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Printed by Jouve, 75001 PARIS (FR)

Description

BACKGROUND OF THE INVENTION

1. Technical Field

[0001] The present invention relates to a hand tool, and more particularly to a rotary pipe sizing tool, which is driven by a power to expand and shrink an end of a pipe.

2. Description of Related Art

[0002] Typically, a conventional pipe sizing tool is applied to expand and shrink an end of a pipe, so that the expanded or shrunk pipe could be connected to the other pipe. Because the pipes usually are arranged at the corners of a room, the sizing process has to be performed at a narrow space or a space that is hard to reach.

[0003] U.S. Patent No. 6,619,099 disclosed a hydraulically powered flaring hand tool, which has a hydraulic pump and a flaring piston arranged in a line. Therefore, the clamping device for holding the pipe is arranged in the same line. As a result, the flaring hand tool has a large length, which is hard to operate it in a narrow space. Besides, this patent did not disclose how the clamping device rotate relative to the hydraulically pump. In spite of that, this patent still has the drawback of large length.

[0004] U.S. Patent No. 8,671,732 disclosed an oil-pressure swaging tool for rebuilding a connecting pipe, which has an oil-pressure device and an axial member for flaring arranged in a line. This patent still has the drawback of large length, which is hard to operate in a narrow space or a space hard to reach.

[0005] U.S. Patent No. 9162275 disclosed a flaring tool, which has a main member with a manual hydraulic pump and a tank for storing hydraulic liquid. The main member is fixed to the tank with an angle. The flaring tool further includes an expanding device arranged in the main member. Since there is a fixed angle between the main member and the tank, it is not helpful to operate the flaring tool in a narrow space or a space hard to reach.

BRIEF SUMMARY OF THE INVENTION

[0006] In view of the above, the primary objective of the present invention is to provide a rotary pipe sizing tool, which has a short length and is easy to be operated in a narrow space or a space hard to reach.

[0007] In order to achieve the objective of the present invention, a rotary pipe sizing tool for changing a diameter of a pipe includes a main member having a driving portion, a clamping device provided at an end of the driving portion of the main member; and a rotating mechanism provided between the main member and the clamping device. The clamping device is free to rotate relative to the main member through the rotating mechanism.

[0008] In an embodiment, the rotating mechanism has a neck portion and a slot; the neck portion is provided on

the main member, and the slot is provided on the clamping device; the neck portion engages the slot to make the clamping device rotate freely relative to the main member.

[0009] In an embodiment, the rotating mechanism includes a recess on the clamping device and an engaging block on the main member to engage the recess.

[0010] In an embodiment, the clamping device is provided with a bore on a bottom of the recess, and the engaging block engages the recess with a portion passing through the bore to hold the clamping device on the main member.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0011] 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

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

FIG. 2 is a perspective view of the preferred embodiment of the present invention, showing the clamping device being turned for an angle;

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

FIG. 4 is a perspective view of the base of the preferred embodiment of the present invention;

FIG. 5 is a perspective view of the pipe and the adaptor of the preferred embodiment of the present invention;

FIG. 6 is a sectional diagram of the preferred embodiment of the present invention, showing the rotating mechanism; and

FIG. 7 is a top view of FIG. 6.

DETAILED DESCRIPTION OF THE INVENTION

[0012] As shown in FIGS. 1 and 2, a rotary pipe sizing tool of the preferred embodiment of the present invention includes a main member 10, a clamping device 30, and a rotating mechanism 50. The rotating mechanism 50 is arranged between the main member 10 and the clamping device 30, and connected thereto, which allows the clamping device 30 to be rotated relative to the main member 10.

[0013] As shown in FIGS. 1 and 3, the main member 10 includes an operating portion 12 and a driving portion 14. The operating portion 12 further includes a handle 122 and an operating device 124. An angle is formed between the operating portion 12 and the driving portion 14. An angle between the handle 122 of the operating portion 12 and the driving portion 14 is about 90 degrees. A driving axle 16 is provided in the driving portion 14, and has an engaging slot 18 at an end thereof.

[0014] A terminal 20 has an engaging section 22 at an

end thereof to be engaged with the engaging slot 18 of the driving axle 16. The terminal 20 is an expanding terminal to expand a pipe. In another embodiment, the terminal 20 is a shrinking terminal (not shown) to shrink a pipe.

[0015] As shown in FIGS., a hydraulic pump is provided to drive the driving axle 16 in the driving portion 14 through the operating portion 12, so that the terminal 20 is moved along with the driving axle 16 to expand (or shrink) a pipe.

[0016] The clamping device 30 includes a clamping set 32 and a base 34. The clamping device 30 is arranged in an axial direction of the driving axle 16 in the driving portion 14. The clamping set 32 are provided in a chamber 36 of the base 34 to clamp a metal round pipe 70.

[0017] As shown in FIG. 4, the base 34 is provided with a magnetic device 40 on a bottom of the chamber 36. The clamping set 32 is attracted by the magnetic device 40 to be firmly positioned in the chamber 36. As a result, the clamping set is unable to escape from the chamber 36.

[0018] As shown in FIGS. 1, 2, and 3, the rotating mechanism 50 has a recess and an engaging block 54. The recess 52 is provided on the base 34 of the clamping device 30. The engaging block 54 is arranged in the axial direction of the driving axle 16 of the driving portion 14.

[0019] As shown in FIG. 4, the rotating mechanism 50 further has a slot 58 on an end of the base 34 beside the recess 52. The slot 58 has an opening end 582 while at least a connecting portion 59 is provided beside the opening end 582. An elastic positioning set 64, including a ball and a spring for example, is connected to the connecting portion 59. The elastic positioning set 64 has an end extending out of the connecting portion 59, and associated with the slot 58. A bore 56 is provided on a bottom of the recess 52.

[0020] As shown in FIG. 5, the rotating mechanism 50 has a neck portion 62, and the neck 62 and the engaging block 54 are formed on a tube 60. The neck 62 is beside the engaging block 54, and has an outer diameter smaller than that of the engaging block 54. The engaging block 54 could be a round member, or any other suitable appearances.

[0021] As shown in FIGS. 6 and 7, the tube 60 is connected or coupled to an end of the driving portion 14, and the driving axle 16 passes through the tube 60 to engage the terminal 20. The main member 10 and the clamping device 30 are connected together by the engagement of the engaging block 54 and the recess while the engaging block has a portion passing through the bore 56. The neck portion 62 engages the slot 58 to be abutted against the elastic positioning set 64. As a result, the engaging block 54 is free to rotate relative to the recess 52, and the neck portion 62 is free to rotate relative to the slot 58.

[0022] The engaging block 54 has a portion extending out of the bore 56 (FIG. 6) for engagement to prevent the clamping device 30 from escaping along the axial direction of the driving axle 16. The neck portion 62 engages

the slot 58, and the elastic positioning set 64 urges the neck portion 62, so that the clamping device 30 is unable to be moved relative to the main member 10 unless a user exerts a force greater than the elastic positioning set 64 to separate the clamping device 30 from the main member 10 via the opening end 582. Besides, the arrangement of the elastic positioning set 64 and the neck portion 62 allows the clamping device 30 to rotate freely relative to the main member 10.

[0023] In conclusion, the rotating mechanism 50 or the arrangement of the rotating mechanism 50 between the clamping device 30 and the main member 10 makes the clamping device 30 rotates freely relative to the main member 10 through the engagement of the neck portion 62 and the slot 58, so that the angle of the clamping device 30 is adjustable.

[0024] The engaging block 54 has a portion out of the bore 56 could separate the clamping device 30 from the main member 10 along the axial direction of the driving axle 16. The arrangement and relative position of the elastic positioning set 64 and the neck portion 62 allows the clamping device 30 to rotate freely relative to the main member 10. As a result, the clamping device 30 is connected to the main member 10 always no matter the angle of the clamping device 30 is.

[0025] Since an angle is formed between the handle 122 and the operating device 124 of the operating portion 12 of the main member 10, and the clamping device 30 rotates freely relative to the main member 10, the pipe sizing toll of the present invention is able to be operated in a narrow space or a space hard to reach.

[0026] The rotating mechanism 50 of the present preferred embodiment is provided with the engagement of the neck portion 62 and the slot 58 and the engagement of the engaging block 54 and the recess 52. It further includes the slot 58 and the recess 52 provided on the base 34, and the engaging block 54 and the neck portion 62 formed on the tube 60. An alternate design could have the clamping device 30 connected to the driving portion 14, or provides a shaft and a hub to make the clamping device 30 rotate freely relative to the main member 10. Another alternate design is that the clamping device 30 is fitted to the driving axle 16 or the driving 14 for free rotation.

[0027] 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 rotary pipe sizing tool for changing a diameter of a pipe (70), comprising:

a main member (10) having a driving portion

- (14);
 a clamping device (30) provided at an end of the driving portion (14) of the main member (10);
 and
 a rotating mechanism (50) provided between the main member (10) and the clamping device (30);
 wherein the clamping device (30) is free to rotate relative to the main member (10) through the rotating mechanism (50). 5
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2. The rotary pipe sizing tool of claim 1, wherein the rotating mechanism (50) has a neck portion (62) and a slot (58); the neck portion (62) is provided on the main member (10), and the slot (58) is provided on the clamping device (30); the neck portion (62) engages the slot (58) to make the clamping device (30) rotate freely relative to the main member (10). 15
3. The rotary pipe sizing tool of claim 2, further comprising an elastic positioning set (64) besides the slot (58), wherein the neck portion (62) engages the slot (58), and the elastic positioning set (64) has an end extending out of the slot (58) to be abutted against the neck portion (62). 20
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4. The rotary pipe sizing tool of claim 1, wherein the rotating mechanism (50) includes a recess (52) on the clamping device (30) and an engaging block (54) on the main member (10) to engage the recess (52). 30
5. The rotary pipe sizing tool of claim 4, wherein the engaging block (54) is a round member.
6. The rotary pipe sizing tool of claim 4, wherein the clamping device (30) is provided with a bore (56) on a bottom of the recess (52), and the engaging block (54) engages the recess (52) with a portion passing through the bore (56) to hold the clamping device (30) on the main member (10). 35
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7. The rotary pipe sizing tool of claim 1, wherein the main member (10) includes an operating portion (12), which has a handle (122) and an operating device (124); an angle is formed between the handle (122) and the driving portion (14), and an angle is formed between the operating device (124) and the driving portion (14). 45
8. The rotary pipe sizing tool of claim 1, wherein the clamping device (30) includes a clamping set (32) and at least a magnetic device (40), both of which are provided on the base (34), and the clamping set (32) is magnetically attracted by the magnetic device (40). 50
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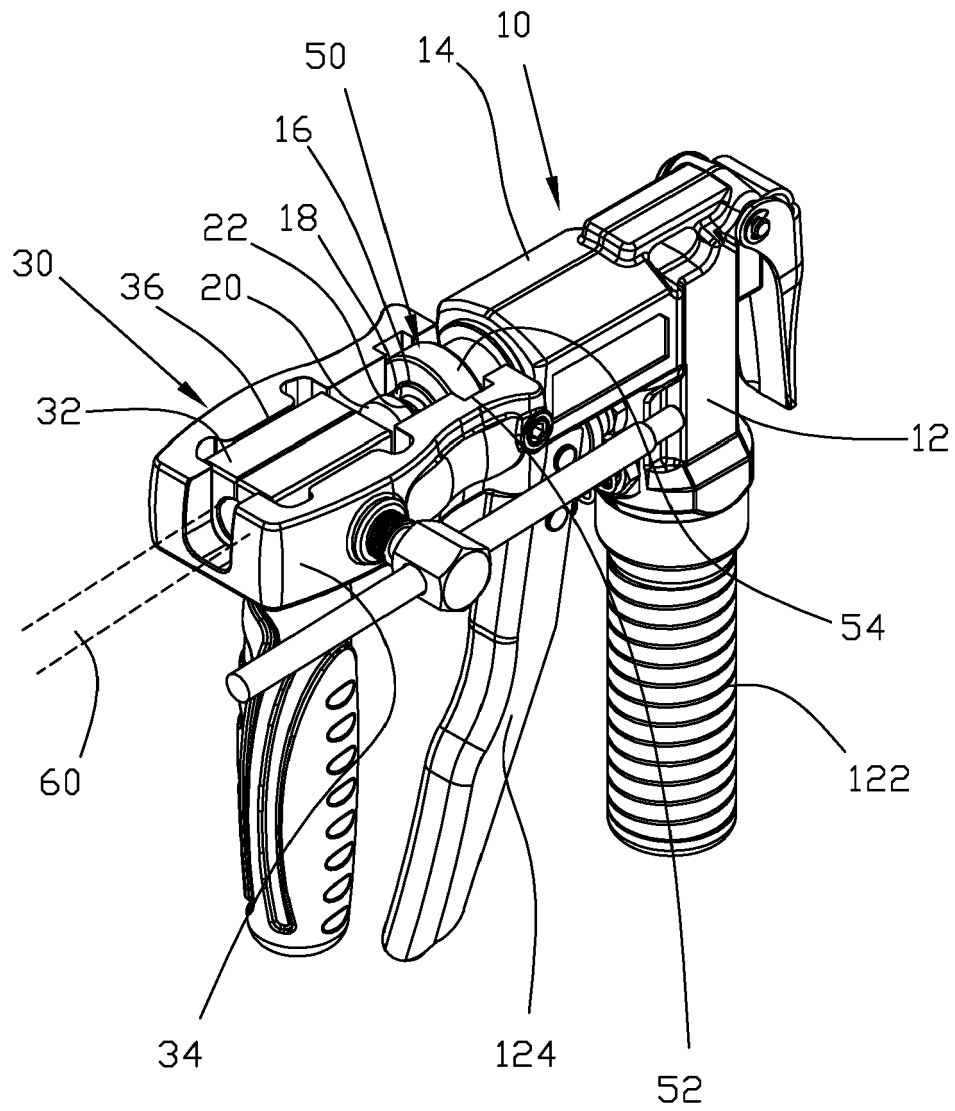


Fig.1

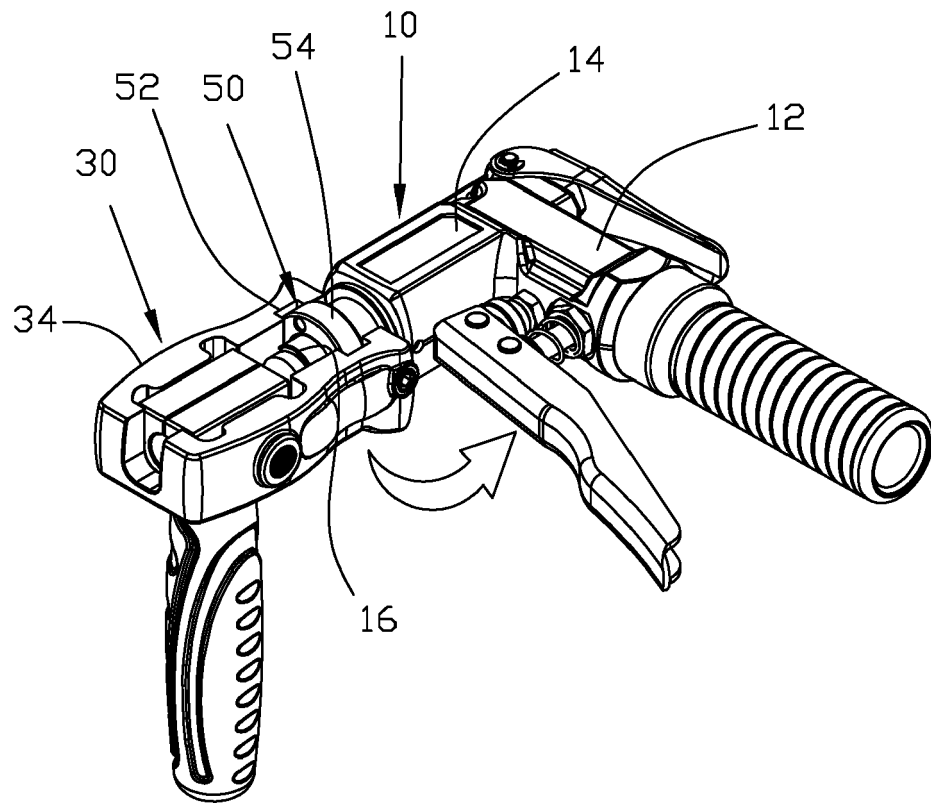


Fig.2

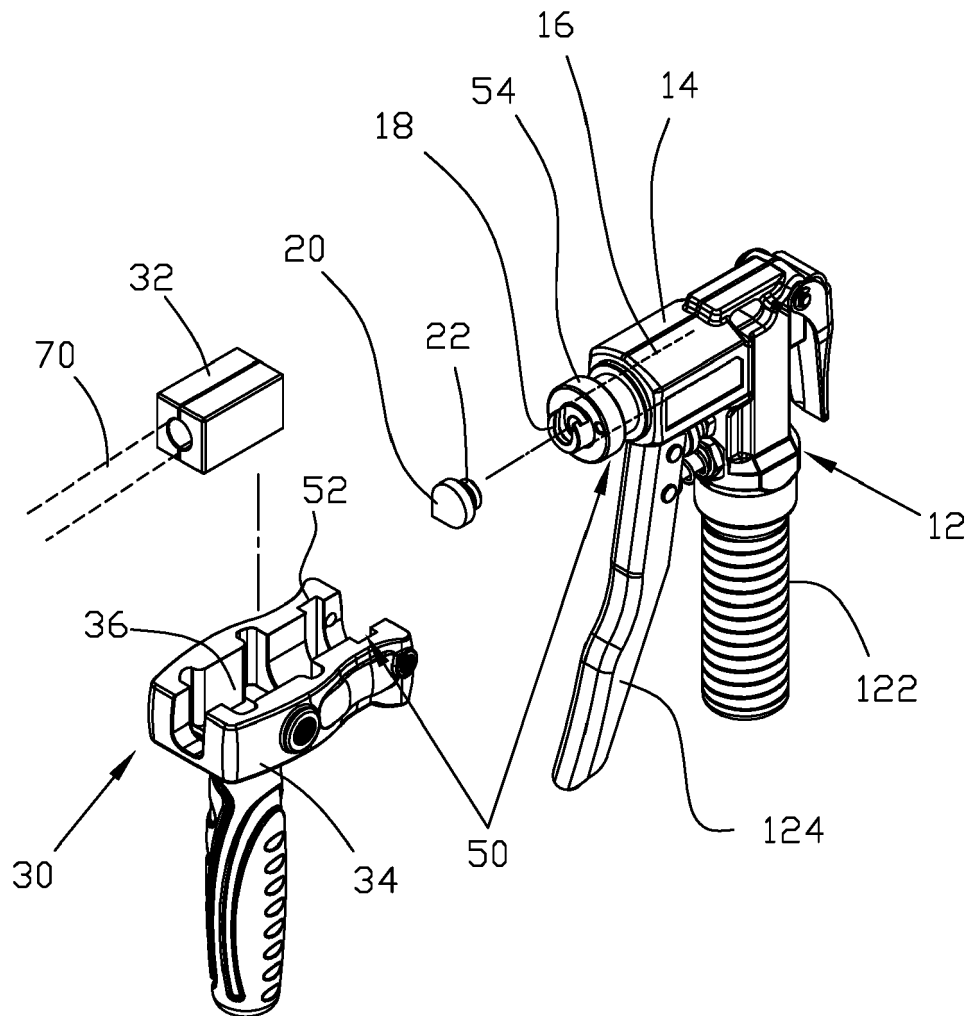


Fig.3

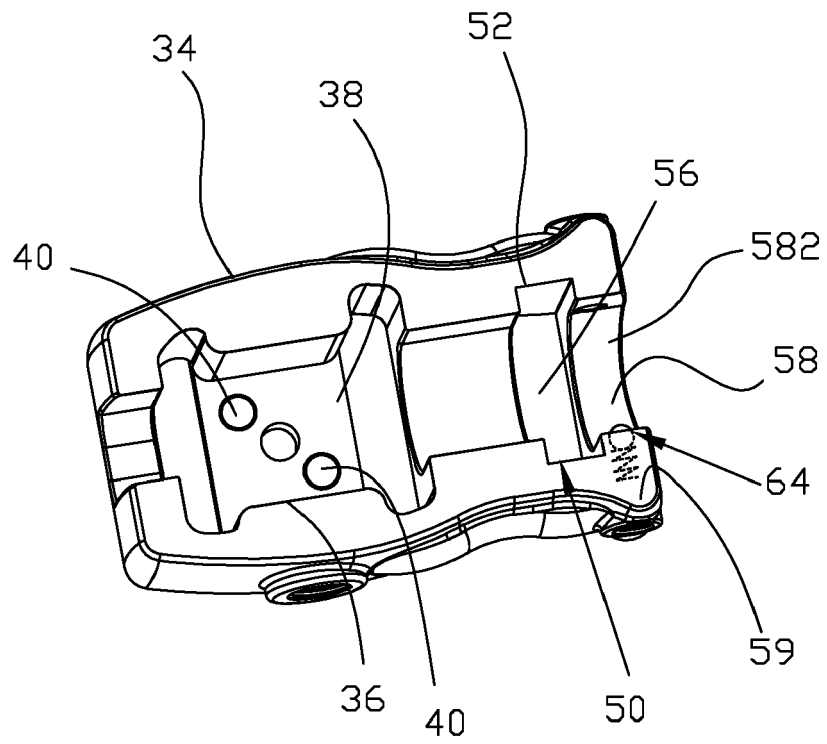


Fig.4

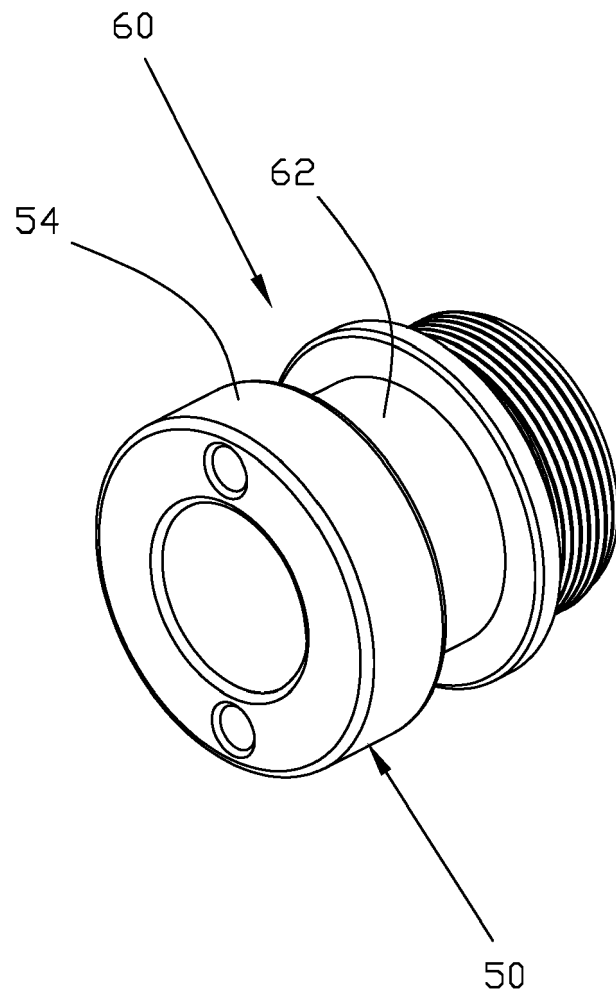


Fig.5

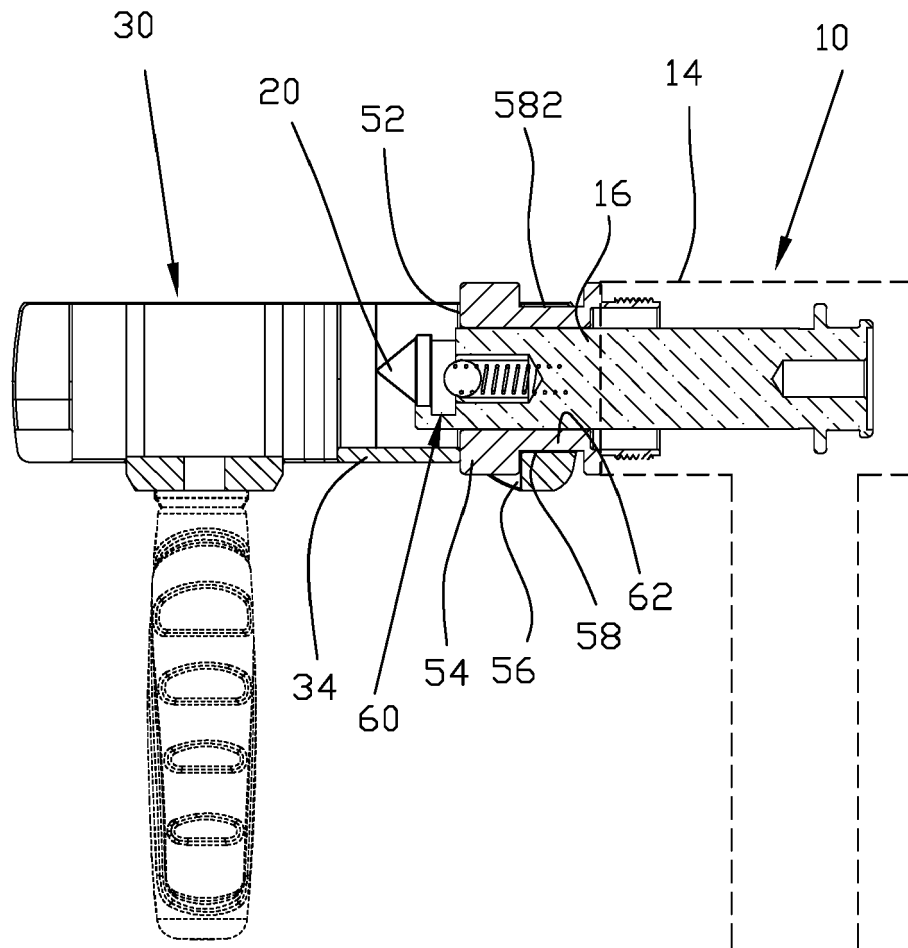


Fig.6

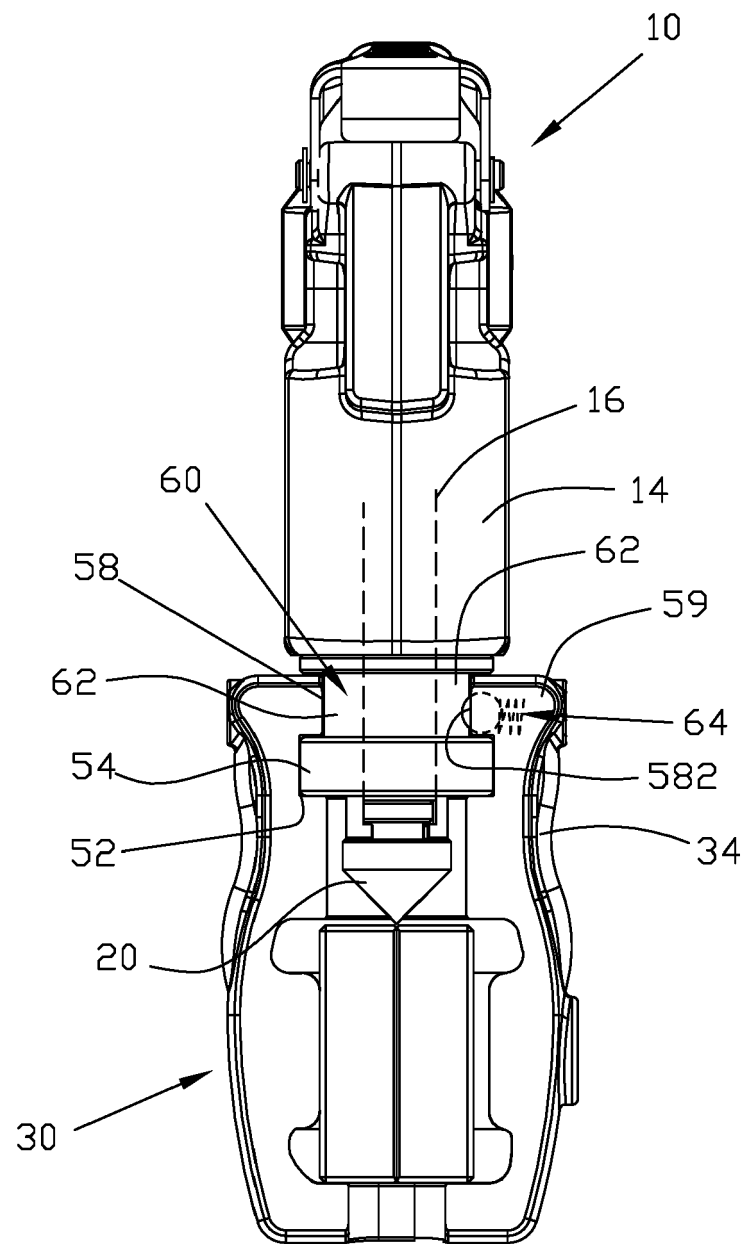


Fig.7



EUROPEAN SEARCH REPORT

Application Number
EP 16 20 7430

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	US 6 619 099 B2 (BARJESTEH MICHAEL [US]) 16 September 2003 (2003-09-16) * figure 1 *	1-8	INV. B21D41/02
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			TECHNICAL FIELDS SEARCHED (IPC)
			B21D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 June 2017	Examiner Vinci, Vincenzo
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 20 7430

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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REFERENCES CITED IN THE DESCRIPTION

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