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(54) **Tool for precision works**

(57) The present invention relates to a tool specifically suitable for precision works in the field of optics, clockwork and the like, of the interchangeable tool tip type. The tool according to the present invention is characterized by a grip made of silicone material or the like which is particularly ergonomic and which is thus capable

of offering a better grip of the tool to the user while ensuring a better force transfer.

At the same time, by virtue of the particular type of coupling between said grip and the tool tip, the tool according to the present invention allows to avoid the screw and nut thread or head from over-tightening and therefore from plastically creeping, thus acting as a torque wrench.

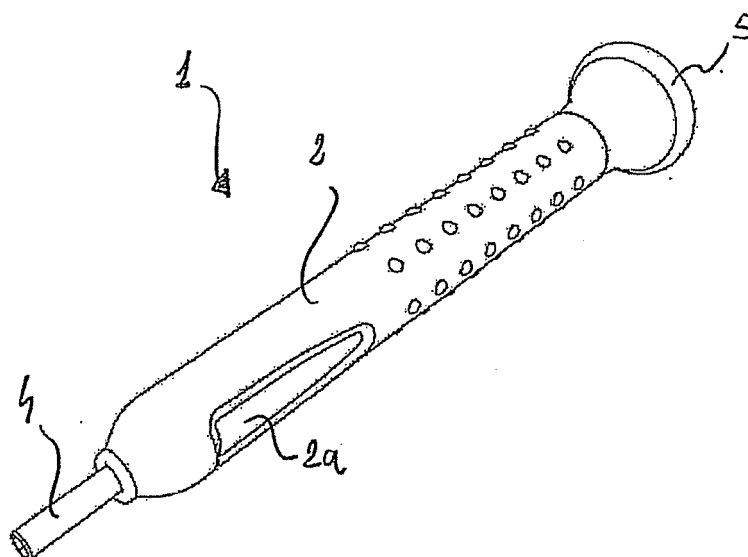


Fig. 1

Description

[0001] The present invention relates to a tool, specifically adapted to carry out precision works, such as for example in the field of optics and/or clockwork or goldsmithing or the like.

[0002] It is known that in all these domains, technicians are called to carry out precision works by specifically intervening on small sized components and fasteners.

[0003] Specifically, it is known that in the field of clockwork and optics, technicians must often intervene on very small fastening screws and nuts, and specifically designed screwdrivers and nut runners are therefore required.

[0004] However, specifically designed tools currently in use for such precision works have several drawbacks.

[0005] Indeed, not only small sizes of screws and nuts characterize the work of the technicians operating in these fields, but technicians must devote particular care when applying tightening force by means of the tool. Such a tightening force should be precisely controlled in order to prevent the thread or head of the concerned screws or nuts from damaging, and because of the small part size, the technicians must pay particular attention to this aspect.

[0006] A further peculiarity which differentiates the precision work of technicians operating with these tools on small sized screws and nuts consists in the difficulty of firmly and effectively holding the tool.

[0007] Therefore, the tool must allow to transmit the required torque despite its small size. Such an object is not effectively achieved by known tools, specifically by screwdrivers and nut runners which offer a poor grip and at the same time may thus cause a bad tightening by technicians, dangerously slipping from their hands, possibly even scratching the article on which they are working.

[0008] A further drawback affecting the precision tools of known type is that of not being able to effectively transmit the force applied under compression, in order to prevent the tool tip from escaping from the slot provided on the screw head.

[0009] As shown, the needs of technicians carrying out precision interventions on articles such as spectacles or the like are multiple.

[0010] In order to face these multiple needs and solve the drawbacks affecting the tools of known type, it is the main task of the present invention to provide a tool, specifically designed not only to facilitate the optical technicians' work, but which is more effective and safer to be used by technicians.

[0011] In the scope of this task, it is the object of the present invention to provide a tool for precision works which allows an optimal force transmission from the tool to the screw or nut, as well as an optimal, safer and more effective gripping by the technician.

[0012] It is a further object of the present invention to provide a tool which may be of modular type, i.e. which

may be used on various types and sizes of screws and nuts by simply modifying the tool head.

[0013] This task and these and other objects which will become clearer below, are achieved by a tool, specifically for precision works in the field of optics, clockwork and the like, of the type comprising a grip and a tool tip removably associable to a metal core axially inserted into said grip, **characterized in that** said grip is made of silicone or rubber material.

[0014] The precision tool according to the present invention is further **characterized in that** said grip made of silicone material is particularly ergonomic.

[0015] Further features and advantages of the present invention will be more apparent from the following detailed description provided by way of non-limitative example and shown in the accompanying drawings, in which:

figure 1 shows a perspective view of the tool according to the present invention;

figure 2 shows another perspective view of the same tool in figure 1;

figure 3 shows a diagrammatic view of the tool according to the present invention in which the internal metal core may be seen;

figure 4 shows the same view as figure 3 indicating other implementation details.

[0016] With particular reference to the above-mentioned figures, tool 1 according to the present invention consists of an ergonomic grip 2 with an essentially cylindrical development, advantageously made of silicone material or the like.

[0017] Said ergonomic grip fully surrounds a core 3 made of metal material. Said metal core 3 also has an essentially cylindrical development and has a specific, blind axial hole at one of its ends 3b adapted to accommodate the tool tip 4. A preferably cylindrical pin 6 may be appropriately and rotationally associated with the opposite end 3c of said metal core 3. Pin 6 is thereby axially connected to said metal core 3, from which it protrudes outwards as an axial extension and is adapted to rotate with respect thereto about the longitudinal axis of said metal core 3.

[0018] Said metal core 3 substantially consists of a solid metal rod, the external surface of which is appropriately machined so as to obtain a surface knurling. Such a surface knurling, which may be obtained by means of machine tools as known by a person skilled in the art, allows to obtain many advantages in terms of friction between said metal core 3 and said grip 2.

[0019] As mentioned, the grip 2 made of silicone material surrounds said metal core 3.

[0020] Said grip may externally comprise a pair of grooves 2a, arranged in a position diametrically opposite to each other, provided close to the grip end in which the tool tip is inserted.

[0021] Said grooves 2a are appropriately shaped so

as to accommodate the technician's forefinger and thumb, respectively, when gripping the tool so as to improve the grip. Furthermore, with particular reference to figures 3 and 4, said grip 2 includes an oversized section area at the end in which said tool tip 4 is inserted. Specifically, the substantially cylindrically developed grip comprises an oversized diameter area in the tool tip zone. A step or backing useful also in this case for being gripped by the technician is thus defined at the oversized diameter area 2c.

[0022] More specifically, with particular reference to figure 3, in diametrically opposite positions on the external surface of said grip 2, grooves 2a also have a substantially longitudinal development and end at said oversized diameter area in which the backing 2c is present.

[0023] When gripping said grip 2, the user thus puts his or her forefinger and thumb at the ergonomic grooves 2a. While the presence of the grooves 2a allows to optimize the torque transmitted from the technician's fingers to the tool, the backing 2c offers a resting element which optimizes the force transfer during the pushing action towards the tool tip. Indeed, as known, both in the case of screws and nuts, the correct tightening action of the element occurs by simultaneously exerting a pushing action of the tool against the screw or nut and a twisting torque.

[0024] In order to further improve the force transfer by the technician to the tool, the grip 2 may further have a surface comprising means adapted to increase the friction between tool grip and the technician's hand.

[0025] These means adapted to increase the friction consist, in the illustrative embodiment shown in the accompanying drawings, of a plurality of protrusions 2b appropriately arranged on the external surface of grip 2.

[0026] Furthermore, in order to optimize the transfer of the axial force exerted by the technician, the tool according to the present invention comprises a knob 5, at the opposite end with respect to the tool tip.

[0027] Such a knob 5 is appropriately inserted on said pin 6 axially and rotationally associated with said metal core 3. Knob 5 may thus rotate with respect to grip 2 which is integral with the metal core 3. This contrivance allows the technician to be able to exert an axial pressure by resting the hand palm on the knob 5 and exerting the required twisting for fastening or loosening the screw or nut.

[0028] As the knob 5 is pivoting, the pressure exerted by the technician with the hand palm on the knob does not obstruct the tool rotation required to apply the desired twisting moment.

[0029] Furthermore, knob 5 may be also appropriately made of silicone material or rubber or the like, preferably of the same silicone material of which the grip 2 is made. In accordance with the preferred embodiment shown by way of example in the accompanying drawings, such a pivoting knob 5 may advantageously be interchangeable so as to have different dimensions, in particular different diameters, of the knob part on which the user exerts the

pressure of the hand palm.

[0030] The coupling between knob 5 and pin 6 may be simply made by friction fitting. Specifically, as shown in the accompanying drawings, pin 6 may appropriately have a knurled external surface, having a series of longitudinal grooves, so as to ensure the required integral coupling between knob and pin when the knob is rotated, while allowing to easily remove the knob from the pin by means of a simple pull, thus easily allowing its replacement.

[0031] As mentioned, metal core 3 comprises one end 3b which has a blind axial hole 3a in which said interchangeable tool tip 4 may be inserted.

[0032] An axial hole 2d is thus provided at said axial hole 3a which will be appropriately shaped so as to be able to contribute in holding the tool tip 4 by friction.

[0033] In the area adapted to be inserted into said blind hole 3a, said tool tip will be appropriately provided with a profile mating the internal profile of hole 3a, preferably a polygonal profile, even more preferably a hexagonal profile, so as to be able to transfer the twisting torque from the metal core to the tool tip.

[0034] Furthermore, said tool tip 4 may consist of a screwdriver tip, as shown for example in figure 4, which may be of the slot or Phillips type, or a nut runner tip, i.e. provided with a tip provided with a polygonal hole mating the profile of the nut, which may be hexagonal or have other profiles.

[0035] The twisting torque is thus completely transmitted from the metal core 3 to the tool tip 4, while the nature of the grip 2 - metal core 3 coupling is such that the silicone material of which said grip 2 is made holds said metal core 3 by friction, and the twisting moment applied by the user to the grip 2 is thus transmitted by friction to the metal core 3 and finally to the tool tip 4.

[0036] The particular knurled surface machining provided on the external surface of the metal core 3 aids in transferring the twisting torque from the grip to the metal core.

[0037] At the same time, the knurling which characterizes the coupling between metal core 3 and grip 2 is such that a friction effect is obtained when a given predetermined twisting torque is exceeded.

[0038] In other words, the friction coupling between the metal core and the surrounding silicone grip is such that the twisting moment value transmitted without slipping may be varied by appropriately varying the surface knurling of the metal core. Thereby, when the stall torque offered by the screw, and thus transmitted from the tool head to the metal core, is higher than a predetermined value, the twisting torque applied by the user on the tool grip will cause a slipping of the grip with respect to the metal core, thus providing a friction effect which will actually prevent the thread or head of the screw or nut from damaging by over-tightening. In essence, the coupling here described between grip and metal core makes the tool act as a torque wrench.

[0039] We have thus explained that the precision tool

shown hereto achieves the proposed objects.

[0040] Specifically, we have disclosed that the precision tool according to the present invention is more effectively used by technicians, offering an improved, more ergonomic grip, which allows a better force transmission from the user's hand to the tool tip.

[0041] Specifically, we have shown that the precision tool according to the present invention allows a better grip by the user, both allowing a more effective and firmer transmission of the axial force and a more effective transmission of the twisting torque.

[0042] Furthermore, we have shown that the tool according to the present invention allows to obtain the further advantage of avoiding the screws or nuts from over-tightening because the grip-metal core coupling provides a friction effect so that the tool acts as a torque wrench.

[0043] Moreover, we have shown that the tool according to the present invention comprises a series of contrivances, including the presence of the pivoting, interchangeable knob and the presence of appropriate means for increasing the gripping friction on the grip, allowing an improved and more effective gripping by the user.

[0044] Furthermore, we have shown that the tool according to the present invention actually is a modular system because different tool tips may be easily fitted on the same grip.

[0045] Several changes may be made by a person skilled in the art without departing from the scope of protection of the present invention.

[0046] Therefore, the scope of protection of the claims should not be limited to the disclosures or preferred embodiments described by way of example, but rather the claims should include all the features of patentable novelty inferable from the present invention, including all the features which would be treated as equivalent by a person skilled in the art.

Claims

1. A tool (1), specifically for precision works in the field of optics, clockwork and the like, of the type comprising a grip (2) and a tool tip (4) removably associated with a metal core (3) which is axially inserted into said grip (2), **characterized in that** said grip (2) is made of silicone material or rubber or the like.
2. A tool (1) according to the preceding claim, **characterized in that** said metal core (3) has a substantially cylindrical development and has a blind axial hole (3a) adapted to accommodate said interchangeable tool tip (4) at one end (3b) thereof.
3. A tool (1) according to the preceding claim, **characterized in that** said axial hole (3a) has a transverse polygonal profile section, mating with the profile of the segment of tool tip (4) adapted to be inserted into said hole (3a) by means of a friction coupling
4. A tool (1) according to one or more of the preceding claims, **characterized in that** said tool tip (4) is a screwdriver tip.
5. A tool (1) according to one or more of the claims from 1 to 3, **characterized in that** said tool tip (4) is a nut tip.
6. A tool (1) according to one or more of the preceding claims, **characterized in that** said metal core (3) consists of a solid metal rod appropriately machined on the external surface in order to obtain a surface knurling adapted to provide a friction effect between said grip (2) and said metal core (3) upon exceeding a predetermined twisting torque value.
7. A tool (1) according to one or more of the preceding claims, **characterized in that** a preferably cylindrical pin (6) is rotationally associated with the end (3c) of said metal core (3) opposite to the end in which the tool tip is inserted, said pin (6) being axially connected to said metal core (3) from which it protrudes outwards as an axial extension.
8. A tool (1) according to the preceding claim, **characterized in that** said pin (6) has an external knurled surface, said knurling being formed by a plurality of longitudinal grooves.
9. A tool (1) according to one or more of the preceding claims, **characterized in that** it further comprises a knob (5) adapted to be removably inserted on said pin (6).
10. A tool (1) according to one or more of the preceding claims, **characterized in that** said grip (2) has a substantially cylindrical development and comprises at least a pair of grooves (2a) diametrically opposite to each other, provided close to the grip end in which the tool tip is inserted.
11. A tool (1) according to one or more of the preceding claims, **characterized in that** at the end in which said tool tip (4) is inserted, said grip (2) includes an area with a larger diameter (2c) which thus defines a step or backing useful for the technical exerting an axial force on the tool.

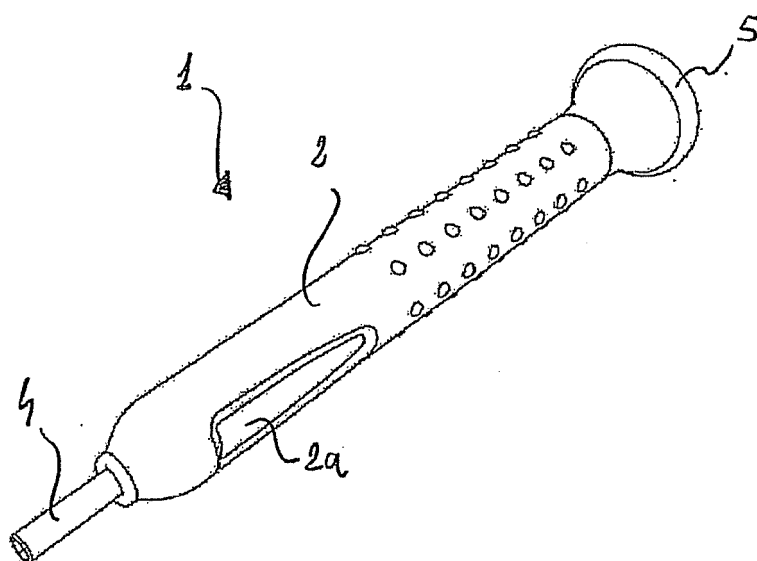


Fig. 1

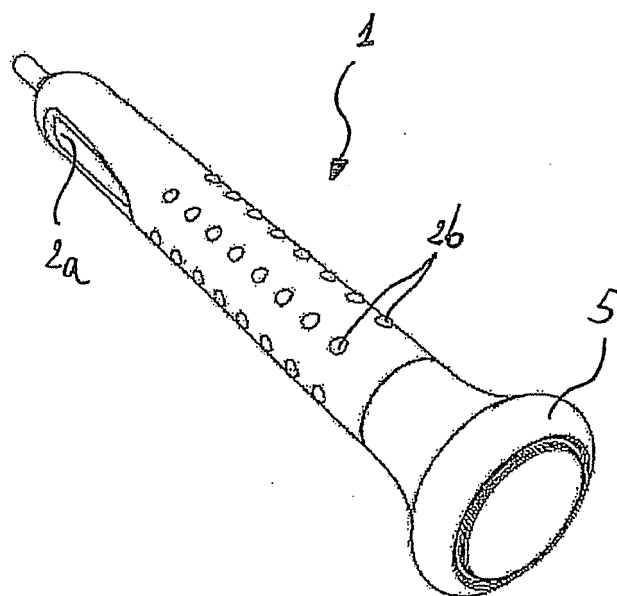


Fig. 2

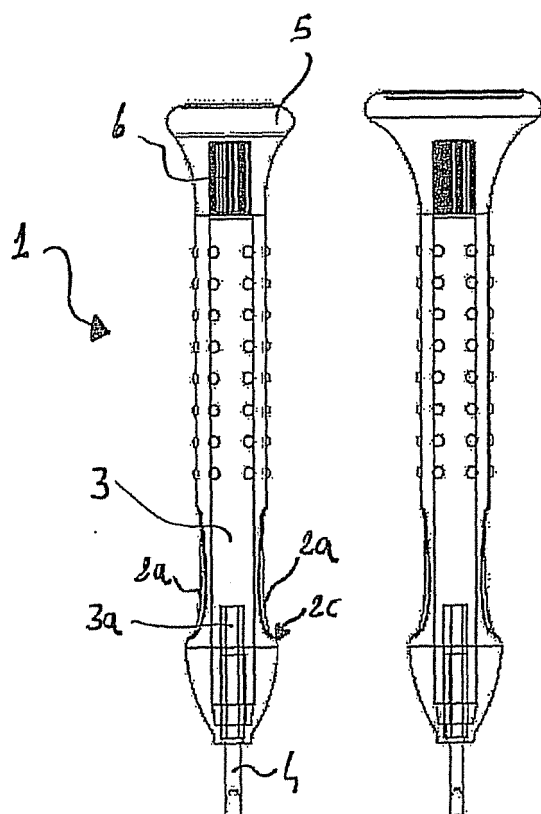


Fig. 3

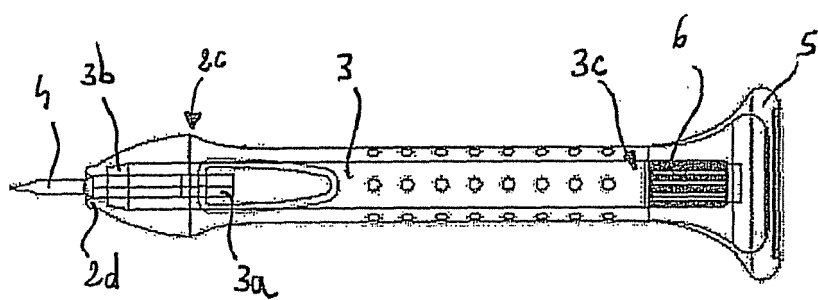


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 09 15 9588

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 August 2009	Examiner David, Radu
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 09 15 9588

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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