward the upper surface **32** of anvil portion **15**.

Pivotally securing strap feeding assembly **18** to the frame **12** at the aforementioned pivot location is shaft **44**. It passes transversely through the entire strap feeding assembly **18** and a portion **45** of main frame **12** adjacent nose **14** (see FIG. **4**), so that its axis is perpendicular to the longitudinal axis of main frame **12**. It is spaced upwardly from both anvil **15** and nose **14** and located generally therebetween laterally. Drive section **38** of strap feeding assembly **18** is open at the top thereof to permit tension handle **20** to be mounted pivotally on shaft **44** and protrude outwardly from strap feeding assembly section **39**. Drive handle **20** is bifurcated at the pivoted end thereof to permit ratchet gear **46**, which is rotatably mounted on shaft **44**, to be straddled by the tension handle bifurcations, as shown in FIG. **4**. Carried immediately within the end of handle **20** and in contact with ratchet gear **46** is drive pawl **48**; it is rotatably mounted to a pin **49** passing through both bifurcations of handle **20** and biased clockwise (in the sense of FIGS. **1–3** and **5**) by spring **50**.

A second shaft **52** is also provided within the strap feeding assembly **18**, parallel to shaft **44** and passing through both sections **38** and **39** of the strap feeding assembly as well as the intervening portion **45** of the main frame **12**, just below and inwardly of shaft **44**. Shaft **52** is journaled for rotation within the walls of strap feeding assembly **18** and passes through an enlarged opening (not shown) within main frame portion **12** to allow the shaft to move with assembly **18** relative to frame **12**. A tension gear **54** is secured to shaft **52** within drive section **38** and meshes with ratchet gear **46**. Also rotatably secured to shaft **52** in section **39** of the strap feeding assembly is knurled strap feed wheel **56**. It is located at a position which is spaced from shaft **44** immediately above anvil portion upper surface **32** and wear plug **36**, and in opposing relationship thereto. Bias spring **42**, in exerting a downward force upon the strap feeding assembly **18**, serves to maintain feed wheel **56** normally against plug **36**, and to compress the strap end S'' therebetween. It should be noted that means other than wear plug **36** could be utilized as well; for example, a second wheel could be substituted, and strap end S'' captured between such second roller and the feed roller.

Initially, however, the strap feeding assembly **18** must be raised against spring **42** to accept strap end S'' between wheel **56** and wear plug **32**. To this end, a lift arm in the form of a lever **60** is pivotally secured by pin **61** within frame **12** spaced from shaft **44** immediately rearwardly of the end of assembly **18** opposite shaft **44**, and below handle **20**. Lever **60** is comprised of two arms **62** and **64** of generally similar length of the order of small fraction of the width of assembly **18** along frame **12**. The two arms extend from pin **61** along frame **12**, and define an angle somewhat greater than 90° with respect to each other. Arm **62** extends back toward end **27** from pin **61**, while arm **64** protrudes forwardly from pin **61** and into engagement with assembly **18** under a rearwardly extending end projection **66** (best seen in FIG. **5**) of section **39**. Under the influence of spring **42**, arm **64** is normally biased downwardly along with assembly **18**, thus causing arm **62** to normally protrude upwardly from frame **12** into the path of handle **20**. Assembly **18** may be pivoted about shaft **44** by exerting a force upwardly against end projection **66** by means of lever **60**. It will be seen from FIGS. **2**, **3** or **5** that a moment arm is defined by the distance between end projection **60** and the axis of shaft **44** which is much larger than that of either of arms **62** or **64** about pivot **61**.

Tension handle **20** is provided on its lower side near its pivoted end with an abutment or boss **68** positioned over arm **62**. The boss engages arm **62** when handle **20** is manipulated from its solid-line position of FIG. **2** to the dotted-line position, and when further moved downwardly to an extreme position immediately adjacent upper member **28** of frame **12**, drives the arm **62** downwardly, as shown in FIG. **3**. With such downward movement of arm **62**, arm **64**, already in engagement with protruding end portion **66** of assembly **18**, drives portion **66** together with assembly **18** upwardly, pivoting assembly **18** about shaft **44**. The mechanical advantage provided by handle **20** against spring **42** and lever **60** is not very large, since the distance of end portion **66** from shaft **44** is only a small amount less than that

of boss 68 from shaft 44, with arms 62 and 64 of comparable length. Thus the mechanical advantage is only enough to allow hand pressure to supply a force at protruding portion 66 somewhat larger than that provided by spring 42, and to overcome spring 42 in a reasonably easy manner. The upward pivoting of assembly 18 moves wheel 56 away from plug 36 and surface 32, thus enabling the free strap end S'' to be quickly and easily placed between these elements.

Once the strap end S'' is loaded into the tensioner and the nose 14 butted against the seal 26, downward manipulation of handle 20 toward frame 12 through an arc generally of about 180° to the solid-line position (FIG. 2) drives the feed wheel 56 counterclockwise through the drive mechanism, represented by drive pawl 48, ratchet gear 46, and tension gear 54, in order to take up the tension of the loop of strap 22. Pawl 48 has a narrow projection protruding from pin 49 against ratchet gear 46 for engaging the teeth thereof, as well as an extension section 59 protruding upwardly beyond the top surface of tension handle 10. With the downward motion of the tension handle, the drive pawl 48 engages ratchet gear 46 to cause clockwise motion of the ratchet gear and consequently counterclockwise motion of tension gear 54, which also engages ratchet gear 46. Thus, feed wheel 56, secured to the same shaft 52 as that of tension gear 54, is driven counterclockwise to feed the strap through seal 26 and gradually to tension the strap loop 22 and the strap portion S'' protruding beyond the strap loop and up to feed wheel 56. Upward motion of tension handle 10 at the end of its drive stroke to restore the handle upwardly preparatory to the next stroke does not, as a result of the action of pawl 48, impart any motion to ratchet gear 46, so that the drive is always in the indicated sense.

Moreover, as the tensioning of strap 22 progresses, a reaction tension is also present which tends to pull strap end S'' toward seal 26 and to reverse wheel 56 and gear 54 contrary to the driven direction (as indicated by the dotted arrowed line in FIG. 5) between tensioning strokes. In order to prevent such reversal and the release of tension between strokes, a pair of holding pawls 72 and 74 (FIG. 5) are carried within drive section 38 of strap feeding assembly 18 and are positioned to engage tension gear 54 at spaced locations along its periphery. Each holding pawl is biased by a coil spring (not shown) counterclockwise toward engagement with gear 54; however, the relatonship of the placement of the holding pawls with respect to the spacing of the gear teeth of gear 54 is such that only one of the holding pawls is in engagement between a pair of teeth of gear 54 at any one time, thereby minimizing the degree of reversal of the feed wheel under the influence of reaction tension.

In this manner, successive downward strokes of handle 20 multiply the strap tension and bind strap 22 about article 24 increasingly forcefully, without loss of tension between strokes. At the same time, reaction tension also multiplies manyfold, and creates a powerful resultant movement force acting clockwise about shaft 44 (as viewed in FIGS. 1–3 and 5) to bias assembly 18 toward anvil 15. Thus, the assembly 18 itself acts on a lever to translate the strap reaction tension into a large load acting downwardly through end projection 66 upon arm 64, and which increases with the strap tension. The difference between the moment arm defined by arms 62 or 64 about pivot 61 and the moment arm defined by the distance between projection 66 and the axis of shaft 44, insures that this load almost immediately becomes far greater than any countervailing force which could be exerted upon protruding portion 66 of assembly 18 by the operator through lever 60 and handle 20.

It will then be appreciated that with the tool of the invention, there is no need for concern if the operator accidentally swings handle 20 too far downwardly and causes boss 68 to contact lever arm 62. Once tensioning has progressed to any extent, such accidental impact has no effect, and the more the tension progresses, the more this is so. The tool may be released only by the deliberate action of the operator, done when tensioning is complete and seal 26 has been crimped into place about the overlapping strap portions. The operator then tilts the entire tool upwardly at about 90° to the upper surface of package 24, as shown by the dotted-line position in FIG. 1. Since nose 14 of the tool is butted against seal 26, and strap portion S'' is still held in a tensioned attitude by the tool, the upward movement of the tool bends and finally cleanly breaks off strap portion S'' at seal 26. The lever 60 then again becomes operable to start the cycle over and open a space between wheel 56 and plug 32 to enable strap portion S'' to be removed and the tool to be loaded once more.

It will also be appreciated that the advantages of the invention are not limited to the particular form of basic tensioner tool which has been described. Rather, the same advantages may be obtained when the invention is used with tensioner tools of various known designs, particularly with those incorporating a rack and pinion drive mechanism. Thus, if the package 24 is highly compressible, a rotary-type tool as has been described above is especially useful, since it has the advantage of unlimited take-up of strap slack. On the other hand, if the package 24 is made up of material which is not very compressible, a tensioner tool having a rack and pinion drive mechanism, with a consequently fixed stroke and limited strap take-up, may be as advantageous.

In any of these contexts, the invention provides an extremely rapid one-handle operation of the tool, and it eliminates false starts due to accidental release of tension, since the loading means including lever 60 become automatically effectively inoperable with the tensioning of the strap. Thus, a highly convenient, uncomplicated, and very time-saving advance in tensioning tools is disclosed which does not sacrifice any of the advantages of prior tools. Moreover, tools according to the invention represent an advance in safety of operation as well, since sudden accidental loss of tension and the resultant violent movement of a partially tensioned strap is prevented.

What is claimed is:

1. A strap tensioning tool for use with a strap disposed around an article in a loop so that an inner strap portion is overlapped by an outer strap portion to complete said loop, with a seal receiving a section of said overlapped portions and with an end section of said inner overlapped portion folded under said seal held between the article and the facing seal surface, said tool comprising: a frame having an anvil section, said frame having an abutment at one end thereof engageable with said seal, said outer overlapping strap portion protruding beyond said seal; tensioning means carried upon said frame and including a movable handle, a

feeding assemby having a strap-engaging member, means mounting the feeding assembly for movement relative to said frame toward and from said anvil section, means biasing the feeding assembly toward said anvil section to compress said protruding strap portion between said strap-engaging member and said anvil section, means for moving said feeding assembly away from said anvil and including a lever pivoted on said frame at a point removed from said feeding assembly and having a first arm extending into the path of said handle, said lever including a second arm engaging said feeding assembly and which upon movement of said handle into engagement with said first arm overcomes said feeding assembly biasing means and moves said feeding assembly relative to said frame to permit said protruding strap portion to be accepted between said anvil section and said strap engaging member, and a drive mechanism connected between said handle and said strap engaging member to transmit a tensioning force in a direction away from said seal and said abutment and toward said strap engaging member when said handle is moved relative to said frame, whereby said protruding strap portion is moved through said seal to increasingly tension said loop and the protruding strap section between said seal and said strap engaging member, with said increased tensioning of said protruding strap section providing an increasing reaction force through said strap engaging member to further bias said feeding assembly toward said anvil section, said biasing of said feeding assembly toward said anvil section thereafter increasing with the increased tensioning of said protruding strap section and the consequent reaction force to become far greater than any force exerted by said means for moving said feeding assembly, rendering said means effectively inoperable as said tension on said strap is increased.

2. A strap tensioning tool as in claim **1,** in which said anvil section is located at a position spaced from said one end of said frame, said feeding assembly is pivoted upon said frame at a position adjacent said anvil section and in opposed relationship to said anvil section, and said lever is pivoted on said frame closely adjacent to an end portion of said feeding assembly opposite said assembly pivot position, said second arm of said lever pivoting said feeding assembly away from said anvil section in response to the engagement of said handle with said first arm.

3. A strap tensioning tool as in claim **2,** in which said handle is pivoted with said feeding assembly upon said frame, said handle including an abutment section engaging said first arm and spaced from said pivot position a greater distance than said end portion of said assembly.

4. A strap tensioning tool as in claim **2,** in which the abutment at said one end of said frame includes a flat nose portion engageable with said seal, and said feeding assembly is pivoted on said frame at a position laterally spaced both from said anvil section and said nose portion and lying therebetween.

5. A strap tensioning tool as in claim **2,** in which said drive mechanism includes at least one pawl and gear cooperating therewith, said mechanism preventing release of said tension and causing a resultant force acting about said feeding assembly pivot position to increasingly strongly bias said feeding assembly against said anvil section and thereby render said means for moving said feeding assembly away from said anvil section effectively inoperable as said tension on said strap is increased.

6. A strap tensioning tool as in claim **2,** in which said strap engaging member is a wheel mounted in opposed relationship with said anvil section and spaced from said feeding assembly pivot position.

7. A strap tensioning tool as in claim **1,** in which said feeding assembly and said drive mechanism form a unitary assembly pivoted upon said frame at a position closely adjacent said one end of the frame.

8. A strap tensioning tool as in claim **7,** in which said means mounting the feeding assembly for movement includes a first shaft mounted to said frame and upon which both said unitary assembly and said handle are pivoted, and said lever pivot point is located closely adjacent an end portion of said unitary assembly opposite said shaft.

9. A strap tensioning tool as in claim **8,** in which the lengths of said lever arms are a small fraction of said distance between said end portion of said unitary assembly and said first shaft.

10. A strap tensioning tool as in claim **8,** in which said end portion of said unitary assembly is located a shorter distance from said first shaft than the abutment section of said handle engaging the first arm of said lever.

11. A strap tensioning tool as in claim **8,** in which said handle extends from said unitary assembly, and said unitary assembly includes a drive pawl and a ratchet gear mounted on said first shaft, said drive pawl engaging said ratchet gear to drive said gear in one sense only, said unitary assembly further including a second shaft, and a tensioner gear and feed wheel secured to said second shaft, said tensioner gear engaging said ratchet gear, said feed wheel being positioned in opposed relationship to said anvil section to move said protruding strap portion therebetween, said strap tension giving rise to a resultant force biasing said unitary assembly toward said anvil section and preventing the pivoting of said unitary assembly by said lever and handle once tension has been established in said strap.

12. A strap tensioning tool for use with a strap disposed around an article in a loop so that an inner strap portion is overlapped by an outer strap portion to complete said loop, with a seal receiving a section of said overlapped portions and with an end section of said inner overlapped portion folded under said seal held between the article and the facing seal surface, said tool comprising: a frame having an end portion adapted to butt against said seal and a strap supporting surface spaced from said end portion; a strap feeding assembly including a strap gripping member; means defining an axis on said frame above said strap supporting surface for pivotally mounting said strap feeding assembly for movement between a strap loading position where said gripping member is spaced from said strap supporting surface and a strap feeding position where said gripping member compresses said strap against said surface, the distance between said axis and said strap supporting surface effectively defining a moment arm about which strap tension forces may be applied to said strap feeding assembly; a tension handle pivotally supported on said frame; drive means connected between said tension handle and said strap gripping member for applying a tensioning force to said strap and for feeding said strap away from the end portion of the frame and toward the strap gripping member upon pivotal movement of said handle in one direction; a lift arm pivotally

supported on said frame in spaced relationship with respect to said axis, said lift arm being in the form of a lever having a first arm positioned in the path of movement of said tension handle and a second arm positioned to engage said strap feeding assembly, engagement of said tension handle with the first arm of said lever being effective to pivot said feeding assembly from said strap feeding position to said loading position in the absence of tension in said strap, the effective moment arm of the second arm of said lever being substantially less than said first-mentioned moment arm, whereby said tension handle is effectively prevented from pivoting said feeding assembly from its strap feeding position once tension is drawn in said strap loop.

13. A strap tensioning tool as in claim **12,** which further includes means biasing said strap feeding assembly toward said strap supporting surface to compress said protruding strap portion therebetween in said strap feeding position.

14. A strap tensioning tool as in claim **12,** in which said strap gripping member is a wheel mounted in opposed relationship with said strap supporting surface and spaced from said axis.

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