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B23D 21/06 (2006.01)

(56) Documents Cited:
EP 3450070 A1
EP 0756530 A1
US 20050150113 A1
JP H1190725
EP 1295688 A2
EP 0246257 A1

(58) Field of Search:
INT CL **B23D, B26B**
Other: **WPI, EPODOC**

(54) Title of the Invention: **Pipe cutter**
Abstract Title: **Hinged cutting tool for cutting a cylindrical pipe**

(57) A tool 10 for cutting a cylindrical tube or pipe with first and second jaws 12, 14 joined by a hinge 16 and movable between open (Figure 2) and closed positions. The jaws define an enclosure 18a, 18b for receiving a tube. The tool has a cutting blade 20 protruding into the enclosure and a catch 30 for retaining the jaws in the closed position. The enclosure defined by the jaws may have a first portion 18a of a first smaller diameter and a second portion 18b of a second larger diameter, and the cutting blade may protrude into both the smaller and larger diameter portions of the enclosure, or into only the larger diameter portion of the enclosure (Figure 6). Each jaw may define part of the larger diameter portion and part of the smaller diameter portion, or the first jaw may define part of the larger diameter portion only (Figure 6).

Fig. 1

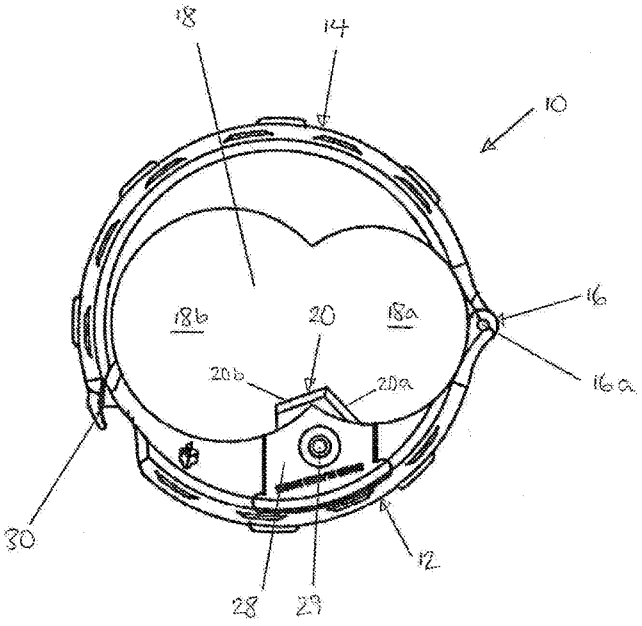

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Fig. 1

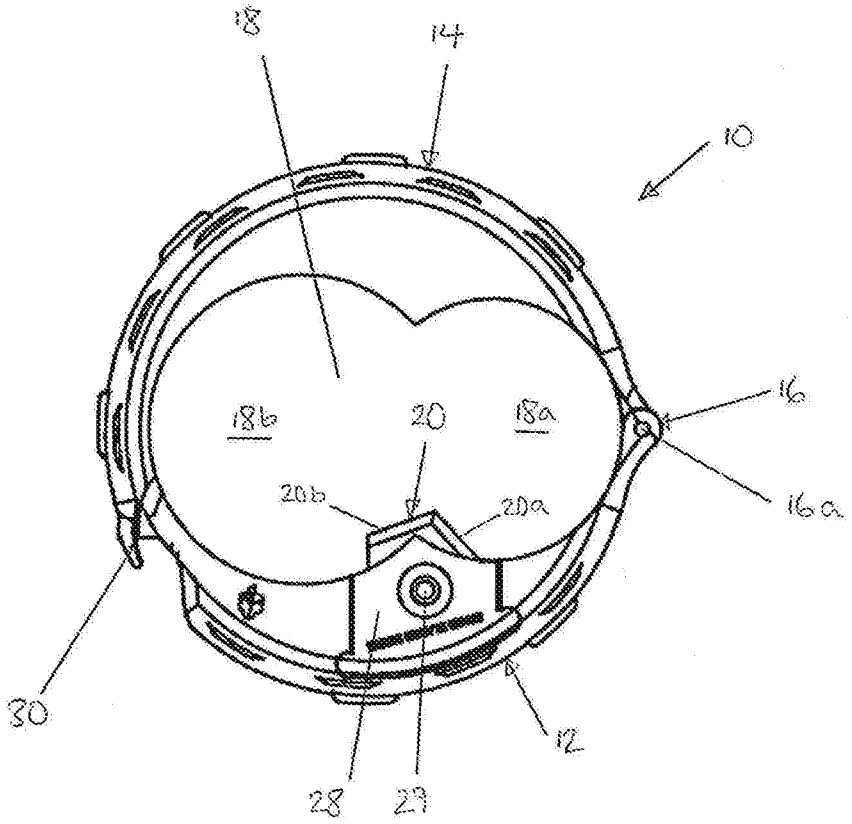
18
14
10
18b
20
18a
16
16a
20b
20a
30
12
28
29

Fig. 2

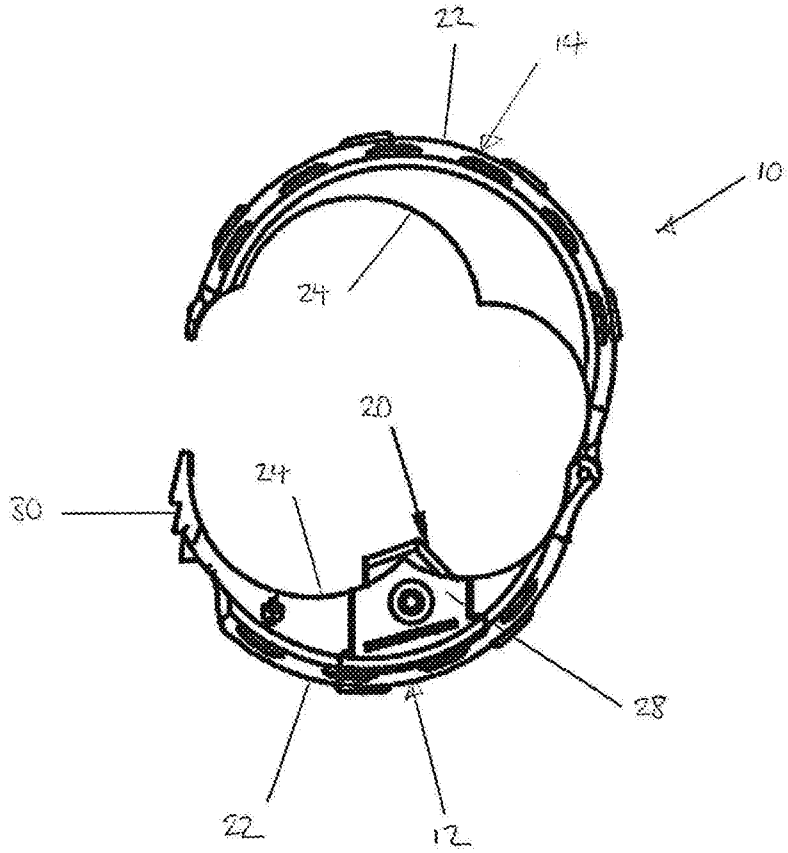
22
14
10
24
20
24
30
28
22
12

Fig. 3

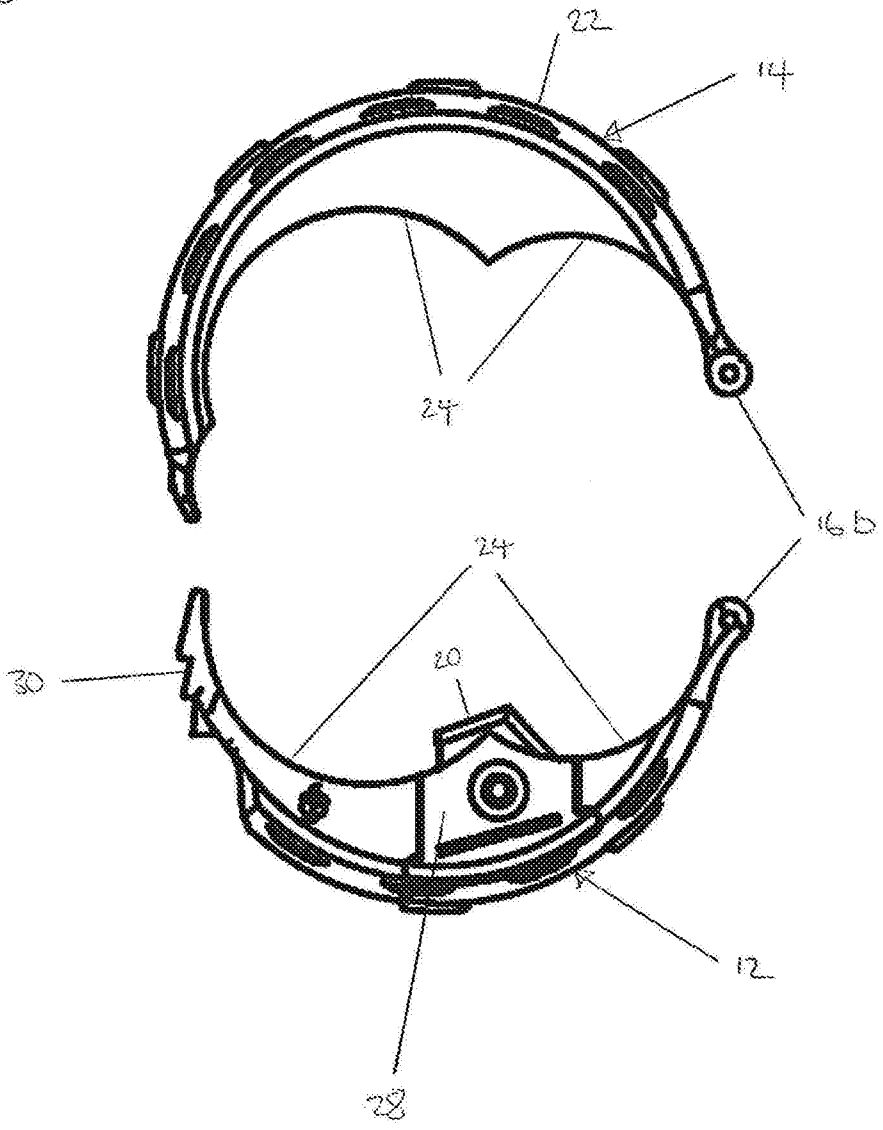

Fig. 4

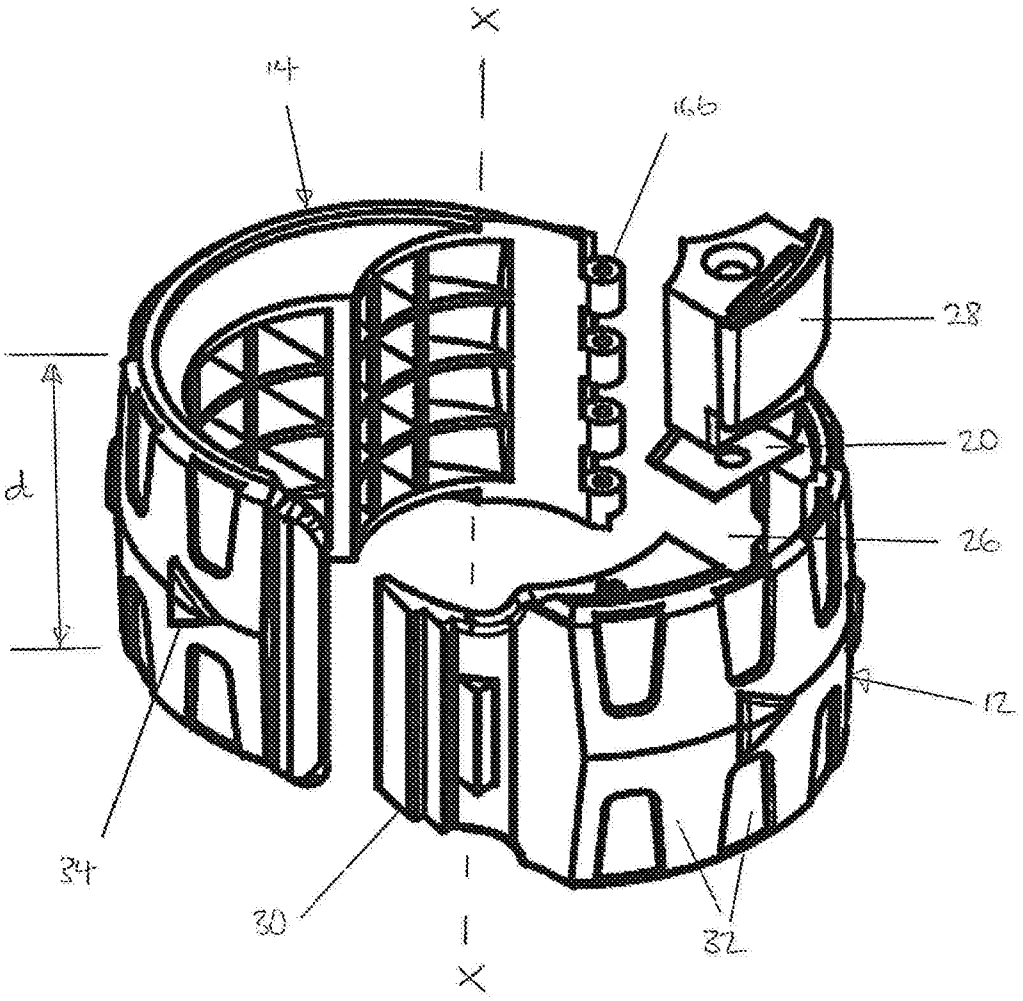

Fig. 5

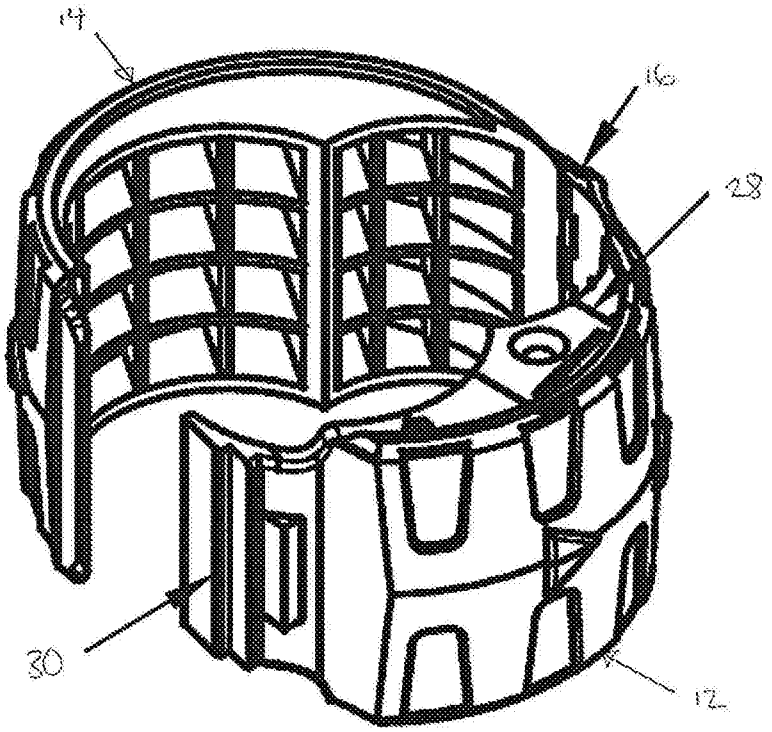

Fig. 6

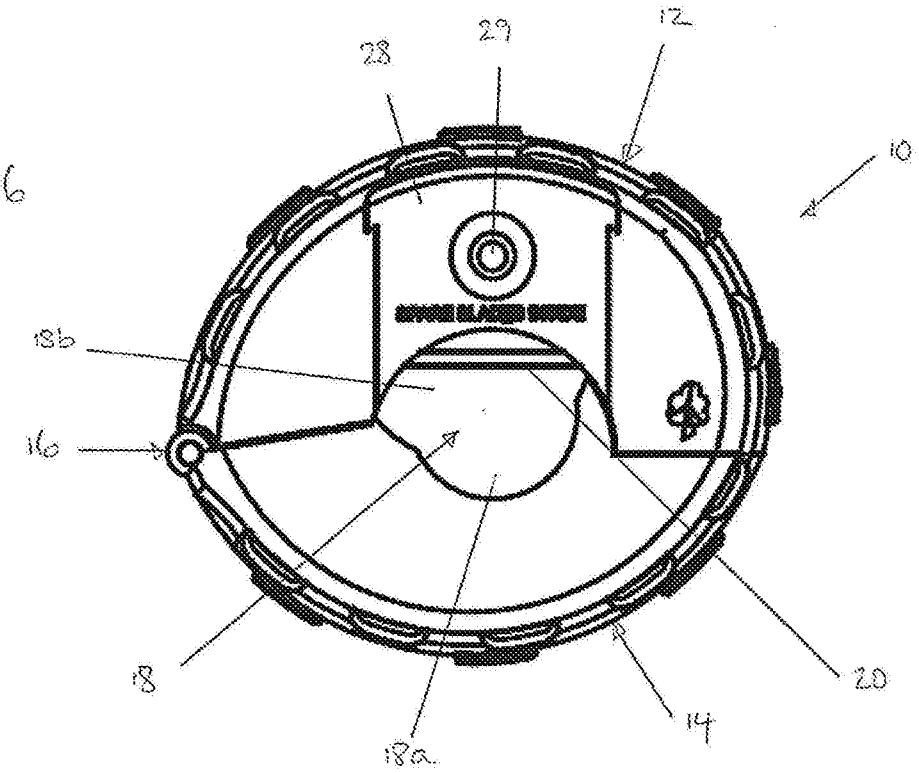

Fig. 7

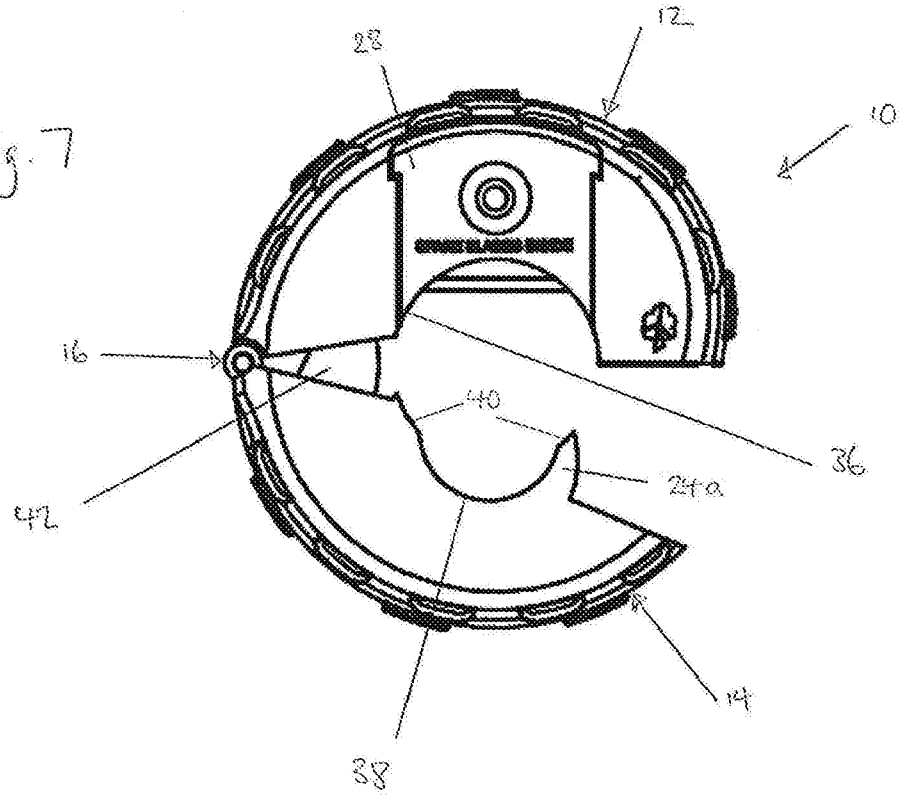

Fig. 8

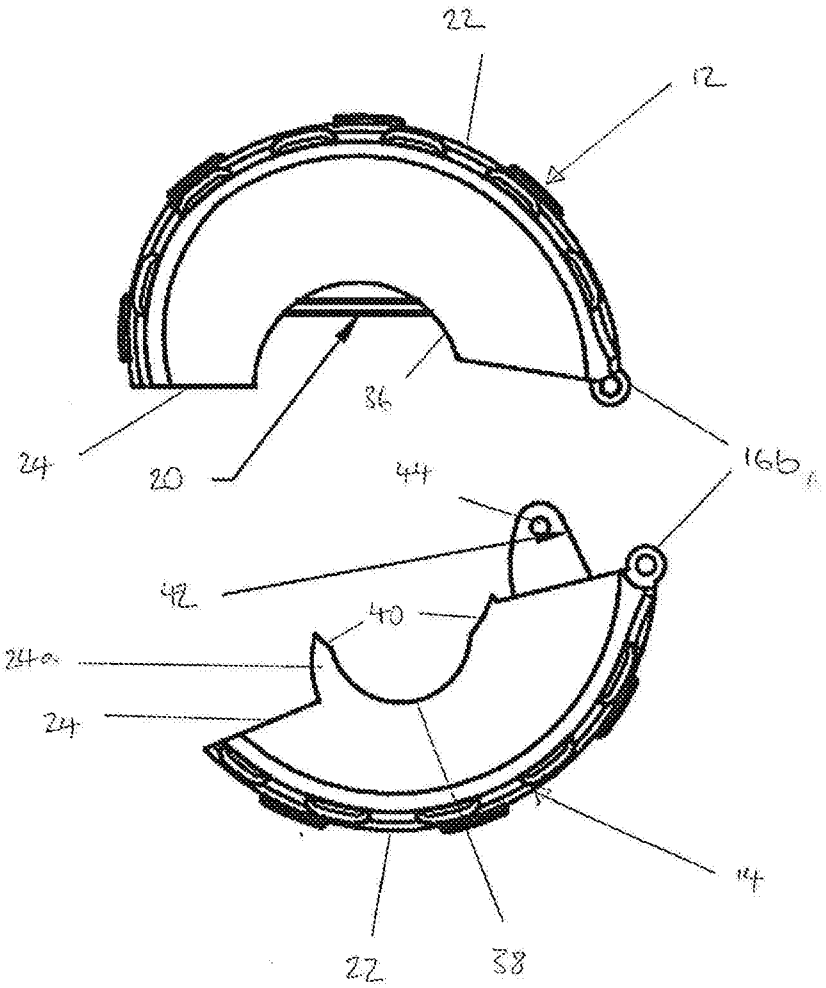

Fig. 9

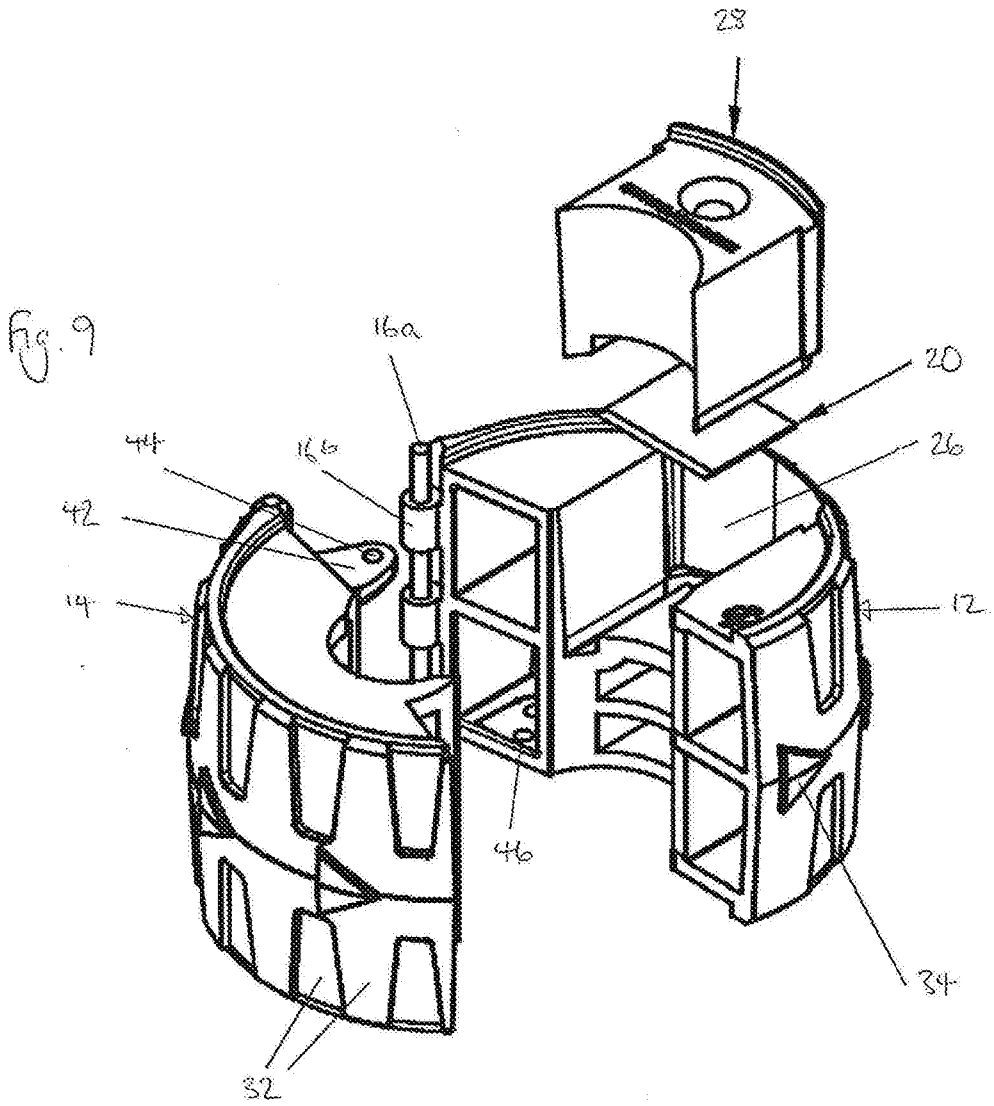

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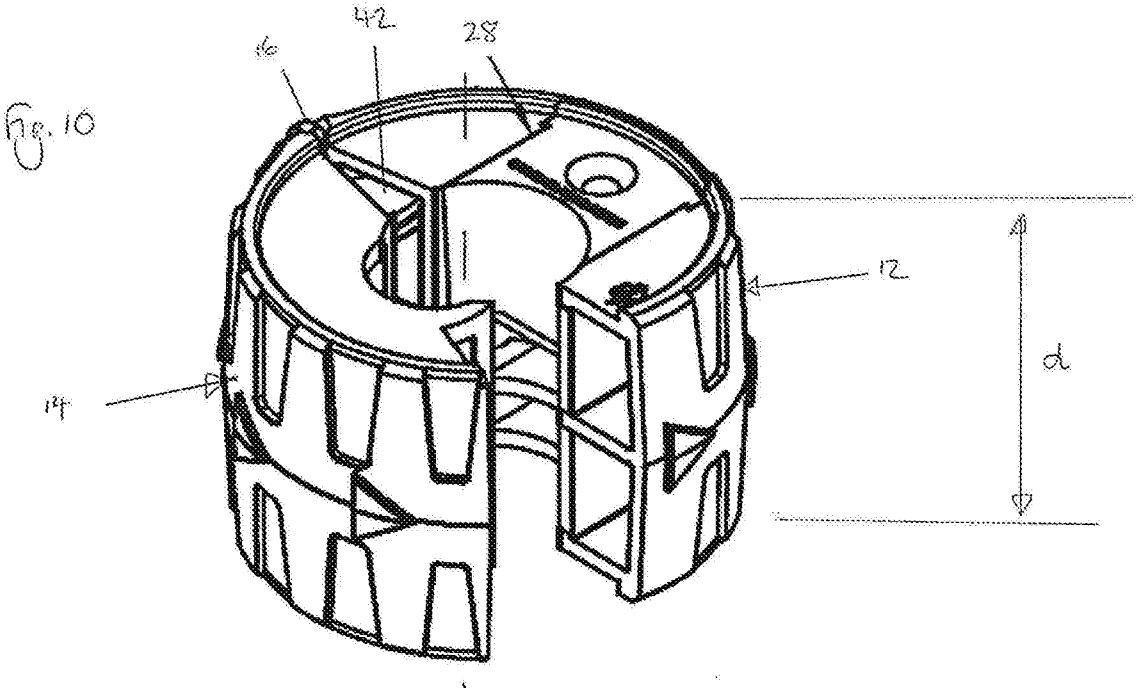
Fig. 10



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I X

PIPE CUTTING TOOL

The present invention relates to a tool for cutting pipes or tubes, for example plastic or metal pipes used in plumbing applications.

Various types of pipe cutting tools are known in the art. For example, US 3,636,629 describes a manual cutter with a rigid holder with a U-shaped slot for receiving a tube and a blade projecting into the slot. However, such cutters can be awkward to use and unsuitable for use with a variety of pipes of different diameters. Thus, a need remains for a simple cutting tool which can accommodate pipes of different diameters.

The present invention provides a cutting tool for cutting a cylindrical tube or pipe, the tool comprising first and second jaws which are joined by a hinge and are movable about the hinge between open and closed positions, wherein the jaws define between them an enclosure for receiving a tube, and the tool further comprises a cutting blade protruding into the enclosure and a catch to retain the jaws in the closed position.

Preferably, each jaw has an arcuate outer surface such that in the closed position the tool forms a generally cylindrical body with a longitudinal axis, and the cutting blade extends perpendicular to the axis.

Preferably, each jaw has an inner surface with at least one arcuate portion which defines part of the enclosure.

The outer surface of each jaw may formed with directional markers.

Advantageously, the enclosure defines a smaller diameter portion and a larger diameter portion. In one embodiment, each jaw defines part of the larger diameter portion of the enclosure and part of the smaller diameter portion of the enclosure. In this case, the cutting blade preferably protrudes into both the smaller diameter portion and the larger diameter portion of the enclosure.

In another embodiment, the first jaw defines part of the larger diameter portion of the enclosure and the second jaw defines part of the larger diameter portion and part of the

smaller diameter portion of the enclosure. In this case, the cutting blade may protrude only into the larger diameter portion of the enclosure.

The cutting blade may be received in a recess in one of the jaws and held in position by a clamping block.

The catch may comprise a plurality of co-operating projections and recesses formed on the first and second jaws. The catch may be formed on the free ends of the jaws remote from the hinge, or on the jaws adjacent to the hinge.

Each jaw may be formed as a one-piece plastic moulding, or a one-piece metal die casting.

The invention will now be described in detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a plan view of a first embodiment of the invention in the closed position;
Figure 2 is a plan view of the first embodiment in the open position;
Figure 3 is a plan view of the first embodiment with the jaws separated;
Figure 4 is an exploded perspective view of the first embodiment;
Figure 5 is an assembled perspective view of the first embodiment in the open position;
Figure 6 is a plan view of a second embodiment of the invention in the closed position;
Figure 7 is a plan view of the second embodiment in the open position;
Figure 8 is an underside view of the second embodiment with the jaws separated;
Figure 9 is an exploded perspective view of the second embodiment; and
Figure 10 is an assembled perspective view of the second embodiment in the open position.

In general terms, the present invention comprises a cutting tool 10 formed of first and second jaws 12, 14 which are joined by a hinge 16. The jaws 12, 14 are movable away from and towards one another to provide open and closed positions. The jaws 12, 14 define between them an enclosure 18 for receiving a cylindrical tube or pipe to be cut. A cutting blade 20 protrudes into the enclosure 18. A catch 30 is configured to retain the jaws in the closed position.

A first embodiment of the invention is illustrated in Figures 1-5. In this embodiment, the cutting tool 10 comprises a first jaw 12 and a second jaw 14 which are joined by hinge 16.

This is typically in the form of a metal pin 16a passing through interlocking eyes 16b formed on the jaws 12, 14.

The outer surface 22 of each jaw 12, 14 is curved so that in the closed position as shown in Figure 1 the tool 10 is generally circular in plan view. The jaws 12, 14 also have a depth d as shown in Figures 4-5 so the tool 10 overall has a cylindrical form with a longitudinal axis X. The inner surface 24 of the jaws 12, 14 is shaped to define an enclosure 18.

As shown in Figure 1, in the closed position, the enclosure 18 preferably comprises two overlapping circular portions to give a figure of eight shape. The first portion 18a is of smaller diameter and the adjacent second portion 18b of a larger diameter.
The inner surface 24 of each jaw 12, 14 is shaped to define a part of the perimeter of the smaller diameter portion 18a and a part of the larger diameter portion 18b.

A cutting blade 20 protrudes from one jaw 12 into the enclosure 18. As shown in Figure 4, the jaw 12 is formed with a recess 26. The recess 26 preferably extends to half of the depth d of the jaw 12. The cutting blade 20 is positioned in the base of the recess 26 and protrudes out into the enclosure 18. It is held in position by a cassette or clamping block 28 which fits into the recess 26 above the blade 20 and is held in position for example with a screw 29. Thus, the blade 20 is perpendicular to the longitudinal axis X of the cutter 10.

In this embodiment, the blade 20 is formed with two cutting edges oriented in different directions so that a first cutting edge 20a protrudes into the smaller diameter portion 18a of the enclosure 18 and a second cutting edge 20b protrudes into the larger diameter portion 18b.

In the closed position, the ends of the jaws 12, 14 which are opposite to the hinge 16 overlap one another and can be retained in the closed position by a catch 30. Preferably, the jaws 12, 14 are formed with a series of corresponding projections and recesses 30 which are engageable with one another to retain the jaws 12, 14 in the closed position. For example, a series of interlocking teeth in a saw-tooth form may be provided as seen in Figure 4, enabling the jaws 12, 14 to be engaged with one another in different positions, thereby to accommodate different sizes of tube within the enclosure 18.

Preferably, the jaws 12, 14 are not solid bodies but, as seen in Figures 4-5, are formed with a series of interlocking ribs with hollow chambers between them. This construction provides strength whilst reducing the weight of the tool 10 and the quantity of material used to manufacture it. The outer surface 22 of the jaws 12, 14 is preferably formed with raised and recessed areas 32 to enhance a user's grip on the tool 10 and with arrows or similar directional markers 34 which assist the user as described below.

In use, the jaws 12, 14 are opened sufficiently wide to allow a pipe to be placed in the enclosure 18, with its longitudinal axis parallel with the axis X of the tool 10. The tube can be seated in either the smaller diameter portion 18a or the larger diameter portion 18b, 18b of the enclosure 18 to provide the best fit. The user moves the jaws 12, 14 to the closed position in order to engage the catch 30. Initially, the user may need to exert some force to keep the jaws 12, 14 closed and the catch 30 engaged and to ensure the cutting blade 20 pierces the tube. The user then rotates the cutter 10 relative to the tube in the direction shown by the arrows 34, thereby moving the cutting blade 20 around the circumference of the tube to sever it.

A second embodiment of the invention is illustrated in Figures 6-10. This has a generally similar structure, although the form of the enclosure 18 and the catch 30 differ to that in the first embodiment. The second embodiment is intended to suit tubes of smaller diameter than those on which the first embodiment may be used.

In the second embodiment, the cutting tool 10 also comprises first and second jaws 12, 14 joined by a hinge 16. The outer surface 22 of each jaw 12, 14 is curved and formed with gripping features 32 and directional markers 34. The inner surface 24 of the jaws 12, 14 is shaped to define the enclosure 18.

However, in this embodiment, the inner surface 24 of the first jaw 12 provides only one arcuate surface 36 of a larger diameter. The inner surface 24 of the second jaw 14 is shaped with an arcuate surface 38 of smaller diameter. On either side of this smaller diameter arc 38, there are further arcuate portions 40 having the same diameter as the arcuate surface 36 formed on the first jaw 12. Part of the arc 38 and one arc 40 may be formed on a projecting leg 24a of the jaw 14.

The cutting blade 20 is fitted in a recess in the first jaw 12 and secured by a clamping block 28 in the same manner as in the first embodiment. However, in this case, the blade 20 has one straight cutting edge which extends across the larger diameter portion 18b of the enclosure 18.

To either side of the arcuate surfaces 36, 38, 40, the inner surface 24 of the jaws 12, 14 is generally straight and these surfaces abut against one another in the fully closed position as shown in Figure 6. The projecting leg 24a of the second jaw 14 seats against part of the larger diameter arc 36 of the first jaw 12 as shown in Figure 6. In this position, the cutting tool 10 is of a generally oval shape.

In the second embodiment, the catch 30 is provided adjacent the hinge 16, rather than at the free ends of the jaws 12, 14 as in the first embodiment. As shown in Figures 7-10, one of the jaws, here the second jaw 14, comprises at least one and preferably a pair of projecting arms 42 which protrude from the inner face 24 adjacent the hinge 16. The arms 42 includes at least one protrusion 44. As the jaws 12, 14 are moved into the closed position, the arms 42 enter recesses in the other jaw 12 which are provided with co-operating recesses 46 into which the protrusions 44 on the arms 42 can engage. Preferably, a series of recesses 46 are provided so that the arms 42 can engage in different positions to retain the jaws 12, 14 in a partially open position as seen in Figures 7 and 10 for example, or in the fully closed position shown in Figure 6.

In use, in the same manner as the first embodiment, the jaws 12, 14 are initially opened sufficiently wide to allow a tube to be placed in the enclosure 18 with its longitudinal axis parallel with the axis X of the tool 10. Depending on the tube diameter, it may be seated within either the smaller diameter portion 18a, or in the larger diameter portion 18b. The user pushes the jaws 12, 14 together until the catch 30 engages and the blade 20 pierces the tube. As before, the user may need to exert some pressure on the jaws 12, 14 to reach this initial condition. The cutter 10 is then rotated relative to the tube in the direction shown by the arrows 34 in order to progress the blade 20 around the circumference of the tube and sever it.

In this embodiment, the tube may be cut and the catch 30 engaged even when the jaws 12, 14 are partially open as in Figure 7 as well as in the fully closed position of Figure 6, depending upon the diameter of the tube being cut.

Thus, the present invention provides a simple cutting tool able to accommodate tubes of varying diameters. The tool 10 is easy to fit on a tube since the jaws 12, 14 can be opened as wide as necessary and a tube positioned in the appropriately sized portion of the enclosure 18. Whilst the user must initially must exert some force on the jaws 12, 14 to ensure the blade 20 pierces the tube, once that condition is reached the catch 30 helps to retain the jaws 12, 14 in the closed position whilst the user rotates the tool 10 relative to the tube to sever the tube around its circumference.

CLAIMS:

1. A cutting tool for cutting a cylindrical tube or pipe, the tool comprising first and second jaws which are joined by a hinge and are movable about the hinge between open and closed positions, wherein the jaws define between them an enclosure for receiving a tube, and the tool further comprises a cutting blade protruding into the enclosure and a catch to retain the jaws in the closed position.

2. A cutting tool as claimed in claim 1, wherein each jaw has an arcuate outer surface such that in the closed position the tool forms a generally cylindrical body with a longitudinal axis, and the cutting blade extends perpendicular to the axis.

3. A cutting tool as claimed in claim 1 or claim 2, wherein each jaw has an inner surface with at least one arcuate portion which defines part of the enclosure.

4. A cutting tool as claimed in claim 2 or claim 3, wherein the outer surface of each jaw is formed with directional markers.

5. A cutting tool as claimed in any preceding claim, wherein the enclosure defines a smaller diameter portion and a larger diameter portion.

6. A cutting tool as claimed in claim 5, wherein each jaw defines part of the larger diameter portion of the enclosure and part of the smaller diameter portion of the enclosure.

7. A cutting tool as claimed in claim 5 or claim 6, wherein the cutting blade protrudes into both the smaller diameter portion and the larger diameter portion of the enclosure.

8. A cutting tool as claimed in claim 5, wherein the first jaw defines part of the larger diameter portion of the enclosure and the second jaw defines part of the larger diameter portion and part of the smaller diameter portion of the enclosure.

9. A cutting tool as claimed in claim 8, wherein the cutting blade protrudes only into the larger diameter portion of the enclosure.

10. A cutting tool as claimed in any preceding claim, wherein the cutting blade is received in a recess in one of the jaws and held in position by a clamping block.

11. A cutting tool as claimed in any preceding claim, wherein the catch comprises a plurality of co-operating projections and recesses formed on the first and second jaws.

12. A cutting tool a claimed in any preceding claim, wherein the catch is formed on the free ends of the jaws remote from the hinge.

13. A cutting tool as claimed in any claims 1-11, wherein the catch is formed on the jaws adjacent to the hinge.

14. A cutting tool as claimed in any preceding claim wherein each jaw is formed as a one-piece plastic moulding.

15. A cutting tool as claimed in any of claims 1-13, wherein each jaw is formed as a one-piece metal die casting.

Intellectual Property Office

Application No:	GB1919223.6	**Examiner:**	Dr Sarah Sigley
Claims searched:	1-15	**Date of search:**	20 March 2020

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6, 8-10, 13-15	EP 0756530 A1 (MONUMENT TOOLS LTD) See Figures 4-7, paragraph [0020].
X	1-5, 8-12, 14-15	US 2005/0150113 A1 (SHULTIS) See Figures 3-4, 6.
X	1-4, 10-12, 14-15	EP 1295688 A2 (MAPRESS GMBH & CO KG) See EPO abstract, Figures 1, 3.
X	1-4, 10-12, 14-15	JP H1190725 A (NAOTOKU KK) See Figures 1-2.
X	1, 4, 11-12, 14-15.	EP 3450070 A1 (WAVIN BV) See Figures 1-2, paragraphs [0094]-[0095].
A	-	EP 0246257 A1 (HYTOENEN) See Figures 1-2, column 2, lines 29-49.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

B23D; B26B

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

Intellectual Property Office

International Classification:

Subclass	Subgroup	Valid From
B23D	0021/06	01/01/2006