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(54) **Extension cord retention system**

Halterungssystem für eine Verlängerungsschnur

Système de rétention pour un cordon d'extension

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to portable electric power tools according to the preamble of claim 1 as known from US 4875879 designed for use with extension cords, and specifically to a system for securely retaining the extension cord to the tool in a way which reduces stress on the cord.

[0002] Conventional portable electric power tools, including but not limited to drills, hammer drills, sanders, grinders, circular saws, reciprocating saws, routers, power fastener drivers, garden weed trimmers, leaf blowers and the like are typically provided with a power cord which, depending on the manufacturer and model, varies in length from about 0.15 meters (six inches) to about 3.66 meters (12 feet). Regardless of the length of the standard equipment cord or tool cord, users often need to employ extension cords to reach remote work sites. For example, on construction sites, long extension cords are often connected to portable generators. In such cases, if the extension cord is merely plugged into the tool cord, pulling on the tool, which often occurs during use, may cause the extension cord to become detached from the tool cord, which disrupts work and is frustrating to the operator. Also, the junction of the tool cord and the extension cord often becomes caught on workplace obstructions, causing the tool to become disconnected from the extension cord.

[0003] To address this problem, operators often tie adjacent ends of the extension and tool cords together in a knot. While making a more secure junction, the knot has a tendency to become caught on workpiece edges or on other surfaces, requiring the operator to interrupt work and free the caught knot. Another disadvantage of the knot is that it requires tight bends to be made in both the tool cord and the extension cord. Repetitive sharp bending stresses of this type cause stresses on the internal wiring of the cords and may result in fraying of the cords and/or short circuits.

[0004] One attempted solution to this problem is to provide a tool which lacks a tool cord, but instead has an electric receptacle for directly receiving an extension cord. While this solution removes the problems associated with the extension cord-tool cord knot, a new problem is introduced in that pulling on the tool during work or movement causes the extension cord to become detached from the tool. Again, work is interrupted, which is often frustrating to the operator.

[0005] To address the problem of retention of the extension cord on the tool, tools have been provided with cord retention systems. Such systems are typically configured with formations such as hooks and/or loops which bend the extension cord in a serpentine manner near the tool receptacle and thus isolate the cord plug from a pulling action on the cord. In this manner, pulling on the tool while attached to the cord will not cause the extension cord to become unplugged from the tool.

[0006] However, such conventional systems are often unsatisfactory because they cause excessive and/or sharp bends in the cord, which shorten the life of the extension cord and may cause short circuits. Such stresses occur when the cord is forced into sharp bends around hooks or other projections. One related and important design criteria of such systems is that construction workers working on ladders or on second stories of buildings often raise and/or lower the tool by the cord. Especially with heavier tools, this places a significant load on the cord. When the cord has sharp bends, particularly where the cord leaves the retention system, there is excessive and potentially damaging stress placed on the cord. This problem is especially severe where the retention system creates a right angle bend in the cord as it exits the system. In instances where the tool has a tool cord, the stresses are severe enough to cause the tool cord to be pulled out of the tool.

[0007] Another disadvantage of conventional cord retention systems is that the cord is not sufficiently secured in the system. One problem resulting from this disadvantage is that when a tool is moved backward, as in a sawing motion, a slack condition in the extension cord may cause the cord to become disengaged from portions of conventional systems. Another problem is that when operating in heavy vegetation or crowded work environments, the many cord loops created by conventional systems are prone to becoming caught on branches or other environmental obstructions, which may cause the cord to become detached from the retention system.

[0008] Still another disadvantage of conventional extension cord retention systems relates to the fact that extension cords are provided in a variety of gauges or thicknesses. Conventional cord retention systems are incapable of accommodating a wide range of cord gauges.

[0009] Accordingly, an object of the invention is to provide an improved cord retention system for a power tool which reduces stress on the cord, especially when the cord is used to raise and/or lower the tool.

[0010] Another object of the present invention is to provide an improved cord retention system for a power tool which positively secures the cord to the tool.

[0011] Still another object of the present invention is to provide an improved cord retention system for a power tool which accommodates a range of extension cord gauges.

BRIEF SUMMARY OF THE INVENTION

[0012] The above-listed objects are met or exceeded by the present power tool extension cord retention system with features according to independant claim 1.

[0013] More specifically, the present invention provides a power cord retaining system for use with a power tool configured for accommodating an extension cord with preferred features according to the features of the dependent claims 2-11.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0014]

FIG. 1 is a front perspective view of a tool handle incorporating the present system;
FIG. 2 is a rear perspective view of the tool handle of FIG. 1;
FIG. 3 is a bottom view of the tool handle of FIG. 1 shown with an extension cord in place;
FIG. 4 is a fragmentary side view of the present system showing a cord lock feature;
FIG. 5 is a side view of a tool featuring an alternate arrangement of the present system; and
FIG. 6 is a fragmentary rear view of the tool of FIG. 1 showing the cord loop planes defined by the present system.

DETAILED DESCRIPTION OF THE INVENTION

[0015] Referring now to FIGs. 1-3, a power tool generally designated 10 is shown fragmentarily, and is contemplated as being any one of a group of commonly known portable electric power tools, including, but not limited to drills, hammer drills, sanders, grinders, circular saws, reciprocating saws, routers, power fastener drivers, garden weed trimmers, leaf blowers and the like, all being commercial or homeowner-type power tools commonly used with an extension cord, generally designated 12 (best seen in FIG 3). The extension cord 12 is of the type commonly used in conjunction with wall sockets or portable generators used on job sites. The length of the cord 12 may vary as well as its gauge or diameter and still be suitable for use with the present invention. However, for commercial applications, the extension cord 12 will typically be made of 10, 12 or 14 gauge cable.

[0016] The power tool 10 has a handle portion 14 and an actuator trigger 16. In the preferred embodiment, the handle portion 14 is made of molded rigid plastic, however, other suitable materials are contemplated such as cast aluminum, stainless steel, etc. as are well known in the tool art. If provided, the configuration of the handle portion 14 and the trigger 16 may vary to suit the application. Opposite the tool handle portion 14 is a working end 18 (shown in phantom in FIG. 1) which includes components (not shown) as are known in the art for performing the designated work desired for a particular tool.

[0017] In the preferred embodiment, the cord retaining system, generally designated 20, is secured to the handle portion 14, as by being integrally molded thereto. However, other types of attachment are contemplated, including chemical adhesives and threaded fasteners. Two main components make up the cord retaining system 20, a cord capture formation 22 and a chord channel 24. The cord capture formation 22 is configured for retaining the extension cord 12 at at least two points of contact 26, 28 (FIG. 3), with a loop portion 30 of the cord formed between the two points. The cord channel 24 receives and supports an apex 32 of the loop portion 30.

[0018] More specifically, the cord capture formation 22 is configured to define an enclosed space 34 when attached to the tool 10. Thus, the capture formation 22 may define a circular, oval, free form or other preferably non-cornered shape on its own or using a portion 36 of the tool 10 (depicted as part of the handle portion 14). A non-cornered shape is preferred to avoid sharp edges which may cause wear or stress on the extension cord 12.

[0019] The capture formation 22 includes first and second ends also termed front and rear ends 38, 40. An important feature of the present cord capture formation 22 is that at least one and preferably both of the ends 38, 40 are configured with a fully radiused or rounded edge 42 to prevent unnecessary wear or stress on the extension cord 12. Further, as will be seen in FIG. 2, the ends 38, 40 are outwardly flared to further promote ease of insertion and retention of the cord 12.

[0020] Another aspect of the cord capture formation 22 is that it is preferably located in close proximity to an electrical receptacle 44 which is preferably integrally joined to the handle portion 14, however other configurations are contemplated depending on the application. It will be seen that the tool 10 defines a longitudinal axis, and the cord capture formation 22 is preferably oriented on the tool 10 so that the enclosed space 34 is coaxial or parallel to the longitudinal axis of the tool. While the cord capture formation 22 is shown preferably positioned on a lower end 46 of the tool 10, it is contemplated that other positions may be suitable, including on one side 48 of the tool, depending on the application.

[0021] Referring now to the cord channel 24, the other portion of the present retention system 20, an important feature of the present system is that the cord channel 24 supports the apex 32 of the loop portion 30 along a substantial portion of its length. To that end, and so that kinks and sharp bends in the extension cord 12 are prevented, the cord channel 24 is preferably formed into a semi-circle which depends from the lower end 46 of the tool 10. In addition, the cord channel 24 defines an arcuate or "C"-shaped groove 50 (best seen in FIG. 4) which is curved along its vertical dimension to accept the profile of the extension cord 12. It is preferred that leading and trailing edges 52, 54 of the cord channel 24 are inclined to facilitate cord placement. Also, to prevent excessive cord wear, an outer lip 56 of the channel 24 is also radiused.

[0022] Referring now to FIGs. 3 and 5, for best results, the cord capture formation 22 and the cord channel 24 are linearly aligned on the tool 10 along a major tool axis. In the embodiment of FIG. 3, the capture formation 22 and the cord channel 24 are aligned along the longitudinal tool axis "N". However, in FIG. 5, the capture formation 22 and the cord channel 24 are disposed along an axis "M" defined by the handle portion 14 of a generally "L"-shaped tool 10a. The other major axis is designated "N" for the tool 10a. Thus, some tools may have a single

major axis, that being the longitudinal axis, but other tools may have two major axes, as in the case of "L"-shaped tools 10a.

[0023] Also, given that the tool 10, 10a generally defines a vertical plane, the system 20 is constructed and arranged so that the cord capture formation 22 and the cord channel 24 are in operational relationship to each other on the tool 10, 10a to restrain the cord loop of cord in a cord plane "P" which is generally parallel to the corresponding major axis of the tool. Also, the formation 22 and the channel 24 are spaced apart a sufficient distance for allowing the cord 12 to easily clear the formation 22 and engage the channel 24 without kinking or bending, other than forming the loop portion 30. It will be seen from FIGs. 3 and 5 that it is also preferred that the cord channel 24 is closer to the working portion 18 of the tool 10 than the cord capture portion 22.

[0024] Once the cord 12 is secured in the receptacle 44 and in the system 20, it will be seen that the retained cord forms only two loop planes, the plane P and a second plane Q which is generally inclined relative to the plane P (best seen in FIG. 6). The degree of inclination of the plane Q to the plane P may vary to suit the application. By minimizing the number of cord loop planes, kinking and sharp bending of the cord 12 is prevented.

[0025] Referring now to FIG. 1, another feature of the present system 20 is that once in the cord channel 24, the extension cord 12 is releasably locked in place by a cord lock 60. As illustrated, the cord lock 60 is preferably a biased locking tab which is integrally formed with the cord channel 24. However, it is contemplated that the cord lock 60 could take other forms, including clips, hinges, latches, wedges, any of which retain the cord in place in the channel 24. In the preferred embodiment, the cord 12 is retained in the groove 50 by a snap fit provided by the lock 60.

[0026] Referring now to FIG. 4, since it is contemplated that the system 20 may be used with extension cords 12 having a variety of gauges, if the dimensions of the cord channel 24 and, particularly, the cord lock 60 are fixed, there is a possibility that if the cord lock is configured for a larger diameter cord, then if a smaller diameter cord is used, it may not be properly retained. To that end, a cord lock latch 62 is provided, in which a latch member 64 engages a catch 66 in the lower end 46 of the tool 10. As is known in the art, the latch member 64 is preferably pivotable relative to the cord channel 24, such as by being integrally molded to form a "living hinge", or joined to the channel with a pivot pin (not shown). To further accommodate a variety of cord gauges, the latch member 64 may be provided with a resilient pad 68 for taking up extra space between the latch member and the cord 12 if needed.

[0027] To secure the cord 12 in the tool 10, the user forms the loop 30 in the cord near a plug 70 and inserts the loop through the cord capture formation 22. The loop 30 is then placed around the cord channel 24 and is pressed into the groove 50. The cord lock 60 or 62 secures the cord 12 in place in the groove 50. Next, the plug 70 is engaged in the receptacle 44 as is well known in the art. As seen in FIGs. 3 and 5, if a load "L" is placed on the cord 12 while secured to the tool 10 by the present system 20, such as when the tool is lowered or raised by the cord 12 from an elevated location, it will be seen that the cord is not subject to stresses caused by sharp bends or kinks.

[0028] While a particular embodiment of the present extension cord retention system for a power tool has been described herein, it will be appreciated by those skilled in the art that changes and modifications may be made thereto without departing from the invention in its broader aspects and as set forth in the following claims.

[0029] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. A power cord retaining system (20) for use with a power tool (10) configured for accommodating an extension cord (12) comprising a cord capture formation (22) for retaining the extension cord (12) disposed on the tool (10) and a cord channel (24); said system (20) being **characterized in that** said cord channel (24) is disposed on the tool (10) and is configured for contacting and supporting a loop of the cord substantially along a semi-circular path defined by the loop and **in that** said cord channel (24) has inclined leading and trailing edges (52, 54).

2. The system of claim 1 wherein said cord capture formation (22) and said cord channel (24) are disposed in operational relationship to each other on the tool (10) to restrain the loop of cord in a cord plane (P), said cord plane (P) being generally parallel to a major axis of the tool (10).

3. The system of claim 2 wherein the tool (10) has a receptacle for receiving an end of the extension cord (12), and said cord capture formation (22) and said cord channel (24) are disposed in relation to the tool (10) so that the restrained cord forms only two loop planes (P,Q) when the cord is plugged into the tool (10).

4. The system of claim 1 wherein said cord capture formation (22) is configured to define a closed space (34) when attached to the tool (10).

5. The system of claim 4 wherein said cord capture formation (22) has first and second ends (38, 40), at

least one of which is provided with a radiused edge (42).

6. The system of claim 1 wherein the tool defines a longitudinal axis (N), and said cord capture formation (22) and said cord channel (24) are linearly aligned on the tool (10) along the axis (N).

7. The system of claim 6 wherein said tool (10) has a working end (18), and said cord channel (24) is closer to the working end than said cord capture formation (22).

8. The system of claim 1 wherein said cord channel (24) defines a semi-circular channel for supporting the entire apex (32) of the loop of the cord.

9. The system of claim 1 further including a cord lock (60) for securing the cord in said cord channel (24).

10. The system of claim 9 wherein said cord lock (60) is configured for accommodating a range of cord diameters for retention in said channel (24).

11. The system of claim 9 wherein said cord lock (60) is configured for biasing the cord in said channel (24).

Patentansprüche

1. Ein Netzkabel-Haltesystem (20) zur Verwendung mit einem angetriebenen Werkzeug (10), das zur Aufnahme eines Verlängerungskabels (12) ausgebildet ist, und umfassend eine Kabel-Einfangstruktur (22), um das Verlängerungskabel (12) am Werkzeug (10) angeordnet zu halten, und einen Kabelkanal (24), wobei das System (20) **dadurch gekennzeichnet ist, dass** der Kabelkanal (24) am Werkzeug (10) angeordnet und ausgebildet ist, um eine Schlaufe des Kabels im Wesentlichen entlang eines halbkreisförmigen Pfads, der durch die Schlaufe bestimmt wird, zu berühren und zu stützen, und **dadurch**, dass der Kabelkanal (24) schräge Vorder- und Hinterkanten (52, 54) hat.

2. Das System von Anspruch 1, worin die Kabel-Einfangstruktur (22) und der Kabelkanal (24) in Wirkungsbeziehung zueinander auf dem Werkzeug (10) angebracht sind, um die Schlaufe des Kabels auf einer Kabel-Ebene (P) zurückzuhalten, wobei die Kabel-Ebene (P) im Allgemeinen parallel zu einer Hauptachse des Werkzeugs (10) ist.

3. Das System von Anspruch 2, worin das Werkzeug (10) einen Behälter zur Aufnahme eines Endes des Verlängerungskabels (12) hat und die Kabel-Einfangstruktur (22) und der Kabelkanal (24) so im Verhältnis zum Werkzeug (10) angeordnet sind, dass das zurückgehaltene Kabel nur zwei Schlaufen-Ebenen (P, Q) bildet, wenn das Kabel in das Werkzeug (10) eingesteckt wird.

4. Das System von Anspruch 1, worin die Kabel-Einfangstruktur (22) ausgebildet ist, um einen geschlossenen Raum (34) zu bestimmen, wenn sie an das Werkzeug (10) angeschlossen ist.

5. Das System von Anspruch 4, worin die Kabel-Einfangstruktur (22) erste und zweite Enden (38, 40) hat, von denen mindestens eines mit einer mit einem Radius versehenen Kante (42) ausgestattet ist.

6. Das System von Anspruch 1, worin das Werkzeug eine Längsachse (N) bestimmt und die Kabel-Einfangstruktur (22) und der Kabelkanal (24) linear entlang der Achse (N) auf dem Werkzeug (10) ausgerichtet sind.

7. Das System von Anspruch 6, worin das Werkzeug (10) ein Arbeitsende (18) hat und der Kabelkanal (24) näher am Arbeitsende liegt als die Kabel-Einfangstruktur (22).

8. Das System von Anspruch 1, worin der Kabelkanal (24) einen halbkreisförmigen Kanal bestimmt, um den gesamten Scheitelpunkt (32) der Schlaufe des Kabels zu tragen.

9. Das System von Anspruch 1, das weiter einen Kabelverschluss (60) zum Sichern des Kabels im Kabelkanal (24) einschließt.

10. Das System von Anspruch 9, worin der Kabelverschluss (60) ausgebildet ist, um eine Reihe von Kabeldurchmessern zum Rückhalten in dem Kanal (24) aufzunehmen.

11. Das System von Anspruch 9, worin der Kabelverschluss (60) ausgebildet ist, um das Kabel in dem Kanal (24) vorzuspannen.

Revendications

1. Dispositif de retenue d'un cordon d'alimentation (20) utilisé sur un outil électrique (10) recevant un cordon prolongateur (12), comprenant un élément de retenue de cordon (22) destinée à retenir le cordon prolongateur (12) disposé sur l'outil (10) et un conduit de cordon (24) ;
caractérisé en ce que
le conduit de cordon (24) disposé sur l'outil (10) entre en contact et soutient une boucle du cordon pratiquement selon une trajectoire semi-circulaire définie par la boucle et ses bordures avant et arrière sont inclinées (52, 54).

2. Dispositif selon la revendication 1, dans lequel l'élément de retenue de cordon (22) et le conduit de cordon (24) sont disposés sur l'outil (10) pour contenir mutuellement la boucle du cordon dans un plan (P), le plan (P) étant essentiellement parallèle à un axe majeur de l'outil (10).

3. Dispositif selon la revendication 2, dans lequel l'outil (10) a un réceptacle destiné à recevoir une extrémité du cordon prolongateur (12), et l'élément de retenue de cordon (22) et le conduit de cordon (24) sont disposés en relation avec l'outil (10) de telle sorte, que le cordon contenu ne forme que deux plans de boucle (P, Q) lorsqu'il est branché dans l'outil (10).

4. Dispositif selon la revendication 1, dans lequel l'élément de retenue de cordon (22) définit un espace clos (34) lorsqu'il est fixé à l'outil (10).

5. Dispositif selon la revendication 4, dans lequel l'élément de retenue de cordon (22) a des première et seconde extrémités (38, 40), dont l'une au moins comporte une bordure chantournée (42).

6. Dispositif selon la revendication 1, dans lequel l'outil définit un axe longitudinal (N), l'élément de retenue de cordon (22) et le conduit de cordon (24) étant alignés linéairement sur l'outil (10) selon l'axe (N).

7. Dispositif selon la revendication 6, dans lequel l'outil (10) a une extrémité de manipulation (18), et le conduit de cordon (24) est plus proche de celle-ci que de l'élément de retenue de cordon (22).

8. Dispositif selon la revendication 1, dans lequel le conduit de cordon (24) est un conduit semi-circulaire pour soutenir l'intégralité du sommet (32) de la boucle du cordon.

9. Dispositif selon la revendication 1, incluant en outre un verrouillage de cordon (60) qui fixe le cordon dans le conduit de cordon (24).

10. Dispositif selon la revendication 9, dans lequel le verrouillage de cordon (60) peut recevoir différents diamètres de cordon pour les retenir dans le conduit (24).

11. Dispositif selon la revendication 9, dans lequel le verrouillage de cordon (60) oriente le cordon dans le conduit (24).

Fig. 1

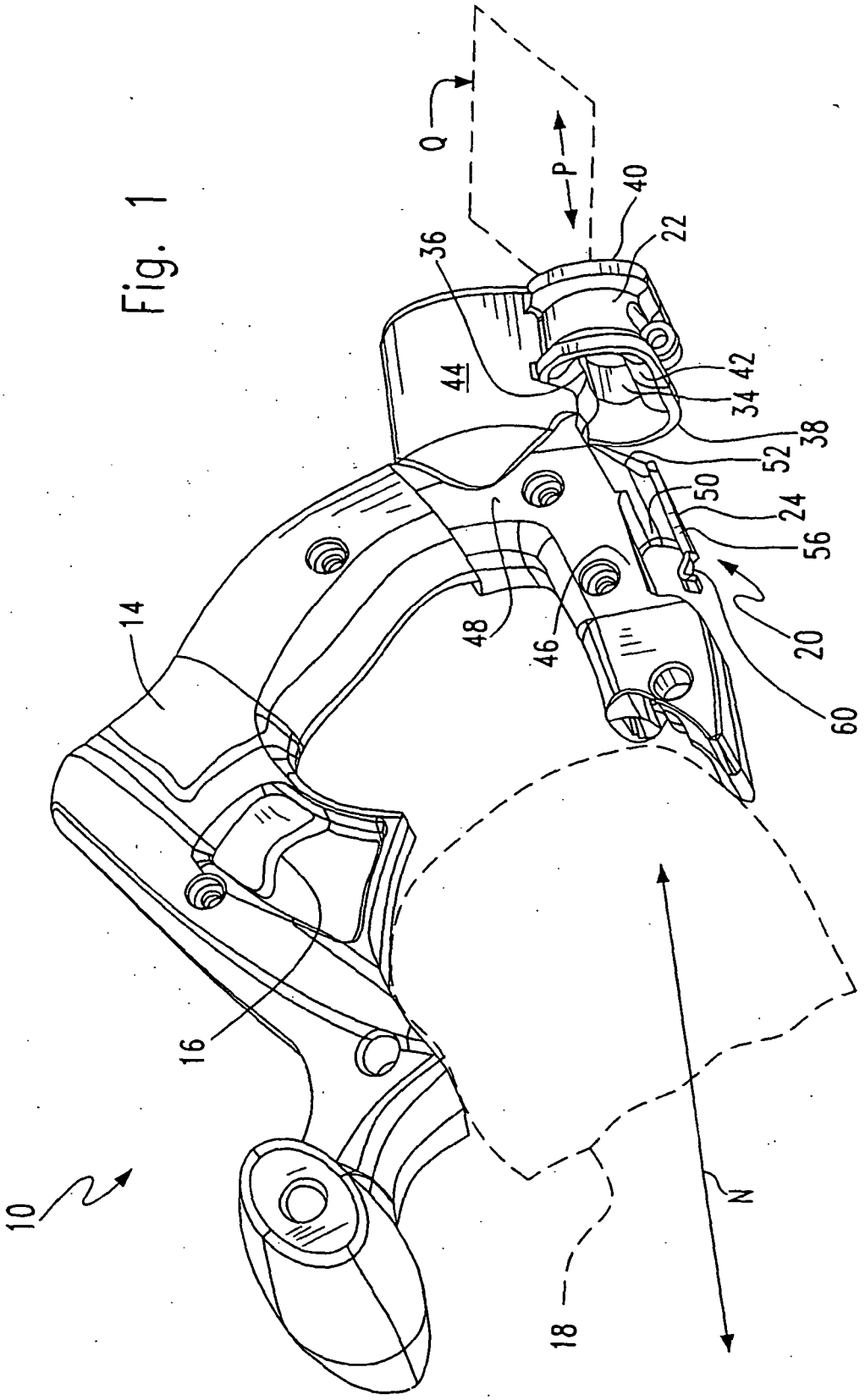


Fig. 2

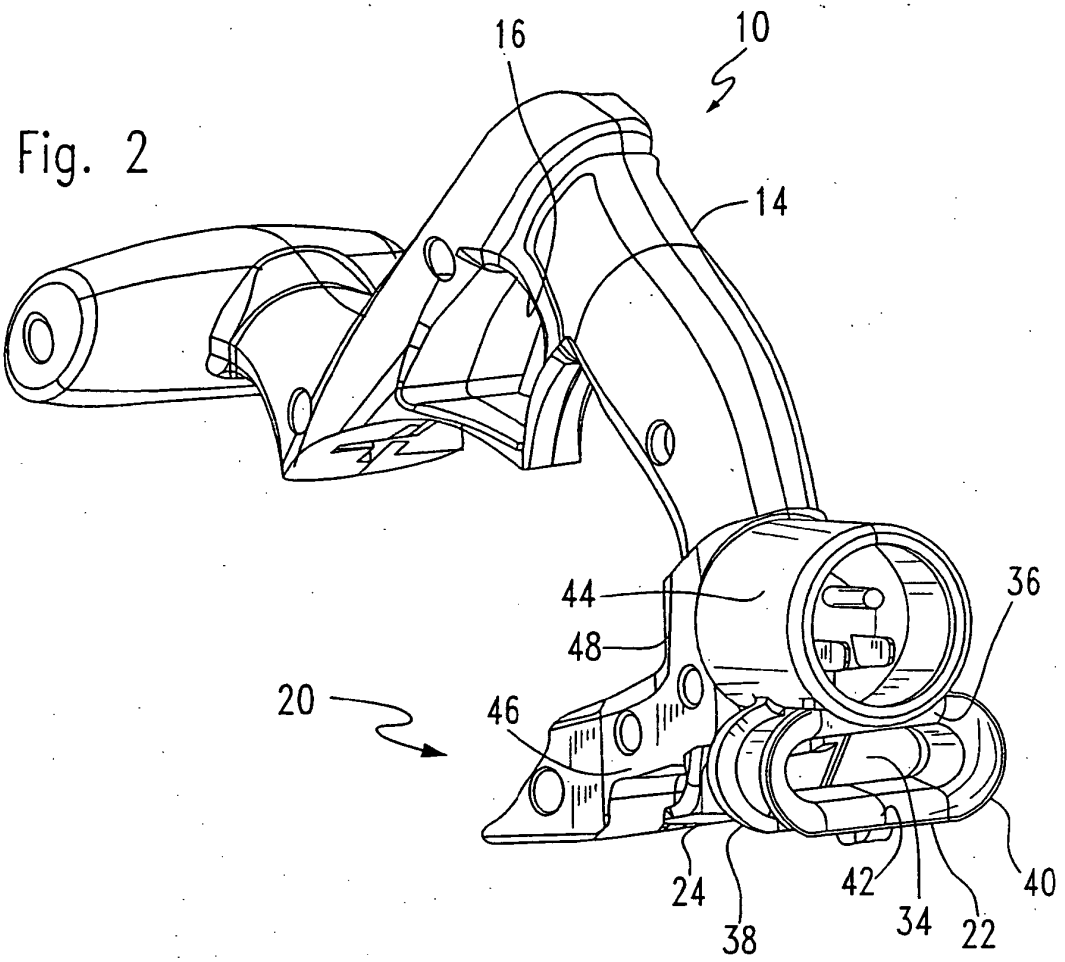
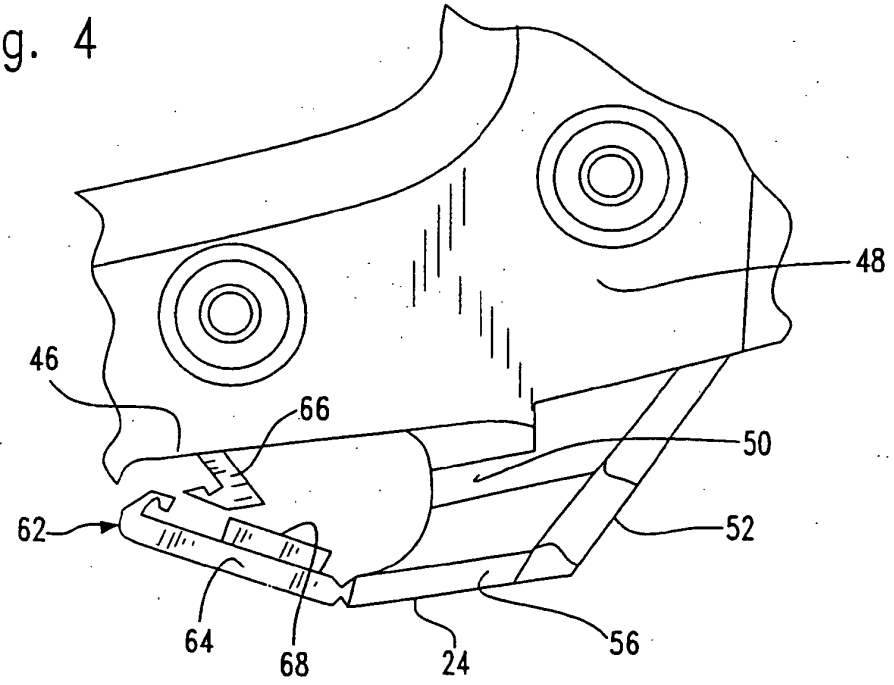


Fig. 4



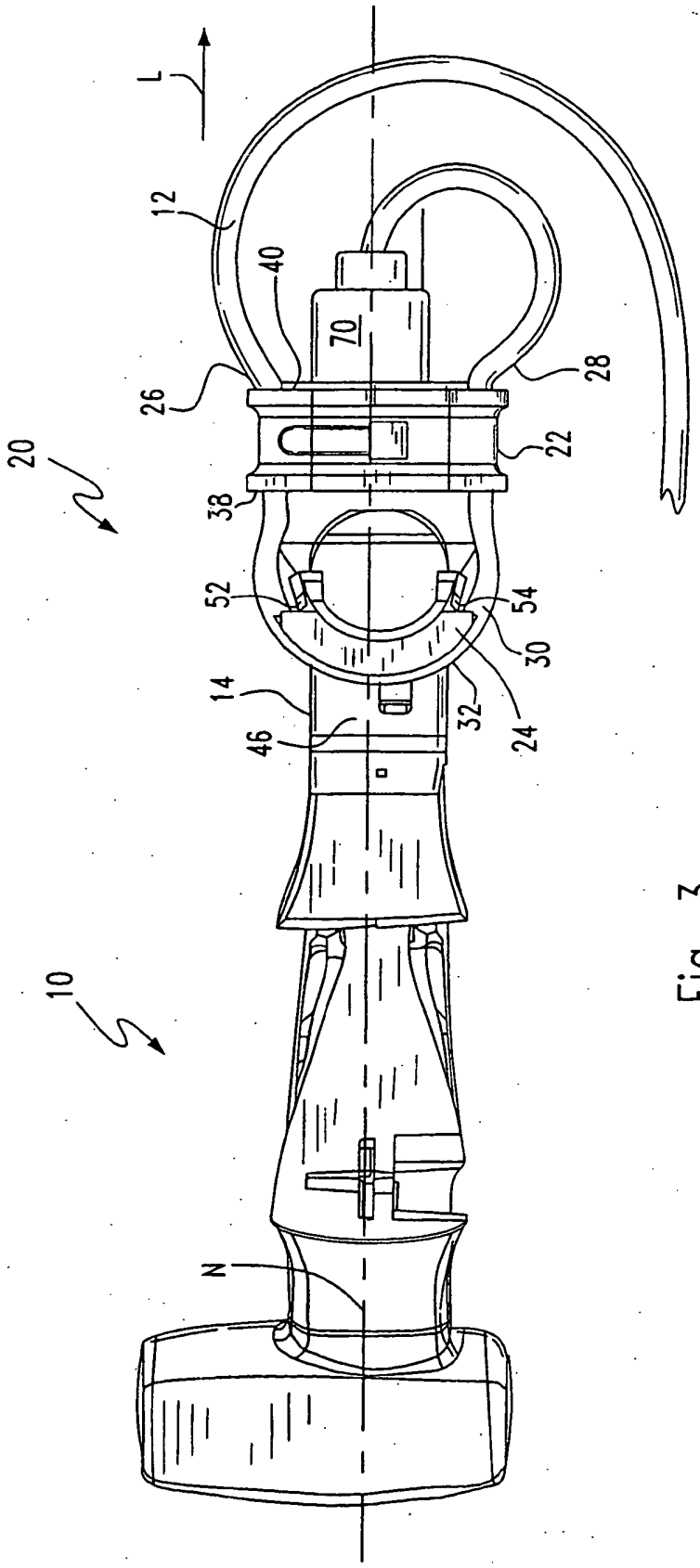


Fig. 3

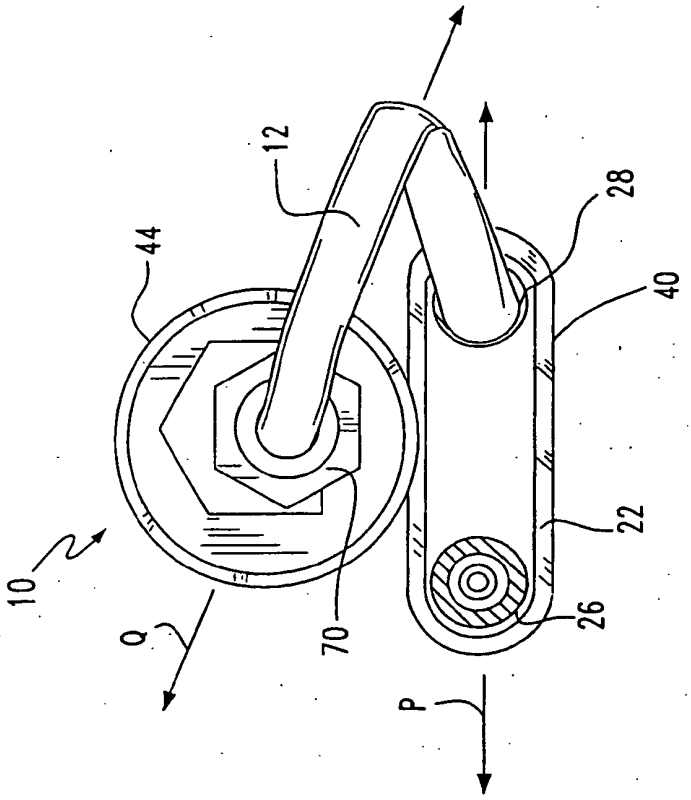


Fig. 6

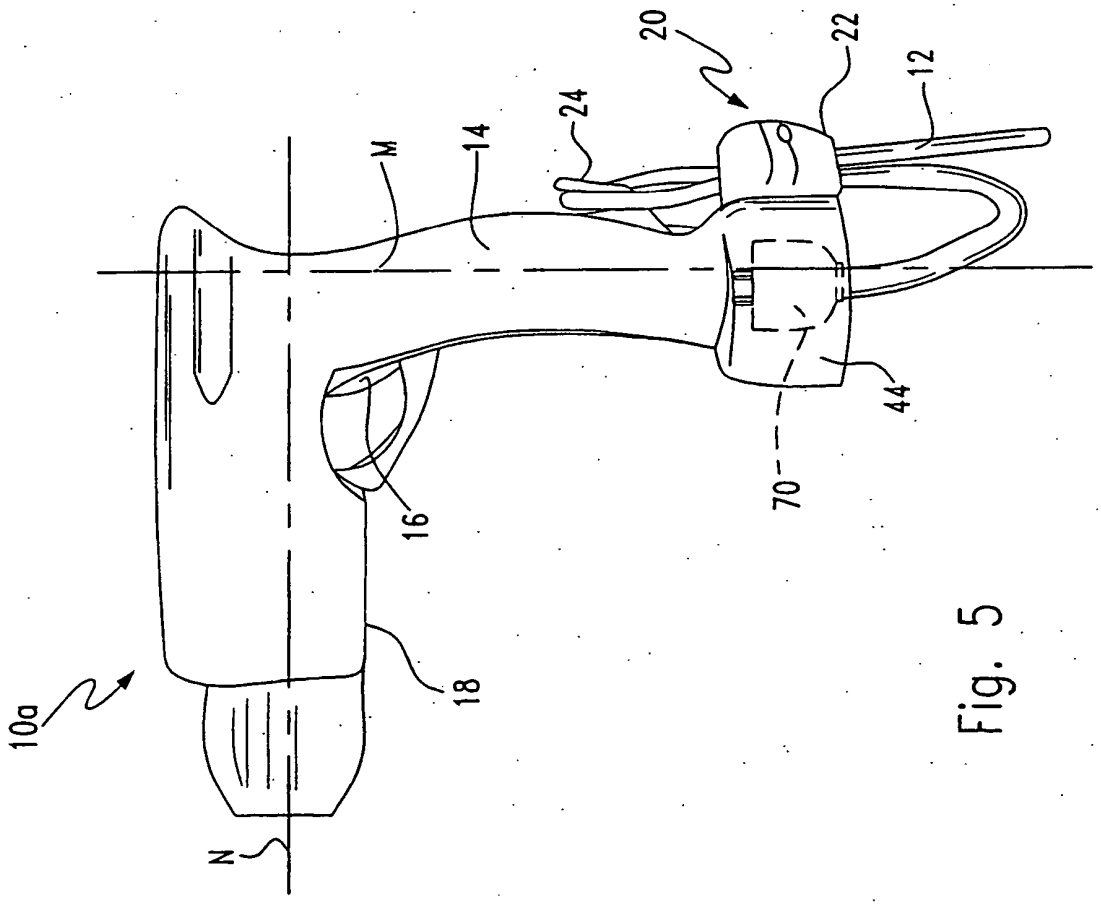


Fig. 5