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(72) Inventor: **Emre, Vecihi Engin**
34310 Istanbul (TR)

(74) Representative: **Sevinç, Erkan**
Istanbul Patent A.S.
Plaza-33, Büyükdere Cad. No: 33/16
Sisli
34381 Istanbul (TR)

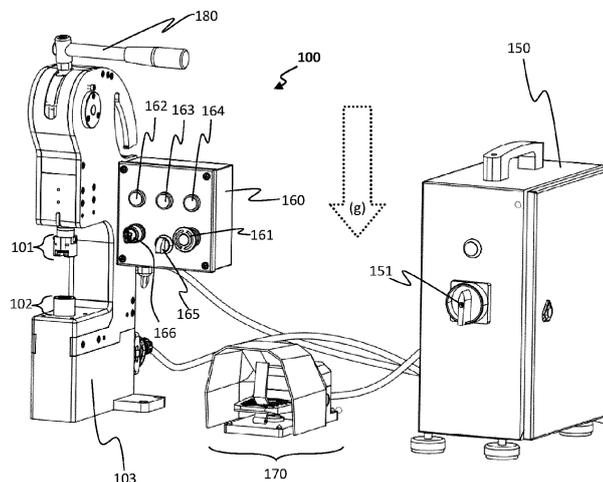
(71) Applicant: **YKK Metal ve Plastik Urunleri Sanayi ve Ticaret A.S.**
59501 Tekirdag (TR)

(54) **BUTTON ASSEMBLING DEVICE**

(57) The present invention proposes a device (100) for use in assembling or disassembling a button (1000) or both. The device (100) comprises a head holder (101) and a base holder (102) disposed along a device axis (A). The head holder (101) is provided with a head grasping means (1011) for, when in use, engaging with the head (1), to control a rotational movement of the head (1) around the device axis (A). The base holder (102) is provided with a base grasping means (1021) for, when in use, engaging with the base (2), to control a rotational

movement of the base (2) around the device axis (A). The device (100) is arranged to, when in use, effect a relative rotation between the head grasping means (1011) and base grasping means (1021) around the device axis (A), and simultaneously to effect a translational or lineal relative movement between the head grasping means (1011) and base grasping means (1021) along the device axis (A), by moving the head holder (101) or base holder (102) or both of the head holder (101) and base holder (102) along the device axis (A).

Fig.5



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Description

Technical Field of the Invention

5 [0001] The present invention relates to a device for assembling a button to constrain flat and flexible items, in particular for releasable attachment of such buttons onto garments.

Background of the Invention

10 [0002] Multiple-part buttons which include a head and base attached to each other are widely employed in the textile industry, often in denim products such as jeans. One commonly encountered attachment method is to push a hollow metal post or stud with a pointed top on the base, through a material (e.g. a flat support such as a fabric) to which the button is to be attached. The post also enters the head with a hole in a lower side thereof. Then, as the base and head are pressed together, the post expands into a hollow area within the head, so that the post is radially widened at an end onto which said pressure is exerted by the head and thus deformed. In consequence the deformed post holds onto the head ensuring that the support through which the post penetrated is held between the base and the deformed end of the post on the base. This process forms an irreversible engagement between the head and base. The head may also be pushed through one or more further layers of material in order for the further material to be secured between the head and the first layer.

20 [0003] Releasable and therefore reversible engagement between a base and head is also available using screw-type connections. An example of such button assemblies is disclosed in the patent document GB 342 066 A. Yet, firmly holding the head without causing damage to its upper surface is difficult with such assemblies.

25 [0004] A head may be encased by a cap. As well as the upper surfaces of heads, cap portions encasing heads are also used in employing design items or brand logos and names. Therefore, it is of commercial importance to assemble the button assemblies without damaging their upper surfaces, or their cap portions. In some examples of releasable button assemblies available to the market, the upper surface of the button assemblies is provided with one or more grooves to be treated by, for example, a coin or other tool to apply rotating force to the head and thus enable a deeper and therefore stronger penetration of the screw into the head. This measure partly occupies the upper surface. It is also of further commercial importance to place information (e.g. brand name or logo) on the upper surface of a button. However, the opportunity to maximize space on the face of the upper surface dedicated for commercial information, without compromising the ease of releasable attachment of the constituents of a button is limited as the surface is interrupted by the grooves.

30 [0005] TR2018/15531 describes a button in the form of an assembly, developed for solving the latter technical problem.

35 [0006] Thus, it is desired to provide a reliable, simple, safe, easy-to-use, fast and low-cost means for reversibly engaging, disengaging or both engaging and disengaging head and base of such a button.

Objects of the Invention

40 [0007] A primary object of the present invention is to overcome the abovementioned shortcomings of the prior art.

[0008] Another object of the present invention is to provide a reliable, simple and low-cost button assembling means for a robust yet reversible engagement between a base and a head of a button; without damaging the head or cap of the button.

[0009] A further object of the present invention is to provide a device which facilitates the replacement of defective heads in buttons.

45 **Summary of the Invention**

[0010] The present innovation enables a robust yet reversible engagement (attachment and detachment) between a base and a head of a button. To this end, the present invention proposes a device comprising a head holder provided with a head grasping means for, when in use, engaging with a head of a button, to control a rotational movement of the head around a device axis. The device further comprises a base holder provided with a base grasping means for, when in use, engaging with a base of the button, to control a rotational movement of the base around the device axis. The device is arranged to, when in use, ensure the head grasping means and the base grasping means rotate relative to each other around the device axis, and simultaneously arrange a relative lineal or translational movement between the head grasping means and base grasping means along the device axis.

Brief Description of the Figures

[0011] The figures, a brief explanation of which is herewith provided, are solely intended for providing a better understanding of the present invention and are as such not intended to define the scope of protection or the context in which said scope is to be interpreted in the absence of the description.

Fig.1(a) is side view of an exemplary head holder for being employed in the device according to the present invention, in a receiving state for allowing or facilitating a placement of a head into said head holder.

Fig.1(b) is a frontal view of the head holder shown in Fig.1(a).

Fig.1(c) is side view of the head holder shown in Fig.1(a), in a retaining state.

Fig.1(d) is a frontal view of the head holder shown in Fig.1(c).

Fig.2(a) exemplifies preparation/alignment of a head for being placed into the head holder shown in Fig.1(a) at the receiving state, from a lateral aspect.

Fig.2(b) exemplifies preparation/alignment of a head for being placed into the head holder shown in Fig.1(b) at the receiving state, from a frontal aspect.

Fig.2(c) is a frontal view of the head holder shown in Fig.2(b) at its receiving state, upon placement of a head as exemplified in Fig.6(a).

Fig.2(d) is a section view (B-B) taken from the depiction provided in Fig.2(c).

Fig.2(e) is frontal view of the head holder at its retaining state.

Fig.2(f) is a section view (C-C) taken from the depiction provided in Fig.2(e).

Fig.3(a) is a frontal view of an exemplary base holder along with a removable base grasping means, employed in the device according to the present invention.

Fig.3(b) is a section view (E-E) taken from the depiction provided in Fig.3(a).

Fig.3(c) is a frontal view of the base holder shown in Fig.2(a), at a non-biasing state.Fig.6

Fig.3(d) is a section view (J-J) taken from the depiction provided in Fig.3(c).

Fig.3(e) is a frontal view of the base holder shown in Fig.3(c), at a biasing state.

Fig.3(f) is a section view (K-K) taken from the depiction provided in Fig.3(e).

Fig.3(g) is a frontal view of the base holder shown in Fig.3(c), at a non-biasing state, wherein a base is placed to the base holder.

Fig.3(h) is a section view (M-M) taken from the depiction provided in Fig.3(g).

Fig.4(a) is a side view of an exemplary button assembling device according to the present invention, which comprises the head holder and base holder.

Fig.4(b) is a frontal view of the device shown in Fig.4(a).

Fig.5 is a perspective view of an exemplary system comprising the device shown in Fig.4(a).

Fig.6(a) is a section view of an exemplary button in a non-engaged state in preparation for being assembled using a device according to the present invention.

Fig.6(b) is a section view of an engaged state of the exemplary button shown in Fig.6(a).

Detailed Description of the Invention

5 **[0012]** Referring now to the figures outlined before, the present invention proposes a device for use in assembling, disassembling, or both assembling and disassembling a head (1) and a base (2) of a button (1000).

[0013] The device (100) comprises a head holder (101) and a base holder (102) disposed on a device axis (A).

10 **[0014]** The head holder (101) is provided with a head grasping means (1011) for, when in use, engaging with the head (1), to control a rotational movement of the head (1) around the device axis (A). The base holder (102) is provided with a base grasping means (1021) for, when in use, engaging with the base (2), to control a rotational movement of the base (2) around the device axis (A). The device (100) is arranged to effect a relative rotation between the head grasping means (1011) and base grasping means (1021) around the device axis (A). That is to say that either the head grasping means (1011) or the base grasping means (1021) or both of them may rotate around device axis (A) in either clockwise or anti-clockwise directions. Simultaneously the device (100) also effects a translational or lineal relative movement between the head grasping means (1011) and base grasping means (1021) along the device axis (A), by moving the head holder (101) or base holder (102) or both of the head holder (101) and base holder (102) along the device axis (A).

15 **[0015]** The above set of features enables:

- 20 - while assembling a button (1000), either the head grasping means (1011) or the base grasping means (1021) to approach the other or both of them to approach each other;
- while disassembling a button (1000), either the head grasping means (1011) or the base grasping means (1021) to move away from the other or both of them to move away from each other.

25 **[0016]** Instances in which the assembling or disassembling of a button (1000) takes place correspond to the use of the device (100).

30 **[0017]** The device (100) enables a facilitated releasable attachment or re-attachable disengagement of a button (1000), e.g. onto a support (30) which can be a piece of garment. Said attachment takes place by engaging a head (1) with a base (2) to constitute an assembled button (1000). In the type of button (1000) to be assembled or disassembled using the device (100) according to the present invention, the head (1) cooperates with the base (2) over a threaded post (21) on the base (2).

35 **[0018]** The word grasping when used to describe a head grasping means (1011) or a base grasping means (1021) corresponds to control of a relative rotational movement between a head (1) and base (2), around the device axis (A), for effecting an assembling or disassembling of a button (100) by cooperation of respective threaded surface (12) and screw threads (22). Within the context of the present application, the word grasping also includes retention and taking hold of the head (1) or base (2), and taking hold of the head (1) or base (2). Such control can correspond to one of the following alternatives:

- 40 - effecting a rotational movement at one of the head (1) and base (2) around the device axis (A) whilst blocking the other one of the head (1) and base (2) from making the same rotational movement; or
- effecting simultaneous rotational movements at both of the head (1) and base (2) in opposite directions around the device axis (A), one clockwise and one anti-clockwise.

45 **[0019]** The head grasping means (1011) can be arranged for engaging with a head (1) for instance over one or more grasping zones (13) which can be provided on the head (1). When the grasping zones (13) are placed accurately to the head grasping means (1011), the device (100) can function more speedily in assembling and disassembling of a button (1000). Likewise, the base grasping means (1021) can be arranged for engaging with a base (2) for instance over one or more holding zones (25) which can be provided on the base (2). In a possible embodiment, the head grasping means (1011) can be arranged for engaging with one or more grasping zones (13) which can be provided on the head (1), and the base grasping means (1021) can be arranged for engaging with one or more holding zones (25) which can be provided on the base (2). Suitable design measures can be contemplated to arrange the control of the rotational movements of the head (1) and base (2) relative to each other, by means of the head holder (101) and base holder (102) which are rotatable relative to each other. Examples of said suitable design measures may include that the head grasping means (1011) has a design to mechanically match with a non-circular section of a head (1) around the device axis (A), such that the head (1) can be grasped by the head grasping means (1011) at a side surface to control radial movements thereof. The embodiments shown in the present drawings exemplify such design measure for grasping of a head (1). Such design measure can also apply to base grasping means (1021) and base (2), mutatis mutandis. Alternatively, the

base grasping means (1021) may include a design to mechanically match with the base (2) at a non-circular zone thereof around the device axis (A), such that the base (2) can be axially held by the base grasping means (1021) to control radial movements thereof. The embodiments shown in the present drawings exemplify such design measure for grasping of a base (2). Such design measure can also apply to head grasping means (1011) and head (1), mutatis mutandis.

[0020] Such control of relative rotational movements can correspond to one of the following exemplary options alternative to each other:

i. either blocking the head (1) against rotating around the device axis (A) by keeping the head holder (101) stationary in terms of rotational movement, when base (2) is rotated by a rotational movement in the base holder (102);

ii. or blocking base (2) against rotating around the device axis (A) by keeping the base holder (102), when the head (1) is rotated by a rotational movement in the head holder (101);

iii. or rotating the head holder (101) and base holder (102) in opposite directions around the device axis (A);

thereby, resulting in an engagement or release between the head (1) and base (2) depending on a respective direction of relative rotation therebetween, due to cooperation between the threaded surface (12) in the head (1) and screw threads (22) on the post (21) of the base (2).

[0021] By means of such control of rotational movements of head (1) and base (2), a relative movement between the head (1) and base (2) around the device axis (A) can be achieved by:

- either by blocking the head (1) from rotating around the device axis (A), when the base (2) is being rotated around the device axis (A), thereby corresponding to the exemplary option i above;

- or by rotating the head (1) around the device axis (A), when the base (2) is blocked from being rotated around the device axis (A) thereby corresponding to the exemplary option ii above;

- or by simultaneously rotating both of the head (1) and base (2) in respective opposite directions around the device axis (A), thereby corresponding to the exemplary option iii above.

[0022] Such relative rotation between the head (1) and base (2) around the device axis (A) allows a cooperation between the threaded surface (12) at the opening (11), and the screw threads (22) at the post (21) of the base (2); resulting in a helical movement which includes the relative translational or lineal movement between the head (1) and base (2) along the device axis (A).

[0023] The assembling and disassembling of the head (1) and base (2) take place via the cooperation between the threaded surface (12) and screw threads (22). Such cooperation requires a relative helical movement between the head (1) and base (2). The relative helical movement can be achieved by combining said relative rotation around the device axis (A) with said relative translational or lineal movement along the device axis (A). The device (100) is developed to ensure the assembling and disassembling, by performing such helical movement with a high accuracy, ease-of-use and speed. The device (100) eliminates operational errors which can be based on any misalignment between head (1) and base (2).

[0024] Thus, the device (100) proposed in the present application is easy-to-use, and enables a robust yet reversible engagement between a head (1) and base (2) of a button (1000), in a reliable, simple, and fast way.

[0025] The head grasping means (1011) can be considered as a setting portion for a respective head (1). Taking the above-exemplified design measures related to the head grasping means (1011) into consideration, the head grasping means (1011) can be arranged for aligning the opening (11) of a respective head (1) along the device axis (A), thereby setting the head (1) for effecting cooperation with a respective base (2).

[0026] The base grasping means (1021) can be provided as a setting portion for a respective base (2). Taking the above-exemplified design measures related to the base grasping means (1021) into consideration, the base grasping means (1021) can be arranged for aligning the post (21) of a respective base (2) along the device axis (A), thereby setting the base (2) for effecting cooperation with a respective head (1).

[0027] The setting portion for the base (2) can comprise a housing recess (1022) which can be arranged for delimiting radial deviation of the base (2) away from the device axis (A). For instance, the housing recess (1022) can extend along the device axis (A) to at least partially surround the base around the device axis (A), thereby delimiting radial deviation when a base (2) is placed into the housing recess (1022).

[0028] Considering the aforementioned features of the button;

- since the opening (11) of the head (1) has a threaded surface (12), and the post (21) of the base (2) has corre-

sponding/cooperating screw threads (22); the button is constituted i.e. the head (1) and base (2) may be assembled together, when the relative rotation takes place in a first direction around the device axis (A); whereas the button may be disassembled upon performing the relative rotation in a second direction reverse or opposite to said first direction. Simultaneously, respective centers of gravity of the head (1) and base (2) diverge or converge, respectively, along the device axis (A).

[0029] It can be considered that the above-discussed translational or lineal movement of the head grasping means (1011) relative to the base grasping means (1021) along the device axis (A) provides a tolerance at such divergence and convergence, thereby avoiding erosion of threaded surface (12) at the head (1) and cooperating screw threads (22) at the post (21) of the base.

[0030] The device (100) according to the present invention can be further arranged for controlling the relative rotational movements in the head holder (101) and base holder (102) to, when in use, alternate a direction of relative rotation between the head (1) and base (2). For instance, the device (100) can be provided with a controlling means, e.g. a switch, operable between a first mode and second mode. For instance, the first mode can correspond to an engaging/assembling, whereas the second mode can correspond to a disengaging/disassembling the head (1) and base (2) from each other when the device (100) is in use. In such case:

- when in the first mode, the head holder (101) and/or the base holder (102) are set for performing a relative movement in respective first direction(s) for, when in use, engaging/assembling the head (1) and the base (2) to each other; and
- in the second mode, the head holder (101) and/or the base holder (102) are set for performing a relative movement in respective second direction(s) (opposite to the first direction(s)) for disengaging/disassembling the head (1) and the base (2) from each other.

[0031] In other words, the device (100) can be provided with a controlling means operable between:

- a first mode for initiating a rotation at one or both of the head holder (101) and base holder (102) to enable movement relative to each other in a respective first direction for assembling the head (1) and the base (2) with each other, and
- a second mode for initiating a rotation at one or both of the head holder (101) and base holder (102) to enable movement relative to each other in a respective second direction opposite to the first direction for disassembling the head (1) and the base (2) from each other.

[0032] The controlling means can be a direction-selective key (165) within the context of the present application.

[0033] In one context, the head holder (101) and base holder (102) can be considered as a first die and a second die, respectively. To minimize its footprint, the device (100) can be preferably configured such that the first die or the head holder (101) and second die or the base holder (102) are at a parallel projection of each other when in use, said parallel projection being parallel to the direction of gravity vector (g). In such case, one of the first die and the second die can be considered as an upper die, and the other can be considered as a lower die when the device (100) is in use. In a preferred embodiment within this context, the device (100) is arranged such that, when in use, the base holder (102) is positioned at a parallel projection of the head holder (101) along the device axis (A). Said parallel projection is, relative to the head holder (101), at a direction parallel to the gravity vector (g), preferably the base holder (102) remains below the head holder (101) when the device (100) is in use. In such case, the head holder (101) and base holder (102) can be considered an upper attaching unit or upper die and lower attaching unit or lower die, respectively. The head holder (101) centers the head (1) with the device axis (A), prevents the same from turning around the device axis (A), and further prevents the head (1) from leaving the head holder (101) due to gravity. The base holder (102) can be stationary and the head holder (101) can be movable to move the head (1) along the device axis (A) to align or abut the opening (11) to the opening (11) post (21), and to rotate the base (2) around the device axis (A) for effecting cooperation between the threaded surface (12) of the head (1) and screw threads (22) of the base (2).

[0034] Such embodiment facilitates the operation of the device (100):

- At assembling: A button (1000) includes a head (1) having a protrusion (10) provided with an opening to engage with a post (21) of a base (2). The head (1) can further include a head portion (14) distal to the opening (11), having a radial width around the device axis (A), which is greater than a width of the protrusion (10) radial to the device axis (A). The head portion (14) is arranged for engaging the head (1) with a hole for a button at fastening of the support to a corresponding portion provided with such hole. A head (1) can be placed into the head holder (101) by inserting the head (1) which radially has a greater width or diameter in comparison with the protrusion (10) with regard to the device axis (A) at a head portion (14) thereof. A corresponding base (2) can be placed onto the base holder (102), such that the post (21) extends upwards to face the opening (11). By relatively translating the head

holder (101) and base holder (102) so that the opening (11) may coaxially align and abut the post (21), the device (100) is set ready for an assembling operation. By rotating the base (2) relative to the head (1) around the device axis (A), e.g. by the device (100) performing a relative rotation between the base grasping means (1021) and head grasping means (1011), the screw threads (22) cooperate with the threaded surface (11) until completion of the assembling process. This corresponds to a helical movement between the head grasping means (1011) and base grasping means (1021), resulting in a translational or lineal movement relative to each other along the device axis (A). The head holder (101) and base holder (102) can be then moved away from each other; the resulting, assembled button (1000) remains pending on the head holder (101), and can be removed easily by e.g. radially withdrawing the button from the head holder (101). As an exemplary design measure for allowing that the assembled button (1000) remains at the head holder (101), when the head holder (101) is moved away from the base holder (102), the button (1000) can be separated from the base holder (102). To this end, the base holder (102), may, for instance comprise, a housing recess (1022) which can be arranged to receive the base (2) and allow the removal of the base (2), by moving the base (2) relative to the base holder (102) parallel to the device axis (A).

- At disassembling: A button (1000) can be engaged into the head holder (101) at a head portion (14) which can be considered as the radially widest portion of the head (1) with regard to the device axis (A), and the head portion (14) can be mechanically retained between a back side (141) facing the base (2) and a face side (140) distal to the back side (141) with regard to the device axis (A). Thereby the button is appended to the head holder (101), such that the protrusion (10) and base (2) extend downwards. The head grasping means (1011) being engaged with the head (1), prevents rotation of the head (1) relative to the head holder (101) around the device axis (A). One or both of the head holder (101) and base holder (102) can then be moved towards one another, to arrange a coaxial alignment between the head holder (101) and base holder (102), and to engage the base holder (102) to the base (2). At this stage, the base grasping means (1021) can engage to the base (2), for instance at a holding zone (25) of the base (2). As a result, the device (100) is set ready for a disassembling process. By rotating the base (2) relative to the head (1) around the device axis (A), e.g. by the device (100) performing a relative rotation between the base grasping means (1021) and head grasping means (1011), the screw threads (22) cooperate with the threaded surface (11) until completion of the disassembling process. This corresponds to a helical movement between the head grasping means (1011) and base grasping means (1021), causing a translational or lineal movement which increase a distance between the head holder (101) and base holder (102) along the device axis (A). The head holder (101) and base holder (102) can be then further moved away from each other to allow separately collecting the head (1) and base (2): the head (1) remains pending on the head holder (101), separated from the base (2) which can remain on the base holder (102), being supported against gravity, exposed for easy collection. The head (1) can be then removed easily by e.g. radially pulling the same from the head holder (101). The exposed base (2), and possibly a support (30) through which the post (21) extends, can be removed from the base holder (102), for instance by axially pulling in a direction opposite to the gravity vector (g).

[0035] Thus, the present invention provides a reliable, simple, safe, easy-to-use, fast and low-cost device (100) for reversibly engaging and disengaging head and base of such a button.

[0036] Fig.1(a) is a side view of an exemplary head holder (101) for being employed in the device (100) according to the present invention, in a receiving state for allowing a deployment of a head (1) into said head holder (101). Fig.1(b) is a frontal view of the head holder (101) shown in Fig.1(a). The head holder (101) can optionally be provided with a head biasing means (1013) arranged for when a head (1) is placed into the head holder (101), confining a head portion (14) of the head (1) along the device axis (A) at a face side (140) and a back side (141) of the head portion (14), between the head grasping means (1011) and the head biasing means (1013).

[0037] The head biasing means (1013) can be further considered as being arranged for biasing a head (1) onto the head grasping means (1011) under a force exerted by a resilient means (1014) which provides mechanical communication between the head grasping means (1011) and head biasing means (1013). To this end, the head biasing means (1013) can further comprise a resilient means (1014) arranged for forcing the head grasping means (1011) towards the head biasing means (1013).

[0038] In a possible embodiment, the head holder (101) can include a receiving zone in which the head grasping means (1011) is disposed. The receiving zone can include a first storage portion arranged for effecting a confinement of a head portion (14) along the device axis (A). The receiving zone can further include a second storage portion arranged for effecting a grasping of a protrusion (10) of the head (1), to block or prevent the head (1) from rotating around the device axis (A) relative to the frame (103) and so the head grasping means (1011) can be considered as a locking means by blocking the rotation of the head (1)); and the resilient means (1014) of the head holder (101) is arranged to bias the first storage portion towards the second storage portion; the resilient means (1014) can be further considered to serve in forcing or biasing the head (1) towards the base holder (102) that is towards a corresponding base (2).

[0039] In a possible embodiment of the device (100), in a side of the head holder (101), an inlet of the receiving zone

can preferably be provided with a guide slope (1025) arranged for guiding a head (1) towards the head grasping means (1011) for engaging the head (1) thereto, that is, arranged for guiding the head (1) into the first storage portion and second storage portion.

5 **[0040]** The receiving state can be achieved by shifting the head biasing means (1013) away from the head grasping means (1011) along the device axis (A), preferably in the meanwhile by increasing a potential energy of the resilient means (1014) arranged to bias the head biasing means (1013) towards the head grasping means (1011). As a result, it is facilitated to introduce the head (1) into the head grasping means (1011).

10 **[0041]** Fig.1(c) is a side view of the head holder (101) shown in Fig.1(a), in a retaining state for confining the head (1) against moving relative to the head holder (101) or relative to the head grasping means, with regard to the device axis (A). Fig.1(d) is a frontal view of the head holder (101) shown in Fig.1(c), in the retaining state. Said confining can be considered as blocking the head (1) from moving in an axial direction along the device axis (A), in a radial direction deviating from the device axis (A) and in a rotational direction around the device axis (A). In this configuration, the device axis (A) is considered to overlap a respective button axis corresponding to a longitudinal axis of a post (21) in a base (2) cooperating with a cavity (11) in a respective head (1).

15 **[0042]** The retaining state can be achieved for instance by confining a head portion (14) along the device axis (A). This can be done e.g. by reversibly delimiting a space height along the device axis (A) of the head holder (101) arranged to receive the head portion (14) to reversibly exert a force onto a back side (141) that is exert a force in a direction along the device axis (A) and simultaneously, onto a face side (140) that responds to said force in a reverse direction. An example to such reversible exertion of force when in a retaining state as discussed before, is schematically depicted in Fig.6(b) using dotted, bold arrows; and a thickness (h) between the face side (140) and back side (141) is considered to correspond to the space height.

20 **[0043]** To achieve such reversible contact, the head holder (101) can include a head biasing means (1013) which is arranged to, when a head (1) is placed into the head holder (101), exert a pressure onto a face side (140) and a back side (141) of the head (1). The head biasing means (1013) can be considered to have a contact surface to be brought into mechanical contact with the face side (140). To avoid mechanical damage on the face side (140), said contact surface can preferably be formed from a material which has a lower hardness when compared to a building material of which the face side (140) is comprised.

25 **[0044]** In an exemplary embodiment within this context, the head biasing means (1013) can further include a resilient means (1014) such as a tension spring arranged for, when preparing the device (100) for use, pulling the head grasping means (1011) away from the base holder (102) that is towards the head biasing means (1013). The placement of the head (1) into the head holder (101) can be performed by a user increasing an energy potential of the resilient means (1014) for example by extending the tension spring thereby increasing the space height, placing the head portion (14) into the respective space, and then releasing the resilient means (1011) to exert opposing forces onto the face side (140) and back side (141).

30 **[0045]** By means of the resilient means (1014), upon introduction of the head (1), the head grasping means (1011) can move the head (1) along the device axis (A) towards the head biasing means (1013), until the head (1) is retained and axial movement of the head (1) relative to the head holder (101) is blocked during operation of the device (100) at assembling or disassembling of head (1) and base (2). This measure facilitates the introduction of the head (1) to the head holder (101); a user can pull the head grasping means (1011), away from the head biasing means (1013) that is against the force for example a spring force, of the resilient means (1014), thereby easily introducing the head (1) while minimizing friction between the head (1) and head holder (101); and then release said portion of the head holder (101) at which the head grasping means (1011) is located, to move towards the head biasing means (1013) in accordance with said force of such resilient means (1014).

35 **[0046]** Fig.2(a) and Fig.2(b) exemplify preparation and alignment of a head (1) for being deployed into the head holder (101) shown in Fig.1(a) at the receiving state, from lateral and frontal aspects of the head holder (101), respectively. In these exemplifications, the head (1) is guided towards the device axis (A) for introduction or deployment into the head holder (101). Fig.2(c) is a frontal view of the head holder (101) shown in Fig.2(b) at its receiving state, upon deployment of a head (1). Fig.2(d) is a B-B section view taken from the depiction provided in Fig.2(c). When the energy potential of the resilient means (1014) is released, the head biasing means (1013) can move relative to the head grasping means (1011) along the device axis (A) as indicated with dashed bold arrow, to abut the head (1), thereby the head holder (101) returning into the retaining state. Fig.2(e) and Fig.2(f) respectively show a frontal view and a C-C section view of the head holder (101) at such retaining state, wherein a respective head (1) is confined, to block the head (1) from moving relative to the head holder (10) or to the head grasping means (1011) in axial, radial and rotational directions with regard to the device axis (A).

40 **[0047]** In a possible embodiment of the device (100), the head grasping means (1011) can be removable from the head holder (101). For instance, provided with a set of head grasping means (1011) having different sizes and shapes for engaging with different geometries in different heads (1). That is to say that the device (100) can be provided with a set of head grasping means (1011) in accordance with different sizes and shapes of heads (1), for example in accordance

with different types, sizes and shapes of grasping zones (13) in different heads (1).

[0048] Fig.3(a) is a frontal view of an exemplary base holder (102) along with a removable base grasping means (1021), for being employed in the device (100) according to the present invention to cooperate with the head holder (101). Fig.3(b) is an E-E section view taken from the depiction provided in Fig.3(a). With reference to Fig.3(a) and Fig. 3(b), the base grasping means (1021) can be replaced when when depreciated. In a further preferable embodiment, the device (100) can include a plurality or set of such removable base grasping means (1021) having different geometries for engaging with different bases (2) with respective, different geometries, which for instance can have holding zones (25) with respective, different geometries. In such embodiment, the base grasping means (1021) can be interchanged or replaced in accordance with the requirements of the base (2) geometries, for instance in accordance with different geometric shapes and sizes of holding zones (25) which can be available on different bases (2). Here, the term geometry refers to shape, size or both. The replacement of base grasping means (1021) can be optionally performed by axially displacing the base grasping means (1021) from the base holder (102), by pulling the base grasping means (1021) away from the base holder (102) along the device axis (A); and then axially introducing another base grasping means (1021) into the base holder (102) along the device axis (A). An exemplary visualization of placement of the base grasping means (1021) into the base holder (102) is available through comparison of Fig.3(b) with Fig.3(d), for the case where the base grasping means (1021) is in the form of a screwdriver bit, which may be readily commercially available. The base holder (102) can include a cavity having a size and shape matching with a portion of the base grasping means (1021), for supporting and retaining the base grasping means (1021) when the device (100) is in use.

[0049] Fig.3(c) is a frontal view of the base holder (102) shown in Fig.2(a), at a non-biasing state, and Fig.3(d) is a J-J section view taken from the depiction provided in Fig.3(c). In the non-biasing state, the base holder (102) is available for deployment of a base (2) to be assembled with a corresponding head (1) for constitution of a button as visually exemplified in Fig.6(b), for instance to be releasably fixed onto a support (30) which can include a hole (31) for passage of the post (21) (see Fig.6(a)).

[0050] Fig.3(e) is a frontal view of the base holder (102) shown in Fig.3(c), at a biasing state. The biasing state is achieved by relatively moving the base holder (102) and head holder (101), (see in particular Fig.1(c), Fig.1(d), Fig.2(e) and Fig.2(f) towards each other, along the device axis (A). When using the device (100) in engaging or disengaging of a respective button (1000), the device axis (A) overlaps a button axis. When the device (100) is in use, the device axis (A) and button axis correspond to a direction along the post (21) and opening (11) in a cooperating base (2) and head (1), respectively.

[0051] The biasing state can be achieved for example by biasing the post (21) of the base (2) along the device axis (A), towards the opening (11) of the head (1).

[0052] To this end, the base holder (102) can include a base biasing means (1023) to which the base grasping means (2021) is connected movably along the device axis (A). Thus, in a possible embodiment of the device (100), the base holder (102) can include a base biasing means (1023) arranged for provision of a linear motion tolerance for the base (2) relative to the head holder (101) along the device axis (A), on being assembled to or disassembled from a respective head (1).

[0053] The base holder (102) can further include a resilient means (1024) arranged for forcing the base grasping means (2021) away from the base biasing means (1023) along the device axis (A). The base biasing means (1023) can be considered to be arranged for provision of a linear motion tolerance to the base grasping means (21), relative to the head holder (101) along the device axis (A), on being assembled to or disassembled from a respective head (1). The resilient means (1024) can be for example a compression spring. The resilient means (1024) is arranged for, when in use, pushing the base (2) along the device axis (A), towards the head holder (101). Said pushing of the base corresponds to a pushing towards a respective head holder (101), thereby easily tolerating a linear component of a helical movement of the base (2) due to cooperation of screw threads (22) with the threaded surface (12) during a penetration of the post (21) into the opening (11). Said tolerance can correspond to a release of an energy potential loaded to the respective resilient means (1024), e.g. partial-release of a compression spring as the resilient means (1024). Fig.3(f) is a section view taken from the depiction provided in Fig.3(e). Fig.3(g) is a frontal view of the base holder (102) shown in Fig.3(c), at a non-biasing state, wherein a base (2) is deployed onto or into the base holder (102). Fig.3(h) is a section view taken from the depiction provided in Fig.3(g).

[0054] The device (100) or the system provided with said device (100) can be powered by electricity. Relative rotation(s) between the head holder (101) and base holder (102) can be arranged over respective electrical motor(s) (not shown) for example servo motor(s). In such embodiment, one or both of the head holder (101) and the base holder (102) are in mechanical communication with one or more respective electric motor(s) for, when in use, arranging relative rotation between the head (1) and corresponding base (2) around the device axis (A). For instance, the base holder (102) can be in mechanical communication with an electric motor for rotating the base grasping means (1021), in particular where the head holder (101) is provided above the base holder (102) at assembling or disassembling of a button (1000).

[0055] Electric power can be supplied from a mains power, preferably through a voltage regulator (not shown). Preferably, the device (100) is provided with a generator (not shown) for supplying electric power. A suitable power supply

(150) can be arranged in accordance with common general knowledge in the technical field related to machinery. The power supply (150) can be provided with a main power switch (151), which can include an "on" position for allowing energy supply to the device (100), and an "off" position for ceasing the energy supply.

5 **[0056]** Fig.4(a) is a side view of an exemplary device (100) according to the present invention, which comprises the head holder (101) and base holder (102) arranged to cooperate with each other. As exemplified in Fig.4(a), the device (100) can include a frame (103) in mechanical communication with the head holder (101) and base holder (102). The frame (103) can be made from a rigid material and the head holder (101) and base holder (102) can be arranged onto the frame (103) stationary in radial directions with regard to the device axis (A). Such embodiment of the device (100) enables that the head holder (101) and base holder (102) are maintained in alignment with regard to the device axis (A), such that, when at assembling or disassembling processes, the opening (11) of a head (1) and post (21) of a corresponding base (2) are maintained centralized along the device axis (A).

10 **[0057]** In other words, the device (100) can include a frame (103), which can be arranged for securing an axial alignment between the head holder (101), and the base holder (102), such that, when the device is in use, a post (21) of a base (2) is coaxially aligned with an opening (11) of a corresponding head (1).

15 **[0058]** In a further preferred embodiment within this context, for making better use of gravity for holding a head (1), the device (100) can be configured such that the second die or the base holder (102) is located at a gravitational parallel projection of the first die or the head holder (101) when the first die or the head holder (101) is displaced above the second die or the base holder (102) when the device (100) is in use. In such case, the first die and the second die can be considered as an upper die and lower die, respectively. Fig.4(a), Fig.4(b) and Fig.5 show an exemplary device (100) according to such preferred embodiment.

20 **[0059]** Fig.4(b) is a frontal view of the device shown in Fig.4(a). The device (100) can include a lever (180) movably connected to the frame (103); the lever (103) provides mechanical communication between the frame (103) and the head holder (101); and the lever (180) is arranged to translate the head holder (101) towards and away from the base holder (102) along the device axis (A) when the lever (180) is moved relative to the frame (103) in a respective direction. The distance between the head holder (101) and base holder (102) along the device axis (A) is temporarily decreased using the lever (180), to set the positioning between a head (1) and base (2) for assembling or disassembling process based on cooperation of an opening (11) and a post (21) in a respective head (1) and base (2). An exemplary trajectory of the lever (180) and the response in which the distance between the head holder (101) and base holder (102) is decreased, is shown using dashed arrows.

25 **[0060]** The bold, dashed arrows in each of Fig.4(a) and Fig.4(b) correspond to a visualization of that, when the head holder (101) and base holder (102) are approached to each other, the device (100) causes head (1) and base (2) of a corresponding button (1000) approach each other. Here, the head holder (101) and base holder (102) are approached each other in an exemplary way, wherein the head holder (101) is approached to the base holder (102).

30 **[0061]** Fig.5 is a perspective view of an exemplary system comprising the device (100) shown in Fig.4(a).

35 **[0062]** Referring to Fig.4(a), Fig.4(b) and Fig.5, the device (100) (or the system provided with said device (100)) can be provided with a control panel (160), in communication with the power supply (150). The control panel (160) can include a connection switch (162) for enabling electrical communication between the power supply (150) and the control panel (160).

40 **[0063]** The control panel (160) can be further provided with one or more of the following, electrical communication such being preferably enabled via the connection switch (162):

- a disconnection switch (163) for disabling electrical communication between the power supply (150) and any further elements on the control panel (160) or
- 45 - a safety check key (164) for enabling electrical communication between the power supply (150) and a relay (not shown, e.g. a so-called K105 safety relay as known in the related art as of the filing date of the present application, or any equivalent thereto), or both of the disconnection switch (163) and safety check key (164).

50 **[0064]** The control panel (160) can be also provided with one or more of the following, electrical communication such being preferably enabled via the connection switch (162):

- an emergency key (161) for instantly cutting a power supply to the electric motor(s) (i.e. for instantly stopping the device (100));
- 55 - a direction-selective key (165) with a plurality of designated positions, for effecting direction-selective relative rotations between head (1) and base (2) when activated in designated positions thereof;
- a mode selection switch (166) for enabling or disabling the activation of the direction selective key (165). The mode

selection switch (166) can be e.g. a key switch, operable between at least two positions: a first position corresponding to enabling the activation of the direction selective key (165), and a second position corresponding to an enablement of the activation of a foot switch (170).

5 **[0065]** Although such further elements can be provided elsewhere in the device (100) or the system provided with said device (100), collection thereof on the control panel (160) facilitates the operation, enhances the ergonomics-related aspects, and also decreases necessary time to reach to a key or switch when needed, to select a suitable key for an intended activity, and time to stop the device (100) in a case of emergency. Thus, the control panel (160) enhances the device (100) by rendering the same more reliable, simple, safe, easy-to-use, and fast.

10 **[0066]** As discussed above, the device (100) or the system provided with said device (100) can preferably be provided with a direction-selective key (165) operable between a plurality of designated positions, for effecting direction-selective relative rotations between head (1) and base (2) when activated in designated positions thereof. The direction-selective key (165) can be considered to be movable between the following three positions:

- 15 - a first position directed to relative rotation between the head (1) and base (2) in a first direction for assembling thereof to form a button,
- a second position directed to relative rotation between the head (1) and base (2) in a second direction opposite to the first direction, for disassembling of the button and
- 20 - a third position at which any relative rotation between the head (1) and base (2) is blocked, thereby being directed to a "neutral" or "passive" state without any relative rotation between the head (1) and base (2).

25 **[0067]** In a further preferred embodiment, the direction-selective key (165) can be arranged to effect respective relative rotations as long as being held at the first position or second position. For instance, the direction-selective key (165) can be a 1-0-2 position knob with spring return. The device (100) can be provided with a servo, to accordingly move the motor(s) back and forth, e.g. at a low speed such as 1 rpm. It can be considered that the direction-selective key (165) renders the device (100) semi-automatic, by requiring by continuous handling of the direction-selective key (165) to effect a relative rotation. Inherently, a momentary position of the direction-selective key (165) visually corresponds to an actual rotational direction, hence simplifying the operation of the device (100) for a user by being reliable in terms of

30 actualization in an intended rotational direction. Once the direction-selective key (165) is taken into a pre-determined position, the relative rotation starts; and once the direction-selective key (165) is released, the relative rotation is instantly ceased. The relative rotation can continue as long as the direction-selective key (165) is maintained at one of respective pre-determined positions thereof, enabling the assembly or disassembly notwithstanding the number of screw pitches at cooperating head (1) and base (2). Thus, the direction-selective key (165) renders the device (100) useful notwithstanding the mechanical design (in terms of number of screw pitches) of a button suitable for being assembled or disassembled with the device (100) as discussed above. As a result, the direction-selective key (165) enhances the device (100) by rendering the same more reliable, simple, safe, easy-to-use, and fast. The direction-selective key (165) can be considered as a controlling means as discussed before.

40 **[0068]** As discussed above, the device (100) or the system provided with said device (100) can preferably be provided with an emergency key (161) arranged for instantly cutting a power supply to the electric motor(s) (e.g. when pushed). As a result, the emergency key (161) enhances the device (100) at least in terms of safety.

[0069] The device (100) or the system provided with said device (100) can preferably be provided with a foot switch (170) arranged for being actively brought into an active state for example by pressing thereon to allow or trigger power

45 supply to the electric motor(s) for a pre-determined timeframe. The foot switch (170) can be considered to, when not depressed, maintain a passive state thereof at which power supply to the motor(s) is blocked. The pre-determined timeframe can correspond to an extent of relative rotation between the head holder (101) and base holder (102), to perform an engagement or disengagement of a pre-determined number of screw pitches at the threaded surface (12) and screw threads (22) cooperating with each other. For an exemplary case in which a button is to be assembled or disassembled by cooperation of five screw pitches at the treaded surface (12) of a head (1) and corresponding screw threads (22) of a base (2), the foot switch (170) can be arranged relative rotation corresponding to a pre-determined number, in this case: five or more, of revolutions for example of the base grasping means (1021), and then cease electrical communication with respective motor(s). Inherently, the foot switch (170) allows hands-free commencement of a relative rotation, thereby enhancing the operational simplicity of the device (100). In the case where the foot switch (170) is arranged for actuation of a relative rotation for a pre-determined timeframe, the relative rotation is automatically

55 ceased at the end of the timeframe. This brings an increased extent of automatization to a respective assembling or disassembling process; and an increased safety, because any unattended and indefinite relative rotation is prevented. Upon placing a head (1), a corresponding base (2) (and where applicable, a support (30)) to the device (100), a user

can easily initiate a relative rotation (for assembling or disassembling of the button) by a basic and quick foot action. As a result, the foot switch (170) enhances the device (100) by rendering the same more reliable, simple, safe, easy-to-use, and fast.

[0070] Any combination of independent features disclosed above will be apparent to those skilled in the art.

[0071] The device (100) ensures a correct and fast operation, by eliminating operator errors. The device (100) enhances sustainability, by enabling the assembly or disassembly of recyclable buttons which have a head (1) and base (2) as discussed above. The device (100) offers flexible working opportunities, enabling high production rates efficiently.

[0072] Fig.6 (a) is a section view of a non-engaged state of an exemplary button (1000) for being assembled and disassembled using a device (100) according to the present invention. Fig.6(b) is a section view of an engaged state of the exemplary button (1000) shown in Fig.6(a). Referring to Fig.6(a) and Fig.6(b), an exemplary button for being reversibly engaged by the device (100) can be defined as follows:

- The button comprises a base (2) including a post (21) having screw threads (22), and a head (1) having a protrusion (10) provided with an opening (11) configured to at least partly receive said post (21) by a relative movement of the base (2) along an device axis (A) which can also be named as a receiving axis. The opening (11) is provided with a threaded surface (12) configured to engage with said screw threads (22). The head (1) can comprise one or more grasping zones (13) about the device axis (A).
- The head (1) or one or more grasping zones (13) thereof, can be considered to be arranged in its size and shape for enabling the confinement of the head (1) by a first grasping means for controlling a rotational movement thereof around the device axis (A).
- The base (2) is sized and shaped for enabling the confinement of the base (2) so as to control rotational movement thereof around the device axis (A); for instance, the base (2) can be provided with a holding zone (25) which can be accordingly sized and shaped.

[0073] For the device (100) according to the present invention, one or more of the following can be taken into consideration:

- the device (100) can comprise a frame (103) at which the head holder (101) and base holder (102) are provided on or attached as a first die, which is preferably an upper die and the second die, which is preferably the lower die, to cooperate with each other, respectively suitable for holding of a head (1) as a female, first portion and a base (2) as a male, second portion of a button (1000);
- the upper die is provided with a respective setting portion for example a head grasping means (1011) for the first portion or head (1), and the lower die is provided with a respective setting portion for example a housing recess (1022) for receiving the cooperating second portion or base (2);
- the head grasping means (1011) or the base grasping means (1021) or both can include one or more electric motors as discussed above, arranged for effecting relative rotation between the base (1) and head (2) by rotating one or both of the head grasping means (1011) and base grasping means (1021);
- preferably, when in use, the lower die for example the second die or base holder (102) is substantially stationary along the device axis (A) in a linear direction parallel to the gravity vector (g), for example by being fixed to the frame (103); and the upper die for example the head holder (101) is arranged to be moved toward the lower die, for example by means of the lever (180), thereby being movable downwards relative to the frame (103);
- preferably, as discussed above, the first die is the upper die, arranged for appending of the head (1) to be supported at a back side (141) against gravity thereby making use of the gravity; and preferably, the second die is the lower die, provided with the base holder (102) which comprises the base grasping means (1021), which can be in the form of a replaceable bit of a screwdriver (cf. Fig.3(a));
- the preferred embodiment in which the base holder (102) is equipped with a resilient means (1024) as discussed above, provides an elasticity that ensures a pressure is applied more smoothly onto the base (1) at assembling or disassembling with an opposing head (2);
- as discussed above, the base holder (102) can preferably include a housing recess (1022); and the base grasping means (1021) can protrude towards the head holder (101) through the housing recess (1022), to exert force onto

a base (2) towards a respective head (1);

- preferably, the base grasping means (1021) is arranged to rotate around the device axis (A), by means of a respective electric motor;

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- numerous versions of the base grasping means (1021) as disclosed in the present specification may ensure that the relative rotation between the base (2) and head (1) takes place smoothly. In the case where the base grasping means (1021) is in the form of a screwdriver bit, which can be defined as a removable or interchangeable part for being attached onto a tool to constitute a screwdriver, said part being designed to geometrically match with a corresponding indentation at a screw for being contacted by a screwdriver, a corresponding base (2) can include a form corresponding to that of a screw head which geometrically matches to the base grasping means (1021). Of course, the base grasping means (1021) can be in any form which enables a form-based matching with a base (2) to effect a rotation of the base (2) relative to a corresponding head (1) around the device axis (A). The base (2) can for instance be further provided with a holding zone (25) which is geometrically arranged in its size and shape for such form-based matching with the base grasping means (1021).

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[0074] Upon reading the present description, a person skilled in machinery can easily select suitable measures (e.g. matching geometries) to achieve respective functions of any of the features related to the device (100).

[0075] The following objects are achieved by the present invention:

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- overcoming the abovementioned shortcomings of the prior art,
- provision of an easy-to-use device for enabling a robust yet reversible engagement between a base and a head of a button, in a reliable, simple, safe, and fast way,
- provision of a device which facilitates the replacement of defective heads in buttons.

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List of Reference Signs:

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1	head	161	emergency key
2	base	162	connection switch
10	protrusion	163	disconnection switch
11	opening	164	safety check key
12	threaded surface	165	direction-selective key
13	grasping zone	166	mode selection switch
14	head portion	170	foot switch
21	post	180	lever
22	screw threads	1000	button
25	holding zone	1011	head grasping means
30	support	1013	head biasing means
31	hole	1014	resilient means
100	device	1021	base grasping means
101	head holder	1022	housing recess
102	base holder	1023	base biasing means
103	frame	1024	resilient means
140	face side	1025	guide slope
141	back side	A	device axis
150	power supply	g	gravity vector
151	main power switch	h	thickness
160	control panel		

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Claims

1. A device (100) for use in assembling, disassembling, or both assembling and disassembling a head (1) and a base

(2) of a button (1000), wherein

the device (100) comprises a head holder (101) and a base holder (102) disposed on a device axis (A), the head holder (101) is provided with a head grasping means (1011) for, when in use, engaging with the head (1), to control a rotational movement of the head (1) around the device axis (A);

5 the base holder (102) is provided with a base grasping means (1021) for, when in use, engaging with the base (2), to control a rotational movement of the base (2) around the device axis (A); and

10 the device (100) is arranged to, effect a relative rotation between the head grasping means (1011) and base grasping means (1021) around the device axis (A), and simultaneously to effect a translational or lineal relative movement between the head grasping means (1011) and base grasping means (1021) along the device axis (A), by moving the head holder (101) or base holder (102) or both of the head holder (101) and base holder (102) along the device axis (A).

15 **2.** Device (100) according to claim 1, wherein the head holder (101) includes a head biasing means (1013) arranged for, when the head (1) is placed into the head holder (101), confining a head portion (14) of the head (1) along the device axis (A) at a face side (140) and a back side (141) of the head portion (14), between the head grasping means (1011) and the head biasing means (1013).

20 **3.** Device (100) according to claim 2, wherein the head biasing means (1013) further comprises a resilient means (1014) arranged for forcing the head grasping means (1011) towards the head biasing means (1013).

4. Device (100) according to any of the claims 1 to 3, wherein the base holder (102) includes a base biasing means (1023) arranged for provision of a linear motion tolerance for the base (2) relative to the head holder (101) along the device axis (A), on being assembled to or disassembled from a respective head (1).

25 **5.** Device (100) according to claim 4, wherein the base holder (102) further includes a resilient means (1024) arranged for forcing the base grasping means (2021) away from the base biasing means (1023) along the device axis (A).

30 **6.** Device (100) according to any of claims 1 to 5, further arranged for controlling the relative rotational movements in the head holder (101) and base holder (102) to, when in use, alternate a direction of relative rotation between the head (1) and base (2).

35 **7.** Device (100) according to claim 6, provided with a controlling means operable between a first mode for initiating a rotation at one or both of the head holder (101) and base holder (102) to enable movement relative to each other in a respective first direction for assembling the head (1) and the base (2) with each other, and a second mode for initiating a rotation at one or both of the head holder (101) and base holder (102) to enable movement relative to each other in a respective second direction opposite to the first direction for disassembling the head (1) and the base (2) from each other.

40 **8.** Device (100) according to any of claims 1 to 7, arranged such that, the head holder (101) and the base holder (102) are at a parallel projection of each other parallel to the direction of gravity vector (g), along the device axis (A).

9. Device (100) according to any of claims 1 to 8, wherein the base grasping means (1021) is removable from the base holder (102).

45 **10.** Device (100) according to claim 9, provided with a plurality or set of base grasping means (1021) having different geometries for engaging with respective different geometries in different bases (2).

50 **11.** Device (100) according to any of claims 1 to 10, wherein the head grasping means is removable from the head holder (101).

12. Device (100) according to claim 11, provided with a set of head grasping means (1011) having different sizes and shapes for engaging with different geometries in different heads (1).

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Fig.1(a)

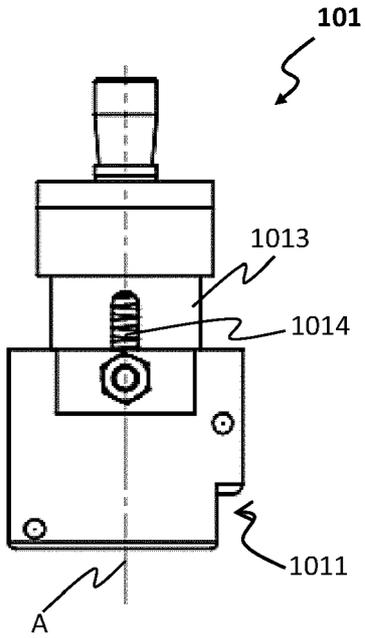


Fig.1(b)

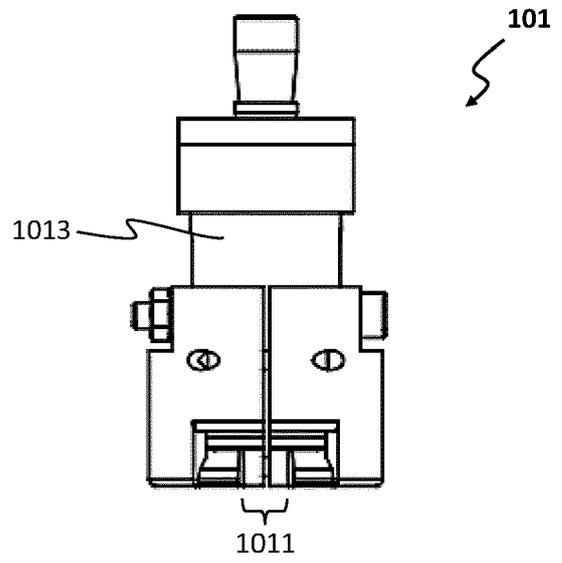


Fig.1(c)

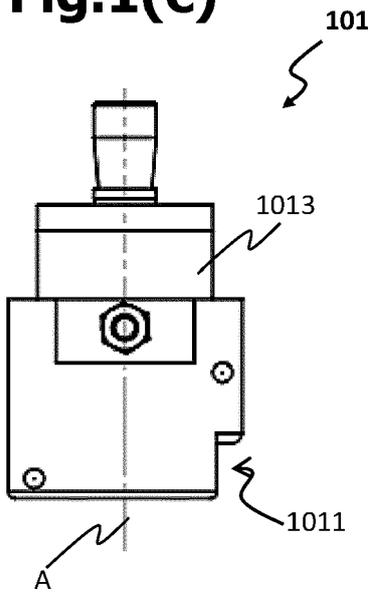


Fig.1(d)

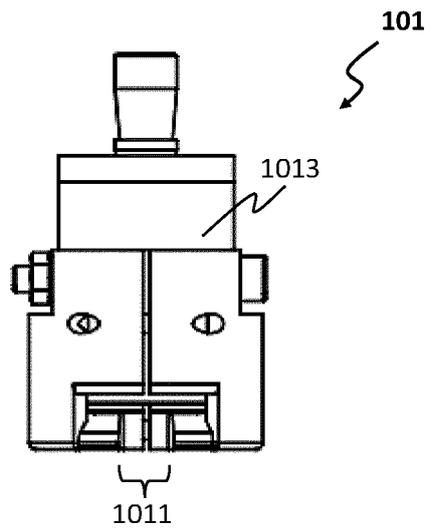


Fig.2(a)

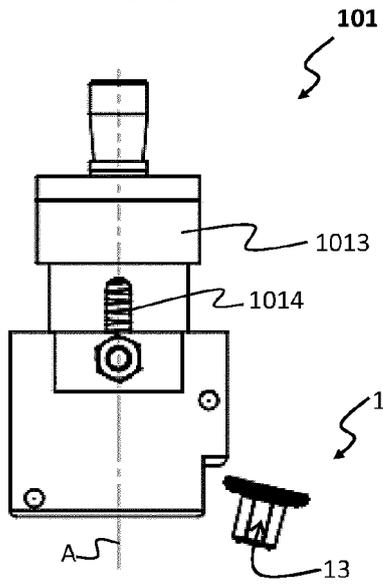


Fig.2(b)

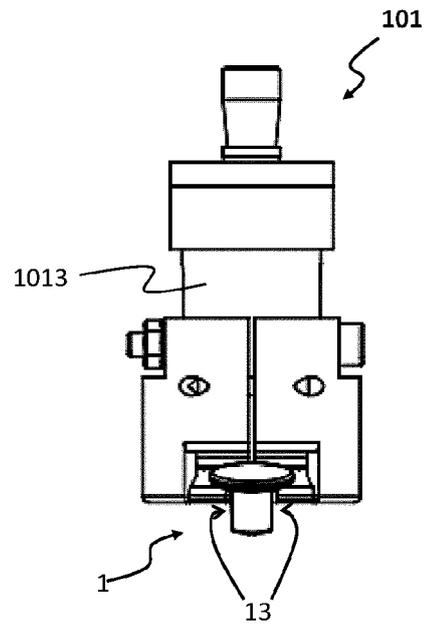


Fig.2(c)

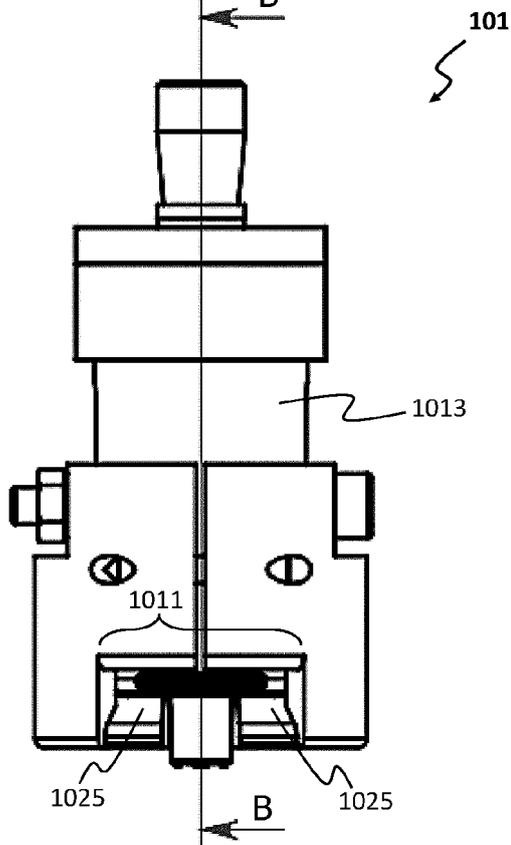


Fig.2(d)

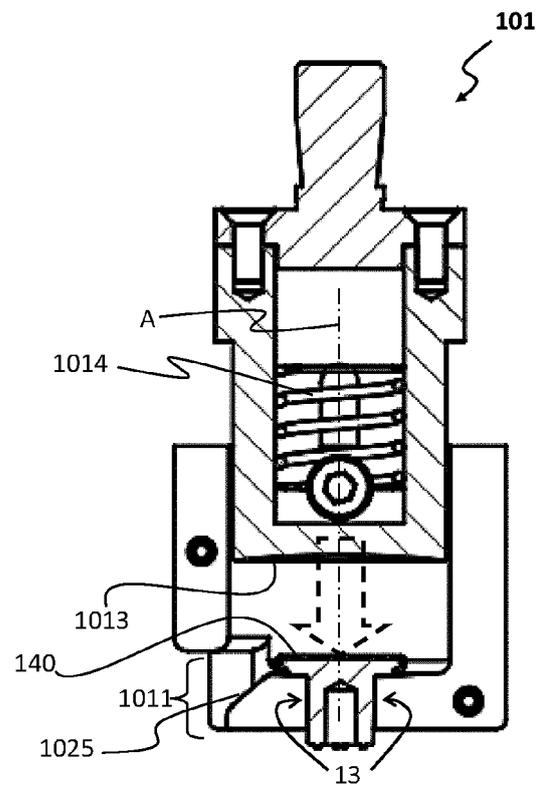


Fig.2(e)

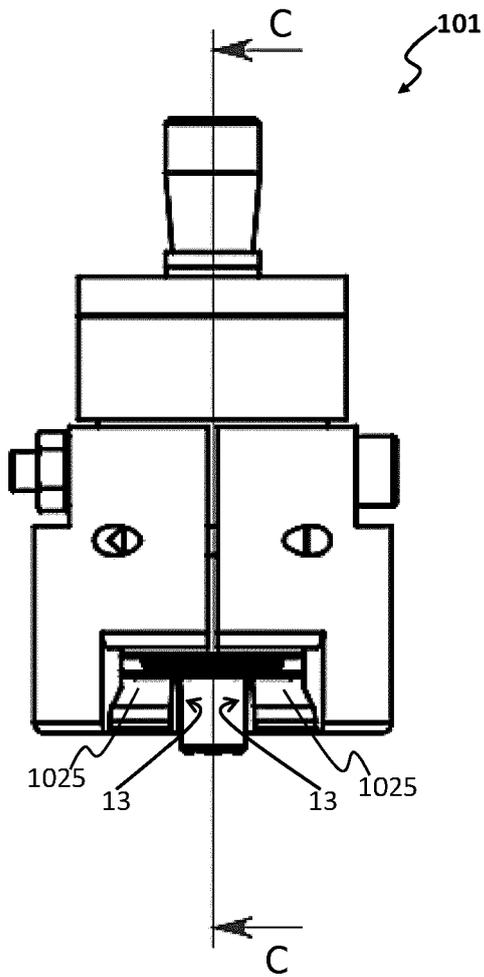


Fig.2(f)

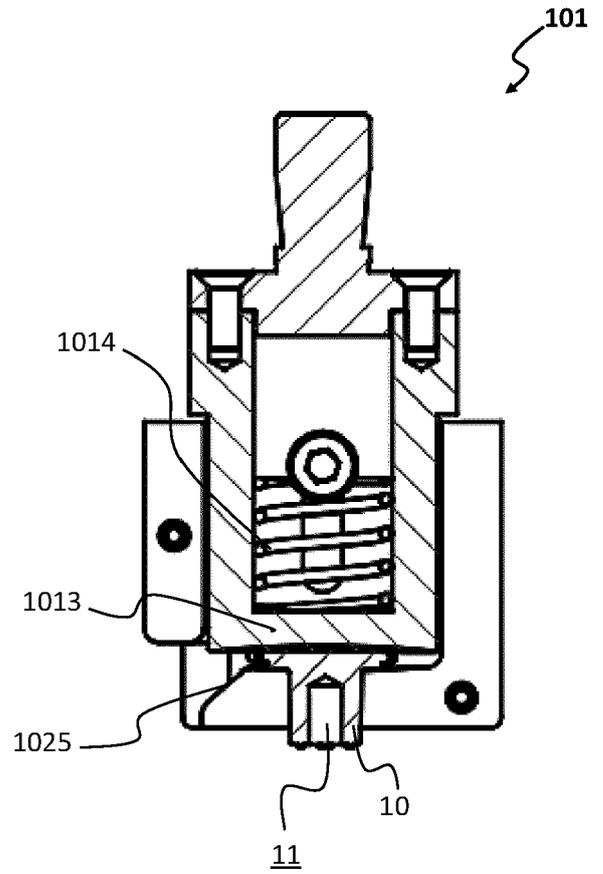


Fig.3(a)

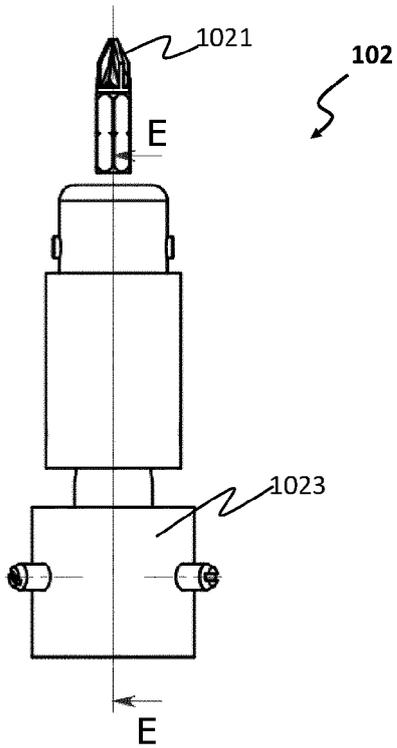


Fig.3(b)

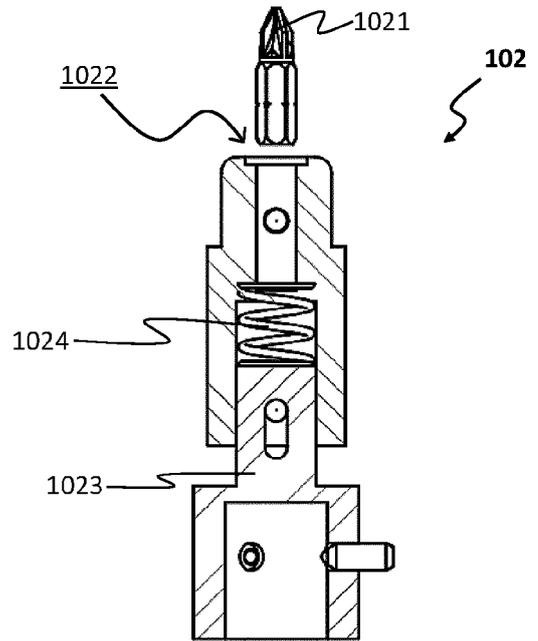


Fig.3(c)

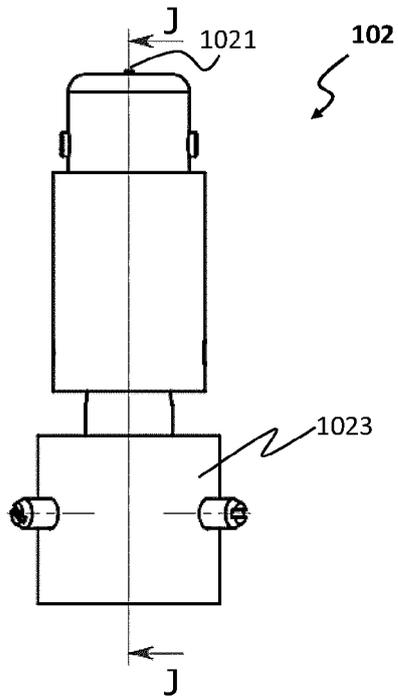


Fig.3(d)

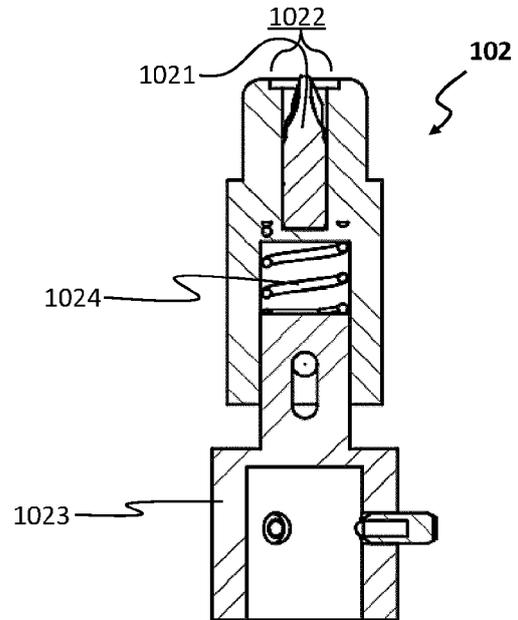


Fig.3(e)

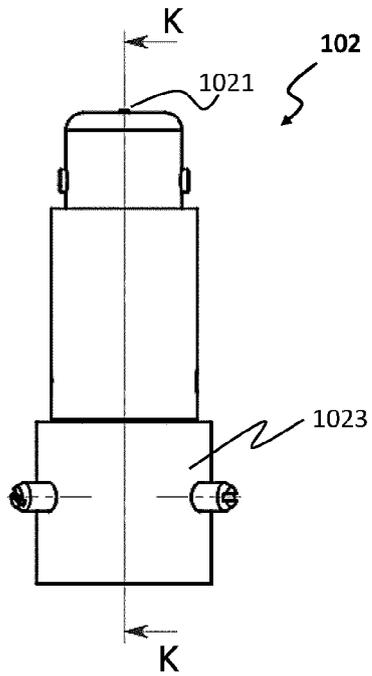


Fig.3(f)

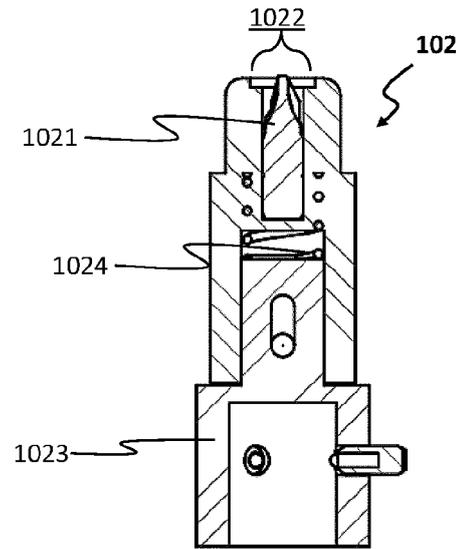


Fig.3(g)

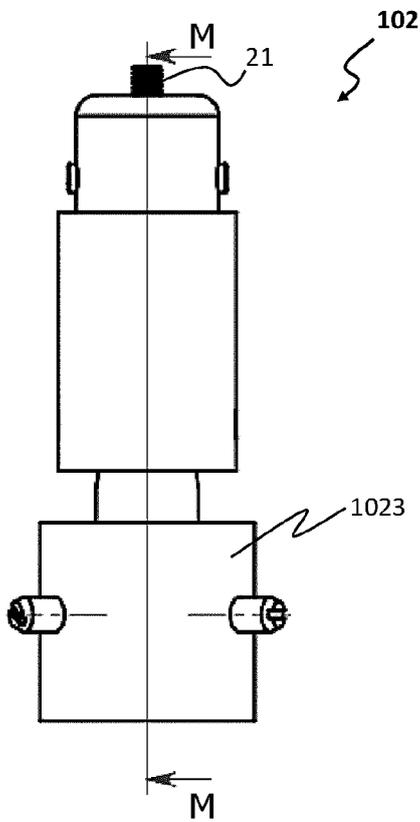


Fig.3(h)

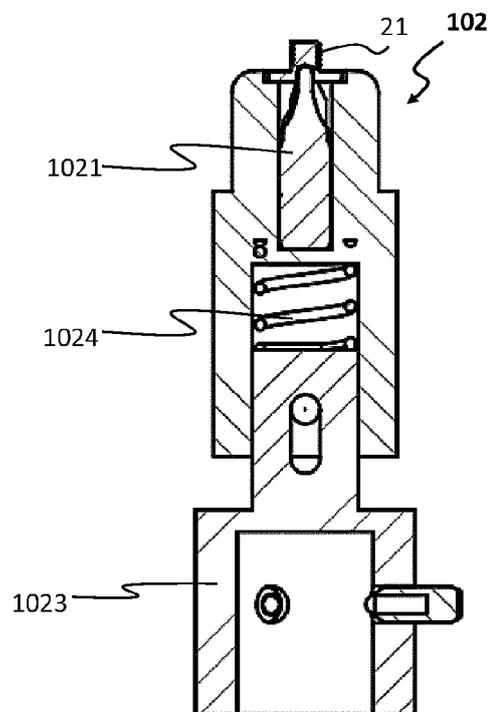


Fig.4(a)

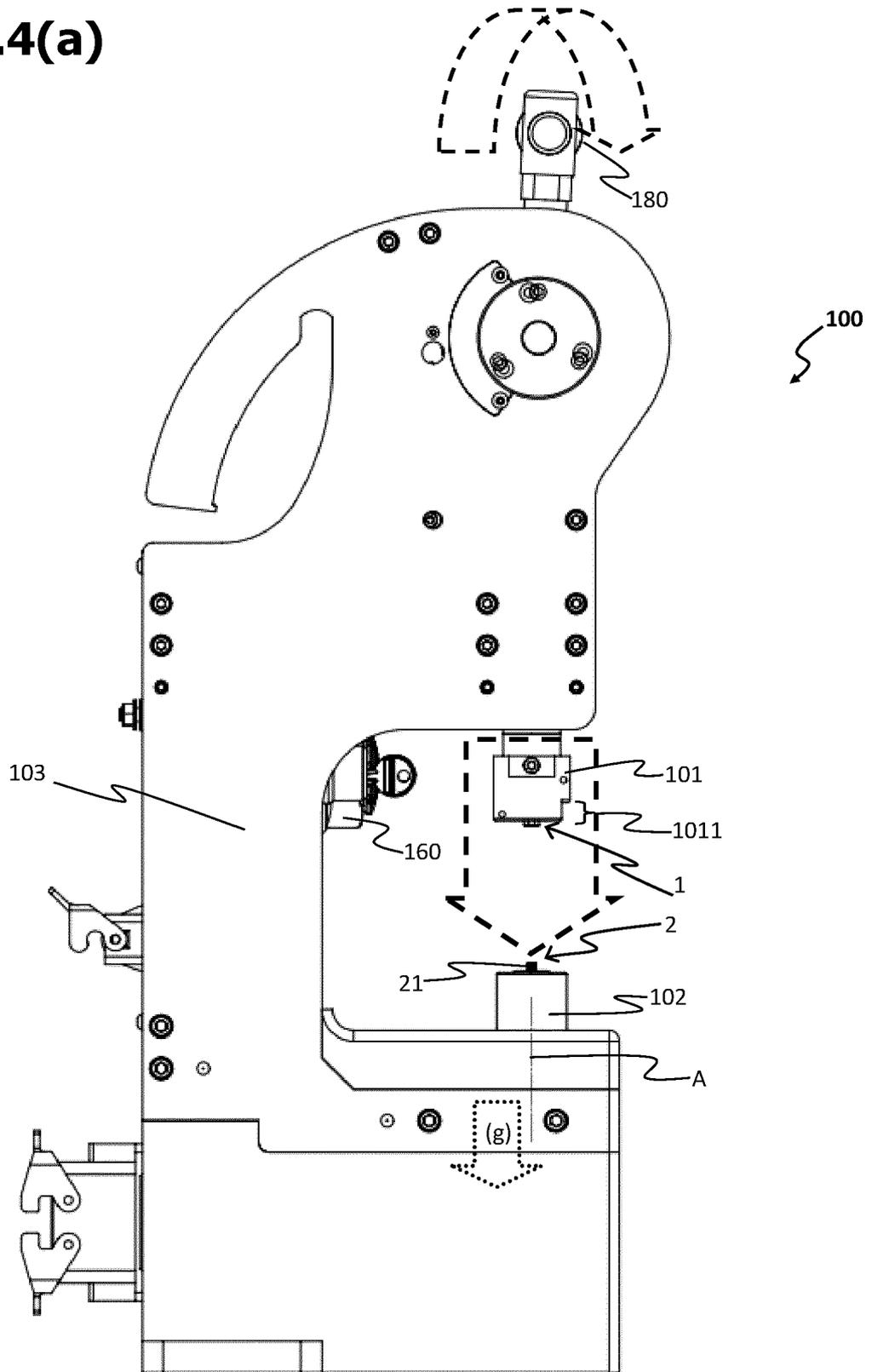


Fig.5

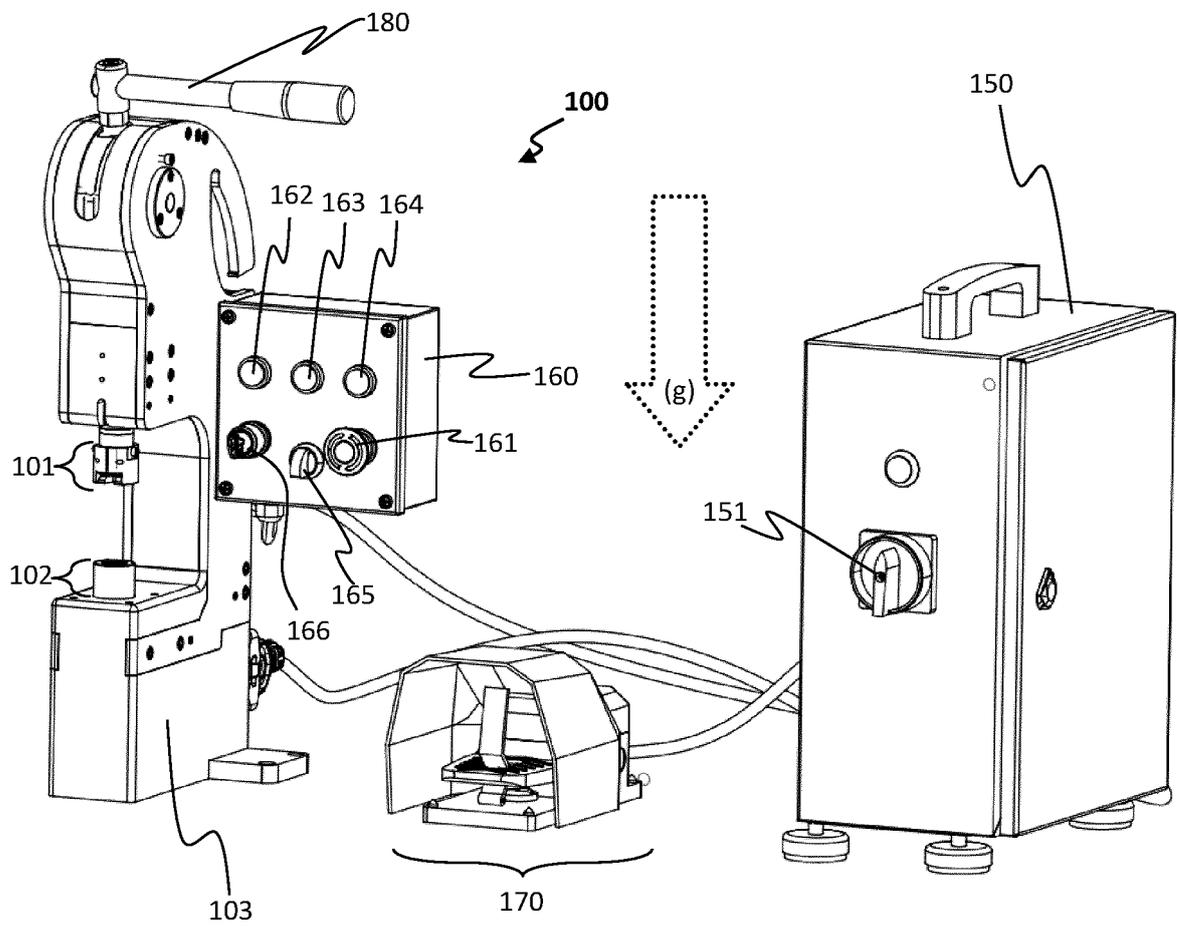


Fig.6(a)

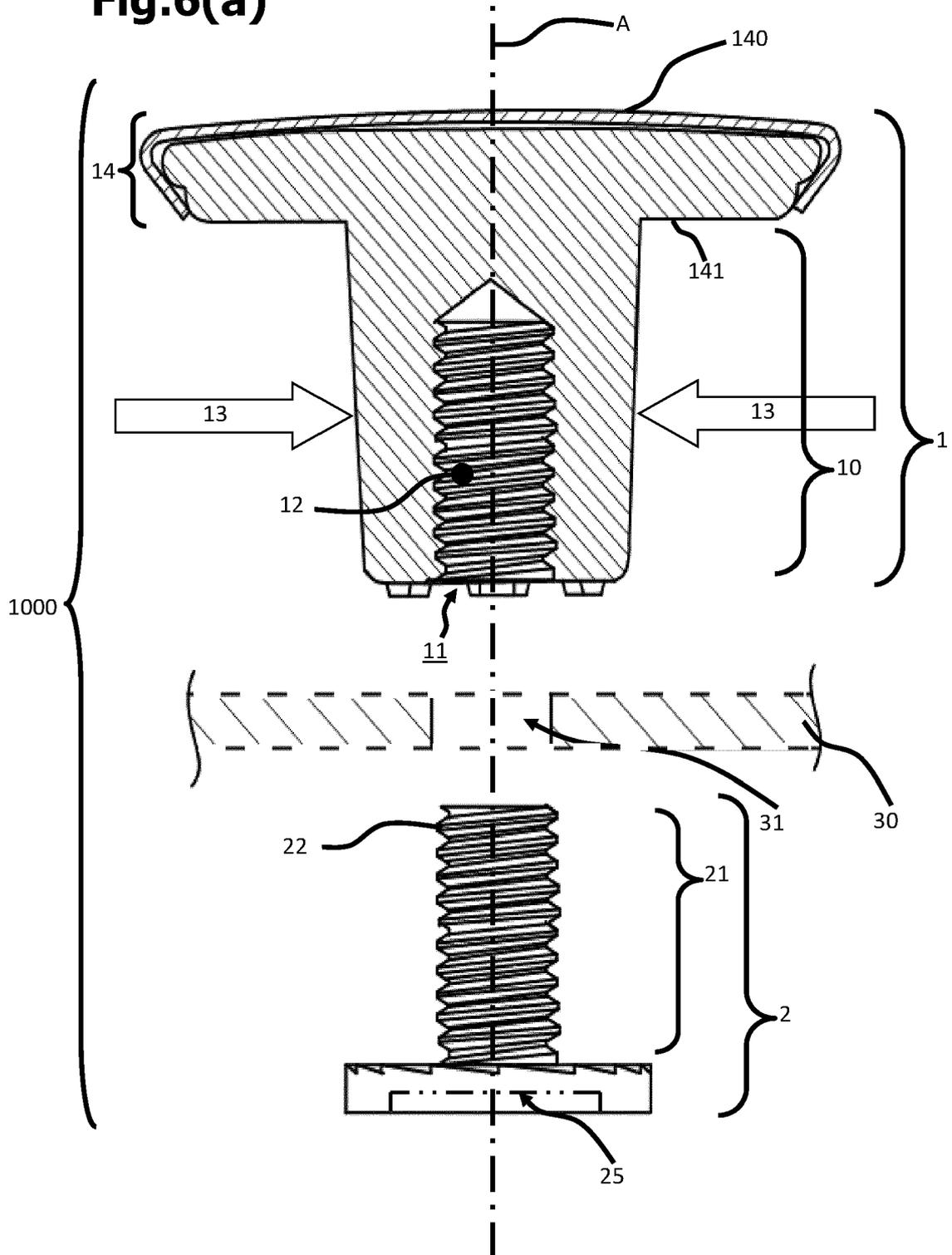
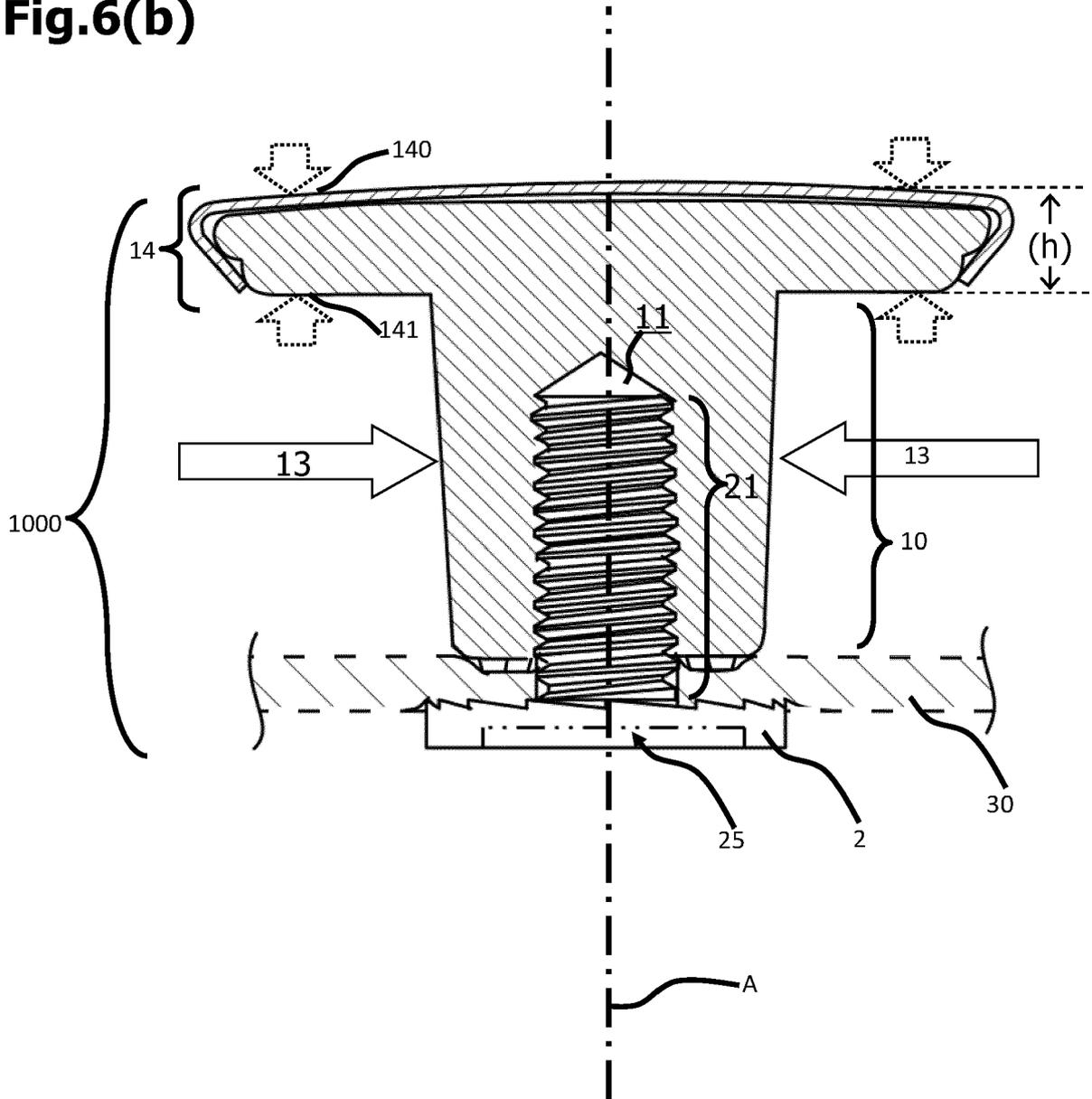


Fig.6(b)





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The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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