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Box breakdown tool

Abstract

Disclosed is a hand tool for opening and breaking down containers. In certain examples, the hand tool includes an elongated handle having an end and defining a longitudinal axis. The hand tool also includes a first arm coupled to the handle and extending away from the end along the longitudinal axis. The hand tool also includes a second arm coupled to the handle and extending away from the end along the longitudinal axis, where the first arm and the second arm form a jaw.

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Background/Summary

FIELD

(1) This application relates generally to tool for breaking down boxes. In particular, this application relates to a tool with safety features to prevent a user from accidental injuries.

BACKGROUND

(2) Box cutters, also known as utility knives, have become essential tools in numerous industries due to their ability to efficiently open packages, cut through various materials, and perform other tasks. Traditional box cutters typically consist of a handle and a retractable razor blade. While these

tools have proved indispensable in enhancing productivity, they also present significant risks to user safety and wellbeing.
(3) Accidental injuries resulting from the use of box cutters are unfortunately all too common. The sharpness and retractable nature of the blade, combined with the ease of handling and operation, make them potentially hazardous if not used with utmost caution. Incidents involving box cutters can range from minor cuts and lacerations to more severe injuries, including deep wounds, tendon damage, and even accidental amputations.
(4) Although safety improvements have been made over time, traditional box cutters and utility knives remain prone to accidental injuries due to several inherent limitations. Existing safety mechanisms, such as manually retractable blades or built-in blade guards, often require precise user manipulation and may be prone to human error or misuse. In some cases, the mechanisms themselves can fail or become unreliable with frequent use, compromising user safety.
(5) Additionally, existing safety features typically focus on the operational use of box cutters, neglecting potential hazards during storage or when not in use. The lack of effective safety measures to prevent unauthorized access, accidental blade deployment, or unintended contact with the blade exacerbates the risks associated with box cutter usage.

SUMMARY
(6) A hand tool for opening and breaking down containers is disclosed. In certain examples, the hand tool includes an elongated handle having an end and defining a longitudinal axis. The hand tool also includes a first arm coupled to the handle and extending away from the end along the longitudinal axis. The hand tool also includes a second arm coupled to the handle and extending away from the end along the longitudinal axis, where the first arm and the second arm form a jaw.
(7) In certain examples, the first arm further comprises a pair of opposing side surfaces that converge to a pointed end. An angle formed by the pair of opposing side surfaces is in the range of between about 5 and 35 degrees.
(8) In certain examples, the second arm comprises a squared end disposed between a pair of opposing side surfaces. The squared end and the pair of opposing side surfaces may be beveled and have serrated portions. In certain examples, an angle formed by the first end and the second end is in the range of between about 15 and 25 degrees.
(9) A method of manufacturing the breakdown tool is also disclosed.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) In order that the advantages of the embodiments of the subject disclosure will be readily understood, a more particular description of the embodiments will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only some embodiments and are not therefore to be considered to be limiting of scope, the embodiments will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:
(2) FIGS. **1**A and **1**B are perspective view diagrams of a breakdown tool, according to aspects of the disclosure;
(3) FIG. **2** is a perspective view diagram of the breakdown tool, according to examples of the disclosure;
(4) FIG. **3**A is, a side perspective view diagram of the breakdown tool according to examples of the disclosure;
(5) FIG. **3**B is a side view diagram of the breakdown tool according to examples of the disclosure;
(6) FIGS. **4**A and **4**B are side and top view diagrams, respectively, of the breakdown tool, according to examples of the disclosure;

(7) FIG. **5** is a perspective view diagram of the breakdown tool in use, according to examples of the disclosure;
(8) FIGS. **6**A and **6**B are perspective view diagrams of the first arm prying open a box, in accordance with examples of the disclosure; and
(9) FIG. **7** is a schematic flow chart diagram of a method of manufacturing a breakdown tool, according to examples of the disclosure.

DETAILED DESCRIPTION

(10) Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment, but mean "one or more but not all embodiments" unless expressly specified otherwise. The terms "including," "comprising," "having," and variations thereof mean "including but not limited to" unless expressly specified otherwise. An enumerated listing of items does not imply that any or all of the items are mutually exclusive and/or mutually inclusive, unless expressly specified otherwise. The terms "a," "an," and "the" also refer to "one or more" unless expressly specified otherwise. The term "and/or" indicates embodiments of one or more of the listed elements, with "A and/or B" indicating embodiments of element A alone, element B alone, or elements A and B taken together.
(11) The schematic flowchart diagrams and/or schematic block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations. It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the Figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. Although various arrow types and line types may be employed in the flowchart and/or block diagrams, they are understood not to limit the scope of the corresponding embodiments. Indeed, some arrows or other connectors may be used to indicate only an exemplary logical flow of the depicted embodiment.
(12) The description of elements in each figure may refer to elements of proceeding figures Like numbers refer to like elements in all figures, including alternate embodiments of like elements.
(13) FIGS. **1**A and **1**B are perspective view diagrams of a breakdown tool **100**, according to aspects of the disclosure. In other examples, the breakdown tool **100** is referred to as an opening tool. The breakdown tool **100** is useful for the safe opening of sealed containers, such as cardboard boxes that are closed with tape, plastic film/shrink wrap, and/or adhesive. The breakdown tool **100** is formed of, in certain examples, a rigid material including, but not limited to, rigid polymers, metals, and/or metallic alloys. In certain examples, the breakdown tool is formed of a single material, such as glass fiber reinforced plastic. The breakdown tool may also be formed of a plastic resin such as ABS, PP or Nylon, that may be reinforced with glass fibers in some examples. In other examples, the breakdown tool is formed of, but is not limited to, combinations of polymers and metals.
(14) The breakdown tool **100**, in certain examples, includes an elongated handle **102** that is configured for gripping by a hand of a user. The handle **102**, in the depicted example, is formed with a generally rectangular cross-section (i.e., rounded rectangle). However, other cross-section geometries are contemplated. In other words, any suitable cross-section geometry that is usable for gripping may be implemented.
(15) A pair of opening arms **104**, **106** extend outward from the handle **102** in a generally longitudinal direction. Stated differently, the opening arms **104**, **106** extend outward from the handle generally along a longitudinal axis that is formed by the handle, such as is depicted by the dotted line **108** (see FIG. **3**B). The opening arms **104**, **106** may be formed as a unitary body with the handle **102**. In other examples, the handle **102** is releasably coupled to the opening arms **104**,

106. The first opening arm **104** (hereinafter "first arm **104**") is configured to form a substantially pointed end **110** that resembles a knife blade. The first arm **104** is useful for sliding into areas of a container that are well sealed, such as a flap of a cardboard box that is glued to another area of the cardboard box (see FIG. **6**B).

(16) The second opening arm **106** (hereinafter "second arm **106**") is configured to form a substantially squared end **112**. In other words, the squared end **112** is an end that includes a substantially linear edge **114** disposed between a pair of corners **116**. The substantially linear edge **114** may be formed with a bevel, as depicted. In certain examples, the squared end **112** of the second arm **106** includes serrated portions **118** disposed along longitudinal sides (i.e., sides that extend longitudinally away from the handle) of the second arm **106**.

(17) The first arm **104** and the second arm **106** extend away from each other at an angle (see FIG. **3**B) from a junction portion **120**. The junction portion **120** is disposed between the opening arms **104**, **106** and the handle **102**. The junction portion **120** may be formed with curvilinear surfaces that help to wedge open flaps of containers (see FIGS. **6**A and **6**B).

(18) FIG. **2** is a perspective view diagram of the breakdown tool **100**, according to examples of the subject disclosure. In the depicted example, the breakdown tool **100** is formed with a honeycomb or ribbed surface on one or both of the first arm **104** and second arm **106** (not shown here). The ribbed surface has multiple advantages including, but not limited to, allow a consistent wall thickness. The ribs on both arms allow the prongs to be molded maintaining a consistent wall thickness through the tool.

(19) FIG. **3**A, a side perspective view diagram, and FIG. **3**B, a side view diagram, illustrate examples of the breakdown tool **100** according to examples of the disclosure. The depicted examples illustrate a "jaw" or opening formed between the first arm **104** and the second arm **106**. The dashed line **108** depicts the longitudinal axis formed by the handle **102**. The first arm **104** and the second arm **106** extend away from the handle **102** in a direction that is substantially parallel with the longitudinal axis **108**.

(20) The breakdown tool **100**, in certain examples, has an elongated body with a length that is selected to optimize a leverage action that is useful in opening containers. The body may be one-piece, integral, and formed from a thermoplastic or fiber reinforced thermoplastic which is capable of transmitting a torque from a user to the container.

(21) In certain examples, the first arm **104** is formed with opposing sides **304** that extend from the handle **102** and converge, or taper, to form a substantially pointed end **110**. The second arm **106** is formed with opposing sides **306** that extend from the handle **102** to the squared end **112**. The opposing sides **306** may, in a central region for example, diverge before converging towards the squared end **112**. In certain examples, the squared end **112** is disposed transverse to the longitudinal axis **108**, in in some examples is disposed orthogonally to the longitudinal axis.

(22) The beveled surface **308** of the squared end **112** may, in certain examples, be directed upwards or towards the longitudinal axis **108** (i.e., towards the jaw **302** area). In other examples, the beveled surface **308** is facing away from the longitudinal axis **108**. The beveled surface **308** of the squared end **112** may continue along the opposing sides **306** of the second arm **106** towards the handle **102**. Serrated portions **118** disposed along the opposing sides **306** aid in cutting through tape or other fastening devices used to close a container. The serrated portions **118** may be formed in the rigid polymer that forms the breakdown tool **100**. Alternatively, the serrated portions **118** may be, for example, metal inserts that are attached (or co-molded into) to the second arm **106**.

(23) FIGS. **4**A and **4**B are side and top view diagrams, respectively, of the breakdown tool **100**, according to examples of the disclosure. In certain examples, the breakdown tool **100** is formed having a length **402** in the range of between about 200 and 330 mm. In other examples, the length **402** is in the range of between about 240 and 290 mm. The length **402** is selected to maximize comfort, usability, and leverage when being used by an adult. A height **404** and width **406** of the handle **102** is in the range of between about 20 and 40 mm. In certain examples, the height **404** and

width **406** are substantially equivalent. In alternative examples, the width **406** is greater than the height **404**, or vice versa.
(24) A height **408** of the jaw opening is selected to best allow for usability of either the first arm **104** or the second arm **106**. Stated differently, the height **408** is selected to allow the user to effectively use one of the arms **104**,**106** without impeding the usability of the selected arm. For example, if the jaw opening was too narrow, a user may find it difficult to slide the first arm **104** in-between surfaces of a container. In certain examples, the height **408** of the jaw opening is in the range of between about 30 and 60 mm. In other examples, the height **408** of the jaw opening is in the range of between about 40 and 50 mm.
(25) An angle **410** formed by the first arm **104** and the second arm **106** corresponds with the height **408**, and is selected for the same reasons. In other words, the angle **410** is selected to allow the effective use of either arm, maximize leverage of the tool when used to pry, and maximize comfort in the hand of a user. In certain examples, the angle **410** is in the range of between about 15 and 25 degrees. In other examples, the angle **410** is in the range of between about 19 and 23 degrees.
(26) A width **412** of the squared end **112** is in the range of between about 23 and 43 mm. In other examples, the width **412** of the squared end **112** is in the range of between about 30 and 36 mm. The width is selected to maximize comfort and usability. A wide handle grip helps with comfort by spreading out the force load on the hand. The more surface area that the handle can contact the hand the more comfortable it will be when applying a force.
(27) Callout **414** depicts an enlargement of the pointed end **110**. As used herein, the term “pointed” signifies that an angle **416** between side surfaces **418**, **420** is less than 90 degrees. In certain examples, the angle **416** is in the range of between about 5 and 35 degrees. Although the depicted examples of the disclosure describe an arm with a pointed end **110** and an arm with a squared end **112**, it is contemplated that both arms may include a squared end **112**, or in the alternative, a pointed end **110**.
(28) FIG. **5** is a perspective view diagram of the breakdown tool **100** in use, according to examples of the disclosure. The breakdown tool **100**, when held by a user, may be used to slice through tape that has sealed a container, such as the depicted cardboard box **502**. The second arm **106**, with the squared end **112** is useful to drag through the tape to unseal the cardboard box. The serrated portions (not shown here) may also help in cutting through the tape. The squared end **112** may be used to slide between flaps **504** of the cardboard box **502**. The breakdown tool **100** beneficially allows a user to quickly and safely unseal and breakdown/flatten cardboard boxes without the use of metal knife edges.
(29) FIGS. **6**A and **6**B are perspective view diagrams of the first arm **104** prying open a box, in accordance with examples of the disclosure. Some cardboard boxes **602** are sealed with adhesive instead of tape. In such a situation, the first arm **104** is useful for prying open an adhered flap **604**. As depicted in FIG. **6**A, the pointed end of the first arm **104** is inserted between flaps **604** and is useful to wedge apart the top flap **604** from the flap **606** underneath. In certain situations, just inserting one of the jaws between glued flaps can break the adhesive bond.
(30) A user may lift, or pry open, as depicted in FIG. **6**B, the top flap **604** by breaking the adhesive bond between flaps **604**, **606**. As described above, the contour of the surfaces of the first arm **104** is selected to minimize the force required to insert the first arm **104** between the flaps **604**, **606**, while the length of the first arm maximizes leverage and comfort for the user.
(31) FIG. **7** is a schematic flow chart diagram of a method of manufacturing a breakdown tool, according to examples of the disclosure. In certain examples, the method **700** starts and at step **702** an elongated handle is provided. The elongated handle may be provided in the manner described above with reference to FIGS. **1**A-**6**B. At step **704** the first arm is provided in the manner described above with reference to FIGS. **1**A-**6**B. At step **706**, the second arm is proved in the manner described above with reference to FIGS. **1**A-**6**B. The breakdown tool may be provided as a single, unitary piece formed by injection molding, or any suitable manufacturing process. In other

examples, the breakdown tool is formed of separate pieces that are coupled or fastened together.
(32) This description uses examples to describe embodiments of the disclosure and also to enable any person skilled in the art to practice the embodiments, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the disclosure is defined by the claims and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal language of the claims.

Claims

1. A hand tool for opening and breaking down containers, the hand tool comprising: an elongated handle having an end and defining a longitudinal axis; a first arm coupled to the elongated handle and extending away from the end along the longitudinal axis; and a second arm coupled to the elongated handle and extending away from the end along the longitudinal axis, where the first arm and the second arm form a jaw, and where the second arm comprises a cutting surface extending away from the first arm.
2. The hand tool of claim 1, where the first arm further comprises a pair of opposing side surfaces that converge to an end.
3. The hand tool of claim 2, where the end of the first arm comprises a pointed end.
4. The hand tool of claim 2, where an angle formed by the pair of opposing side surfaces is in a range of between about 5 and 35 degrees.
5. The hand tool of claim 1, where the second arm comprises a squared end disposed between a pair of opposing side surfaces.
6. The hand tool of claim 5, where the squared end and the pair of opposing side surfaces are beveled to form the cutting surface.
7. The hand tool of claim 5, where at least one of the pair of opposing side surfaces comprises a serrated portion.
8. The hand tool of claim 5, where each of the pair of opposing side surfaces comprises a serrated portion.
9. The hand tool of claim 1, where an angle formed by the first end and the second end is in a range of between about 15 and 25 degrees.
10. A hand tool comprising: an elongated handle having an end and defining a longitudinal axis; a first arm coupled to the elongated handle and extending away from the end along the longitudinal axis, where the first arm comprises a first pair of opposing side surfaces that converge to a pointed end; a second arm coupled to the elongated handle and extending away from the end along the longitudinal axis, where the second arm comprises a squared end disposed between a second pair of opposing side surfaces, and where each of the second pair of opposing side surfaces includes a serrated portion; and where the first arm and the second arm form a jaw.
11. The hand tool of claim 10, where an angle formed by the first pair of opposing side surfaces is in a range of between about 5 and 35 degrees.
12. The hand tool of claim 10, where the squared end and the pair of opposing side surfaces are beveled.
13. The hand tool of claim 10, where an angle formed by the first end and the second end is in a range of between about 15 and 25 degrees.
14. A method of manufacturing a hand tool for breaking down a container, the method comprising: providing an elongated handle having an end and defining a longitudinal axis; providing a first arm coupled to the elongated handle and extending away from the end along the longitudinal axis; and providing a second arm coupled to the elongated handle and extending away from the end along the longitudinal axis, where the first arm and the second arm form a jaw, and where the second arm

comprises a cutting surface extending away from the first arm.
15. The method of claim 14, where the first arm further comprises a pair of opposing side surfaces that converge to an end.
16. The method of claim 15, where the end of the first arm comprises a pointed end.
17. The method of claim 15, where an angle formed by the pair of opposing side surfaces is in a range of between about 5 and 35 degrees.
18. The method of claim 14, where the second arm comprises a squared end disposed between a pair of opposing side surfaces.
19. The method of claim 18, where the squared end and the pair of opposing side surfaces are beveled to form the cutting surface.
20. The method of claim 19, where at least one of the pair of opposing side surfaces comprises a serrated portion.