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Tube cutter capable of cutting tubes with various diameters

Abstract

A tube cutter comprises a main body, a cutting member and a base. The main body has a cutting space and a mounting portion corresponded to the cutting space. The cutting member, which is received in the main body, has a at least a portion protruding into the cutting space. The base has a first clamping portion and a second clamping portion; wherein the base is received in the mounting portion of the main body and can be switched between a first angle and a second angle. The first clamping portion is communicated with the cutting space to clamp a tube with a first predetermined diameter when the base is switched to the first angle. The second clamping portion is communicated with the cutting space to clamp a tube with a second predetermined diameter when the base is switched to the second angle.

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References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
2875518	12/1958	Dyczynski	30/102	B23D 21/08
2937440	12/1959	Kelly	30/95	B23D 21/08
2988814	12/1960	Carpenter	30/102	B23D 21/08
3163932	12/1964	Adams	30/101	B23D 21/08
3335492	12/1966	Spiro	30/101	B23D 21/08
4078304	12/1977	Netzel	30/95	B23D 21/08
D263111	12/1981	Besenbruch	D8/60	N/A
4769911	12/1987	Araki	30/95	B23D 21/04
4831732	12/1988	Garton	30/101	B23D 21/08
5285576	12/1993	Taylor	30/93	B23D 21/08
5325587	12/1993	Steiner	30/91.2	H02G 1/1224
5581886	12/1995	Sesser	30/101	B23D 21/08
6357119	12/2001	Acerra	30/92	B08B 1/10
RE40461	12/2007	Hu	30/94	B23D 21/08
8573099	12/2012	Huang	82/113	B23D 21/08
10052701	12/2017	Zhou	N/A	B26D 7/2621
11224925	12/2021	Canis	N/A	B23D 21/06
11684984	12/2022	Frenken	30/92	B23D 21/00
11701720	12/2022	Huang	30/93	B23D 21/04
D1013474	12/2023	Rampling	D8/60	N/A
2012/0023751	12/2011	Chiu	30/101	B23D 21/08
2012/0247286	12/2011	Huang	82/60	B23D 21/08
2014/0082850	12/2013	Stokes	81/319	B25F 1/003
2016/0008895	12/2015	Chen	30/102	B23D 21/08
2018/0021863	12/2017	Chen	30/102	B23D 21/08
2018/0297227	12/2017	Jenkins	N/A	B26D 3/169

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Background/Summary

BACKGROUND OF THE INVENTION

1. Technical Field

(1) The present invention relates to a hand tool, and more particularly to a tube cutter capable of cutting tubes with various diameters.

2. Description of Related Art

(2) In engineering operations, various types of tubes (such as copper pipes, iron pipes, PVC hoses, etc.) are often required. Typically, these tubes are manufactured in long lengths, but in practical applications, only a portion of them may be needed. In such cases, it is necessary to cut the tubes to the required length using tube cutting equipment.

(3) A prior art taught a blade wheel at one end of an upper clamping part and a corresponding circular groove on one end of a lower clamping part to accommodate a tube. Operator can manipulate the tube cutter to bring the upper clamping part together or separate it from the lower clamping part, thereby adjusting a distance between the blade wheel and the circular groove to clamp the tube and carry out tube cutting operations.

(4) The issue with the structure of the above-mentioned pipe cutter is that dimensions of the circular groove in the lower clamping part are fixed, making it suitable only for tubes of specific diameter. If an operator wishes to use the tube cutter to cut tubes that are larger or smaller than the corresponding diameter, it leads to instability in clamping due to the mismatch between the pipe diameter and the groove. This results in the tube shifting during the cutting operation, requiring more time and effort to adjust the pipe's position, leading to reduced cutting efficiency.

Alternatively, it may necessitate the use of different tube cutters specifically designed for the pipe diameter, which is highly inconvenient.

BRIEF SUMMARY OF THE INVENTION

(5) In view of the above, the primary objective of the present invention is to provide a tube cutter capable of cutting tubes with various diameters by using only one tube cutter to have a convenient tube cutting experience.

(6) In order to achieve the objective of the present invention, A tube cutter, comprises a main body having a cutting space and a mounting portion corresponding to the cutting space; a cutting member received in the main body and having at least a portion protruding into the cutting space; and a base having a first clamping portion and a second clamping portion; wherein the base is received in the mounting portion of the main body to be switched between a first angle and a second angle; the first clamping portion is communicated with the cutting space to clamp a tube of a first predetermined diameter when the base is switched to the first angle, and the second clamping portion is communicated with the cutting space to clamp a tube of a second predetermined diameter when the base is switched to the second angle.

(7) In an embodiment, the base is detachably connected to the main body to be switched between the first angle and the second angle by detaching the base from the main body.

(8) In an embodiment, the mounting portion is provided with a groove, in which the base is received; the groove has a top opening and a side opening; the top opening is communicated with the cutting space, allowing the first clamping portion or the second clamping portion to communicate with the cutting space; the side opening isn't communicated with the cutting space, allowing the base for insertion into or removal from the groove.

(9) In an embodiment, the mounting portion further comprises a blocking surface covering at least a portion of the top opening, so that a width of the top opening is smaller than that of the base.

(10) In an embodiment, the base further comprises a first interface connected to the first clamping portion and a second interface connected to the second clamping portion; the first interface is

engaged with the blocking surface when the base is switched to the first angle, and the second interface is engaged with the blocking surface when the base is switched to the second angle.

(11) In an embodiment, the mounting portion has a first limiting portion and a second limiting portion; the base has a fixing portion; the fixing portion is engaged with the first limiting portion when the base is switched to the first angle, and the fixing portion is engaged with the second limiting portion when the base is switched to the second angle.

(12) In an embodiment, the mounting portion has a groove; the first limiting portion and the second limiting portion are formed on sidewalls of the groove respectively, and the first limiting portion is higher than that of the second limiting portion.

(13) In an embodiment, the base has an arm, on which the fixing portion is provided.

(14) In an embodiment, the base has two arms on opposite sides thereof, each of the arms is provided with a fixing portion; the mounting portion of the main body has two first limiting portions and two second limiting portions; the fixing portions are engaged with one of the first limiting portions and one of the second limiting portions respectively when the base is switched to the first angle, and the fixing portions are engaged with the other first limiting portion and the other second limiting portion respectively when the base is switched to the second angle; each of the arms has a connecting end and a free end, the connecting ends of the arms are connected to the base, while the free ends of the arms extend in opposite directions.

(15) In an embodiment, the first clamping portion and the second clamping portion are two slots formed on opposite sides of the base respectively.

Description

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

(1) The present invention will be best understood by referring to the following detailed description of some illustrative embodiments in conjunction with the accompanying drawings, in which

(2) FIG. 1 is a perspective view of a preferred embodiment of the present invention;

(3) FIG. 2 is an exploded view of the preferred embodiment of the present invention;

(4) FIG. 3 is another exploded view of the preferred embodiment of the present invention;

(5) FIG. 4 is a sectional view of the preferred embodiment of the present invention, showing the first elastic member and the second elastic member engaging the cutting blade;

(6) FIG. 5 is a schematic view of the preferred embodiment of the present invention, showing the tube cutting operation in the first angle; and

(7) FIG. 6 is a schematic view of the preferred embodiment of the present invention, showing the tube cutting operation in the second angle.

DETAILED DESCRIPTION OF THE INVENTION

(8) As shown in FIG. 1 to FIG. 4, a tube cutter of a preferred embodiment of the present invention includes a main body **10**, a cutting member **20**, a base **30**, a first elastic member **40**, a second elastic member **50** and a third elastic member **60**.

(9) The main body **10** is a C-shape circular case, having a cutting space **11** configured to receive a tube, and a mounting portion **12** located beneath the cutting space **11**. In the present preferred embodiment, the mounting portion **12** has a groove **120**, two side openings **121** and a top opening **122**. The groove **120** is corresponded to the base **30** to receive the base **30**. The side openings **121** are located on opposite sides of the main body **10**, communicated with the groove **120** but not communicated with the cutting space **11**, which allows the base **30** for insertion or removal from the groove **120**. The top opening **122** is above the groove **120**, so that the groove **120** is communicated with the cutting space **11** through the top opening **122**. The mounting portion **12** further includes a blocking surface **123**, which is above the groove **120** and covers at least a portion of the groove **120**, making a width of the top opening **122** less than a width of the base **30**, so that

the top opening **122** doesn't allow the base **30** for insertion or removal of the groove **120**. The mounting portion **12** further includes two first limiting members **124** and two second limiting members **125** received in opposite sidewalls of the groove **120** respectively. A height of each first limiting member **124** relative to a bottom of the groove **120** is lower than a height of each second limiting member **125**. In an alternate preferred embodiment, the first limiting members and the second limiting members are located in the same sidewall of the groove. The main body **10** further has a rail **13** configured to receive at least a portion of the cutting member **20**, and the rail **13** is located on a top of the cutting space **11**. In the present preferred embodiment, the main body **10** has two slots **14** arranged side by side, and the rail **13** is formed on bottoms of the slots **14**. The main body **10** further includes two curve slots **15** above the slots **14** and communicated with the slots **14** respectively. A pillar **150** is provided on a bottom of each curve slots **15**. The curve slots **15** are configured to receive the second elastic member **50** and the third elastic member **60** respectively.

(10) The cutting member **20** is received in the main body **10** with at least a portion protruding into the cutting space **11** to cut the tube in the cutting space **11**. The cutting member **20** includes a cutting blade **21** and a shaft **22**. The cutting blade **21** has a circular blade portion **210** and a circular protruding portion **211**, the protruding portion **211** extends outwardly along an axial direction of the blade portion **210**, and an outer diameter of the blade portion **210** is greater than that of the protruding portion **211**. The shaft **22** passes through the center of the cutting blade **21**, allowing the cutting blade **21** to rotate relative to the shaft **22**. Opposite ends of the shaft **22** are engaged with the rail **13**, and the cutting member **20** is movable in the rail **13**. The main body **10** further includes two covers **16** detachably connected to the opposite ends of the shaft **22**, limiting the shaft **22** from moving along its axial direction. The cutting member **20** further includes a first preload portion **23**, a second preload portion **24** and a third preload portion **25**. The first preload portion **23**, the second preload portion **24** and the third preload portion **25** are predetermined portions of a surface of the cutting member **20**, on which the first elastic member **40**, the second elastic member **50** and the third elastic member **60** rest respectively. In the present preferred embodiment, the first preload portion **23** is provided on the outer periphery of the protruding portion **211** of the cutting blade **21**, the second preload portion **24** and the third preload portion **25** is provided on the shaft **22** and located on opposite sides of the cutting blade **21** respectively. In an alternative preferred embodiment, the first preload portion, the second preload portion and the third preload portion are located on either the cutting blade or the shaft.

(11) The base **30** is received in the mounting portion **12** of the main body **10**, and is able to be switched between a first angle and a second angle. The base **30** has a first clamping portion **31** and a second clamping portion **32** located on opposite ends of the base respectively. In the present embodiment, the first clamping portion **31** and the second clamping portion **32** are two grooves. A width and a depth of the first clamping portion **31** are larger than that of the second clamping portion **32**, so that the base **30** is able to receive tubes in different diameters. In an alternative preferred embodiment, the first clamping portion and the second clamping portion are two roller devices with different sizes.

(12) The base **30** further includes a first interface **33** and a second interface **34**. The first interface **33** is connected to the first clamping portion **31**, and the second interface **34** is connected to the second clamping portion **32**. When the base **30** is received in the main body **10** in the first angle, the first interface **33** is engaged with the blocking surface **123**. When the base **30** is received in the main body **10** in the second angle, the second interface **34** is engaged with the blocking surface **123**.

(13) The base **30** further includes two arms **35** and two fixing portions **36**. The arms **35** are connected to left and right ends of the base **30** and adjacent to the sidewalls of the groove **120** respectively. The base **30** has two moving space **37**, the arms **35** are located in the moving spaces **37** respectively to move relative to the moving space **37**. In particular, each arm **35** has a connecting end **350** and a free end **351**. The connecting ends **350** of the arms **35** are connected to

the base **30** while the free ends **351** of the arms **35** extend in opposite directions. The fixing portions **36** are mounted on the free ends **351** respectively and extend in opposite directions. Heights of the fixing portions **36** are different, allowing them to correspond to the first limiting portions **124** and the second limiting portions **125**. When the base **30** is received in the main body **10** in the first angle, the fixing portions **36** engage one of the first limiting portions **124** and one of the second limiting portions **125** respectively. When the base **30** is received in the main body **10** in the second angle, the fixing portions **36** engage the other first limiting portion **124** and the other second limiting portion **125** respectively. In the present preferred embodiment, the first limiting portions **124** and the second limiting portions **125** are slots, and the fixing portions **36** are ribs corresponded to the slots. In an alternative preferred embodiment, the first limiting portions and the second limiting portions are ribs and the fixing portions are slots.

(14) The first elastic member **40** is a curved spring, with an end fixed to the main body **10** and an opposite end engaged with the first preload portion **23** of the cutting member **20**, providing a first elastic force (also known as first preload) biasing the cutting member **20** to move toward a front end of the rail **13**.

(15) The second elastic member **50** is received in one of the curve slots **15**, having a first elastic piece **51**, a second elastic piece **52** and a combining portion **53**. The first elastic piece **51** and the second elastic piece **52** are kept away from each other in a predetermined distance. The combining portion **53** is an annular structure formed between the first elastic piece **51** and the second elastic piece **52** with opposite ends connected to the first elastic piece **51** and the second elastic piece **52**. When the second elastic member **50** is received in the curve slot **15**, the first elastic piece **51** engages the second preload portion **24** of the cutting member **20**, while the second elastic piece **52** engages a sidewall of the curve slot **15**, and the pillar **150** of the curve slot **15** is surrounded by the combining portion **53** to fix the second elastic member **50** in the curve slot **15**. The second elastic piece **52** further includes a curve section **520** bending toward the first elastic piece **51**. The second elastic member **52** is engaged with the second preload portion **24** of the cutting member **20**, providing a second elastic force (also known as second preload) on the second preload portion **24**. Wherein, directions of the first elastic force and the second elastic force are different. In particular, a direction of the first elastic force is substantially parallel to a first normal direction which is defined as a direction perpendicular to a surface of the first preload portion **23**. The second elastic force is substantially parallel to a second normal direction which is defined as a direction perpendicular to a surface of the second preload portion **24**. A non-zero angle is formed between the first normal direction and the second normal direction, so that the first normal direction and the second normal direction are non-parallel. In the present preferred embodiment, the second elastic force, provided by the second elastic member **52**, biasing the shaft **22** of the cutting member **20** to rest against the rail **13**.

(16) The third elastic member **60** has the same structure as the second elastic member **50**, so I do not describe again. The third elastic member **60** is received in the curve slot **15** relative to the second elastic member **50**, with an end engaged with the third preload portion **25** of the cutting member **20**, providing a third elastic force (also known as third preload) on the third preload portion **25**. The direction of the third elastic force is substantially parallel to a third normal direction which is defined as a direction perpendicular to the surface of the third preload portion **25**. The third normal direction is substantially parallel to the second normal direction, so that the third elastic member **60** and the second elastic member **50** exert balanced elastic forces in the same direction on both sides of the cutter member **20**. In an alternative preferred embodiment, it is possible that only the first elastic member and the second elastic member are installed without the third elastic member.

(17) The base **30** of the preferred embodiment of the present invention is able to be switched to different angles by a subject to receive tubes of various diameters. For example, the subject may switch the base **30** to the first angle and insert the base **30** into the groove **120** from the side

openings **121** until the fixing portions **36** of the base **30** are engaged with the first limiting portion **124** and the second limiting portion **125**, as shown in FIG. 5. In the present preferred embodiment, the first angle is regarded as 0 degree. In this situation, the first clamping portion **31** is communicated with the cutting space **11** and corresponded to the cutting blade **21**. Thereby a tube **70** of a first predetermined diameter is able to be inserted into the cutting space **11** and clamped by the first clamping portion **31** and the cutting blade **21** for cutting operation.

(18) To switch the base **30** from the first angle to the second angle, the subject presses the arms **35** inward to release the fixing portions **36** from a fixing state, and detaches the base **30** from the groove **120**. After that, the subject may switch the base **30** into the second angle and insert the base **30** into the groove **120** as the same way mentioned above.

(19) As shown in FIG. 6, the base **30** is received in the main body **10** in the second angle. In the present preferred embodiment, the second angle is regarded as 180 degree. In this situation, the second clamping portion **32** is communicated with the cutting space **11** and corresponded to the cutting blade **21**. Thereby a tube **80** of a second predetermined diameter is able to be inserted into the cutting space **11** and clamped by the second clamping portion **32** and the cutting blade **21** for cutting operation. Due to the widths and the depths of the first clamping portion **31** and the second clamping portion **32** are different, the tube cutter of the preferred embodiment of the present invention is able to cut tubes with different diameters by switching the base **30**. In the present preferred embodiment, the first angle is 0 degree and the second angle is 180 degree. In an alternative preferred embodiment, the first angle and the second angle can be any different angle.

(20) In the present preferred embodiment, the base **30** is switched between the first angle and the second angle by detaching the base **30** from the main body **10**. In an alternative preferred embodiment, the base is switched between the first angle and the second angle without being detached from the main body. For example, the base is pivoted on the main body to be driven to rotate to the first angle or the second angle.

(21) On the other hand, whether a tube is clamped at the first angle or the second angle, the tube would push the cutting blade **21** inward, making the first elastic member **40**, the second elastic member **50** and the third elastic member **60** being compressed to provide preloads in multiple directions on the cutting member **20**. Thus, the cutting member **20** provides a multi-directional automatic feeding effect under the elastic forces during any tube cutting operation.

(22) In conclusion, the tube cutter of the preferred embodiment achieves the ability to cut tubes with various diameters by employing various installation methods of the base **30**. Compared to prior tube cutter that can only cut tubes of specific diameter, the present invention allows cutting operations of tubes in different diameters without changing other tube cutters, thereby provides a convenient tube cutting experience.

(23) It must be pointed out that the embodiments described above are only some preferred embodiments of the present invention. All equivalent structures which employ the concepts disclosed in this specification and the appended claims should fall within the scope of the present invention.

Claims

1. A tube cutter, comprising: a main body having a cutting space and a mounting portion corresponded to the cutting space; a cutting member received in the main body and having at least a portion protruding into the cutting space; and a base having a first clamping portion and a second clamping portion; wherein the base is received in the mounting portion of the main body to be switched between a first angle and a second angle; the first clamping portion is communicated with the cutting space to clamp a tube of a first predetermined diameter when the base is switched to the first angle, and the second clamping portion is communicated with the cutting space to clamp a tube of a second predetermined diameter when the base is switched to the second angle.

2. The tube cutter of claim 1, wherein the base is detachably connected to the main body to be switched between the first angle and the second angle by detaching the base from the main body.
 3. The tube cutter of claim 1, wherein the mounting portion is provided with a groove, in which the base is received; the groove has a top opening and a side opening; the top opening is communicated with the cutting space, allowing the first clamping portion or the second clamping portion to communicate with the cutting space; the side opening isn't communicated with the cutting space, allowing the base for insertion into or removal from the groove.
 4. The tube cutter of claim 3, wherein the mounting portion further comprises a blocking surface covering at least a portion of the top opening, so that a width of the top opening is smaller than that of the base.
 5. The tube cutter of claim 4, wherein the base further comprises a first interface connected to the first clamping portion and a second interface connected to the second clamping portion; the first interface is engaged with the blocking surface when the base is switched to the first angle, and the second interface is engaged with the blocking surface when the base is switched to the second angle.
 6. The tube cutter of claim 1, wherein the mounting portion has a first limiting portion and a second limiting portion; the base has a fixing portion; the fixing portion is engaged with the first limiting portion when the base is switched to the first angle, and the fixing portion is engaged with the second limiting portion when the base is switched to the second angle.
 7. The tube cutter of claim 6, wherein the mounting portion has a groove; the first limiting portion and the second limiting portion are formed on sidewalls of the groove respectively, and the first limiting portion is higher than that of the second limiting portion.
 8. The tube cutter of claim 6, wherein the base has an arm, on which the fixing portion is provided.
 9. The tube cutter of claim 1, wherein the base has two arms on opposite sides thereof, each of the arms is provided with a fixing portion; the mounting portion of the main body has two first limiting portions and two second limiting portions; the fixing portions are engaged with one of the first limiting portions and one of the second limiting portions respectively when the base is switched to the first angle, and the fixing portions are engaged with the other first limiting portion and the other second limiting portion respectively when the base is switched to the second angle; each of the arms has a connecting end and a free end, the connecting ends of the arms are connected to the base, while the free ends of the arms extend in opposite directions.
 10. The tube cutter of claim 1, wherein the first clamping portion and the second clamping portion are two slots formed on opposite sides of the base respectively.
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