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(54) LOCKING ARRANGEMENT FOR A HAND TOOL

(57) A hand tool (10) which includes a handle (20) and a tool head (30). The handle includes a tool head mounting portion in the form of a spigot (22) which is snuggly received in a complementary frusto-conical socket formed by a neck portion (36) of the tool head (30). A locking arrangement (60) is provided in order to resist angular displacement between the handle (20) and the head (30). The locking arrangement (60) includes a male keying formation (62) which protrudes radially from a surface of the spigot (22) and which is positioned in and keys with a longitudinal slot (64) provided on the neck portion (36).

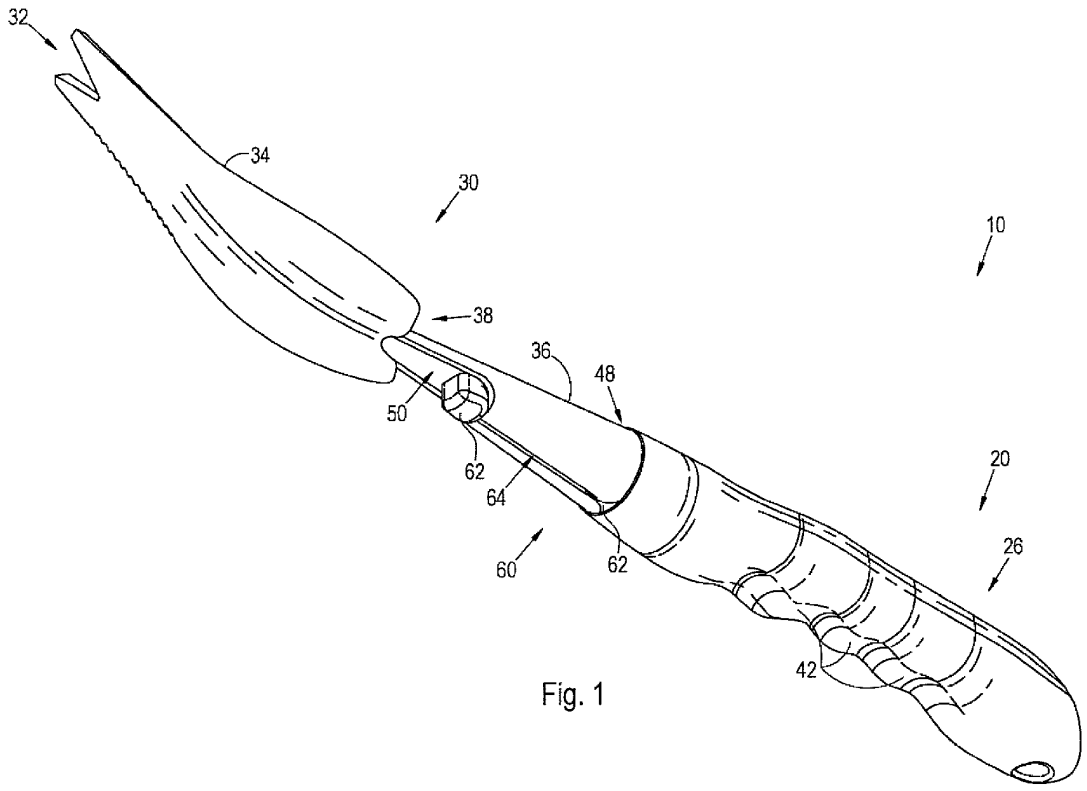

Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The invention relates to a locking arrangement for a hand tool. The invention also relates to a hand tool, a handle for a hand tool and a tool head for a hand tool.

BACKGROUND OF THE INVENTION

[0002] Various configurations of hand tools exist. It is known to construct hand tools such as garden spades, forks, and trowels by fabricating the blade or prong part (hereinafter referred to as the "tool head") separately from the handle. For example, the tool head may be fabricated as a pressing from plate material and provided with an end region which defines a socket for connection to the handle. The handle may in turn be formed such that one of the ends thereof defines a spigot. The handle is configured to be attached to the tool head by way of a friction fit (also known as a press fit or interference fit) between the spigot on the handle and the socket in the tool head.

[0003] Hand tool configurations of the type described above are generally effective in ensuring that the handle remains attached to the tool head. However, the Inventor has found that these configurations may not sufficiently inhibit relative angular displacement between the tool head and the handle, e.g. as a result of the friction fit between the tool head and the handle being too weak or becoming less effective over time. This may make the use of such hand tools potentially difficult, cumbersome and/or frustrating.

[0004] The present invention aims to address the issue identified above, at least to some extent.

SUMMARY OF THE INVENTION

[0005] According to one aspect of the invention there is provided a locking arrangement for a hand tool which includes a handle and a tool head mounted to the handle, the locking arrangement including complementary locking formations on the handle and on the tool head, the locking formations being configured to engage with each other when the handle and tool head are assembled so as operatively to inhibit substantial angular displacement between the handle and the tool head.

[0006] The locking formations may be complementary male and female keying formations. The keying formations when engaged, typically have a degree of radial interference.

[0007] In one embodiment the male keying formation is located on the handle and the female keying formation is located on the tool head.

[0008] The male keying formation may be defined by or attached to and stands proud of a spigot which forms part of the handle, the tool head having a neck portion within which the spigot is frictionally received and the female keying formation being in the form of a recess in the neck portion within which at least part of the male keying formation is positioned.

[0009] The recess may extend longitudinally into the neck portion from a free end thereof for at least part of the length of the neck portion and the male keying formation may be longitudinally elongate and receivable in the recess upon assembly of the handle and tool head.

[0010] The spigot may have a substantially circular transverse cross section, a first end of which is attached to or integral with a handling portion of the handle and a second or free end of which terminates in a transverse bulge which serves as a longitudinal retaining formation in order to hold the neck portion of the tool head captive between the bulge and the handling portion.

[0011] According to another aspect of the invention there is provided a handle for a hand tool, the handle including a handling portion and a tool head mounting portion connected to the handling portion, a male locking formation which is configured to mate with a female locking formation of a tool head of the hand tool, or a female locking formation which is configured to mate with a male locking formation of the tool head, wherein the male and female locking formations are configured to mate with each other so as operatively to inhibit substantial relative angular displacement between the handle and the tool head.

[0012] According to yet another aspect of the invention there is provided a tool head for a hand tool, the tool head including an end region whereby the tool head is mountable on a handle of the hand tool, the tool head further including a male locking formation which is configured to mate with a female locking formation of the handle of the hand tool or a female locking formation which is configured to mate with a male locking formation of the handle, wherein the male and female locking formations are configured to mate with each other so as operatively to inhibit substantial relative angular displacement between the handle and the tool head.

[0013] According to a further aspect of the invention there is provided hand tool which includes:

a tool head;
a handle; and
a locking arrangement including a locking formation located on the handle and a complementary locking formation located on the tool head, wherein the locking formations mate with each other so as operatively to inhibit substantial relative angular displacement between the handle and the tool head.

[0014] The locking formations may be complementary male and female keying formations.

[0015] In a preferred embodiment of the invention the male keying formation is positioned on the handle and the female keying formation is positioned on the tool head.

[0016] The handle may include a spigot and the tool

head includes a complementary socket within which the spigot is an interference fit, the male keying formation standing proud of a surface of the spigot.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The invention will now be further described, by way of example, with reference to the accompanying drawings.

[0018] In the drawings:

FIG. 1 is a three-dimensional view of an embodiment of a hand tool according to the invention;

FIG. 2 is a partial three-dimensional view of the hand tool of FIG. 1, shown from the top;

FIG. 3 is another partial three-dimensional view of the hand tool of FIG. 1, shown from the bottom;

FIG. 4 is a three-dimensional view of a handle of the hand tool of FIG. 1, shown from the top;

FIG.5 is another three-dimensional view of the handle of the hand tool of FIG. 1, shown from the bottom; and

FIG. 6 is a side view of the handle of the hand tool of FIG. 1.

DETAILED DESCRIPTION OF AN EXAMPLE EMBODIMENT

[0019] The following description of the invention is provided as an enabling teaching of the invention. Those skilled in the relevant art will recognise that many changes can be made to the embodiment described, while still attaining the beneficial results of the present invention. It will also be apparent that some of the desired benefits of the present invention can be attained by selecting some of the features of the present invention without utilising other features. Accordingly, those skilled in the art will recognise that modifications and adaptations to the present invention are possible and can even be desirable in certain circumstances, and are a part of the present invention. Thus, the following description is provided as illustrative of the principles of the present invention and not a limitation thereof.

[0020] An embodiment of a hand tool 10 according to the invention is illustrated in the drawings. The hand tool 10 includes a handle 20 and a tool head 30. The hand tool 10 is illustrated in an assembled condition in FIGs 1 to 3, while FIGs 4 to 6 illustrate the handle 20 separately from the tool head 30 in order more clearly to show the features of the handle 20.

[0021] In this exemplary embodiment, the hand tool 10 is a trowel of which the tool head 30 has a forked tip 32, as shown in FIG. 1. The handle 20 is moulded from a plastic material and the tool head 30 is a pressed metal.

[0022] The tool head 30 includes a trowel portion 34 which, at a first end thereof, defines the forked tip 32 referred to above. The tool head 30 further includes a metal end region or neck portion 36 integrally formed with and extending longitudinally away from a second end 38 of the trowel portion 34.

[0023] The neck portion 36 of the tool head 30 is hollow with a predominantly circular transverse cross-section which flares away from the trowel portion 34 and towards an elongate handling portion 26 of the handle 20. The neck portion 36 essentially forms a sleeve which defines an internal frusto-conical socket in which a tool head mounting portion 22 of the handle 20 in the form of a spigot 22 is frictionally received, as shown in FIGs 1 to 3. The spigot 22 itself is best shown in FIGs 4 to 6.

[0024] The neck portion 36 has a substantially circular opening at a first end 48 thereof through which the spigot 22 is pressed into the socket in order to assemble the hand tool 10. A second end of the neck portion has a closed top and an open bottom 50 (see FIGs 1 and 3).

[0025] The spigot 22 has an elongate shape with a predominantly circular transverse cross-section. The spigot 22 tapers from a first end 24, where it is attached to a handling portion 26 of the handle 20, to a second, free end 28. The spigot 22 and handling portion 26 are formed integrally as a unitary moulding.

[0026] The second end 28 of the spigot 22 includes a rebate 44 in a top surface and a bottom surface which defines a bulge 46. In transverse cross-section, the bulge 46 has a major dimension which is greater than a major dimension of an immediately adjacent region 54 of the spigot 22. The spigot 22 is thus configured such that, in order operatively to engage the socket in the neck portion 36 of the tool head 30, the bulge 46 is urged through the socket and through the open bottom 50 of the neck portion 36. The rebate 44 permits the spigot to deform sufficiently to permit the bulge to pass through the socket and to snap back once it clears the socket. In this way, the handle 20 engages the tool head 30 by way of a friction or press fit.

[0027] The region of the handling portion 26 immediately adjacent to the spigot 22 has a greater diameter than the first end 48 of the neck portion 36. The dimensions of this region of the handling portion 26 and the configuration of the bulge 46, in combination with the friction fit achieved between the spigot 22 and the neck portion 26, prevents relative displacement between the handle 20 and the tool head 30, and in particular constrains relative axial or longitudinal displacement, at least to some extent.

[0028] The handling portion 26 of the handle 20 has a series of grooves 42 in a bottom region thereof and a recess 40 in a top region thereof. The grooves 42 and the recess 40 are shaped to facilitate gripping of the handling portion of the handle 20.

[0029] In order further to inhibit or prevent significant relative angular displacement between the handle 20 and the tool head 30, a locking or keying arrangement 60 is provided. The locking arrangement 60 includes complementary male and female locking or keying formations on the handle 20 and the tool head 30. These formations are described in detail below.

[0030] The handle 20 includes a male keying formation in the form of a tongue 62 which protrudes radially from a bottom surface of the spigot 22. The tongue 62 has concave side surfaces and extends longitudinally along the spigot 22, with a free end of the tongue 62 pointing in the direction of the tool head 30 when the hand tool 10 is in the assembled condition, as shown in FIG. 1.

[0031] The tool head 30 includes a complementary female locking or keying formation in the form of a thin, longitudinal slot 64 extending along a bottom region of the neck portion 36 of the tool head 30, as shown in FIGs 1 and 3. The neck is formed by bending two opposed tabs in opposite directions to form the frusto-conical socket. The free ends of the tabs are spaced apart to form the slot 64 which extends along the entire length of the neck portion 36, from the first end 48 and terminates in the open bottom 50.

[0032] The tongue 62 is complementally shaped to an end region of the slot 64 at the first end 48 of the neck portion 36 such that, with the spigot 22 frictionally positioned inside of the socket in the manner shown in FIGs 1 to 3, the tongue 62 mates with the slot 64 by extending longitudinally into the slot. The tongue 62 is held radially captive by the surfaces of the neck portion 36 that define the slot 64. In other words there is a degree of radial interference between adjacent surfaces of the slot 64 and the tongue 62 which serve to prevent significant angular displacement between the handle 20 and the tool head 30 even in the event that the frictional fit between the handle and the tool head should become less effective.

[0033] The Inventor has found that the locking arrangement 60 as described herein may effectively inhibit relative angular displacement between a tool head and a handle or may, in conjunction with other attachment formations or elements, assist in inhibiting such relative angular displacement. This may reduce the risk of a hand tool being difficult or cumbersome to use, or becoming more difficult or cumbersome to use over time, e.g. as a result of the friction fit between the tool head and the handle becoming less effective.

[0034] The Inventor believes that the present invention may be implemented without requiring significant modifications to an existing production line or process in which tools are manufactured. For instance, an existing handle mould may simply be modified to include an additional mould portion for forming the male locking formation as described herein, while ensuring that the male locking formation formed thereby is complementally shaped to a slot in an existing tool head sleeve. In cases where an existing tool head or tool head sleeve does not include such a slot, the tool head shaping process or the shape of one or both of the body from which the neck portion is formed may be slightly modified such that the required slot is defined in the tool head during the shaping process.

[0035] It should be appreciated that the hand tool 10 is shown as a trowel in the drawings merely for exemplary purposes, and that the locking arrangement of the present invention may be applied to tools of various different types and configurations, including (but not limited to) any suitable garden tool.

Claims

1. A locking arrangement (60) for a hand tool (10) which includes a handle (20) and a tool head (30) mounted to the handle (20), **characterised in that** the locking arrangement (60) includes complementary locking formations (62, 64) on the handle (20) and on the tool head (3), the locking formations (62, 64) being configured to engage with each other when the handle (20) and tool head (30) are assembled so as operatively to inhibit substantial angular displacement between the handle and the tool head.

2. A locking arrangement as claimed in claim 1, in which the locking formations (62, 64) are complementary male and female keying formations.

3. A locking arrangement as claimed in claim 2, in which the male keying formation (62) is located on the handle (20) and the female keying formation (64) is located on the tool head (30).

4. A locking arrangement as claimed in claim 3, in which the male keying formation (62) is defined by or attached to and stands proud of a spigot (22) which forms part of the handle (20), the tool head (30) having a neck portion (36) within which the spigot is frictionally received and the female keying formation (64) being in the form of a recess (40) in the neck portion (36) within which at least part of the male keying formation is positioned.

5. A locking arrangement as claimed in claim 4, in which the recess (64) extends longitudinally into the neck portion (36) from a free end thereof for at least part of the length of the neck portion and the male keying formation (62) is longitudinally elongate and receivable in the recess upon assembly of the handle and tool head.

6. A locking arrangement as claimed in claim 5, in which the spigot (22) has a substantially circular transverse cross section, a first end of which is attached to or integral with a handling portion (26) of the handle (20) and a second or free end of which terminates in a transverse bulge (46) which serves as a longitudinal retaining formation in order to hold the neck portion (36) of the tool head (30) captive between the bulge (46) and the handling portion (26).

7. A hand tool (10) which is **characterised in that** it includes:

    a tool head (30);

a handle (20); and
a locking arrangement (60) which includes a locking formation (62) located on the handle (20) and a complementary locking formation (64) located on the tool head (30), wherein the locking formations (62, 64) mate with each other so as operatively to inhibit substantial relative angular displacement between the handle (20) and the tool head (30).

8. A hand tool as claimed in claim 7, in which the locking formations are complementary male and female keying formations (62, 64).

9. A hand tool as claimed in claim 8, in which the male keying formation (62) is positioned on the handle (20) and the female keying formation (64) is positioned on the tool head (30).

10. A hand tool as claimed in claim 9, in which the handle (20) includes a spigot (22) and the tool head (30) includes a complementary socket (36) within which the spigot (22) is an interference fit, the male keying formation (62) standing proud of a surface of the spigot (22).

11. A handle (20) for a hand tool (10), **characterised in that** the handle includes a handling portion (26) and a tool head mounting portion (22) connected to the handling portion (26), a male locking formation which is configured to mate with a female locking formation of a tool head of the hand tool, or a female locking formation which is configured to mate with a male locking formation of the tool head, wherein the male and female locking formations (62, 64) are configured to mate with each other so as operatively to inhibit substantial relative angular displacement between the handle and the tool head.

12. A tool head (30) for a hand tool (10), the tool head (30) being **characterised in that** it includes an end region (36) whereby the tool head (30) is mountable on a handle (20) of the hand tool, the tool head further including a male locking formation which is configured to mate with a female locking formation of the handle of the hand tool or a female locking formation which is configured to mate with a male locking formation of the handle, wherein the male and female locking formations (62, 64) are configured to mate with each other so as operatively to inhibit substantial relative angular displacement between the handle and the tool head.

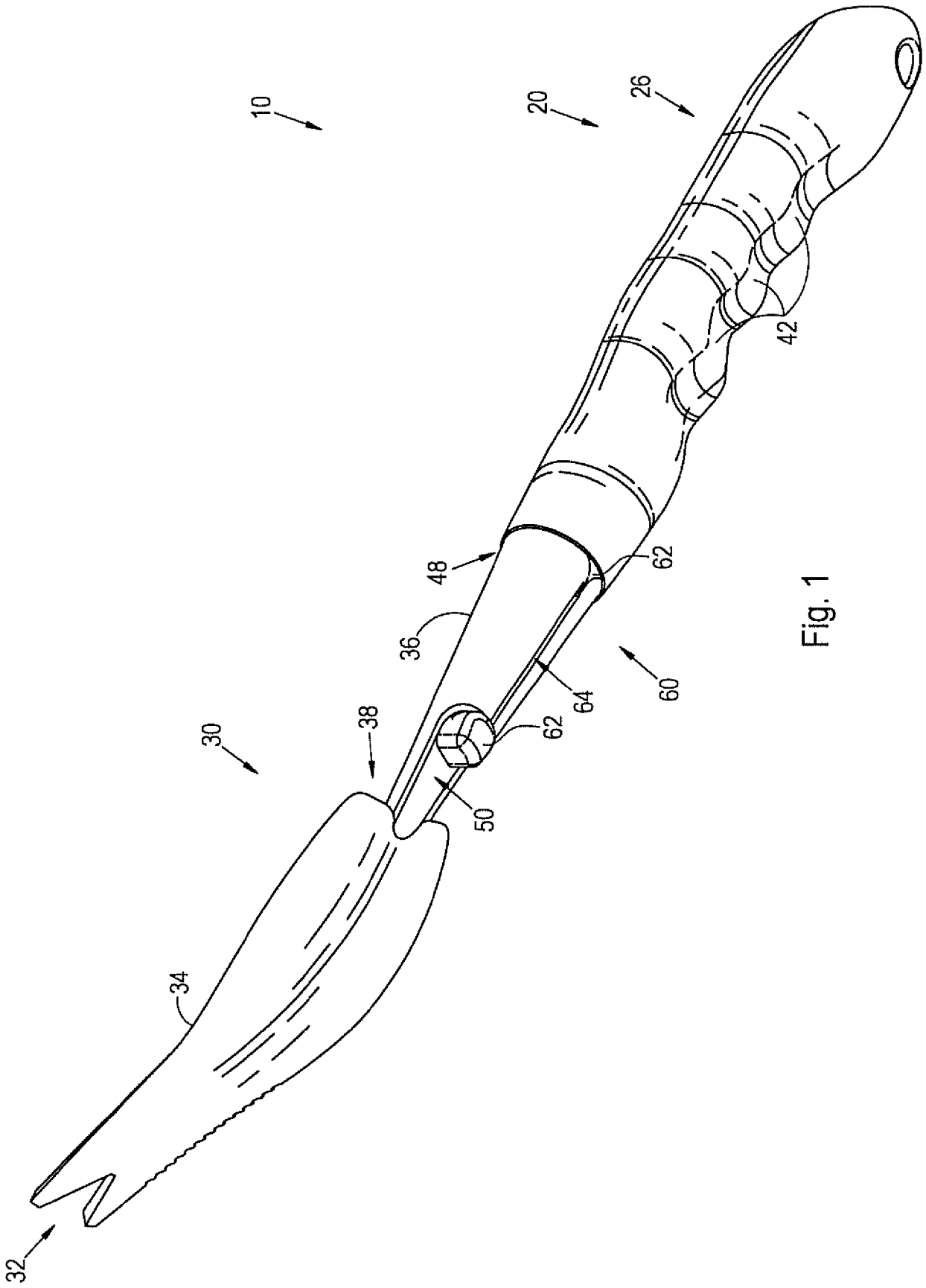

Fig. 1

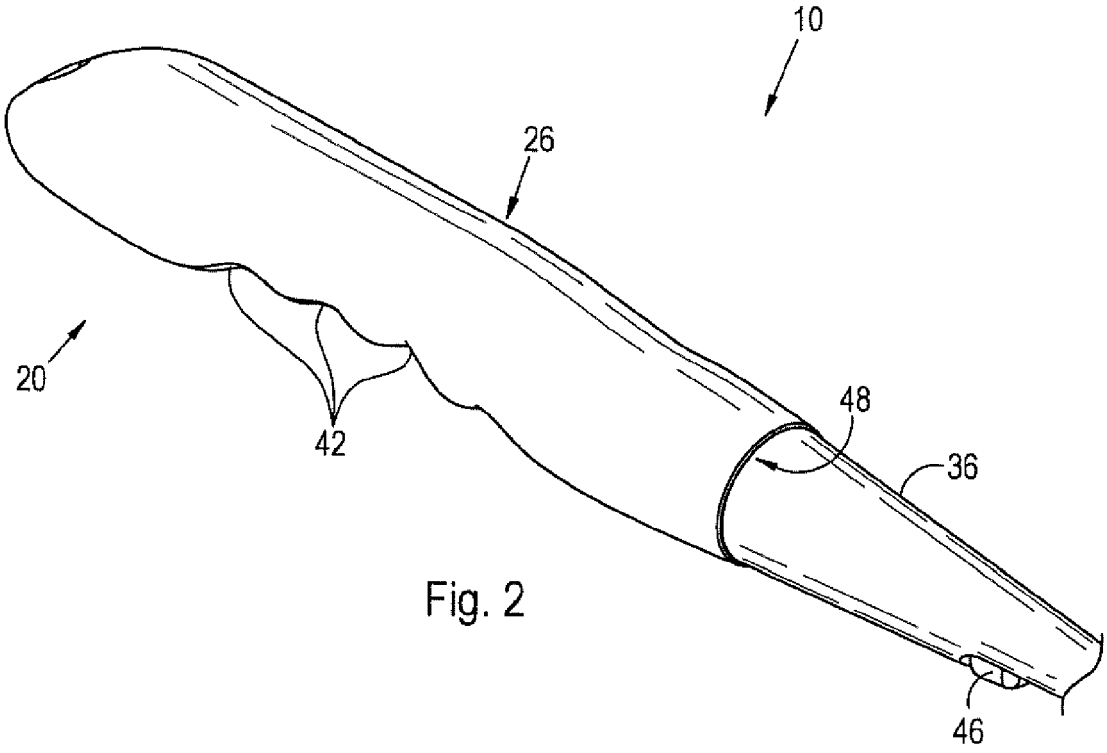

Fig. 2

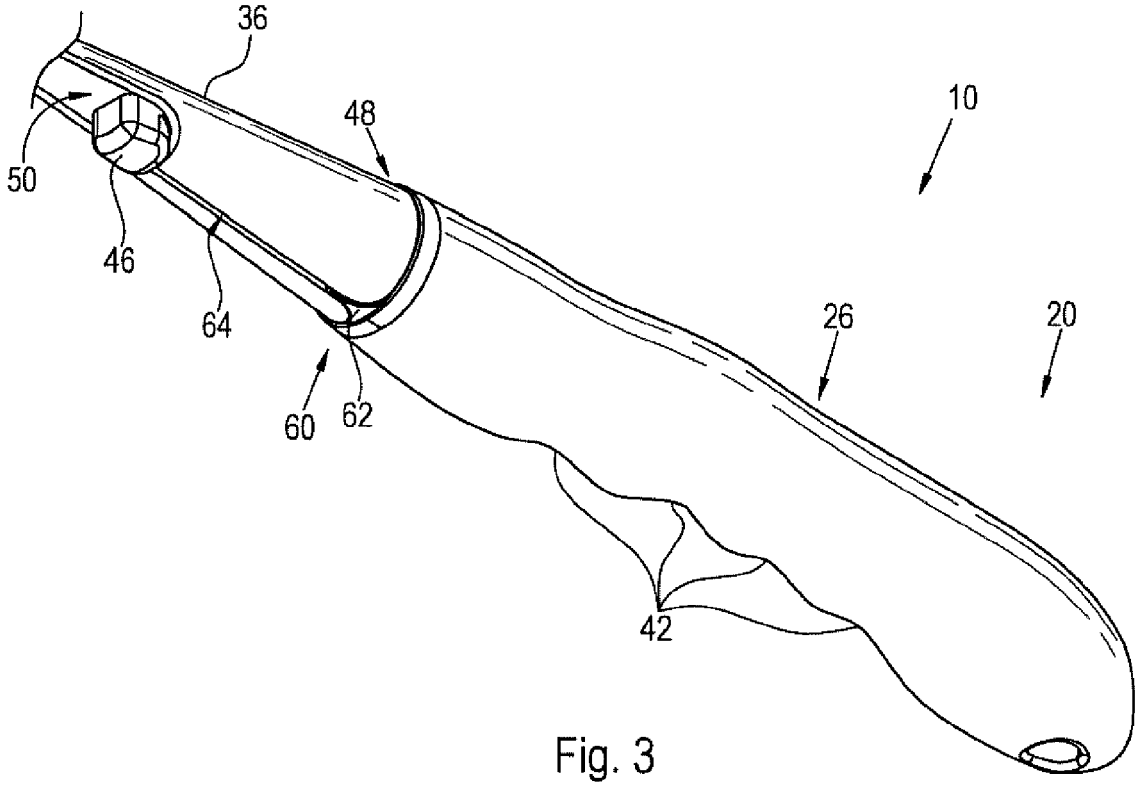

Fig. 3

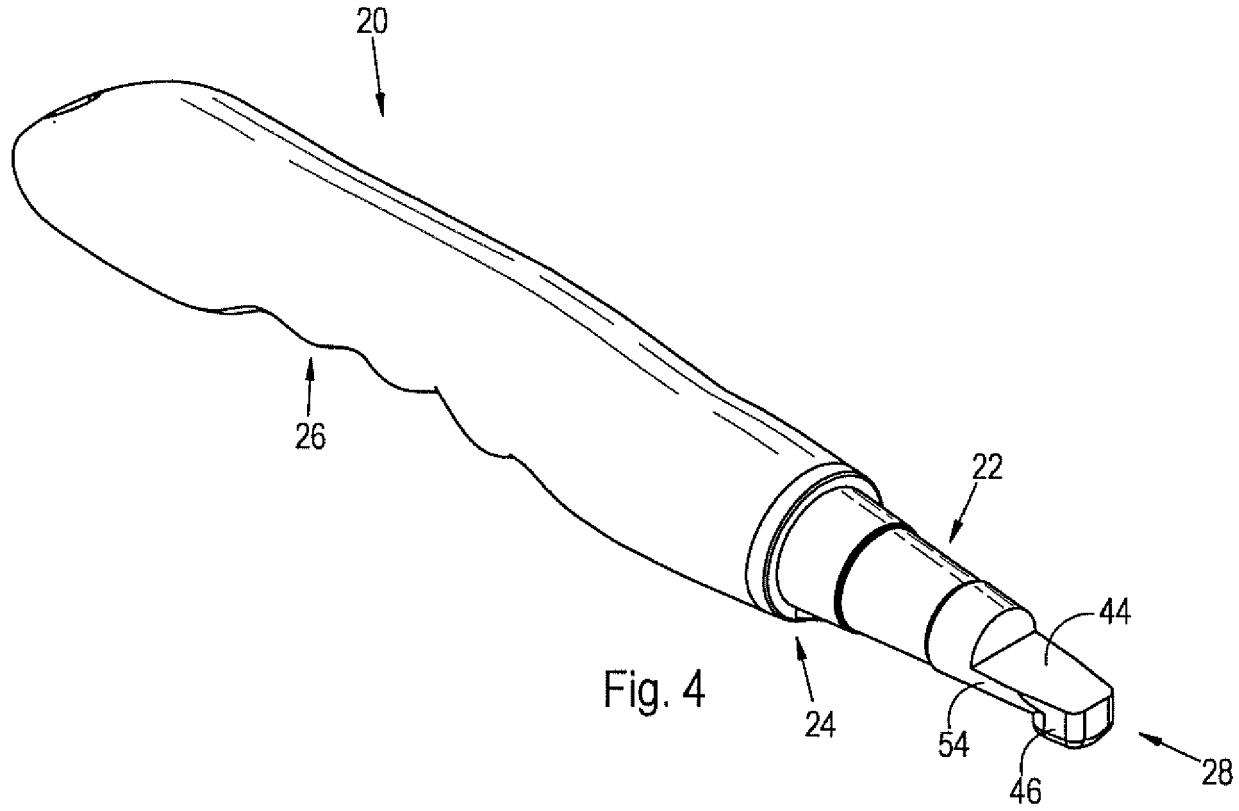

Fig. 4

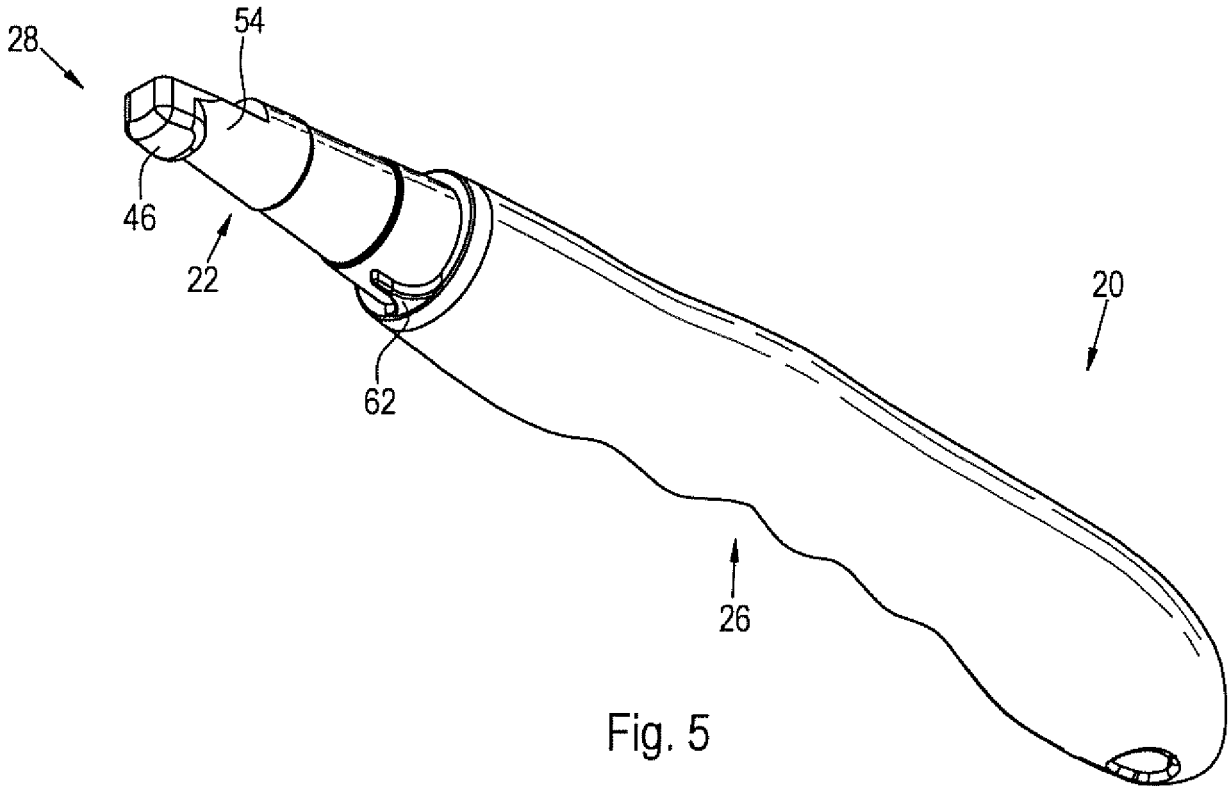

Fig. 5

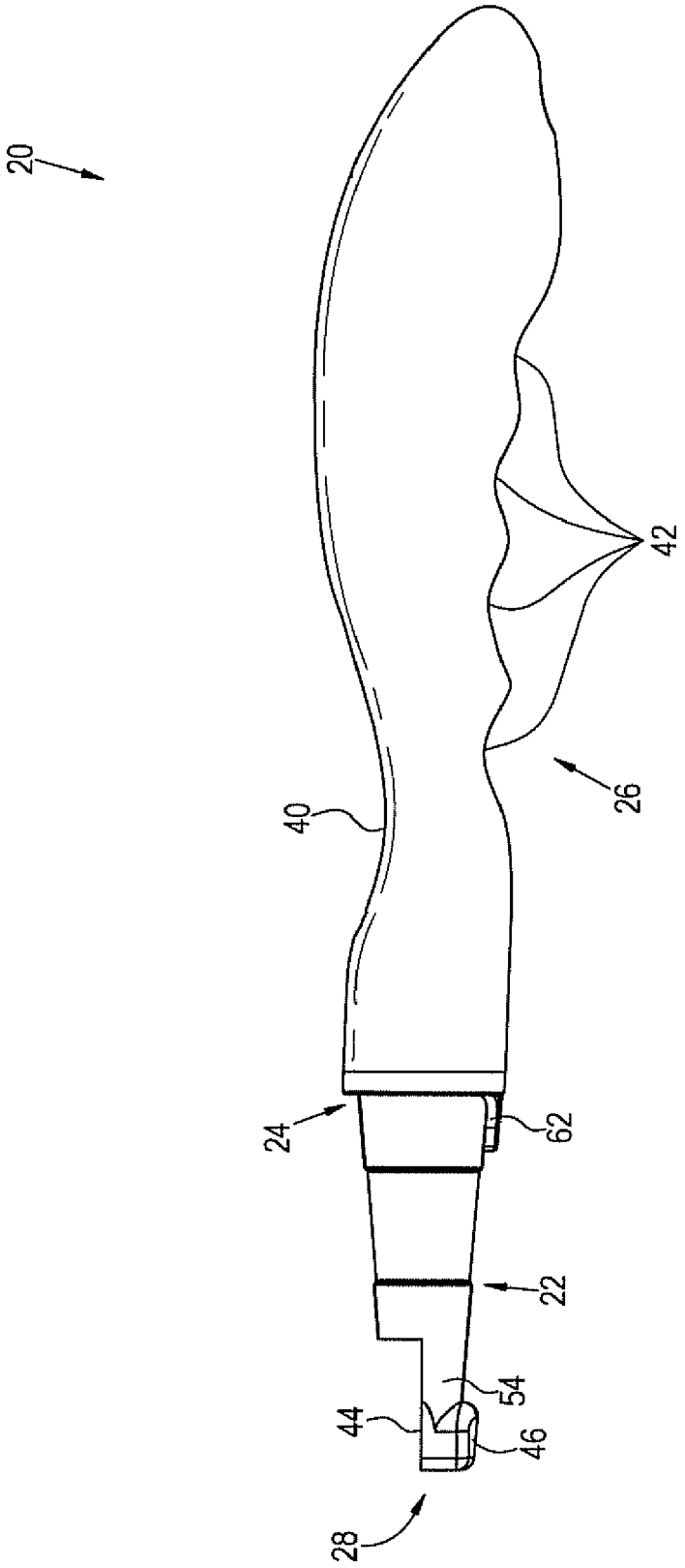

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 18 21 2744

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 1 162 794 A (JENKS & CATTEL HARDWARE LTD) 27 August 1969 (1969-08-27) * page 1, line 83 - page 2, line 48 * * figures 1,3 * -----	1-12	INV. B25G3/18
X	GB 1 406 181 A (ENGLISH TOOLS LTD) 17 September 1975 (1975-09-17) * page 2, lines 11-57 * * figures 1,2 * -----	1-12	

TECHNICAL FIELDS SEARCHED (IPC)

B25G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 May 2019	Bonnin, David

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 21 2744

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1162794 A	27-08-1969	NONE	
GB 1406181 A	17-09-1975	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82