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Attorneys for Plaintiffs and Counterdefendants
ACCENTRA, INC. and WORKTOOLS, INC.

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

ACCENTRA, INC., a New Jersey
corporation; and WORKTOOLS, INC.,
a California corporation,

Plaintiffs,

vs.

ACCO BRANDS CORPORATION, a
Delaware corporation; and ACCO
BRANDS USA LLC, a Delaware
corporation; and DOES 1-10, Inclusive,

Defendants.

And Related Counterclaims

Case No. CV-10-01164 DSF (Ex)

FIRST AMENDED COMPLAINT

Action Filed: February 18, 2010
Judge: Hon. Dale Fischer

Plaintiffs, Accentra, Inc. ("Accentra") and WorkTools, Inc. ("WorkTools")
(collectively "Plaintiffs"), for their First Amended Complaint against Defendants
Acco Brands Corporation and Acco Brands USA LLC (collectively "Defendants"),
allege as follows:

JURISDICTION AND VENUE

1. This action arises under Titles 15 and 35 of the United States Code.
Jurisdiction of this Court is based on 28 U.S.C. §§ 1331 and 1338(a). Jurisdiction of
this Court is also based on 28 U.S.C. §§ 1332, 1338(b), and 1367(a).

2. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b),

1 1391(c), and 1400(b).

2 THE PARTIES

3 3. Plaintiff Accentra is a corporation organized under the laws of the State
4 of New Jersey, having its principal place of business at 301 South State Street, Suite
5 N200, Newtown, Pennsylvania 18940.

6 4. Plaintiff WorkTools is a corporation organized and existing under the
7 laws of the State of California, having its principal place of business at 20755
8 Plummer Street, Chatsworth, California 91311.

9 5. Upon information and belief, Defendant Acco Brands Corporation is a
10 corporation organized and existing under the laws of the State of Delaware, having its
11 principal place of business at 300 Tower Parkway, Lincolnshire, Illinois 60069.

12 6. Upon information and belief, Defendant Acco Brands USA LLC is a
13 corporation organized and existing under the laws of the State of Delaware, having its
14 principal place of business at 300 Tower Parkway, Lincolnshire, Illinois 60069.

15 BACKGROUND

16 7. Plaintiffs Accentra and WorkTools are engaged in the business of
17 designing, manufacturing, selling, and/or distributing innovative new spring-powered
18 staplers. These staplers have received widespread and favorable reception from the
19 public. Many features of these staplers are covered by patents that are of great value
20 to Plaintiffs, and are important for their continued commercial success.

21 8. On March 13, 2007, Acco Brands USA LLC filed a Complaint for
22 Declaratory Judgment, Unfair Competition, and Tortious Interference, naming
23 Plaintiffs as defendants. The relief sought by Acco Brands USA LLC included, *inter*
24 *alia*, a declaration of non-infringement and invalidity of U.S. Patent No. 7,178,709
25 (“the ‘709 patent”). The complaint was dismissed on May 13, 2008 for lack of
26 subject matter jurisdiction.

27

28

1 9. On September 10, 2007, while the action with Acco Brands USA LLC
 2 was pending, Plaintiffs filed a Complaint against Staples, Inc.¹, the self-described
 3 “world’s largest office products company.”² The Complaint alleged infringement of
 4 the ‘709 patent and U.S. Patent No. 7,234,621 based on the manufacture, use, offer
 5 for sale, sale, and importation by Staples of its Executive One-Touch stapler.
 6 Plaintiffs subsequently filed Amended Complaints alleging infringement of three
 7 additional patents³; violation of § 43(a) of the Lanham Act, 15 U.S.C. § 1125(a);
 8 infringement of common law trademark; and California statutory and common law
 9 unfair competition, based on activities relating to the Executive One-Touch stapler
 10 and three additional staplers.

11 10. Plaintiffs have been working diligently to enforce their rights in the ‘709
 12 patent and other patents since before the filing of the complaint against Staples in
 13 September of 2007, and have been devoting substantial amounts of time and
 14 resources to advance the litigation with Staples since that time. Fact discovery has
 15 been extensive, involving, *inter alia*, the exchange of hundreds of thousands of pages
 16 of documents and the taking of nearly twenty depositions.

17 11. Upon information and belief, Defendants have been manufacturing,
 18 using, selling, and/or importing spring-powered stapling devices, specifically the
 19 “Swingline Optima PowerEase,” Swingline PowerEase,” and “Swingline Compact
 20 PowerEase” staplers, in or into the United States.

21 12. On information and belief, Defendant Acco Brands Corporation has
 22 continuous and systematic contacts with the State of California, including within the
 23 Central Judicial District of California. Acco Brands Corporation is registered with
 24

25 ¹ Staples the Office Superstore LLC was subsequently added as a Defendant.

26 ² www.staples.com/sbd/cre/marketing/about_us/

27 ³ Three patents, including the ‘709 patent, are currently being asserted in the action
 28 against Staples.

1 the California Secretary of State (Entity No. C3103438) to engage in repeated and
 2 successive transactions of its business in California, and has designated Corporation
 3 Service Company, d/b/a/ CSC – Lawyers Incorporating Serve, 2730 Gateway Oaks
 4 Drive, Suite 100, Sacramento, CA 95833, as its agent for service of process in
 5 California.

6 13. On information and belief, Defendant Acco Brands USA LLC has
 7 continuous and systematic contacts with the State of California, including within the
 8 Central Judicial District of California. Acco Brands USA LLC is registered with the
 9 California Secretary of State (Entity No. 200612210031) to engage in repeated and
 10 successive transactions of its business in California, and has designated United States
 11 Corporation Company, 2730 Gateway Oaks Drive, Suite 100, Sacramento, CA
 12 95833, as its agent for service of process in California.

13 **CAUSE OF ACTION**

14 14. Plaintiffs incorporate by reference each and every allegation contained in
 15 paragraphs 1 through 13 above.

16 15. The '709 patent, entitled "Spring Energized Desktop Stapler," was duly
 17 and legally issued on February 20, 2007. A copy of the '709 patent is attached hereto
 18 as Exhibit A.

19 16. U.S. Patent No. 5,664,722 ("the '722 patent"), entitled "Forward Acting,
 20 Forward Grip, Staple Machine," was duly and legally issued on September 9, 1997.
 21 A copy of the '722 patent is attached hereto as Exhibit B.

22 17. U.S. Patent No. 7,748,589 ("the '589 patent"), entitled "Spring
 23 Energized Desktop Stapler," was duly and legally issued on July 6, 2010. A copy of
 24 the '589 patent is attached hereto as Exhibit C.

25 18. Plaintiff WorkTools is the owner of the entire right, title, and interest in
 26 and to the '709, '722, and '589 patents ("the Patents-in-Suit").

27 19. Plaintiff Accentra is the exclusive licensee of the Patents-in-Suit.

28 20. As the owner and exclusive licensee of the Patents-in-Suit, Plaintiffs

1 have the right to bring actions for infringement thereof.

2 21. On information and belief, Defendants are infringing and have infringed
3 the Patents-in-Suit in violation of 35 U.S.C. § 271, by making, using, offering for
4 sale, selling, and/or importing stapling devices, including the "Swingline Optima
5 PowerEase," "Swingline PowerEase," and "Swingline Compact PowerEase" staplers,
6 in or into the United States.

7 22. On information and belief, Defendants have had actual knowledge
8 and/or notice of at least the '709 and '722 patents.

9 23. Plaintiffs have been damaged as a result of Defendants' acts of patent
10 infringement in an amount to be determined at trial, and will suffer imminent and
11 irreparable injury unless this Court enjoins Defendants from further acts of
12 infringement.

13 24. Defendants' acts of infringement have been carried out deliberately and
14 willfully, without the consent of Plaintiffs and with full knowledge of the Patents-in-
15 Suit, entitling Plaintiffs to treble damages under 35 U.S.C. § 284.

16 25. This is an exceptional case entitling Plaintiffs to an award of attorneys'
17 fee under 35 U.S.C. § 285.

18 WHEREFORE, Plaintiffs pray for judgment as follows:

19 1. That Defendants have been and are infringing, are contributing to
20 the infringement of, and are actively inducing infringement of the Patents-in-Suit;

21 2. That Defendants and their officers, agents, and employees and all
22 others in concert or participation with them be preliminarily and permanently
23 enjoined from further acts of infringement of the Patents-in-Suit under 35 U.S.C. §
24 283;

25 3. That Plaintiffs be awarded damages adequate to compensate them
26 for Defendants' infringement of the Patents-in-Suit, together with interest and costs
27 under 35 U.S.C. § 284;

28 4. That Plaintiffs be awarded treble the damages they have incurred

1 by reasons of Defendants' acts of deliberate and willful infringement of the Patents-
2 in-Suit under 35 U.S.C. § 284;

3 5. That Defendants be required to pay Plaintiffs' reasonable
4 attorneys' fees in connection with this action as provided in 35 U.S.C. § 285;

5 6. That Defendants be directed to file with this Court and serve on
6 Plaintiffs within thirty (30) days after service of an injunction, a report in writing,
7 under oath, setting forth in detail the manner and form in which Defendants have
8 complied with this injunction ordered by this Court;

9 7. That Defendants be required to pay all of Plaintiffs' costs and
10 expenses, including expert witness fees; and

11 8. That Plaintiffs have such other, further and different relief as this
12 Court deems just and proper.

13 Respectfully submitted,

14
15 Dated: December 21, 2010

FOX ROTHSCHILD LLP

16
17 

18 Joseph F. Posillico
19 Frank T. Carroll
20 Alan C. Chen


21 Attorneys for Plaintiffs and Counterdefendants
22 Accentra, Inc. and WorkTools, Inc.
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DEMAND FOR JURY TRIAL

Plaintiffs hereby demand trial by jury on all issues raised by the Complaint.

Dated: December 21, 2010

FOX ROTHSCHILD LLP



Joseph F. Posillico

Frank T. Carroll

Alan C. Chen

Attorneys for Plaintiffs and Counterdefendants

Accentra, Inc. and WorkTools, Inc.

EXHIBIT A



US007178709B2

(12) **United States Patent Marks**

(10) **Patent No.:** US 7,178,709 B2
 (45) **Date of Patent:** *Feb. 20, 2007

(54) **SPRING ENERGIZED DESKTOP STAPLER**

(75) **Inventor:** Joel Marks, Sherman Oaks, CA (US)

(73) **Assignee:** WorkTools, Inc., Chatsworth, CA (US)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 30 days.

This patent is subject to a terminal disclaimer.

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Packaging: *EasyShot Staple Gun & Desktop Stapler, PowerShot*, Jan. 2001.

Primary Examiner—Rinaldi I. Rada

Assistant Examiner—Nathaniel Chukwurah

(74) **Attorney, Agent, or Firm**—Paul Y. Feng; Fulwider Patton LLP

(21) **Appl. No.:** 11/065,781

(22) **Filed:** Feb. 24, 2005

(65) **Prior Publication Data**

US 2005/0139631 A1 Jun. 30, 2005

Related U.S. Application Data

(63) Continuation of application No. 10/443,854, filed on May 23, 2003, now Pat. No. 6,918,525.

(51) **Int. Cl.**
B25C 5/00 (2006.01)
B25C 5/04 (2006.01)

(52) **U.S. Cl.** 227/107; 227/119; 227/120

(58) **Field of Classification Search** 227/119, 227/120, 125, 126, 132, 134, 107
 See application file for complete search history.

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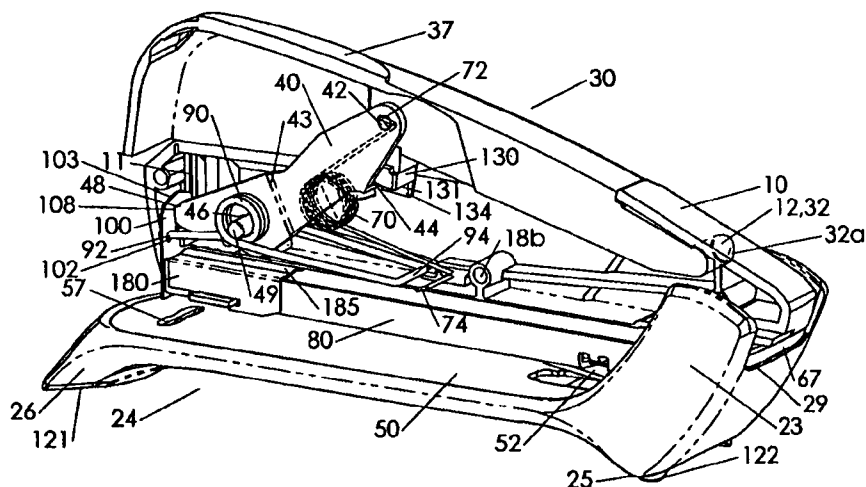
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(57) **ABSTRACT**

A desktop stapler uses a spring to store energy to install staples by impact blow. The force required to fasten papers together is reduced. A very compact mechanism is used, including a dual coil power spring with a nested lever. A multi-function base provides a sloped front all the way to down to a desk top surface to guide paper sheets atop the base, easy access for lifting the stapler off a desk, horizontal or vertical resting positions, and integrated soft grip under-surface. The base surrounds the rear of the stapler body to provide a smooth exterior so that the device is natural to use both horizontally and vertically. A simple re-set spring provides a smooth re-set action as the handle is raised. A staple track includes enlargement features to fit a larger staple pusher spring.

29 Claims, 13 Drawing Sheets



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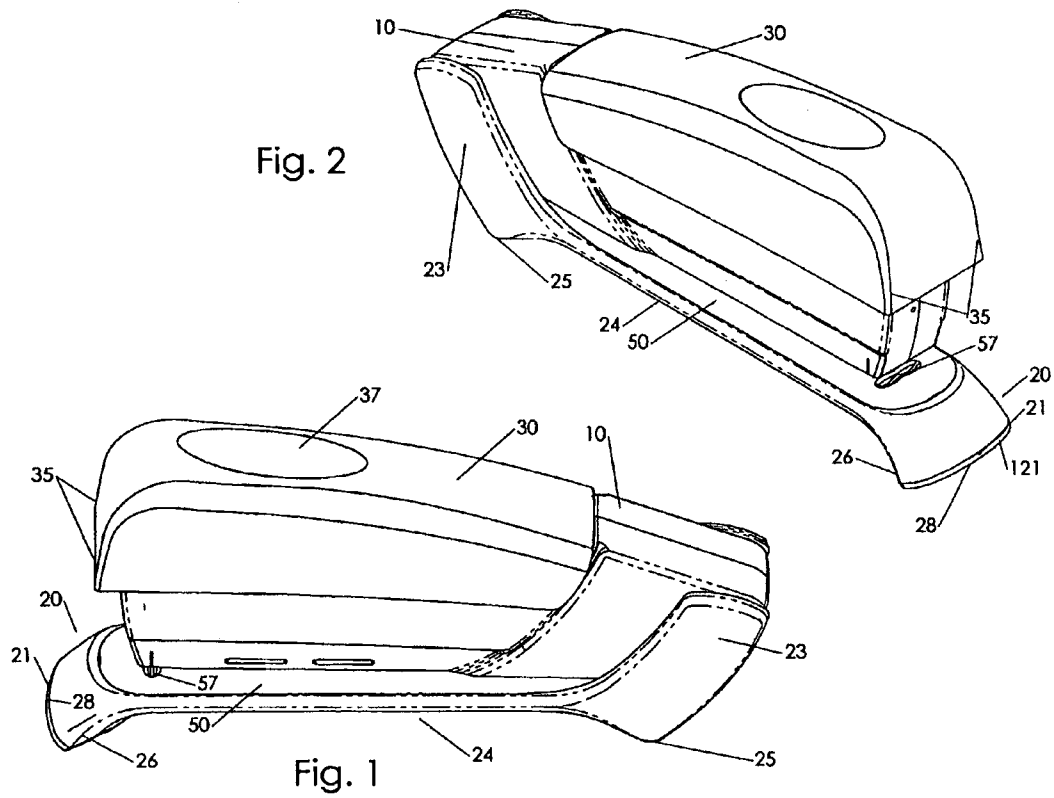
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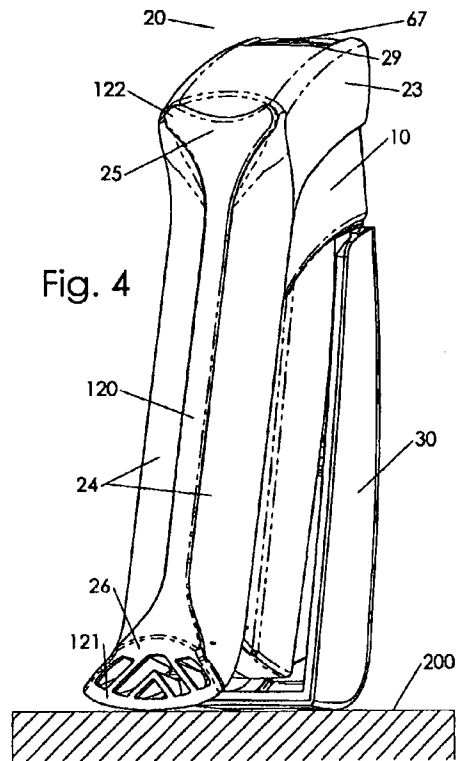
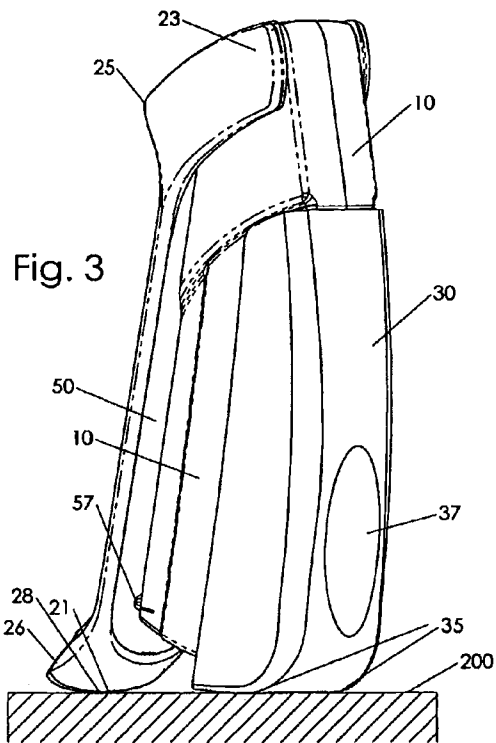


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Fig. 5

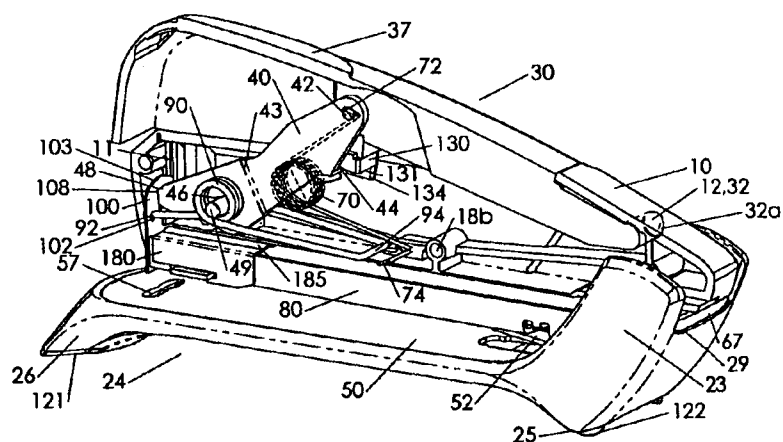
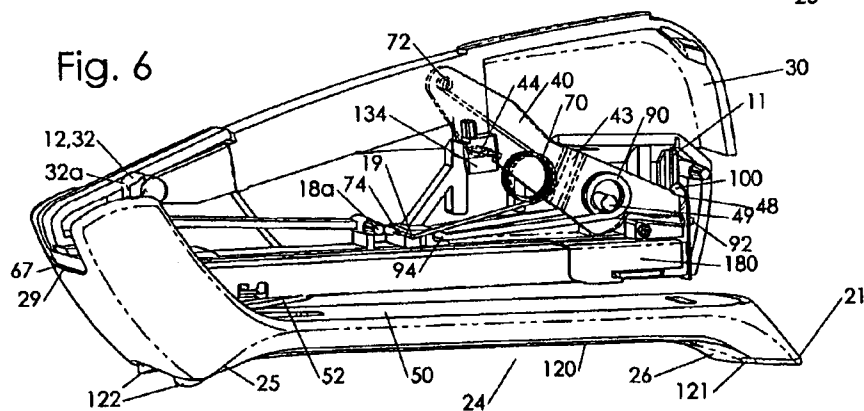


Fig. 6

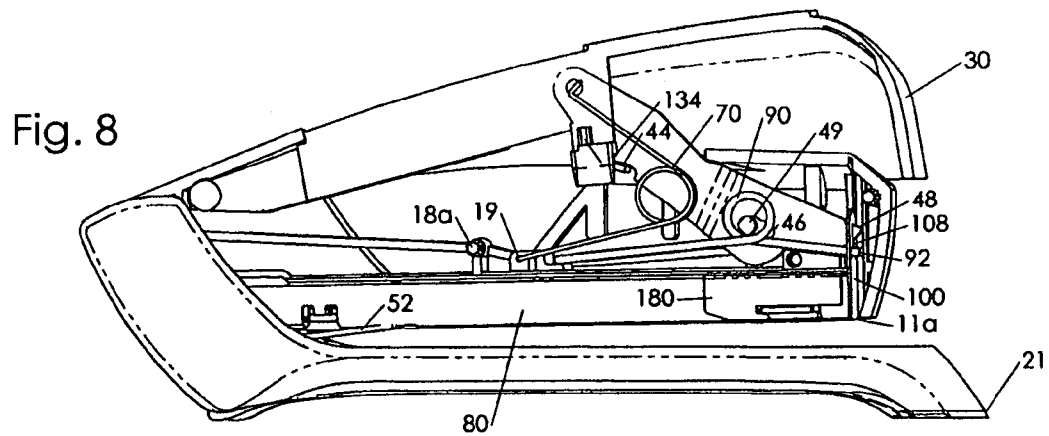
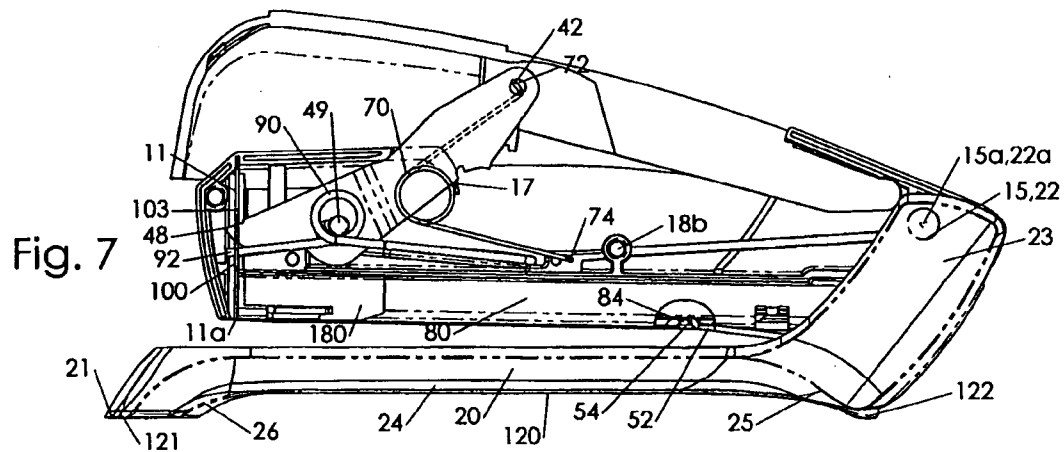


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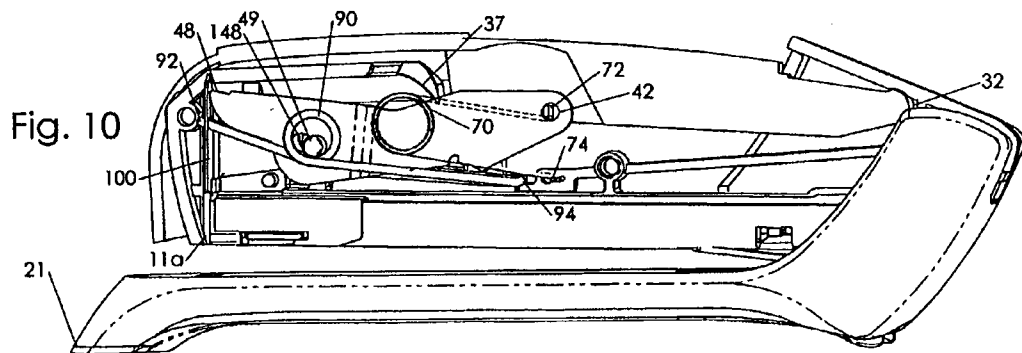
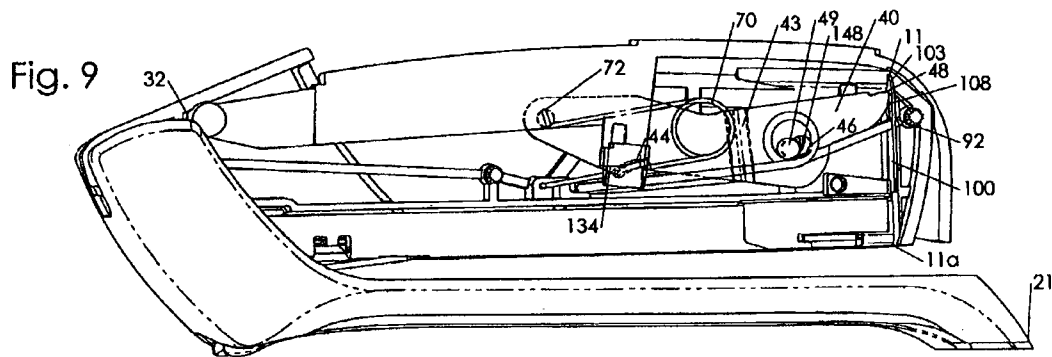


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Fig. 11

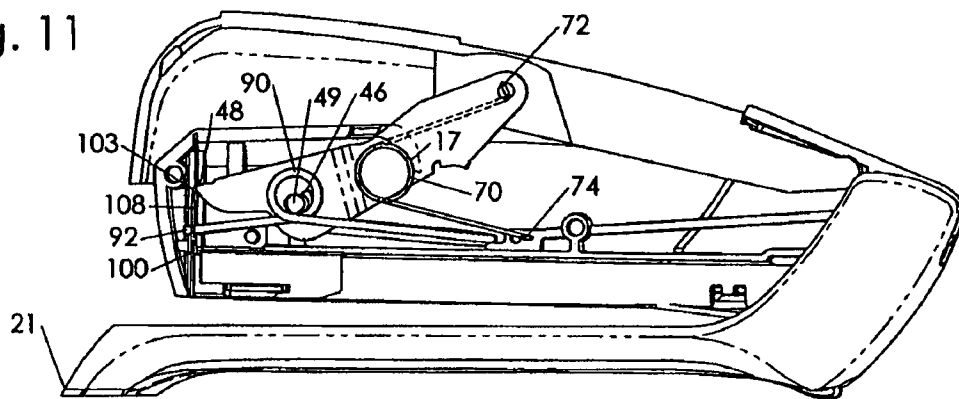
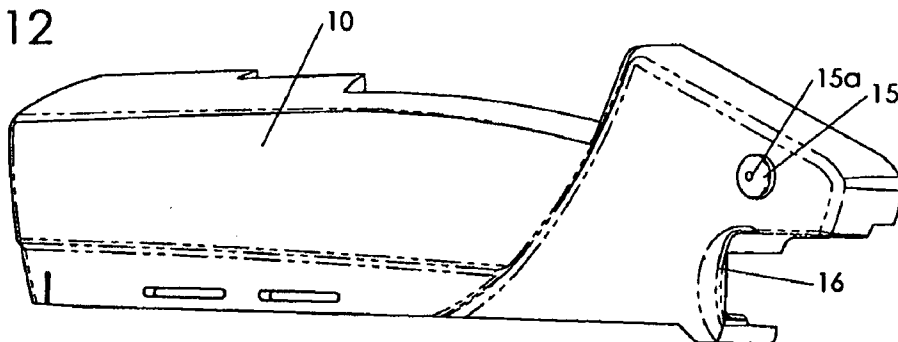


Fig. 12



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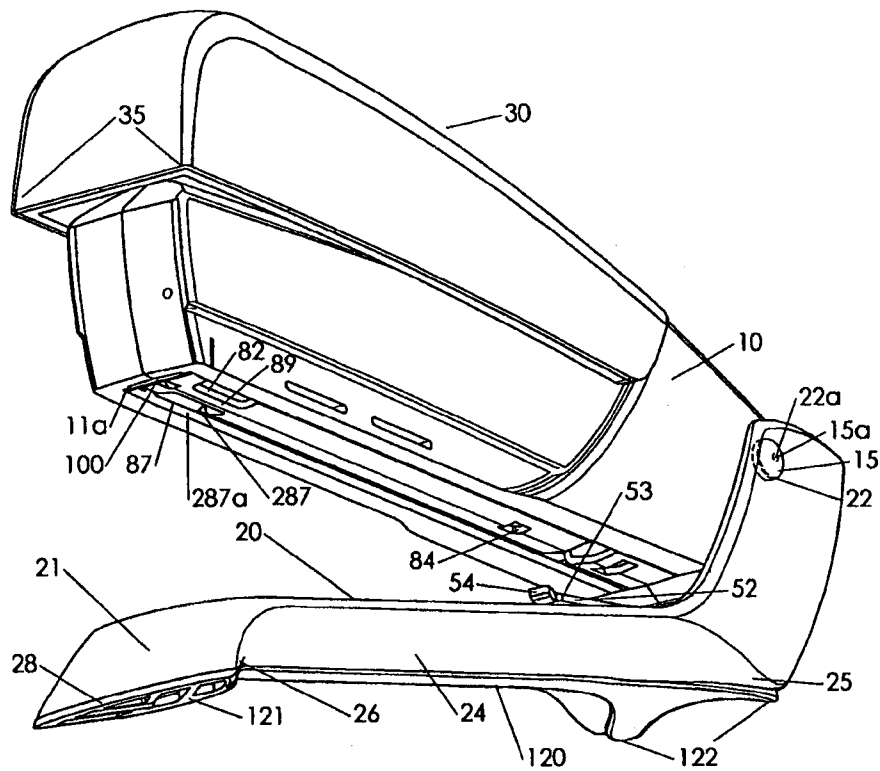


Fig. 13

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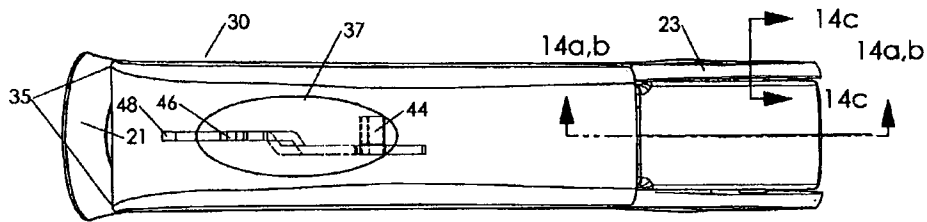


Fig. 14

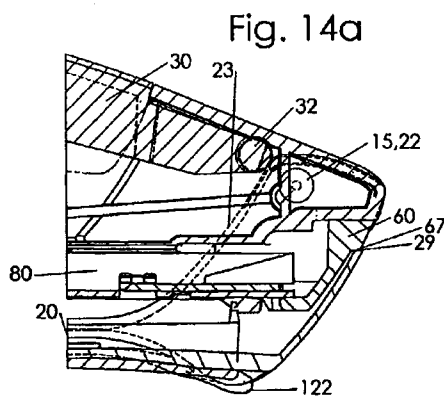


Fig. 14a

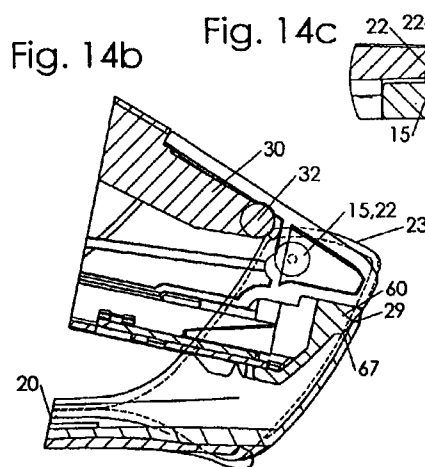


Fig. 14b

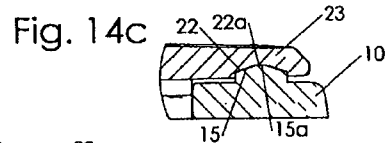


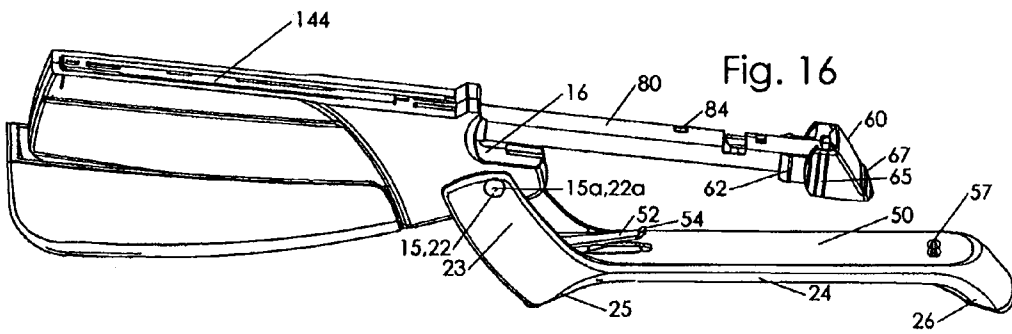
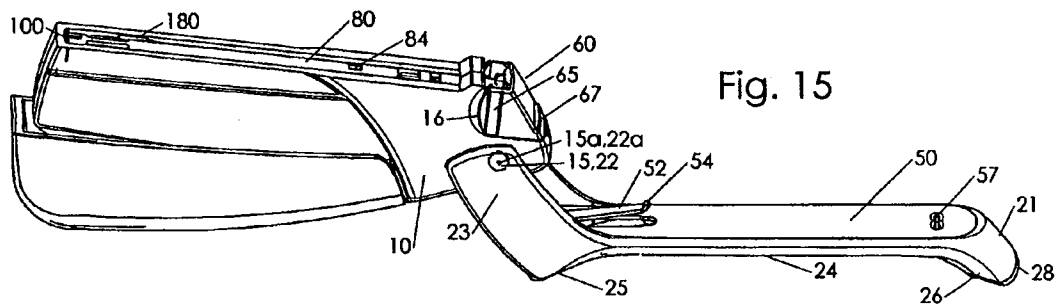
Fig. 14c

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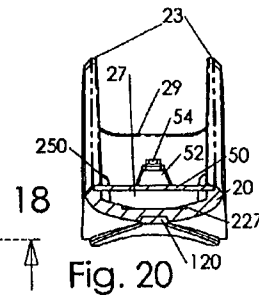
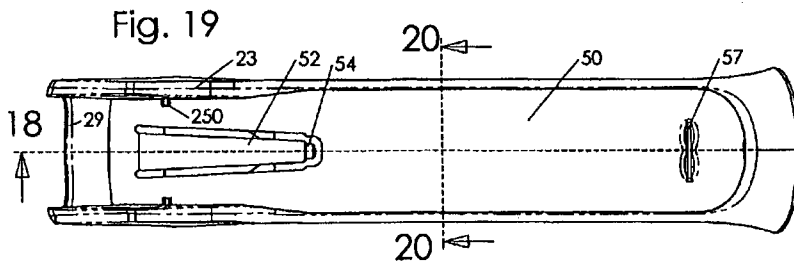
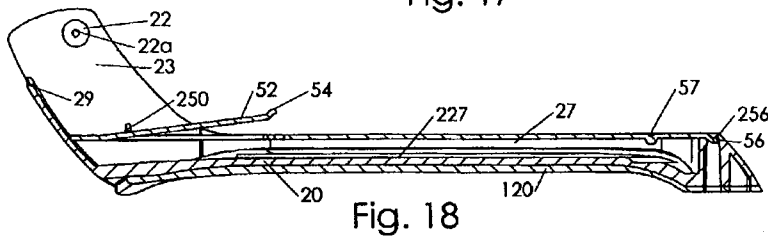
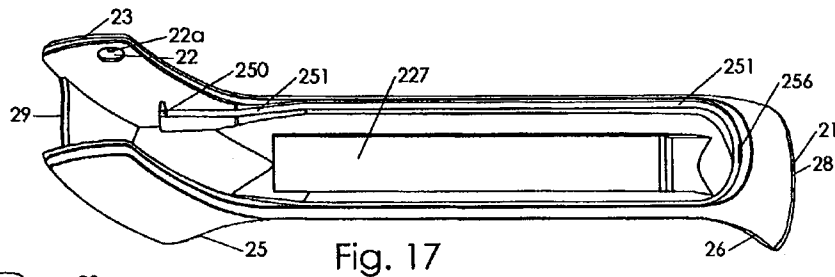


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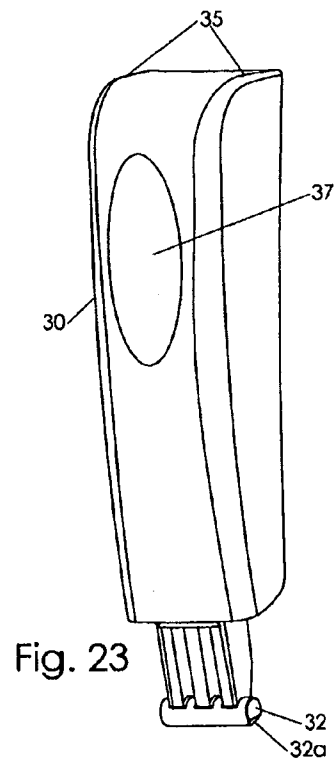
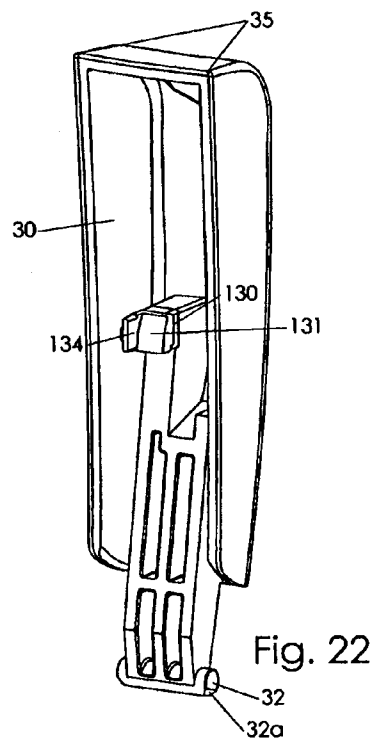
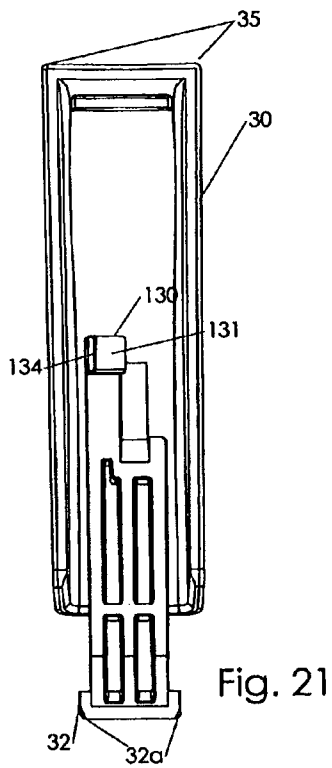


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Fig. 24

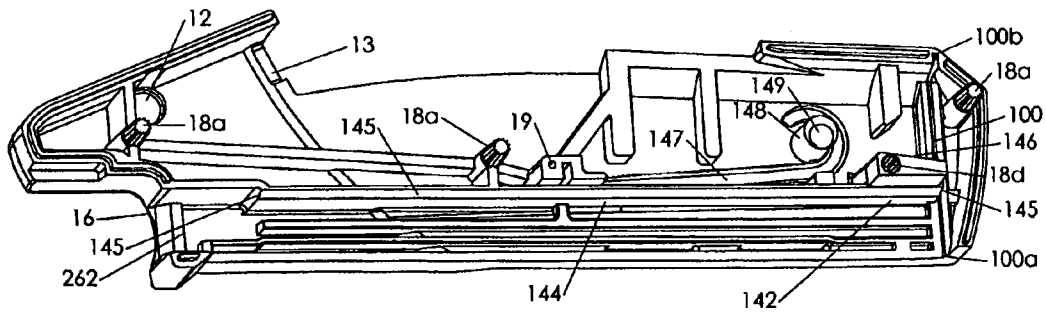
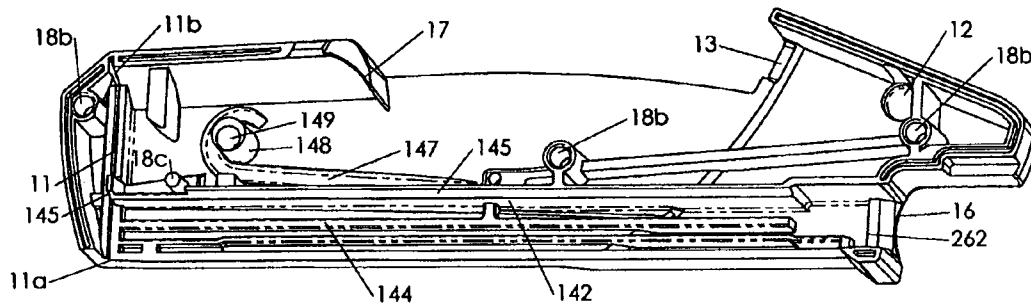


Fig. 25

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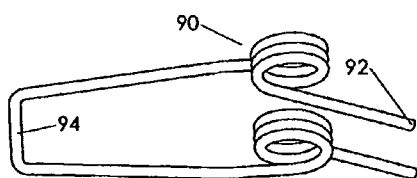


Fig. 26

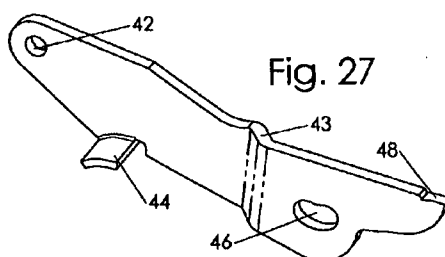


Fig. 27

Fig. 28

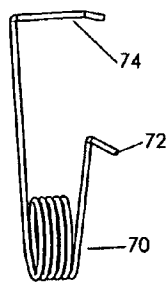


Fig. 30

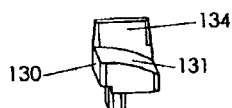


Fig. 29

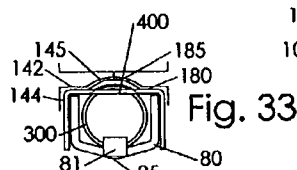


Fig. 33

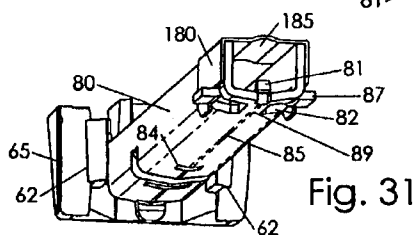


Fig. 31

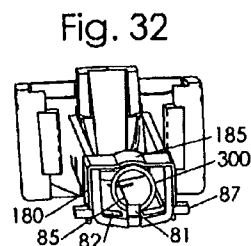


Fig. 32

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SPRING ENERGIZED DESKTOP STAPLER**CROSS-REFERENCE TO RELATED APPLICATIONS**

This is a continuation application of application Ser. No. 10/443,854, filed May 23, 2003 now U.S. Pat. No. 6,918,525, whose entire contents are hereby incorporated by reference.

FIELD OF THE INVENTION

The present invention relates to desktop staplers. More precisely the present invention discloses improvements to a spring-actuated stapler.

BACKGROUND OF THE INVENTION

In a common desktop stapler a striker is linked directly to a handle so that pressing the handle ejects a staple out and through a stack of papers. Three distinct forces must be overcome: breaking off the staple from the rack of staples, piercing the papers, and folding the staple legs behind the papers. As the staple moves through the cycle there are force peaks and force lows. The result is a jerky experience as the user forces the handle down. The handle resists, suddenly gives way, and then resists again. Even though the peak forces are for short durations, they define the difficulty of using a stapler. Empirical information suggest that a conventional stapler requires peak forces of 15 to 30 pounds, depending on the number of paper sheets to be fastened.

It is desirable to limit the peak force required. An effective way to do this is to accumulate the total energy needed to install the staple and then release that energy all at once by striking the staple in an impact blow. This is a type of action commonly used in staple gun tackers. A handle is pressed through a range of motion causing a spring to store energy. The stored energy is suddenly released at a predetermined handle position. A striker linked to the spring ejects and installs a staple released at a predetermined handle position. A striker linked to the spring ejects and installs a staple.

An important advantage of using stored energy to install a staple is that the handle end need not be directly linked to the striker. In a common direct acting desktop stapler the handle front end moves exactly as the staple moves. This means that, for example, 15 lbs. to force a striker, thus a staple, to move 1 mm requires 15 lbs. to move the handle that same 1 mm. If the driving energy is stored, then the handle can be de-linked from the striker. The handle can move more than the striker moves to provide enhanced leverage. For example, the handle, where it is pressed near its front end, may move downward one inch as the spring is deflected, while the striker moves just 1/2 inch when the spring is released. According to the preceding discussion, force in stapling can be reduced through two ways. First, spring stored energy allows removal of force peaks by averaging forces over a full handle motion. Second, the energy can be stored through a leveraged system.

A stapler must have a method for adding staples to a staple track. In a common direct acting stapler the striker has a rest position immediately above the staple to be ejected. The track may move outward from the front of the stapler to expose a staple loading area since the striker does not obstruct such motion. Or the handle may be linked to a staple pusher whereby pivoting the handle away from the track causes the pusher to retract while the track becomes exposed.

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In a practical spring actuated stapler these two common loading systems are not easily provided. The striker rests in its down position just in front of the staple rack. It is not possible to slide the track out past the obstruction created by the striker. Further, since there is an energy storage mechanism linking the striker to the handle in the spring-actuated stapler, it would require a complex design to provide for exposing the staple track by pulling the handle away from the track. An alternate staple loading design is needed.

Among the prior art is UK Patent GB2229129. A spring actuated heavy-duty desktop stapler includes a two piece molded housing with a double torsion (two coil) power spring. A lever has a "U" channel section, and engages an extended handle by means of a roller linkage.

German Patent DT2856-621 shows a staple gun that uses a similar mechanism to the above '129 reference, but as a staple gun tacker, without a base or a forward handle linked to the lever.

U.S. Pat. No. 4,463,890 discloses a standard style desktop stapler with a spring-actuated driver. The striker has a raised rest position, above the staples as in typical direct action staplers. Base 10 overhangs rubber footpads under the base at the distal front and rear ends of base 10.

U.S. Pat. No. 2,271,479 shows a stapler with footpads slightly more closely integrated with the base. The front footpad angles upward and forward to meet the lower edge of the base, leaving a notch under the base.

UK Patent GB2032327 shows re-set spring 12 attached to lever 3 rearward of lever pivot 4.

U.S. Pat. Nos. 5,988,478 and 6,145,728, to the present inventor, show forward action staple guns. In both references the lever has a "U" channel section that partially surrounds the power spring from above. In '728 lever 60 engages striker 80 by two opposed openings 83. Power spring 70 fits into striker opening 87 between the opposed lever openings. In '478, the handle is pivoted to the body by arcuate extensions 32 surrounding post 12.

U.S. Design Pat. Nos. 186342, B396377, D413239, and D437,754, show various base designs. A short center portion of the base is actually or visually raised in these designs.

U.S. Pat. No. 5,699,949 to the present inventor shows a further forward action staple gun. A staple track is at the bottom of the device, behind the numeral 50 in FIG. 1, formed as an upright "U" metal channel. A staple track guiding tab of: the track is seen just to the left and above the numeral 5 in FIG. 1. An opening is seen in the side of the track from which the tab has been formed. A pusher spring resembling a cross hatch shows through this opening in FIG. 1. The tab is made from a cut out portion of the side of the "U" channel.

U.S. Pat. No. 2,218,794 shows a spacer spring 39 that serves a function to releasably limit upward motion of the body through a snap fit. Elongated "ears or bearings 11" position the body laterally above the base in a conventional way by contact between the body sides and the elongated bearings 11. Spring 39 includes various out-of-plane bends to allow it to change length as the body closes against the base. It is therefore not stiff in the lateral direction. Further, rivet 38 does not provide substantial lateral stiffness to spring 39.

U.S. Pat. No. 4,546,909 shows a stapler with a spacer spring a3 or a4 formed as a "punched out" element.

U.S. Pat. No. 4,795,073 shows a spacer spring 19 that is apparently molded as part of the base.

U.S. Pat. No. 4,811,884 shows a base with a rearward attachment to the body. Groove 107 engages tab 108 to hold the base in the fully open position, col. 9, lines 5-13.

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SUMMARY OF THE INVENTION

In the present invention a desktop stapler includes improvements to increase ease of use and modes of use. A spring is linked to a striker so that when the striker is raised and suddenly released the stored energy of the spring drives a staple through a stack of papers to be fastened together. A handle is pressed to raise the striker and store energy in the spring. Improvements of the invention include: a very compact mechanism to maintain a conventional looking size of the stapler, a smooth re-set action as the handle is raised, a simplified handle pivot connection and assembly method, a spring to raise the stapler body away from the base where the spring is integrated into a base cover plate, the base cover plate further including a staple forming anvil, a press fitted connection between the body and the base, a novel method to accurately position the body front end over the anvil, a location for a staple loading track that is convenient and compatible with a striker that maintains a lowered rest position, a rear distal end of the body resiliently engages a rib of the base to create a releasable detent holding the body in a maximum up position from the bias of the body raising spring, and a base that is raised along the majority of its length and is convex in its underside to facilitate lifting the stapler off a table. A further operational mode allows that the stapler rests on a desk in a front down vertical position so that it may be most easily lifted up for use.

A staple loading system includes a track pull element that is normally hidden from view. Pivoting the body up from and rearward of the base exposes the track pull for operation.

An advantage of the present invention is that the low operating force makes it easy to use with an extended hand on a desk. It is even practical to press by fingertips.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an upper left side view of the stapler of the invention.

FIG. 2 is an upper front right side view of the stapler of FIG. 1.

FIG. 3 is an upper right side view of the stapler in a vertical orientation.

FIG. 4 is a bottom right side view of the stapler of FIG. 3.

FIG. 5 is a rear-left side view of the stapler with the left housing half removed, and the handle partly in section.

FIG. 6 is a rear-right side view of the stapler of FIG. 5, with the right housing half removed, and the handle partly in section.

FIG. 7 is a side view of the stapler of FIG. 5.

FIG. 8 is a side view of the stapler of FIG. 6.

FIG. 9 is the stapler of FIG. 8, with the mechanism in a pre-release position.

FIG. 10 is the stapler of FIG. 7, with the mechanism in a prerelease position.

FIG. 11 is the stapler of FIG. 7, with the mechanism in a re-set stroke.

FIG. 12 is a side-rear exterior view of a left housing half of the stapler.

FIG. 13 is a front-left side view of the stapler, with the body partially raised.

FIG. 14 is a top view of the stapler, a lever in hidden view.

FIG. 14a is a partial side sectional view of the stapler of FIG. 14.

FIG. 14b is the view of FIG. 14a, with the body pivoted upward.

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FIG. 14c is a partial sectional view of the stapler of FIG. 14.

FIG. 15 is an upper-right side view of the stapler, with the body pivoted fully to the rear of the base.

FIG. 16 is the stapler of FIG. 15, with the track opened for staple loading.

FIG. 17 is an upper-right side view of a stapler base.

FIG. 18 is a partial sectional side view of the base of FIG. 17, with a cover plate assembled to the base.

FIG. 19 is a top view of the base assembly of FIG. 18.

FIG. 20 is a partial sectional lengthwise view of the base of FIG. 19.

FIG. 21 is a bottom view of a stapler handle.

FIG. 22 is a bottom-left view of the handle of FIG. 21.

FIG. 23 is a top-right view of the handle of FIG. 21.

FIG. 24 is a lower-side rear interior view of a right housing half.

FIG. 25 is a lower-side rear interior view of a left housing half.

FIG. 26 is an isometric view of a power spring in a rest position.

FIG. 27 is an isometric view of a lever.

FIG. 28 is an isometric view of a striker.

FIG. 29 is an isometric view of a slip link.

FIG. 30 is an isometric view of a re-set spring in a rest position.

FIG. 31 is a lower-front right side view of a track assembly.

FIG. 32 is an upper-front right side view of the track assembly.

FIG. 33 is a front view of the rack assembly within a cut-away portion of a staple-loading chamber.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 and 2 show a desktop stapler according to the invention in a substantially horizontal orientation, as it would sit upon a desktop. Base 20 can be seen with a raised elongated central under portion or surface 24 and front and rear foot sections 25 and 26. Base 20 may be made from plastic such as glass filled polypropylene, polycarbonate, etc. Body 10 includes a left half, FIG. 25, and a right half, FIG. 24. Body 10 may be made from high strength low friction nylon. However, other materials may be used such as other plastics or die cast metal. Die cast metal may be desirable if higher weight is needed for design preference. Cover plate 50 encloses cavity 27 of base 20, FIG. 20 to define a central top surface of base 20. Anvil 57 is formed into the material of cover plate 50. Alternately, anvil 57 is a separate and possibly movable steel element from cover plate 50. In this case cover plate 50 may be of a plastic or other non-ferrous material. Pivotal handle 30 fits to housing 10. Optional inset 37 includes decorative or instructive graphic information. Handle 30 includes a front face bounded on two sides by corners 35. Corners 35 gradually become more rounded toward the top of the handle, remaining sharp at least to the position of contact with surface 200 in FIGS. 3 and 4. Sidewalls 23 of base 20 surround housing 10 to an upper rear of housing 10. The front end of base 20 includes a top face of front foot section 26. This top face is sloped down to a first edge 21 of the rigid material of base 20. The front face of footpad 121 continues to slope down and forward to a lowermost level of the stapler, edge 121a, FIG. 8. Footpad 121 is part of rubber or elastomer overmold 120, FIG. 4. Footpads 121 and 122 extend across the width of foot sections 25 and 26, and are connected by an

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elongated narrow central section of overmold 120. Overmold 120 thus forms an hourglass shape with a long neck section, FIG. 4. The exposed rigid material of underside 24 is relatively slippery so that fingers may easily slide under base 20. The narrow strip of overmold 120 along the center of underside 24 helps a user keep a grip on the stapler after the fingers are in position around the stapler.

Handle 30 between corners 35 may be straight or concave. It is slightly concave in at least one portion as seen in FIG. 14. The front face defined by corners 35 allows the stapler to be stable in a vertical position on a desk, FIGS. 3 and 4. Surface 200 represents such a desk. The vertical position is most convenient for users that wish to normally lift the stapler for use by squeezing. The convex sectional shape of the length of under portion 24, FIG. 20, makes squeezing especially comfortable. Other shapes could be used such as segments that approximate a convex shape. Edge 24a, FIG. 20, defines a highly raised edge of the central portion of the base, near the level of the top of cover plate 50, so that fingers can easily grip under the stapler. This highly raised edge extends along each side of the base effectively making the bottom of base 20 much higher off a surface than it would be if the entire underside were at its lowest level, the position of centrally aligned overmold 120 in FIG. 20. It is desirable to keep the level of cover plate 50 on base 20 as low as possible so that papers do not need to be raised too high for stapling. At the same time a limitation to raising the level of under portion 24 is that the thickness of base 20 must be sufficient to maintain adequate stiffness of the base. Therefore using a low center with higher edges 24a, joined by a convex sectional shape below with a flat top provides a low but thick base comprising an approximate "D" shape that is easy to grip under. Foot sections 25 and 26 comprise a short portion of the length of base 20, being separated by a long straight portion including convex underside 24. In fact foot section 25 at rear footpad 122 contacts a horizontal surface at just two points, 122a, FIGS. 7 and 18. Edge 24a extends 30 from near a forward most, lowest point of base 20, near callout 26, FIG. 1, up to a long straight segment near the level of cover plate 50, and down to a rear most, lowest point of base 20, near callout 25, FIG. 1.

Three points support the stapler in the vertical position, the two corners 35, and base front end 28, preferably at the central forward edge of footpad 121. As a design choice front end 28 may be flat, with respect to a top view, to provide a longer support surface. However, in the illustrated embodiment most of the weight in the vertical position is supported at the handle, so corners 35 provide good support. As seen in FIGS. 3 and 4, corners 35 do not need to contact surface 200 at a lower most edge, but rather the handle front may be shaped so that contact with surface 200 is at a handle surface more to the right in FIGS. 3 and 4.

The forward edge of footpad 121 extends to sharp edge 121a, FIGS. 7 and 18. In each of the horizontal position of FIG. 1 and the vertical position of FIG. 3 this edge of soft material touches a desk surface. The front face of footpad 121 is aligned with edge 21. Optionally, edge 21 could be stepped behind the front face of footpad 121. Combined with the downward sloped base front including rigid edge 21, a continuous ramp is provided to lift a paper sheet off a table and guide the sheet up onto cover plate 50. In the horizontal position there is no gap or undercut to catch a sheet under edge 121a of base 20. Edge 21 should not be stepped forward since the resulting ledge would catch a paper sheet sliding up footpad 121 of the ramp. Overmold 120 includes front footpad 121 and rear footpad 122.

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FIGS. 5 and 6 show internal elements of the stapler of the invention in a rest position. See also FIGS. 21 to 32. In FIG. 5 the left housing half is removed to expose the interior, while in opposite view FIG. 6, the right housing half is removed. In each view the respective side of handle 30 is cut away. Handle 30 pivots about bosses 32, FIG. 21, within recess 12 of body 10, FIGS. 24 and 25. Lever 40 pivots about pin 49 at slot 46, FIG. 27. Pin 49 fits within cavity 149 of housing 10.

To best fit the components of the stapler in a compact body shape, a single relatively thick plate lever 40 is used rather than a thinner steel inverted U channel lever design. Lever front end 48 thus extends through single central slot 108 under a tall center portion of striker 100, FIG. 8. Lever 40 includes a centrally aligned front portion and a rear portion out of plane from the front portion, defined at bend 43, FIG. 14. The rear portion is to one side in body 10, into the page in FIGS. 6 and 8, to allow clearance for the coil of re-set spring 70. Tab 44 extends back across the centerline of the body, out of the page in FIGS. 6 and 8. Tab 44 provides an engagement surface upon which handle 30 can press.

Preferably handle 30 presses tab 44 through a low friction linkage. In FIG. 22 slip link 130 is shown attached to handle 30. Stem 138, FIG. 8, extends by a friction fit into a cavity of handle 30 to secure slip link 130 to the handle. In normal use tab 44 presses upward so that slip link 130 can not fall out of position. Slip link 130 is made from a low friction material such as Teflon or acetal such as Delrin 100ST. Optionally, handle 30 could be made entirely from such a low friction material, but it would be much more costly to produce than if only slip link 130 is of the low friction resin while handle 30 is of olefin, ABS or other common structural plastic. Alternately, a roller or a pivotable arm could be attached to either of handle 30 or lever 40 to provide a low friction linkage between the elements. Slip link 130 includes guide wall 134 to help position handle 30 within housing 10. Curved surface 131 presses tab 44.

Striker 100 is fitted along two edges in guide channels 11 of housing 10, FIG. 5. The location where slip link 130 presses tab 44 is substantially coplanar with slot 46 and lever front end 48. Lever 40 is flat in the area of slot 46. In FIG. 14 this is approximately the plane of section cuts 14a, b. This alignment is important with the single thickness lever 40 to prevent twisting forces upon lever 40. Non-aligned linkages could cause the lever to twist and bind within body 10 since it is not inherently stable like a less compact U channel.

Power spring 90 stores energy for installing staples. Spring 90 is linked to handle 30 through lever 40 and striker 100. Lever 40 pivots about pin 49 at slot 46 to raise striker 100 at lever front distal end 48, FIGS. 9 and 10. Rising striker 100 in turn deflects the front end of spring 90 up by linkage to the spring at openings 102, FIG. 5. In the illustrated embodiment handle 30 moves downward at its front end about 0.9 inch. This is approximately double that possible with a direct action stapler where the handle is directly linked to the striker. The increased handle travel provides additional leverage to deflect spring 90, thus allowing reduced handle force. Spring 90 is preferably a double torsion spring, with co-axial helical coils to each side of lever 40, with the coils linked at rear end 94; lever 40 passes between the coils. Lever 40 pivots about an axis defined at pin 49. Spring 90 pivots about an immediately higher axis defined by sleeve 148, FIGS. 24 and 25. Preferably sleeve 148 of housing 10 surrounds pin 49 to both position pin 49 and give low friction support to the interior of the coil of

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spring 90, FIGS. 9, 24 and 25. Sleeve 148 is cylindrical or equivalent in function to define an axis of pivoting for spring 90. A large low friction support surface increases the efficiency and cycle life of spring 90 as the spring wire slides against the sleeve. If the spring rubs on a small steel pin rather than a larger molded plastic surface, the spring will wear quickly. As shown, sleeve 148 defines an axis that is slightly off center from pin cavity 149, FIG. 24, with the lower wall of sleeve 148 being thin to the limit of what can be reliably molded. This allows spring 90 to pivot about the highest possible position, nearly but not precisely co-axial with the lever pivot defined by pin cavity 149. A low position of the spring coil would cause the angle between spring ends 92 and striker 100 to become large at the striker's upper most position of FIGS. 9 and 10. A large angle would force the striker forward causing excess friction between the striker, spring, and channels 11.

FIGS. 9 and 10 show a pre-release position of the stapler mechanism. Lever front end 48 is just out of the plane defined by striker 100, no longer engaged with slot 108. Striker 100 is free to accelerate downward under the stored energy of spring 90, to install a staple. Note that the handle interior is very near to top edge 103 of striker 100. Top edge 103 is adjacent to upper end 11b of striker channel 11. Handle 30, shown in cut away, is therefore in a lower most possible position. To fit lever 40, spring 90 and striker 100 in a reasonably sized device resembling a desktop stapler requires a very compact design. A limitation is that handle 30 should be able to fully lower against body 10 as defined by the striker top most position. The upper surface of handle 30 is strongly rounded to make the handle comfortable to grip and not appear large. The top of body 10 is similarly rounded, being tallest at the center of its thickness. Striker 100 is then also peaked at top edge 103 to provide the maximum possible striker material within body 10 that is compatible with the striker uppermost position. Lever end 48 can therefore nearly approach the very top of the interior of rounded body 10 in an uppermost position. Two ends 92 of the double torsion spring fit into openings 102 below and to each side of slot 108. Lever 40 is "nested" within the spring, between the coils of spring 90, so that the assembly of the lever and spring are vertically compact. Pin 49 extends through both slot 46 of the lever and the coil of spring 90.

As handle 30 is forced downward to the position of FIGS. 9 and 10, slip link 130 presses tab 44, in a sliding relation that accommodates the arcing motion of the handle about boss 32 and lever 40 about pin 49. The surface of tab 44 is convex such that the contact point between curved surface 131 of slip link 130 and tab 44 includes a radial force component toward pin 49. See tab 44 where slip link 130 is cut away in FIG. 8. A perfectly tangential contact would not produce any force toward pin 49, only around pin 49. A radial component produces a cam action that exaggerates the motion of lever 40 with respect to motion of handle 30. The extra lever motion shows as additional sliding of tab 44 under curved surface 131 beyond that which would result just from the respective arcing of the lever and handle. The cam action functions as long as there is some inherent sliding at the contact point, where the sliding is reducing the combined distance from: boss 32—to the contact point at tab 44—to pin 49.

When boss 32, the contact point, and pin 49 are aligned, there is a neutral condition with no sliding. In FIGS. 9 and 10 the handle and lever positions are just past this neutral condition. The contact point has moved forward to a differ-

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ent position of convex tab 44. The force on tab 44 from curved surface 131 is nearly entirely tangential about pin 49.

The effect of the above discussion of the contact point is a varying leverage action of the handle upon the lever. The handle moves the lever quickly with low leverage at the start of the stroke, FIGS. 5 to 8. At the end of the stroke, FIGS. 9 and 10, the leverage of handle 30 is relatively higher upon lever 40. At the same time the force required to deflect spring 90 increases as striker 100 is lifted toward the position of FIGS. 9 and 10. Since the leverage provided by the handle increases through the stroke, the net force required to operate the handle is relatively constant, with no hard to overcome peak at the end from a highly deflected spring 90.

FIG. 11 shows a re-set position of the stapler intermediate between the rest position and the pre-release position. This condition occurs as handle 30 is lifted after ejection of a staple out of staple ejection slot 11a. Re-set spring 70 is biased to rotate lever 40 so that lever front end 48 moves down into alignment with slot 108 of the striker during a re-set stroke. The lever rear end including tab 44 moves upward as lever 40 pivots about pin 49. To provide a smooth re-set action it is necessary that lever end 48 first moves down to top edge 103 of the striker, then secondly slides down past top edge 103 of striker 100 with little resistance. Therefore the lever should not be biased forward in this part of the re-set stroke. To prevent a forward or rearward bias upon lever 40, re-set spring end 72 is positioned substantially directly above spring end 74 in body 10 during most of the re-set stroke. Re-set spring end 72 presses generally upward at hole 42 of lever 40. However, at the end of the re-set stroke a forward bias is required upon lever 40 to cause lever end 48 to move into and engage striker slot 108 in a third and final step of the re-set action. For this purpose body 10 includes a rib 17 extending across a width of the body toward the out-of-plane, or rear, portion of the lever. In the illustrated embodiment rib 17 is an element of the right half of housing 10, FIG. 24. However, rib 17 could be attached to or part of the left half, FIG. 25, or other part of the stapler. As lever 40 rises at its rear end the coil of spring 70 also moves upward. The coil also moves rearward as spring ends 72 and 74 move apart because of the increasing angle between the arms of spring 70. At a predetermined position of the re-set stroke the coil contacts rib 17 and can no longer move up or rearward. The coil then presses upward against rib 17, slightly urged forward by the angle of rib 17, while spring end 72 is biased to arc up and forward about a center defined approximately by the axis of the spring coil. The forward element of this bias causes lever 40 to slide forward upon pin 49 about slot 46. Lever end 48 moves into slot 108 of striker 100.

In the re-set action it is desirable to maintain a downward bias upon pin 49 by lever 40 so that there is no take-up or "rattle" within slot 46 as the next power stroke begins. For example, if a re-set spring causes an upward force at pin 49, pin 49 will press the bottom edge of slot 46. As the power stroke begins slot 46 will press pin 49 at the opposing upper slot edge. The lever will unproductively move as slot 46 adjusts about pin 49. To prevent this wasted motion re-set spring upper end 72 is fitted in lever hole 42, rearward of tab 44. Hence as slip link 130 presses down on tab 44, and spring end 72 presses up on the rear end of the lever at hole 42, all points on the lever forward of tab 44, including slot 46, are biased downward. A tab notch or other engaging feature of lever 40 may serve the function of hole 42.

Re-set spring 70 includes features at each end to hold the spring in place. During assembly lower re-set spring end 74 is normally installed first into hole 19 of the left half of

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housing 10, FIG. 25. Hole 19 is larger in diameter than the wire of spring 70. Spring end 74 includes a short bent segment 74a, FIG. 30 such that the end 74 including 74a presses the wall of hole 19. This interference prevents the spring from falling out of hole 19 as the stapler is assembled. After assembly an opposing rib 174, FIGS. 11 and 24, normally holds spring end 74 in hole 19. Note that spring end 74 appears uncontained in FIG. 11, since the housing left half is not shown for clarity. After brief use of the stapler, the distal end of segment 74a digs a circumferential partial groove in the wall of hole 19 as end 74 rotates in the axis defined by the hole. Then end 74 with segment 74a pivots with minimal resistance in hole 19. Spring upper end 72 includes a simple structure to hold it in position in hole 42. End 72 extends upward as it passes through hole 42, as best seen in FIG. 5. As spring 70 presses up within hole 42, it is drawn toward lever 40 because of the upward angle of end 72. To further secure the upper spring end from sliding out of hole 42 a rib of handle 30 extends behind spring end 72 in FIG. 5. This rib does not normally contact the spring except in the possible case of impact from dropping of the stapler.

During the re-set stroke handle 30 rotates upward as tab 44 presses handle 30 upward, through slip link 130, from the bias of re-set spring 70. Handle 30 rotates at recess 12 of body 10 about a boss 32 on each side of the handle. Body 10 preferably includes chamfers 13 aligned with bosses 32, FIGS. 24 and 25. Handle 30 may be assembled into body 10 by pressing the handle rearward into the body after all the internal components of the stapler are assembled but optionally before the two halves comprising body 10 are fully fastened together. The halves of the upper rear part of body 10 will slightly separate with assistance from chamfers 13 to allow bosses 32 to pass into recesses 12. A rear edge of bosses 32 may also be chamfered at chamfers 32a, FIG. 22. By assembling the handle after both housing halves are fitted together there is no concern that internal parts can fall out of position as the handle is moved into place. Optionally handle 30 may include recesses to fit inward facing bosses in body 10. The assembly function would be equivalent.

The stapler includes a normal closed position. In the closed position the body is substantially parallel and spaced from base 20, as shown in most of the Figures of the complete assembly. FIGS. 7, 18 and 19 show spacer spring 52. Tab 54 is an offset feature at the distal end of the spring. The tab engages opening 84 of track 80. Shoulder 53 is a spring surface adjacent to tab 54. Shoulder 53 presses the bottom of track 80 while adjacent offset tab 54 protrudes into opening 84. Tab 54 will not necessarily contact any part of opening 84 or track 80 unless there is a lateral force on the stapler against which the tab is to react. Such force may be for example from a user pushing sideways as well as down on handle 30, and therefore body 10, where tab 54 presses against edges of opening 84 with a force directly proportionate to the user's sideways applied force. See also FIG. 13 where the base and body have been pivoted slightly apart. The protrusion of tab 54 is minimal so that tab 54 does not enter the space enclosed by track 80 where tab 54 could interfere with the staple feeding system within track 80. Spacer spring 52 holds the body of the stapler above cover plate 50 so that papers can be inserted under the stapler. Spacer spring 52 may be formed as shown, from a cut out portion of the material of cover plate 50. In this manner no extra parts are needed to include the spacer spring. Spring 52 is preferably tapered from a wide attaching end to a narrower distal end for efficient energy storage. The tapered design also ensures that spring 52 is very rigid in the lateral

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direction, the spring being fixed laterally, vertically in the page of FIG. 19, in relation to cover plate 50, while still movable downward, vertically in FIG. 18. Spring 52 deflects toward cover plate 50 as body 10 is forced toward base 20 during normal use.

Spring 52 extends upward and forward. The resulting geometry ensures that spring 52 will not interfere with any papers that are inserted all the way to sidewalls 23; FIG. 9 shows this subject well.

Tab 54 aligns in the lateral direction, vertical in FIG. 14, the stapler front directly over anvil 57 of cover plate 50. Opening 84 is elongated front to back to provide for translation of tab 54 along track 80 as the stapler body pivots toward base 20. Shoulder 53 slides against the bottom of track 80 during the translation. The distance between tab 54 and hinge connection 22 of base 20, FIG. 7, defines the moment arm available to align the front of the body over anvil 57 at the front of cover plate 50. A longer distance provides more accurate lateral positioning. As discussed above, spring 52 includes a rigid attachment to cover plate 50 so that spring 52 can provide secure lateral positioning. In a typical stapler, sidewalls 23 are bearings that extend forward to form this moment arm to react against sideways forces. However, the closer the sidewalls are to the anvil, the less cantilever or overreach is possible to staple toward the center of a paper sheet. In the present invention paper can extend fully up to small sidewalls 23, passing under spring 52. A further advantage of the positioning design of the invention is that base 20 may be plastic resin that is less stiff than the die cast or steel base typically used. Tab 54 provides a stiff steel element to position a forward portion of the body. For best effect tab 54 and opening 84 should be similar in width, into the page of FIG. 7, so that tab 54 will not move laterally in opening 84. According to the above description, a single sheet metal element provides four distinct functions: a cover plate for a base, a spacer spring, a lateral positioner for the body, and a staple-forming anvil.

Base 20 includes elongated raised under-portion 24 to provide a gap between a tabletop and the stapler. The gap creates a substantial area from which to get fingers under and lift the stapler. Front foot 26 and rear foot 25 are features that serve to hold up raised portion 24. Raised portion 24 has a convex outer sectional surface to further facilitate inserting fingers under base 20. To form the main component of convex base 20 by molding, a reasonably thin wall must be used according to standard molding practice. The thin wall creates cavity 27, FIG. 20, enclosed by base cover plate 50. Note in FIG. 20 the edges of cover plate 50 are enclosed by a thin tapered wall section of base 20 as cover plate 50 rests on inset shelf 251. The base of the stapler is thus a smooth solid form on its exterior. Using a sheet steel cover plate that extends much of the length of the base creates a laminated structure providing additional stiffness to the base assembly of FIGS. 18 to 20.

Cover plate 50 is held to base 20 without the use of additional components or specialized operations. Tab 56 of the cover plate extends below undercut 256 of base 20, FIG. 18. Ribs 250, or another part of base 20 near sidewalls 23, create a friction fit to hold cover plate 50 against shelf 251. Ribs 250 engage corresponding notches in the cover plate to position cover plate 50 longitudinally, left to right in FIG. 19. To assemble, cover plate 50 is tilted so that tab 56 enters undercut 256. The cover plate is then lowered at its rear and pressed into place between sidewalls 23. Spacer spring 52 normally provides pressure to hold cover plate 50 down at

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its rear giving a redundant holding feature. Cavity 27 may include flattened portion 227 to fit a steel bar for additional weight in the base.

The rear end of the stapler of the invention presents a clean, simple appearance, FIG. 4. Sidewalls 23 are joined by rear wall 29, FIGS. 14a, b and 17, largely enclosing the lower rear end of body 10. Recess 16 in body 10 fits retractable track pull 60, FIGS. 15 and 16. Sidewalls 23 normally surround these elements so that they do not show. Body 10 rotates about post 15 at hinge connection recess 22 on sidewalls 23. Post 15 is seen best in FIGS. 12 and 14c. Hinge connection 22 is seen best in FIGS. 14c and 17. These features are shown as hidden lines in FIGS. 15 and 16 for reference. Alternately, the post may extend from sidewalls 23, while the recessed hinge connection may be in body 10. In the illustrated embodiment track pull 60 includes extension 67. As the stapler body is forced to pivot about hinge connection 22, extension 67 passes against an upper edge of wall 29, FIG. 14b. Wall 29 forms a detent to control the motion of the body pivoting from the base. In a normal rest position, where body 10 is upright above base 20, spring 52 holds the body up in a body rest position to provide clearance for papers, with spring 52 being held slightly deflected down by the detent formed by extension 67 against wall 29 below hinge of pivotal attachments 15 and 22. Further upward force overcomes the resistance of the detent to unload the spring and allow the body to be fully pivoted behind the base, to an upside down and rearward extending position, FIG. 15. With the above-described structure, the mechanism used for loading staples is not visible until it is needed.

Using extension 67 to hold the body with a slight preload on spring 52 provides a stiff structure. If, for example, the body were held down at tab 54 of spring 52 by a frictional engagement between tab 54 and opening 84, the body would bounce over the base since an unloaded spring is doing all of the holding. This would suggest low quality design.

Squeezing track pull arms 65 releases track locks 62 from catches 262, FIGS. 16 and 24, of the body. The track can now be pulled rearward by retracting track pull 60, FIG. 16, to expose staple loading chamber 144. In the open position the body is upside down and rearward of the base, FIG. 15. Track pull 60 is now above hinge connection 22, facing forward or oppositely from its normal rearward orientation under the hinge, FIG. 14a. Using extension 67 of track pull 60 adds resiliency to the detent system that engages rib 29 since the track pull is slightly movable within recess 16 in the normal engaged position of track pull 60; FIGS. 14a, b. Resiliency within a detent action enhances the feel and reliability of the detent action since some give is needed for the detent to release. Alternately, extension 67 could be a direct element of body 10 or further component of the stapler. If extension 67 were rigid it could be desired that rib 29 be a resilient cantilevered tab of base 20 created by, for example, two parallel vertical slots in rib 29 near sidewalls 23 with respect to the view of FIG. 20.

Staple pusher 180 fits over track 80 to urge staples, not shown, that are guided by track 80 toward striker 100, FIGS. 31 and 32. Extension spring 300 is secured at a spring front end under loop 81 of the track. A rear end of the spring attaches to pusher 180 to urge the pusher forward. Spring 300 is represented schematically by a single typical coil of spring 300. Spring 300 in fact extends axially within the space enclosed by track 80 and pusher 180. Although spring 300 is a low force spring, it must store energy over a long distance to urge every staple in a long rack of staples forward. For example, a typical rack of standard staples is

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about 4 inches long. So spring 300 must extend 4 inches from its rest position, while maintaining a preloaded bias force in the rest position. The spring rest position corresponds to the last single staple of the rack of staples when pusher 180 is fully forward. In the Figures, the pusher is shown near to the spring rest position.

To store the most energy spring 300 needs a maximum number of coils and maximum coil diameter, to effectively pack the longest possible wire in the available space. This possible wire length is a function of the overall length of track 80 and an internal area enclosed by both the track and the pusher that can fit the coil diameter. The internal transverse sectional area of the track with pusher is determined by the size of the staples that the track is designed to carry. A wider track will not fit within a specified staple leg dimension, and a taller track will require striker 100 to rise higher than necessary to clear the top of the staples, requiring a taller overall stapler device since striker channel upper end 11b would need to be higher. Standard desktop staples are relatively wide and short compared to tackler staples.

According to the present invention, a larger interior space enclosed by the track for the coil of spring 300 is provided by creating an effectively taller space, while still fitting wide short staples. In FIGS. 31 and 32 the bottom of track 80 is not flat, having an elongated crease 85. In the prior designs, the level of the bottom of the track has been the same as tabs 87, which fit into channels 287 FIGS. 24 and 25. There is a rib 287a under channel 287 defining a gap between tab 87 and the underside of housing 10. See also FIG. 13. It is important that the track does not protrude below the underside of the housing since the track would hold the housing away from papers to be stapled. However the thickness of rib 287a is an available space into which the track may protrude without interfering with the function. In FIGS. 31 and 32 the center of track 80 is lowered at crease 85, by part of the thickness of rib 287a. This lowered portion allows increased diameter for the coil of spring 300, where spring 300 is centered across the width of track 80.

To further increase the available spring area, pusher 180 includes centrally aligned arcuate hump 185 co-axial with the coils of spring 300. Arcuate channel 145, FIGS. 24, 25 and 33, extends into ceiling 142 of loading chamber 144. In FIG. 33 staples 400 are shown in front of pusher 180. Ceiling 142 provides an upper vertical confinement for holding staples 400 on track 80. However, such confinement need only be at each side of the staple, so hump 185 may protrude up, with lower shoulders to each side at the conventional height, providing extra space for the coil of spring 300. Hump 185 need not be precisely arcuate or precisely co-axial with spring 300.

Tabs 87 are formed from cutouts 82 of the bottom of track 80. Rib 89 forms a divider between cutouts 82. This design contrasts with that of U.S. Pat. No. 5,699,949 (Marks) where the tabs are formed from cutouts of the track sides. Using cutouts from the bottom is desirable in the present invention light duty stapler where the staples and thus the track sides are short compared to staple gun tacklers. Forming the tabs from the sides would leave little material on the side. Rib 89 provides stiffness to the bottom of the track.

Bumper 146 provides a stop for power spring 90, FIGS. 6 and 25. The impact force from spring 90 is directed toward the outer portions of housing 10 since the power spring is in two separate spaced arms at striker 100. The outer portion is the thicker areas of ceiling 142, away from channel 145, FIG. 33. So ceiling 142 provides good support for bumper 146. The left and right halves of housing 10 may be fastened with screws, welds, glue, or other well-known means. In the

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illustrated embodiment, serrated posts or holes are used. The left half of housing 10, FIG. 25, includes three serrated posts 18a, and one serrated hole 18d. The right half, FIG. 24, includes three smooth holes 18b and one smooth post 18c. With one element of each pair serrated, a reliable interference fit is possible to press the housing together, as the sharp edges of the serrations are gently crushed. The interference fit holds the assembly together as ultrasonic welding or glue are used to securely bond the housing halves. Such bonding may be on the posts directly or other areas of housing 10.

Hinge connection 22 with post 15 is shown in section in FIG. 14c, with the individual elements in FIGS. 12 and 17. Post 15 includes a main diameter and extends from both left and right housings 10. Posts 15 include a tapered end with small diameter end 15a. Small end 15a engages small end 22a of hinge connections 22. The respective small end diameters are preferably the same. Optionally, the taper leading to small end 15a is steeper than that of 22a. Further the spacing of sidewalls 23 with hinge connections 22 may be slightly smaller than the distance between left- and right-side posts 15. Then small ends 15a will be pressed by small ends 22a. The effect is then similar to a needle bearing, where small ends 15a are precisely located by wedging within the recesses of hinge connections 22, at 22a. Since the diameters of the small ends are much reduced from the main diameters of the associated features, there is minimal friction against rotation even as there is some wedging. This precise locating works with the moment arm discussed above with respect to tab 54 and opening 84 to position the front end of the stapler over 30 anvil 57.

For assembly, housing 10 is forced in-between sidewalls 23. The tapered ends of posts 15 form ramps to spread apart sidewalls 23 as posts 15 begin to press edges of sidewalls 23 during assembly. Hinge connections 22 are at movable portions of sidewalls 23, FIG. 17, since there is no cross member adjacent to connections 22 to rigidly bind them in relative position. The closest such member is rib 29. Therefore, no separate fasteners are required to connect housing 10 to base 20.

What is claimed is:

1. A stapling device for dispensing staples, comprising:
 - a handle pivotably attached to a housing body;
 - a striker slidably disposed in the body proximate to a front end thereof;
 - a track disposed beneath the striker within the body for holding the staples, wherein the striker is biased to move toward the track to impact the staples;
 - a lever having a front end, a back end, a pivot axis therebetween, wherein the pivot axis pivotably engages the body, the handle selectively engages the lever, and the lever front end selectively lifts the striker against the striker bias;
 - a re-set spring including a coiled torsion spring having a first arm and a second arm, the re-set spring urging the lever back end away from the track and lowering the lever front end to re-engage the striker;
 - wherein the re-set spring pivotably engages the body at a first end of the first arm, and the re-set spring presses the lever at a second end of the second arm; and
 - the first arm includes a bent segment that extends into a hole of the body, the hole being larger in diameter than a wire diameter of the re-set spring and defining a pivot axis for the first spring arm, wherein the bent segment has at its distal end a further bent portion, and the bent portion presses into a wall of the hole.
2. A stapling device for dispensing staples, comprising:
 - a handle pivotably mounted to a housing body;

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the body having a front end and a hinge connection proximate to a rear end;

a base pivotably engaging the body at the hinge connection;

a striker slidably disposed in the body proximate to the front end thereof;

a track disposed beneath the striker for holding the staples, wherein the striker is biased to move toward the track to impact the staples;

a lever having a front end, a back end, a pivot axis therebetween, and a contact point rearward of the pivot axis, wherein the pivot axis pivots against the body, the handle rotatably engages the contact point, and the lever front end selectively lifts the striker against the bias, and wherein the lever pivot axis includes an elongated slot pivotably and slidably mounted to the body so that a re-set spring further urges the lever to slide linearly toward the front end; and

the re-set spring presses rearward of the lever pivot axis and engages the lever back end and body, urging the lever front end toward the track to re-engage the striker.

3. A stapling device for dispensing staples, comprising:

a handle pivotably mounted to a housing body;

the body having a front end and a hinge connection proximate to a rear end;

a base pivotably engaging the body at the hinge connection;

a striker slidably disposed in the body proximate to the front end thereof;

a track disposed beneath the striker for holding the staples, wherein the striker is biased to move toward the track to impact the staples;

a lever having a front end, a back end, a pivot axis therebetween, and a contact point rearward of the pivot axis, wherein the pivot axis pivots against the body, the handle rotatably engages the contact point, and the lever front end selectively lifts the striker against the bias, and wherein the lever includes a slidable mounting within the body so that the lever front end is biased to slide linearly toward the body front end; and

a re-set spring disposed rearward of the lever pivot axis and engaging the lever back end and body, urging the lever front end toward the track to re-engage the striker.

4. A stapling device, comprising:

a body;

a base including a plurality of sidewalls, wherein the body extends forward from a pivotal attachment of the base to the body in a substantially parallel relationship above the base, and wherein the body includes opposed bosses that engage complementary recesses in the sidewalls of the base, the sidewalls being non-rigid extensions of the base at the recesses, the bosses and recesses defining a pivot location of the body upon the base at the pivotal attachment, the body installed between the sidewalls by momentarily deflecting the sidewalls apart;

a handle movably attached to the body;

a staple loading chamber;

a track within the loading chamber to hold and feed staples; and

a striker to eject staples at a front of the loading chamber out of the stapling device.

5. The stapling device of claim 4, wherein two sidewalls extend upward in a substantially parallel relationship, and the recesses are in interior surfaces of the sidewalls, wherein the non-rigid sidewalls are momentarily spread apart by the bosses at edges of the sidewalls as the body is forced

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between the sidewalls, and wherein the sidewalls spring back when the bosses are seated within the recesses.

6. A stapling device, comprising:

- a body and a handle pivotably attached to the body, wherein the handle has a rest position where the handle is pivoted to a farthest position away from the body, the handle has a pre-release position where the handle is pivoted toward the body, and the handle has a re-set position intermediate between the rest position and the pre-release positions;
- a striker that is movable within the body and is linked to the handle through a lever whereby pressing the handle toward the body causes the striker to rise in the body;
- a power spring within the body that is linked to the striker wherein raising the striker causes the power spring to deflect and store energy;
- wherein at a predetermined position of the handle, the lever suddenly de-links from the striker and the striker ejects a staple out of a staple loading chamber as the power spring returns to a rest position;
- the power spring includes a helical coil that pivots about a spring axis; and
- the lever axis is defined by a pin and the pin fits into a cavity of the body, and a molded cylindrical sleeve of the body surrounds the pin with the sleeve defining the spring axis, wherein a wire of the power spring slides against the sleeve as the spring is deflected.

7. The stapling device of claim 6, wherein the sleeve includes a thin lower wall whereby the spring axis is above the lever axis.

8. A stapling device, comprising:

- a body and a handle pivotably attached to the body at a rear of the stapling device, wherein the handle has a rest position where the handle is pivoted to an upper position away from the body, the handle has a pre-release position where the handle is pivoted down toward the body, and the handle has a re-set position intermediate between the rest position and the pre-release positions;
- a striker movable within the body and linked to the handle through a lever wherein pressing the handle toward the body causes the striker to rise in the body; wherein the handle presses a lever tab at a contact point near a rear of the lever, and the lever pivots about a lever pivot axis within the body;
- a power spring within the body is linked to the striker wherein raising the striker causes the power spring to deflect and store energy;
- wherein at a predetermined position of the handle, the lever suddenly releases the striker and the striker ejects a staple out of a staple loading chamber as the power spring returns to a rest position;
- a re-set spring pushes upward upon the lever at a rear portion of the lever behind the lever pivot axis, in the re-set position of the handle the re-set spring causes a downward bias upon a front portion of the lever at the lever pivot axis; and
- wherein the re-set spring engages the lever at a position rearward of the lever axis, and the re-set spring engages the lever rearward of the contact point.

9. The stapling device of claim 8, wherein a re-set stroke of the lever includes a first step where the lever front distal end moves from above the striker downward to a top edge of the striker, a second step where the lever front distal end moves to behind the striker, and a third step where the lever front distal end moves forward into a slot in the striker;

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the re-set spring includes a torsion spring, a lower arm of the torsion spring pivotally attached to the body, an upper arm pivotally attached to the lever, a coil of the re-set spring positioned forward from the attachments of the upper and lower arms and movable with the body;

wherein the re-set spring pushes upward upon the lever during the first step and second steps, and the re-set spring pushes upward and forward upon the lever during the third step; and

wherein the coil of the re-set spring moves rearward as the arms of the reset spring move apart during the re-set stroke, the coil of the re-set spring contacts a rib of the body during the third step of the re-set stroke.

10. The stapling device of claim 9, wherein the lower arm includes a bent segment that extends into a hole of the body, the hole being larger in diameter than a wire diameter of the re-set spring and defining a pivot axis for the lower spring arm, and wherein the bent segment has at its distal end a further bent portion, the bent portion pressing into a wall of the hole.

11. A stapling device, comprising:

- a body and a handle pivotably attached to the body wherein the handle has a rest position where the handle is pivoted to a farthest position away from the body, the handle has a pre-release position where the handle is pivoted toward the body, and the handle has a re-set position intermediate between the rest position and the pre-release positions;
- a striker is movable within the body and is linked to a front end of a lever at a centrally disposed striker slot, and a rear end of the lever is linked to the handle wherein pressing the handle toward the body causes the striker to rise in the body;
- a power spring within the body is linked to the striker at a front end of the power spring whereby raising the striker causes the power spring to deflect and store energy;
- at a predetermined position of the handle the lever suddenly de-links from the striker and the striker ejects a staple out of a staple loading chamber as the power spring returns to a rest position;
- wherein the power spring includes two co-axial helical coils that pivot about a spring axis, with the coils spaced apart from each other, and the lever passes between the coils;
- wherein the lever includes a lever pivot axis with an elongated slot wherein the pivot axis is pivotably and slidably mounted to the body, the front of the lever being in front of the helical coils, the rear of the lever being behind the helical coils, and the lever being nested between the two helical coils;
- wherein the helical coils of the power spring terminate in two parallel, forward extending arms including a spring end of each arm, the spring ends extend into openings in the striker, the openings being to each side and below the striker slot; and
- wherein the spring arms are spaced apart, and an impact force from the arms of the power spring against a bumper stop is directed toward outer portions the body, and the bumper is supported by a ceiling of the staple loading chamber.

12. The stapling device of claim 11, wherein the striker is tallest at a central portion of a top edge of the striker, whereby the lever front end is near a top most interior of the body, and an interior of the handle is immediately above the top edge of the striker in an uppermost position of the striker.

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13. The stapling device of claim 12, wherein a rear portion of the lever is out of plane from the front portion, a bend being between the front portion and the rear portion of the lever.

14. The stapling device of claim 13, wherein a re-set spring is positioned at the rear portion of the lever.

15. The stapling device of claim 11, wherein the lever axis is defined by a pin, and the pin fits into a cavity of the body with a cylindrical sleeve of the body surrounding the pin, and wherein the sleeve defines the spring axis, and a wire of the power spring slides against the sleeve as the spring is deflected.

16. The stapling device of claim 15, wherein the lever axis is positioned immediately below the spring axis.

17. A stapling device, comprising:

a body and a handle pivotably attached to the body, a staple loading chamber, a track within the loading chamber to hold and guide staples in the stapling device, a staple pusher to urge staples on the track toward a front of the stapling device, a striker to eject staples at a front of the loading chamber out of the stapling device, wherein a pusher spring is attached at one end to the track, and at a further end to the pusher, a diameter of the pusher spring fits within an internal area enclosed by the track and the pusher upon the track;

a tab extends into a channel of the loading chamber, a rib of the loading chamber is under the channel;

a bottom of the staple track is lowered at a downward protruding elongated crease whereby the track protrudes below a level of the tab to a level of the rib, the crease providing an enlarged internal area that fits a diameter of the pusher spring.

18. The stapler of claim 17, wherein the pusher includes a centrally aligned upward protruding arcuate hump, the hump being co-axial with an extended direction of the pusher spring, the hump providing an enlarged internal area that fits the diameter of the pusher spring.

19. The stapler of claim 18, wherein the staple loading chamber includes an elongated channel in a ceiling of the loading chamber, and the hump protrudes into the channel.

20. A stapling device for dispensing staples, comprising:

a handle pivotably attached to a housing body;

a striker slidably disposed in the body proximate to a front end thereof;

a track disposed beneath the striker within the body for holding the staples, wherein the striker is biased to move toward the track to impact the staples;

a lever having a front end, a back end, a pivot axis therebetween, wherein the pivot axis pivotably engages the body, the handle selectively engages the lever, and the lever front end selectively lifts the striker against the striker bias;

a re-set spring includes a coiled torsion spring including a first arm and a second arm, the re-set spring urging the lever back end away from the track and lowering the lever front end to re-engage the striker;

wherein the re-set spring pivotably engages the body at a first end of the first arm, and the re-set spring presses the lever at a second end of the second arm; and

the re-set spring second end includes a single angled segment at a distal end of the second arm, the angled segment extends in a direction transverse to a length of the second arm, the angled segment extending from a first side of the lever to a second side of the lever, the angled segment being spaced from the first end of the re-set spring at the first side of the lever, the angled

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segment is further spaced from the first end of the re-set spring at the second side of the lever, and the second arm is drawn toward the first side of the lever as the angled segment presses the lever.

21. The stapling device of claim 20, wherein the first end of the first arm is below the second arm, and the re-set spring presses upward upon the lever.

22. The stapling device of claim 20, wherein a hole of the lever extends from the first side of the lever to the second side of the lever, and the angled segment passes through the hole.

23. The stapling device of claim 20, wherein a handle engages the lever, a rib of the handle is spaced from the lever first side, and the second arm is drawn away from the rib.

24. A desktop stapler, comprising:

a body with a handle pivotably attached to the body, the handle including a pressing area near a front end of the handle;

a base pivotably attached to the body toward a rear end of the stapler, wherein the body extends forward from the pivotal attachment in a substantially parallel relationship above the base in a closed stapler position, and in the closed stapler position, the handle has a rest position wherein the handle is moved to a farthest position away from the base, and the handle has a pre-release position wherein the handle is moved toward the base; a re-set spring biasing the handle toward the rest position;

a power spring within the body linked to the handle wherein pressing the handle at the pressing area from the rest position to the pre-release position causes the power spring to deflect and store energy;

a striker linked to the power spring, wherein at the pre-release position of the handle, the striker under bias from the power spring ejects a staple out of a staple loading chamber; and

wherein the handle at the pressing area moves about 0.9 to 1 inch inclusive toward the base as the handle moves from the rest position to the pre-release position.

25. The desktop stapler of claim 24, wherein the striker includes a pre-release position above the staple loading chamber, a lowest striker position in front of the staple loading chamber, wherein the striker moves toward the base about one half inch between the striker pre-release position and the striker lowest position.

26. The desktop stapler of claim 24, wherein a lever releasably engages the striker, and the lever releases the striker at the pre-release position of the handle.

27. A desktop stapler, comprising:

a body with a handle pivotably attached to the body, the handle including a pressing area near a front end of the handle;

a base pivotably attached to the body toward a rear end of the stapler, the stapler having a closed stapler position wherein the body extends forward from the pivotal attachment in a substantially parallel relationship above the base, and the handle has a rest position wherein the handle is moved to a farthest position away from the base, and the handle has a pre-release position where the handle is moved toward the base, including a handle pressing distance defined by the distance between the pressing area at the rest position and the pressing area at the pre-release position;

a re-set spring biasing the handle toward the rest position;

a power spring within the body linked to the handle wherein pressing the handle at the pressing area from the rest position to the pre-release position causes the power spring to deflect and store energy;

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a striker linked to the power spring, wherein at the pre-release position of the handle, the striker under bias from the power spring ejects a staple out of a staple loading chamber;

wherein the striker includes a pre-release position above 5 the staple loading chamber and a lowest striker position in front of the staple loading chamber, and wherein the pressing distance is about double the distance that the striker moves toward the base between the striker pre-release position and the striker lowest position.

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28. The desktop staple of claim 27, wherein the handle at the pressing area moves about 0.9 to 1 inch inclusive toward the base as the handle moves from the rest position to the pre-release position.

29. The desktop stapler of claim 27, wherein a lever releasably engages the striker, and the lever releases the striker at the pre-release position of the striker.

* * * * *

EXHIBIT B

US005664722A

United States Patent [19]

Marks

[11] Patent Number: **5,664,722**[45] Date of Patent: **Sep. 9, 1997**[54] **FORWARD ACTING, FORWARD GRIP,
STAPLE MACHINE**[75] Inventor: **Joel Steven Marks**, Los Angeles, Calif.[73] Assignee: **Worktools, Inc.**, Chatsworth, Calif.[21] Appl. No.: **563,746**[22] Filed: **Nov. 29, 1995****Related U.S. Application Data**

[63] Continuation of Ser. No. 268,278, Jun. 30, 1994, abandoned, which is a continuation of Ser. No. 141,437, Oct. 22, 1993, abandoned, which is a continuation of Ser. No. 899,748, Jun. 17, 1992, abandoned.

[51] Int. Cl.⁶ **B25C 5/11**[52] U.S. Cl. **227/132; 227/146**[58] Field of Search **227/128, 132,
227/146; 173/202, 120; 267/158, 47, 160,
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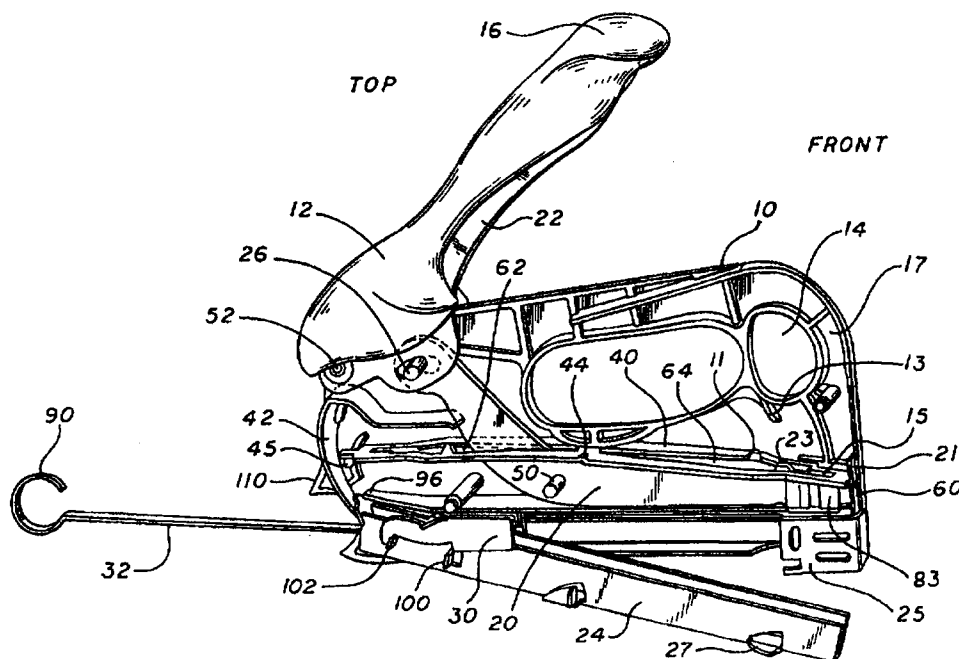
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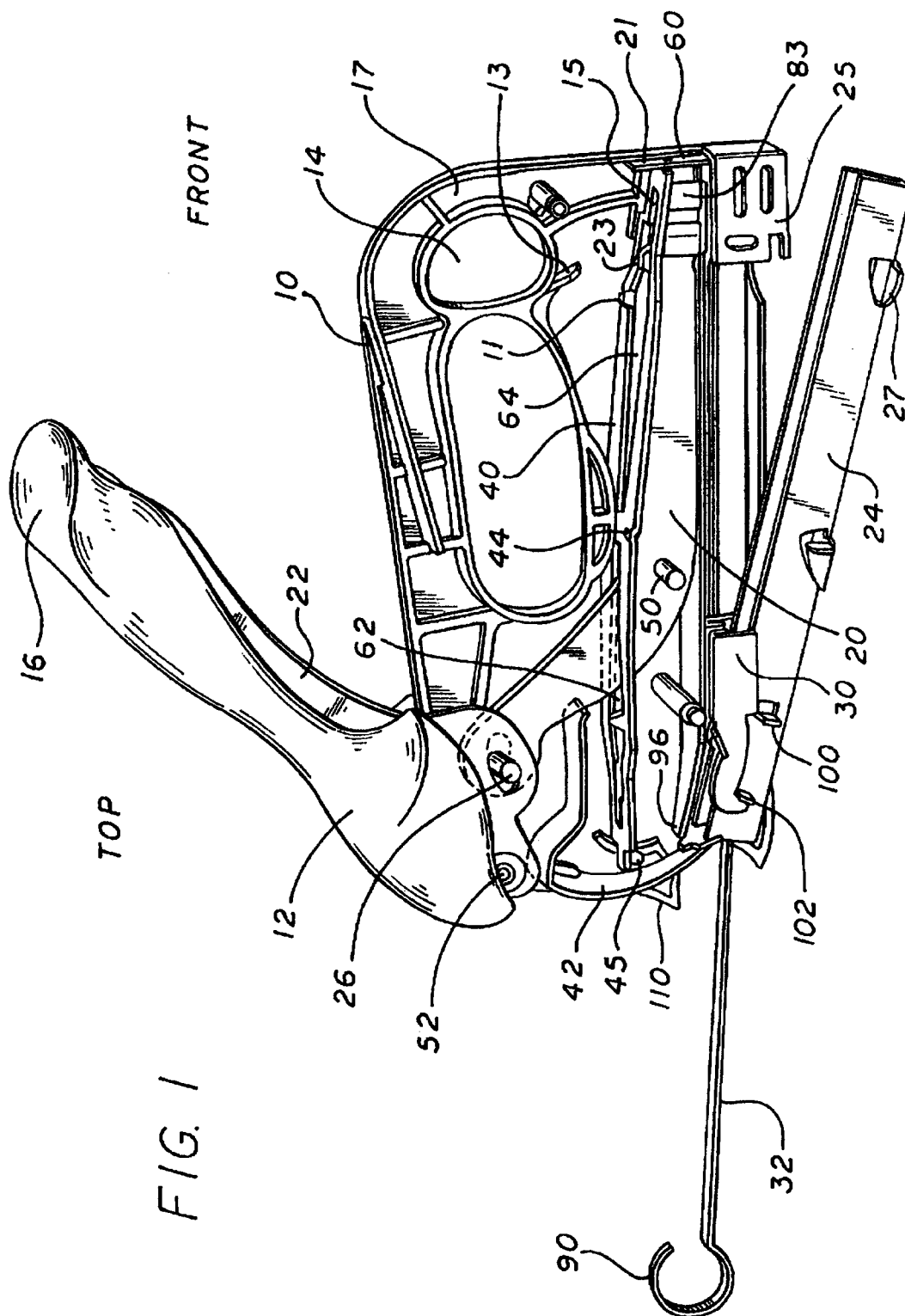
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*Primary Examiner—Rinaldi I. Rada**Attorney, Agent, or Firm—Paul Y. Feng; Fulwider Patton
Lee & Utecht*[57] **ABSTRACT**

A manually powered fastening tool which stores and instantly releases the energy of a spring such that it may force a fastener into an object by an impact blow in which the operating handle is hinged near the end of the tool body opposite the end from which the staples exit. The main spring is a single piece flat torsion spring which decreases in cross-section away from its fulcrum point to enable the entire spring to provide energy storage. The operating handle is linked to the spring through a low friction rolling element which provides varying leverage to allow a constant operating force through the operating handle motion. The staple guide track includes position and latch feature within a one piece assembly.

13 Claims, 6 Drawing Sheets

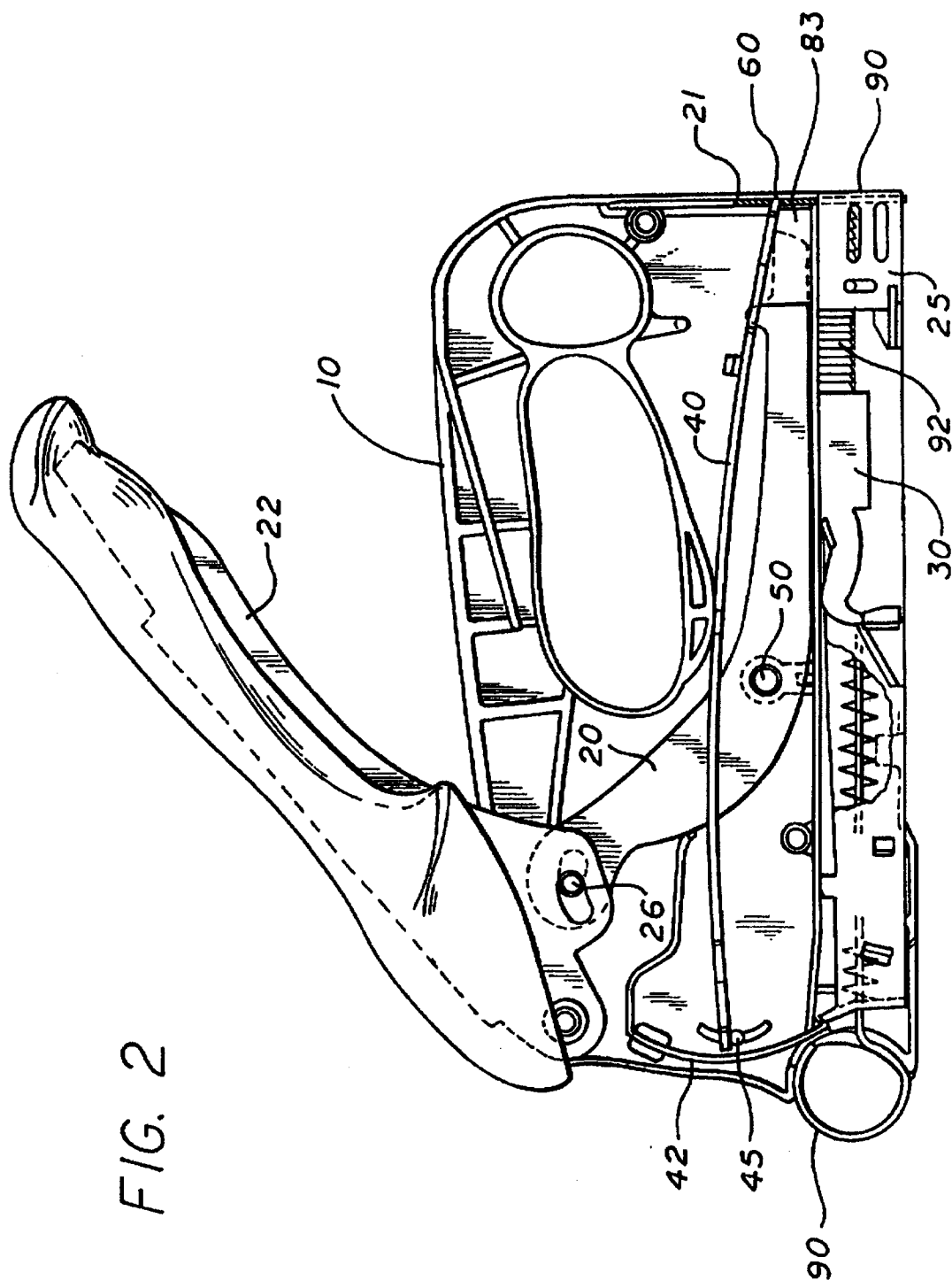


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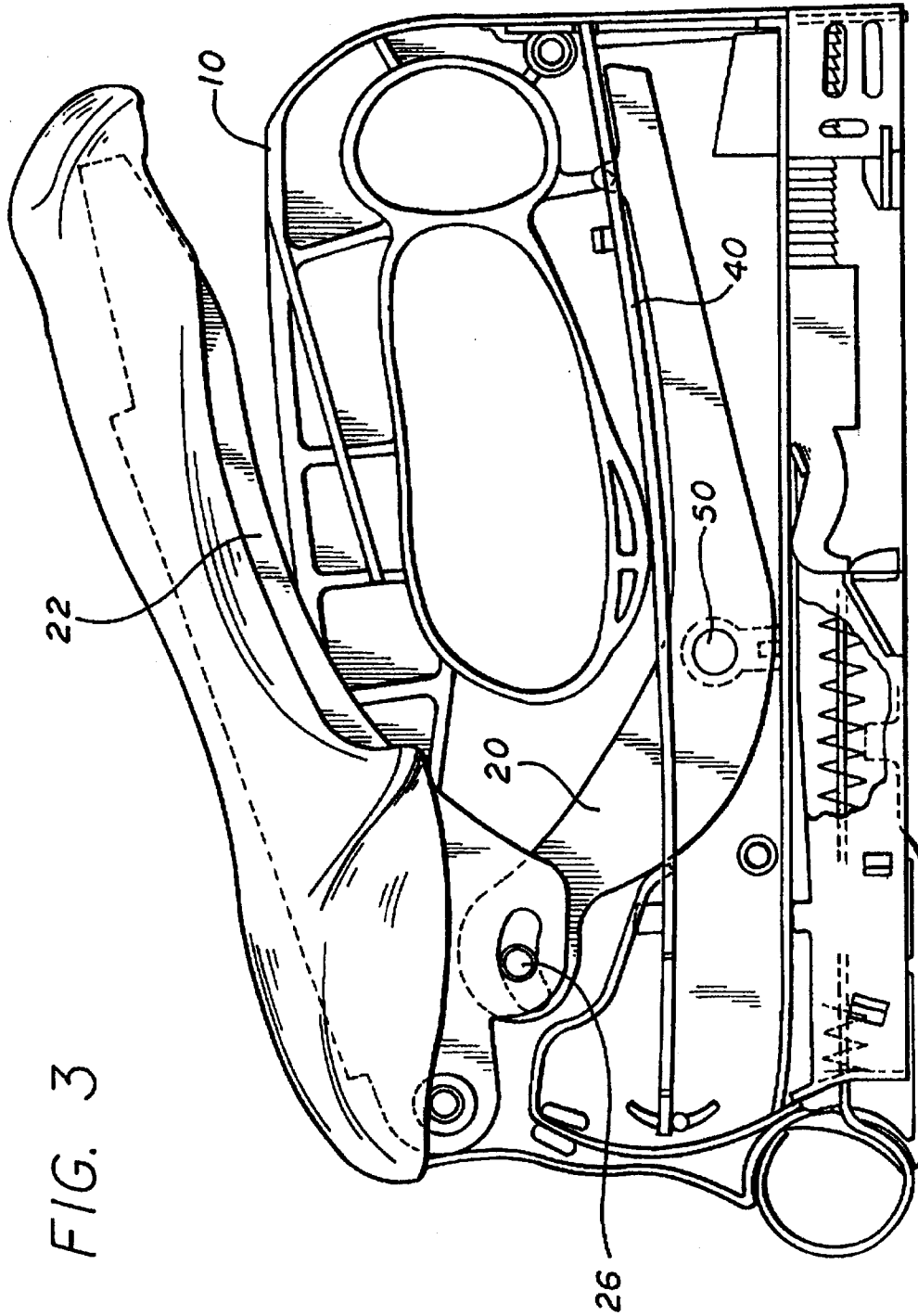


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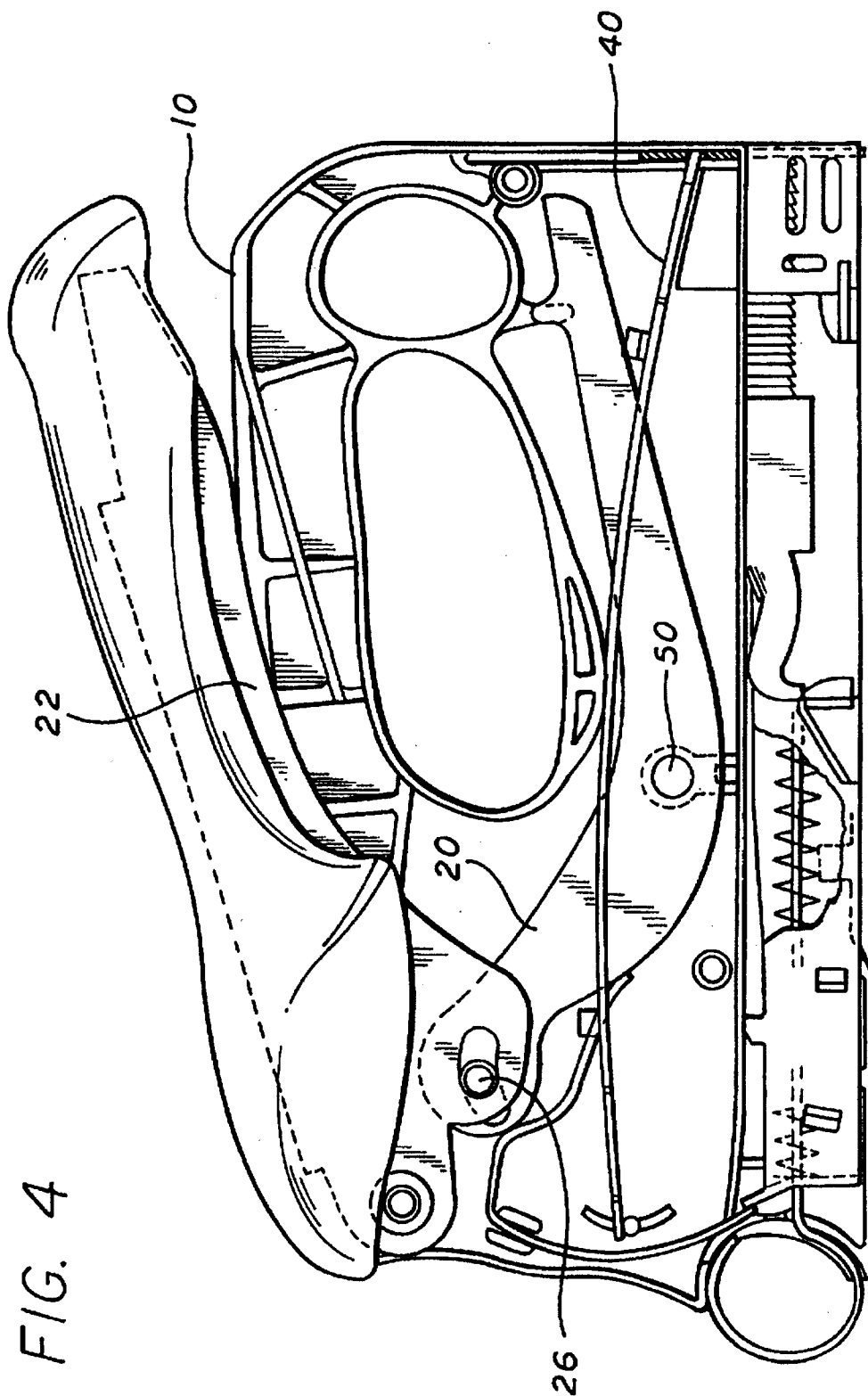


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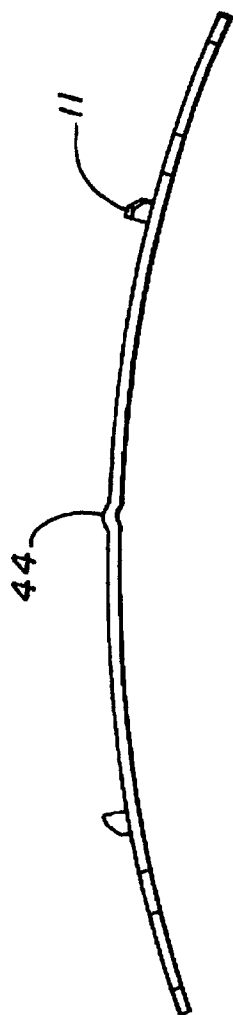


FIG. 5

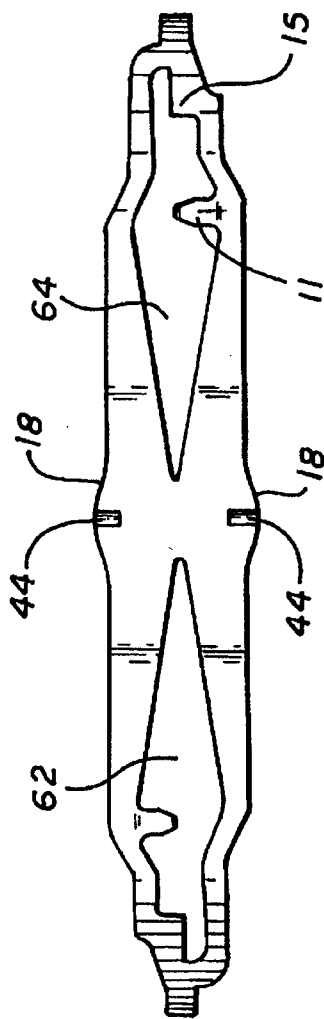


FIG. 6

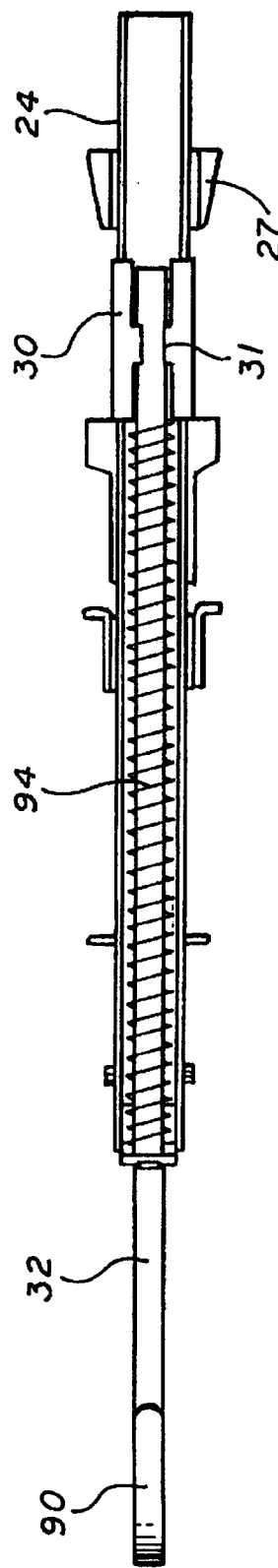


FIG. 7

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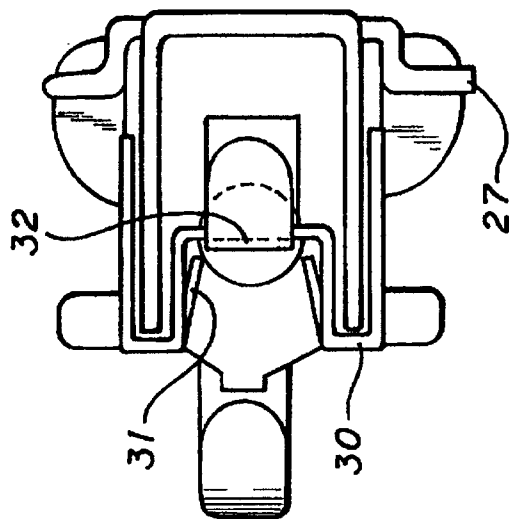


FIG. 8

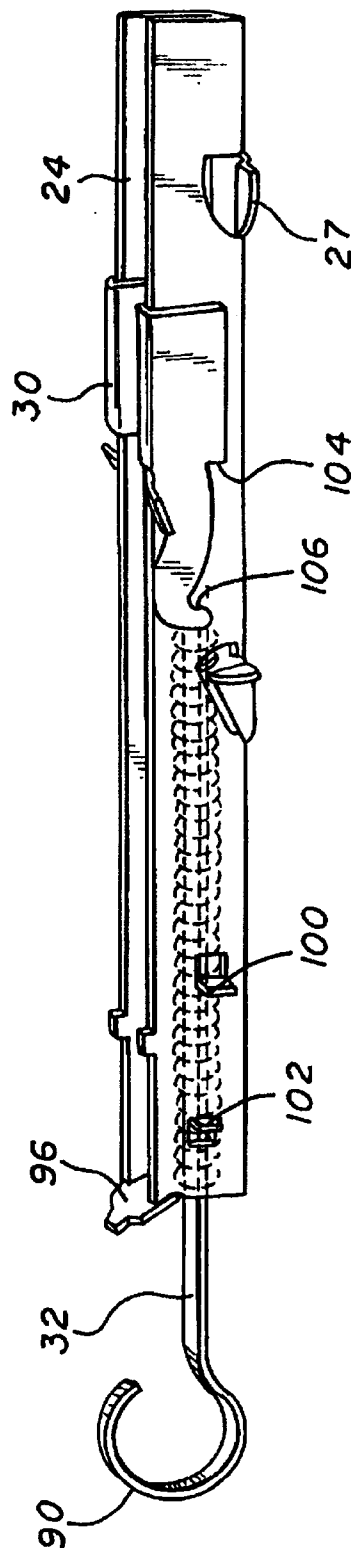


FIG. 9

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FORWARD ACTING, FORWARD GRIP, STAPLE MACHINE

This is a continuation of U.S. application Ser. No. 08/268,278, filed Jun. 30, 1994, which is a continuation of U.S. application Ser. No. 08/141,437, filed Oct. 22, 1993, which is a continuation of U.S. application Ser. No. 07/899,748, filed Jun. 17, 1992, all abandoned.

BACKGROUND OF THE INVENTION

The present invention generally relates to manually powered fastening devices, and more specifically to impact driven staple guns and tacking machines.

FIELD OF THE INVENTION

The fastening tool of the present invention is similar to that described in U.S. patent application Ser. No. 07/772,536, which has been allowed in part and has issued as U.S. Pat. No. 5,165,589. The fastening tool enables an operator's single hand to compress a spring to store and instantly release the energy of the spring to expel a staple from the fastening tool by an impact blow. The fastening tool incorporates a forward acting actuator lever. The staples exit towards the front end of the fastening tool while the lever is hinged near the rear end of the fastening tool. The tool may be gripped through an opening in the body of the tool. The opening extends to the front of the tool, and in certain configurations, the opening may originate at the front of the body of the tool.

U.S. Pat. No. 2,671,215 issued to Abrams discloses the familiar Arrow stapler. A lever is pivoted towards the front of the staple gun. Pressing down the lever behind the pivot compresses a coil spring and raises a plunger. Once the lever is depressed to a predetermined point, the lever is disconnected from the plunger assembly and the plunger is driven downwards by the force stored in the coil spring. The coil spring is located immediately adjacent to, or above, the plunger. The plunger is located in the front of the staple gun. A protrusion extends in front of the front plane of the staple gun in order to accommodate mechanics associated with the plunger. Functional components occupy an approximately two and one half inch region between the front of the staple gun and the hand grip opening. The staple feeder is releasably connected to the back of the staple gun. The entire feeder assembly can be removed, and additional staples inserted into a channel. The feeder is completely separated from the staple gun during this process.

U.S. Pat. No. 3,610,505 issued to Males discloses a design similar to the Abrams design. A lever is pivoted near the front of a staple gun. Pressing the extended arm of the lever downwards towards the rear of the staple gun causes a coil spring to compress and simultaneously raises a plunger. Once the lever has been lowered past a predetermined point, the lever is released from the coil spring and plunger assembly, and the force stored in the coil spring is allowed to drive the plunger downwards, striking and ejecting a staple. The plunger is located at the front of the staple gun. A nose piece extends beyond the front plane of the staple gun in order to accommodate mechanics associated with the plunger. Functional components occupy an approximately two inch region between the front of the staple gun and the hand grip opening. The staple feeder must be fully removed to load additional staples. The staple feeder includes a spring which extends substantially the entire length of the staple gun and wraps around a pivot point located near the front of the staple gun. Unlike the Abrams device in which a spring

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is compressed in order to force staples to the front of the staple gun, with the Males device, the spring is stretched in order to force staples to the front of the staple gun.

U.S. Pat. No. 2,326,540 issued to Krantz discloses a staple gun in which the actuation lever is pivoted towards the rear of the staple gun. Through a series of levers, this action is connected to a coil spring and plunger located at the front of the staple gun. As the lever arm is lowered, the spring is compressed and the plunger is raised. Once the lever reaches a predetermined point, it is disconnected from the plunger and coil spring assembly, and the energy stored in the coil spring is allowed to release, driving the plunger downward, striking and expelling a staple. In order to accommodate interconnection of the plunger and coil spring assembly, a nose piece which extends in front of the front plane of the staple gun is attached. Functional components occupy an approximately two inch region between the front of the staple gun and the hand grip opening. It appears that the staple feeding mechanism consists of a wound spring assembly which is connected by cable to an end member which sits in the staple channel, forcing the staples towards the front of the staple gun. The end member must be removed from the back of the staple gun in order to add staples. Once removed, the end member will be pulled in a position adjacent to the body of the staple gun immediately above the staple channel.

U.S. Pat. No. 2,769,174 issued to Libert describes a staple gun in which the actuation lever is pivoted at a point towards the rear of the staple gun, and staples are expelled out of the front of the staple gun. Pressing down on the actuation arm towards the bottom of the staple gun compresses a coil spring and raises the plunger. At a predetermined point, the lever is disconnected from the coil spring and plunger assembly, and the energy stored by the coil spring is allowed to release, driving the plunger downwards, striking and expelling a staple. Functional components occupy an approximately two inch region between the front of the staple gun and the hand grip opening. Staple loading is accomplished by completely removing the feeder mechanism, which is extremely similar to the feeding mechanism of the Abrams device.

U.S. Pat. No. 4,629,108 issued to Judge describes a stamped metallic frame which is enclosed in a second stamped or molded housing. Judge describes a common mechanism to accommodate an actuation lever pivoted near the rear of the staple gun. The mechanism provides a typical linking lever location in front and above the hand grip opening. Functional components occupy an approximately two and one half inch region between the front of the staple gun and the hand grip opening.

United Kingdom Patent Application GB 2,229,129A by Chang discloses a desk top stapler which cannot be removed from its base to function as a portable staple gun in a manner similar to the earlier described inventions or the present invention. As shown in FIG. 3, plunger 1 is elevated above the fastener channel in the resting state, and spring 2 is pre-stressed. Plunger 1 is released when the handle is pressed downwards. The device is purportedly "reloaded" or "reenergized" when the user releases the handle, with spring 4 supplying the "resumptive" force to re-stress spring 2. There is no means provided to link the resumptive force of spring 4 to any action which could reset spring 2. Hence, there is no way to return to the configuration shown in FIG. 3 from that shown in FIG. 4, and hence no way for the device to function. Presuming that the '129 reference were to function as described, the plunger will be driven downward by spring 2, which is loaded in the resting state, and is released when the handle is actuated.

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The '129 reference is similar in overall shape and in function to other heavy duty desk top staplers. Like other desk top staplers, '129 is not expected or intended to feature a hand grip opening, nor is allowance for such an alternate configuration mentioned or claimed in the patent application. The nature of the '129 design prevents a hand grip opening from being designed into the device because it requires a large lever 3 located in the area immediately above and behind the plunger. Spring member 2 is located substantially in the middle of the body of the '129 fastener, just below lever 3. The area below spring 2 is shown in FIG. 4 to provide structural support. If the structural support could be removed, spring 2 would prevent forming a hand grip opening near the plunger in the '129 device. Lever 3 further hinders such an opening.

LaPointe et al. U.S. Pat. No. 3,862,712 discloses a staple guiding track which slides rearward to expose a chamber in the staple gun body into which staples are placed. The staple gun is inverted during the loading operation. This sliding mechanism requires numerous components and assembly operations for its manufacture.

All of the above described staple guns feature a hand grip opening in the tool body which is two inches or more behind the front of the tool. The space between the front of the tool and the hand grip opening is occupied by the components which link the actuating lever to the plunger. It is not possible to locate the hand grip opening near the front of the above described staple guns.

The above-described staple guns employ a large number of discrete components which must be precisely assembled in order to function correctly. In addition, all of the operative devices described above store energy by compressing a coil spring.

SUMMARY OF THE INVENTION

A need therefore exists for a staple gun which employs fewer parts and is simpler to assemble than the prior art, is forward actuating, may be gripped and operated near its front end, and has an efficient and easy to use staple loading mechanism.

Accordingly, it is an object of the present invention to provide a front actuated staple gun which is highly efficient, and imparts greater energy to the plunger than do prior art devices. It is a primary objective of the present invention to provide a staple gun which may be gripped and operated near its front end using only one hand.

It is a further object of the present invention to provide a more efficient staple loading mechanism.

It is a further object of the present invention to provide a hand motion or a fastening machine which effectively requires less effort to produce a superior stapling result than the prior art.

It is a further object of the present invention to provide a fastening device design in which the force applied to the actuation lever will maximally bias the fastening device towards the object being fastened.

It is a further object of the present invention to provide a fastening device which is optimized for single hand operation.

It is a further object of the present invention to provide a fastening device which operates with minimal shock to the operator upon fastener ejection.

It is a further object of the present invention to provide a fastening device which requires a substantially constant force to be applied to the actuation lever.

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It is a further object of the present invention to provide a fastening device which operates with a minimum of parasitic friction.

It is a further object of the present invention to provide a fastening device which comprises a die cast metal housing which is inexpensive and well contoured for comfortable operation.

It is a further object of the present invention to provide a fastening device which employs a minimum number of parts which can be easily and efficiently assembled.

The present invention employs a forward-acting actuation lever which stores energy in a torque transmitting spring while raising a plunger located in the front of the fastening device. At a predetermined point, the actuation lever is released from the spring and plunger assembly, allowing the energy in the spring to drive the plunger downwards, striking and expelling a fastener. A torque transmitting spring, such as a bar, flat, or leaf spring, or a coiled wire torsion spring allows a low reciprocating mass design when compared to the more common coiled wire compression spring, all of the torque transmitting springs mentioned above store energy by bending or flexing about a fulcrum point. Use of a flat tapered torque transmitting spring allows uniform distribution of stress along the length of the single, flat spring as described in the detailed description. The present invention features a fully surrounded hand grip opening extending to the front of the tool body. A stop for the index finger of the gripping hand is provided at the extreme front end of the grip opening.

The present invention also employs a novel fastener loading, guiding and feeding system in which a release lever is pulled towards the back of the fastening device, thus allowing a channel to be lowered along the front of the device. The channel is pivoted towards the back of the device. Staples, or other suitable fasteners, are then placed on the channel. To re-engage the staple loading mechanism, the channel is pushed toward the body of the fastening device, and the loading mechanism reset.

Loading fasteners into the tool of the present invention requires few steps and minimal contortions of the operator's hand. The operating hand may continue to hold the tool without altering its grip while the second hand performs the few steps required to load fasteners. Another innovation of the present loading system is reduced part count. In an embodiment, three discreet parts are required to manufacture the staple guiding and feeding system.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, with one half of the housing removed, of a fastening tool.

FIG. 2 is a side elevation of the fastening tool of FIG. 1, with its grip handle in an extended position and spring in its rest state, as the tool would appear before commencing an operating sequence.

FIG. 3 is a side elevation of the fastening tool of FIG. 1, with the grip handle fully drawn toward the tool body and spring energized as the tool would appear just prior to ejection of a staple.

FIG. 4 is a side elevation of the fastening tool of FIG. 1, with the spring in its rest state and the handle fully drawn toward the tool body, as the tool would appear just after ejection of a staple.

FIG. 5 is a side elevation view of the flat spring of an embodiment of the present invention.

FIG. 6 is a view from below of the spring of FIG. 5.

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FIG. 7 is a top view of the staple loading system of the invention.

FIG. 8 is the loading system of FIG. 7 viewed from the end opposite the pulling loop.

FIG. 9 is a perspective view of the loading system of FIG. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, die-cast metal housing 10 consists of two opposing halves joined together to contain, guide and hold the internal components of the fastening tool in a predetermined position. Housing 10 is contoured throughout the gripping region for comfortable operation. Opening 14 in metal housing 10 is provided to receive the index finger of a hand as it grips the fastening tool. Finger stop 17 provides a surface for the index finger to support the tool when the tool is held vertically. Molded handle cover 12 provides a thumb rest surface 16 such that an operator's thumb may rest over and past the end of the handle and opposite pivot 52. Shock absorber 83 limits the travel of the spring 40 and plunger 21.

Pivot 52 is a post which is integral to housing 10. Handle cover 12 fits over, and covers the top portion of lever 22. Roller linkage 26 passes through corresponding slots in levers 20 and 22. Force is transmitted through roller linkage 26 from lever 22 to lever 20 to cause lever 20 to pivot about pivot 50. Pivot 50 is a pin linkage identical in shape to roller linkage 26. As portion 16 of lever 22 is pressed towards housing 10, the force is transmitted through linkage 26 to lever 20, causing lever 20 to pivot about pivot 50. As lever 22 is further depressed towards housing 10, the force being transmitted from lever 22 to lever 20 is increasingly transmitted tangentially relative to pivot 50. Since linkage 26 provides substantially no friction, the arrangement provides varying leverage to deflect spring 40.

Pin or roller linkage 26 rolls within slots 28 and 29 of levers 20 and 22. Lever 22 has an identical second slot 29 behind slot 28 of lever 20 to provide even loading on roller linkage 26. The second slot is not visible in the drawings. In FIG. 3, roller linkage 26 is confined in a circular cavity formed by the slot ends of slots 28 and 29.

Relatively slight motion of lever 22 produces a relatively large motion in lever 20 as portion 16 of lever 22 is initially pressed towards housing 10. Near the end of the downstroke of lever 22 the relationship is reversed, and a larger motion of lever 22 is required to produce a smaller motion in lever 20 as portion 16 of lever 22 is pressed towards housing 10. The net effect is that lever 22 requires an essentially constant force through its range of motion even though the force applied to lever 20 increases due to the increasing deflection of spring 40.

Spring 40 is preloaded in its resting state to provide resistance at the start of the displacement of lever 22. Spring 40 deflects about fulcrum point 44 upon fulcrum support 43 of housing 10 (see FIG. 1), is held at one end by rear support 45, and moves up and down at the opposite end where it is connected to plunger 21 through slot 60. Spring 40 is shown in more detail in FIGS. 5 and 6. Spring 40 is held in position within housing 10 by protrusions 18 (FIG. 6). Spring 40 has constant thickness and a varying effective width. This variation in the effective width of spring 40 is accomplished by openings 62 and 64 in spring 40. Preferably, openings 62 and 64 are identical, allowing spring 40 to be more easily assembled into the fastening tool. Openings 62 and 64 thus provide a tapered width of spring 40. Spring 40 is wider at

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the center of the spring near protrusions 18, and is effectively narrower towards the ends of spring 40.

Referring to FIG. 1, lever 20 makes contact with spring 40 beneath portion 15, which is located near the end of spring 40 (see FIG. 6) and is near slot 60 in plunger 21. As lever 22 is lowered, force is transmitted through linkage 26 to lever 20 causing lever 20 to rotate about pivot 50 and apply upward force to section 15 of spring 40. Because the material cross-section of spring 40 decreases (relatively linearly) from the center of spring 40 to the ends thereof, as shown in FIG. 6, the stress within spring 40 is substantially constant along the entire length of spring 40. The stress is constant because the cross-section of spring 40 is decreasing away from fulcrum 44 and protrusions 18, while the torque upon spring 40 decreases similarly away from fulcrum 44 and protrusions 18. As shown in FIG. 2, note that the plunger 21 is free to slide within a vertical slot located at the front part of the housing 10.

As lever 20 applies upward force on section 15 of spring 40, and raises section 15 of spring 40 as handle 22 is lowered towards housing 10, as shown in FIG. 3, plunger 21 will be raised upwards by the interconnection of spring 40 with slot 60 in plunger 21. An angled tab 23 is located near the end of lever 20 where lever 20 comes in contact with section 15 of spring 40. As lever 22 continues to be pressed towards housing 10, it forces section 15 of spring 40, and plunger 21 upwards within the body of the tool, until angled tab 23 comes into contact with the angled edge of protrusion 13 of housing 10.

As the end of lever 20 which presses on section 15 of spring 40 continues to be raised, angled tab 23 is pressed against the angled edge of protrusion 13. Protrusion 13 is part of housing 10. Protrusion 13 forces lever 20 to slide sideways because of the contact between protrusion 13 and angled tab 23. This forces lever 20 to slide out from under section 15 of spring 40.

At this point, spring 40 is no longer being forced upwards by lever 20. Spring 40 is free to move, and release the energy stored in spring 40. By releasing the energy stored in spring 40, section 15 of spring 40 is driven downwards, towards the bottom of the fastening tool. Since plunger 21 is connected to spring 40 through slot 60, plunger 21 is thus forced downwards by the motion of spring 40.

Lever 20 is free to wobble slightly about linkage 26 and pivot pin 50 in order to allow sideways movement of the end of lever 20 beneath segment 15 of spring 40. The configuration of lever 20 and spring 40 after lever 20 has been released from section 15 of spring 40 is shown in FIG. 4.

Referring to FIG. 2, after lever 22 has been pressed towards the bottom of housing 10 and spring 40 has been released from lever 20, as shown in FIG. 4, the operator will release lever 22. Secondary spring 42 (see FIG. 1) is supported with housing 10 near pivot point 52 of lever 22. Secondary spring 42 exerts pressure on lever 20 to cause the portion of lever 20 linked to lever 22 through pivot 26 to move upwards, thus raising lever 22 to the starting (rest) position. As lever 22 returns to its initial position, the portion of lever 20 which had been positioned beneath segment 15 of spring 40 is lowered towards the bottom of housing 10. This end of lever 20 must again become positioned beneath segment 15 of spring 40 in order for the device to be actuated during the next downstroke of lever 22.

To allow this to occur, tab 11 is located on spring 40 near section 15 thereof. Tab 11 is oriented so that it does not interfere with or make contact with lever 20 as lever 20 presses upwards on section 15 of spring 40. During the

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downward motion of the end of lever 20 near section 15 of spring 40, tab 11 deflects lever 20 away from section 15 of spring 40 until lever 20 has passed beneath spring 40. Once lever 20 has passed beneath spring 40, lever 20 will again become positioned beneath section 15 of spring 40. Secondary spring 42 is biased to apply force to lever 20 in order to force the end of lever 20 to become located beneath section 15 of spring 40. The wobble about the axis defined by the distinct locations of roller linkage 26 and pin 50 allows lever 20 to be positioned under or beside section 15 of spring 40.

In an alternate embodiment, pin 50 is free to roll in respective slots in housing 10 and lever 20. In this configuration section 15 would extend fully across the inner width of spring 40. Lever 20 would disengage section 15 of spring 40 by translating rearward rollably about pin 50. To substantially eliminate friction at translatable linkage 26, the linkage is comprised of a single piece roller bearing. This bearing is not fixed to housing 10 in any way, but rather forms a rolling contact between levers 20 and 22. This design allows roller bearing 26 and pivot pin 50 to be identical in order to ease manufacturing, even though pivot pin 50 serves only as a pivot pin in the embodiment shown. Roller bearing 26 rolls under a load within corresponding slots within levers 20 and 22. The roller bearing functions repeatedly within the slots without requiring additional positioning components, although such a bearing is free to fall to a skewed angle within the slots during the unloaded resetting operation. At the end of the return stroke, the linked components are lightly forced to the furthest end of their respective slots. The inside walls of housing 10 confine bearing 26 in the axial direction. The roller is then constrained in an effective circular cavity formed by the stacked slots. As the mechanism of the tool is engaged under load, the bearing will roll within the slots contained in levers 20 and 22. Because of the contact friction between the bearing and slots, and a geometry which keeps the slot edges relatively parallel to each other at the point of contact with the bearing, the roller will not slide out of position as long as the load is present.

Referring to FIG. 1, to operate the fastener loading system, an operator pulls ring 90 away from housing 10. Ring 90 is connected to a flat wire 32 which in turn is coupled to feeding plunger 30. Feeding plunger 30 is located above track 24, and when in position as shown in FIG. 2, applies force to fasteners 92 to force them towards plunger 21. Feeding plunger 30 maintains pressure against fasteners 92 because of the force applied to feeding plunger 30 by spring 94 (See FIGS. 7-9). Spring 94 is a compression spring which is pressing against stop 96 which is located at the end of track 24 where track 24 pivots away from housing 10. Spring 94 is biased to expand, and thus forces feeding plunger 30 away from stop 96, and towards plunger 21. Feeding plunger 30 is retained upon flat wire 32 by tabs 31.

Track 24 is positioned within steel nose piece 25 by tabs 27 which are located towards the bottom of track 24. Tabs 27 are formed of the same piece comprising track 24. Notches in steel nose piece 25 accommodate tabs 27, thus ensuring that track 24 remains in position within fastener channel 75 of housing 10. Fasteners such as staples 92 may be loaded by placing them on top of channel 24, or by inverting housing 10, and inverting the staples and placing them within fastener channel 75.

Tabs 27 will remain in the notches in nose piece 25 until ring 90 is pulled away from housing 10, pulling feeding plunger 30 away from nose piece 25 until the vertical section 104 of feeding plunger 30 comes into contact with tab 100

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located on track 24. At this point, moving ring 90 further away from housing 10 forces feeding plunger 30 to pull channel 24 away from nose piece 25. This causes tabs 27 to disengage from the slots in nose piece 25, allowing track 24 to be pivoted away from body 10.

Once staples have been loaded onto track 24, the operator manually rotates track 24 upwards towards housing 10, and tabs 27 engage mating notches 29 on nose piece 25. When this occurs, the back of track 24 has rotated, and notch 106 on feeding plunger 30 releases from tab 102 on plunger 24 allowing spring 94 to drive feeding plunger 30 towards nose piece 25, thus pressing staples 92 towards plunger 21. Ring 90 is then pushed towards nose piece 25, causing wire 32 to become located in the channel within track 24. Ring 90 is pressed towards nose piece 25 until ring 90 comes to rest beneath section 110 of housing 10.

With staples 92 resting on track 24 and the spring action of spring 94 pressing against feeding plunger 30, staples 92 are forced towards plunger 21. As plunger 21 is raised above the level of staples 92, the staples adjacent to plunger 21 will be forced beneath plunger 21. As plunger 21 and spring 40 are released from lever 20, plunger 21 will expel the staple located immediately beneath plunger 21, applying the energy released by spring 40. In one embodiment, the loading and feeding system comprises just four parts, track 24, feeding plunger 30, wire 32 with ring 90, and spring 94.

The fastening device of the preferred embodiment is designed for ease of manufacturing. Handle 12 is snap fitted onto lever 22, which allows assembly without the use of fasteners. Roller linkage 26 and pivot 50 are identical and interchangeable. Spring 40 is symmetrical about protrusions 18 of housing 10 so that it can be installed either forwards or backwards without any noticeable difference. Spring 42 serves a dual purpose as both a secondary spring which causes lever 22 to return to its fully extended starting position, and also applies force to track 24 to encourage track 24 to pivot away from housing 10 during the staple reloading procedure.

The staple loading and feeding system comprises a minimum of discreet components. The housing 10 is die cast metal and incorporates numerous guiding functions and exterior contours as well as confining particular components to a predetermined, desired area. The two halves of housing 10 are secured together using built-in rivetable posts which do not require separate fasteners.

To enable energy storage along the entire length of spring 40, the spring must become less stiff further from the fulcrum point. A common leaf spring achieves this effect by stacking progressively shorter flat springs atop each other. A more effective approach is to vary the amount of spring material across just one flat spring. In practice the appropriate way to vary the cross section is to vary the width, but not the thickness, of an individual flat spring. In its simplest embodiment such a flat spring has an elongated four sided diamond shape. The long axis is the bending axis and the short axis, or maximum width, is the fulcrum or pivoting axis. If the fulcrum is at the center of the spring, the spring is engaged at its ends and the spring is flat when unloaded, then the spring will maintain an essentially constant bend radius along its length as it is bent. A conventional non-varying flat spring will remain nearly flat toward its endpoints, bending mostly near the fulcrum.

A spring of the design of the present invention is thinner at its fulcrum point compared to conventional stacked flat torque transmitting springs and coiled wire torsion springs capable of equivalent energy storage. Such compactness is

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essential to minimize the overall height of the tool of the present invention.

There has been described here and above a novel fastening device. Those skilled in the art may now make numerous uses of the teachings of the present invention without departing from the spirit and teachings of the present invention which are defined solely by the scope of the following claims.

What is claimed is:

1. A fastening device comprising:

a housing having a front, back, top, bottom and first and second sides;

a first lever pivoted near the back of said housing;

a plunger located within said housing near the front thereof;

a second lever having first and second ends being linked at said first end to said first lever and releasably linked at said second end to said plunger, said second lever pivotally connected to said housing;

a torque transmitting flat spring pivoting against a fulcrum within said housing and linked at one end to said plunger, said spring decreasing in cross sectional area with increasing distance along the length of said spring away from said fulcrum;

one or more openings through said housing positioned to allow a single hand to grip said first lever and also to grip said housing by passing the fingers of the single hand through said openings.

2. The fastening device described in claim 1 wherein a pivot between said first lever and said housing, a linkage between said first and second levers, and said pivot between said second lever and said housing engage so that with increasing displacement of said first lever from its initial position, said first lever exerts force upon said second lever at the linkage between said first lever and said second lever in an increasingly tangential direction relative to said second lever's pivotal attachment to produce increasing leverage by said first lever upon said second lever, said torque transmitting flat spring being increasingly stressed by the pivotal movement of said first and second levers, said increasing leverage by said first lever on said second lever acting against the increasing stress upon said spring to require a relatively constant force upon said first lever to cause increasing stress upon said spring.

3. The fastening device as described in claim 1 in which said housing is formed of two die cast halves and comprises integral bearing, guiding and positioning surfaces including at least:

an elongated slot in said housing to position and guide said plunger; and

in which said housing is contoured for a fit of an operator's hand.

4. A fastening device comprising:

a housing having a front, back, top, bottom and first and second sides;

a first lever pivoted near the back of said housing;

a plunger located within said housing near the front thereof;

a second lever linked at one end to said first lever and releasably linked at the other end to said plunger;

a torque transmitting spring pivoting on a fulcrum within said housing and linked at one end to said plunger;

said second lever passing through an opening in said spring; and

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one or more openings through said housing to allow a single hand to grip said first lever and grip through said housing.

5. A fastening tool to install fasteners by an impact blow comprising:

a housing to guide and contain mechanical parts;

an elongated torque transmitting spring pivoting on a fulcrum within said housing to store and release energy to install said fasteners;

a lever attached to said housing and linked to said spring such that a user may displace said lever and energize said spring;

said spring being of a substantially constant thickness flat design and having a cross-sectional area that substantially decreases with increasing distance along the length of said spring away from said fulcrum.

6. The fastening device as described in claim 5 in which said spring comprises at least one cavity through its thickness such that a functional component of said fastening tool may pass through said cavity.

7. A fastening tool comprising:

a housing having a top, bottom, first and second sides, a front end, a front, a back, and a length from front to back;

a fastener guide track attached to said housing near the bottom thereof, to guide fasteners towards the front of said housing;

a first opening in said bottom of said housing at said front end of said housing;

a plunger located at said front end of said housing, and having a top and bottom portion, said plunger oriented to expel objects in said fastener guide track through said first opening when said plunger is alternately raised and lowered;

a spring linked to said plunger, oriented to force said plunger towards said first opening, said spring extending rearward from said plunger;

a first lever located substantially above said housing and pivotally connected to said housing near the rear portion of said housing;

a second lever pivotally connected to said housing, elongated rearward from said plunger and linked to said first lever, said second lever further linked to said plunger at a second front end, to transmit pivotal motion of said first lever to cause said plunger to raise, said second lever releasably linked to said plunger such that said second lever will be released from said plunger when said first plunger has reached a predetermined point, causing said spring to force said plunger to lower towards said first opening;

a hand grip opening through said first and second sides of said housing, said hand grip opening elongated along said length of said housing, said hand grip opening extending substantially completely to said front end of said housing and enclosed at said front end by a narrow finger stop structure, said finger stop structure positioned substantially completely at said front end of said housing;

said second lever front end substantially vertically aligned with a front end of said hand grip opening.

8. The fastening device described in claim 7, and further comprising at least a second finger stop structure which spans said hand grip opening, substantially parallel to the first finger stop structure such that said hand grip opening is divided to form at least two distinct openings.

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9. A fastening tool to install fasteners by an impact blow comprising:

a housing to guide and contain mechanical parts;

a spring within said housing to store and release energy to install said fasteners;

a cylindrical roller bearing providing a linkage between a first and a second lever, said roller bearing being loosely positioned within respective slots of said first and second levers;

said slots aligned to form a substantially circular cavity to receive said roller bearing when said levers are in an initial position;

wherein alignment of said slots form an elongated cavity as said levers are displaced from an initial position, such that as said roller bearing rolls within the elongating cavity said roller bearing is held stable within said cavity by contact friction between said slots and said roller bearing;

whereby locations within said slots on said first and second levers of said roller bearing contact remain substantially aligned for all displacement positions of said first and second levers; and

said roller bearing producing a substantially zero friction linkage by rolling between said lever and linked part.

10. A fastening tool to install fasteners by an impact blow comprising:

a housing to guide and contain mechanical parts;

a first lever pivotally attached within said housing;

an elongated cylindrical roller contacting said first lever within said housing;

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a second lever of said fastening tool pressing against said first lever through a linkage comprising said cylindrical roller;

said first and second levers contacting said cylindrical roller at diametrically opposed surfaces of said cylindrical roller to form said linkage across a diameter of said cylindrical roller;

said cylindrical roller rotating between said second lever and said first lever when said second lever is moved relative to said first lever in a direction perpendicular to a long axis of said cylindrical roller.

11. The fastening tool according to claim 10, wherein:

said cylindrical roller contacts said first lever at a first contact surface upon said first lever;

said cylindrical roller contacts said second lever at a second contact surface upon said second lever;

said first contact surface remains parallel to said second contact surface as said second lever is moved relative to said first lever.

12. The fastening tool according to claim 11, wherein at least one of said first and second contact surfaces defines a curve in a direction perpendicular to the long axis of said cylindrical roller.

13. The fastening tool according to claim 11 wherein said first and second contact surfaces feature end structures to limit motion of said cylindrical roller;

end structures causing said cylindrical roller to be entirely contained radially for a particular position of said second lever relative to said first lever.

* * * * *

EXHIBIT C



US007748589B2

(12) **United States Patent
Marks**

(10) **Patent No.:** US 7,748,589 B2
(45) **Date of Patent:** Jul. 6, 2010

(54) **SPRING ENERGIZED DESKTOP STAPLER**

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(75) **Inventor:** Joel Marks, Sherman Oaks, CA (US)

(73) **Assignee:** WorkTools, Inc., Chatsworth, CA (US)

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(21) **Appl. No.:** 11/672,004

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(65) **Prior Publication Data**

Packaging: *EasyShot Staple Gun & Desktop Stapler*, PowerShot, Jan. 2001.

US 2007/0125823 A1 Jun. 7, 2007

(Continued)

Related U.S. Application Data

Primary Examiner—Rinaldi I. Rada

Assistant Examiner—Nathaniel Chukwurah

(63) Continuation of application No. 11/065,781, filed on Feb. 24, 2005, now Pat. No. 7,178,709, which is a continuation of application No. 10/443,854, filed on May 23, 2003, now Pat. No. 6,918,525.

(74) *Attorney, Agent, or Firm*—Paul Y. Feng; Fulwider Patton LLP

(57) **ABSTRACT**

(51) **Int. Cl.**

B25C 5/02 (2006.01)

(52) **U.S. Cl.** 227/132; 227/128; 227/134; 227/156

(58) **Field of Classification Search** 227/132, 227/134, 128, 156

See application file for complete search history.

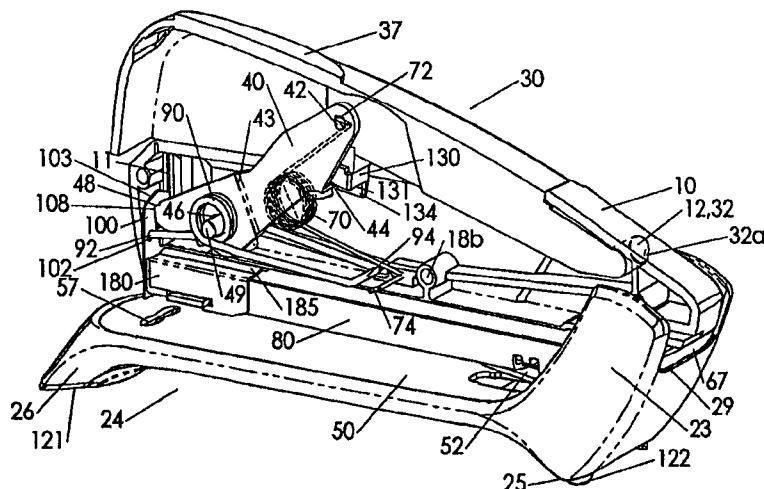
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A desktop stapler uses a spring to store energy to install staples by impact blow. The force required to fasten papers together is reduced. A very compact mechanism is used, including a dual coil power spring with a nested lever. A multi-function base provides a sloped front all the way to down to a desk top surface to guide paper sheets atop the base, easy access for lifting the stapler off a desk, horizontal or vertical resting positions, and integrated soft grip under-surface. The base surrounds the rear of the stapler body to provide a smooth exterior so that the device is natural to use both horizontally and vertically. A simple re-set spring provides a smooth re-set action as the handle is raised. A staple track includes enlargement features to fit a larger staple pusher spring.

24 Claims, 13 Drawing Sheets



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Physical specimen of "EasyShot" Stapler, Model #5650DT, delivered in person to examiner on Mar. 11, 2010 (Photos of specimen attached).

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