(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 099 516 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.05.2001 Bulletin 2001/20

(51) Int Cl.[7]: **B25B 23/14**

(21) Application number: **00123463.2**

(22) Date of filing: **06.11.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **10.11.1999 IT MO990056 U**

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(54) Screw tightening knob with preadjustable active torque

(57) A screw tightening knob with preadjustable active torque is composed of an adaptor base (2) which can be rigidly coupled to a body to be tightened and onto which a handgrip (4) can be screwed with interposed pre-loaded friction coupling means (3).

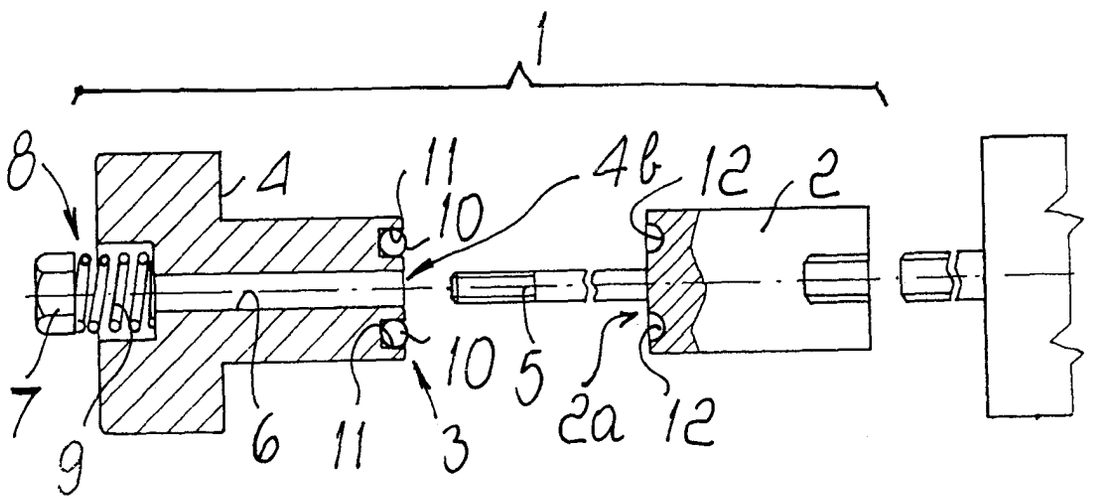

Fig. 1

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Description

[0001] The present invention relates to a screw-type tightening knob with preadjustable active torque.

[0002] As it is known, in many cases it is necessary to fasten two bodies to each other, by resorting to a screw coupling so that the fastening force, i.e. the applied torque, is not excessive.

[0003] This occurs whenever excessive tightening damages one of the fastened bodies, i.e. produces the so-called stripping of the thread of one of the elements that compose the screw coupling.

[0004] Torque wrenches are known for these specific requirements which, preset to specific values of torque and used to tighten nuts and bolts, avoid reaching the critical values which, as mentioned, cause damage.

[0005] However, the use of these wrenches, which are substantially expensive, entails their availability in significant numbers, both for adaptation to the sizes of the nuts and bolts to be tightened and for the torque values that are preset in each wrench.

[0006] Moreover, it is difficult for the operator as well, to have to resort to wrenches whenever the above problem arises.

[0007] The aim of the present invention is to solve the above problems of the prior art, by providing a screw tightening knob with preadjustable active torque which allows to mutually join two bodies with a calibrated force and without exceeding said force and risking damage to the coupling elements, all without the need to resort to the use of torque wrenches or the like.

[0008] This aim and other objects are achieved by a screw tightening knob with preadjustable active torque, characterized in that it is composed of an adaptor base which can be rigidly coupled to a body to be tightened and onto which a handgrip can be screwed with interposed pre-loaded friction coupling means.

[0009] Further characteristics and advantages will become better apparent from the description of a preferred embodiment of a screw tightening knob with preadjustable active torque, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

[0010] Figures 1, 2, 3, and 4 are partially sectional views of as many possible embodiments of the knob according to the invention.

[0011] With particular reference to the above figures, 1 designates a screw tightening knob with preadjustable active torque.

[0012] The knob 1 is composed of an adaptor base 2, which can be rigidly coupled to an intended body to be tightened and on which it is possible to screw a corresponding handgrip 4 with interposed pre-loaded friction coupling means 3.

[0013] A threaded axial pivot 5 protrudes from the adaptor base 2 and is adapted to be inserted snugly, while allowing free forward and backward sliding, in a corresponding axial cavity 6 which passes through the handgrip 4 until it protrudes beyond the end of the cavity 6 in order to allow the screwing of a corresponding nut 7 of the self-locking type for fastening the handgrip 4 to the adaptor base 2.

[0014] Advantageously, an elastic means 8 for reactive contrast by compression is interposed between said nut 7 and said handgrip 4 and is substantially constituted by at least one helical spring 9 whose turns are wound coaxially on the portion of the pivot 5 protruding from the axial cavity 6 and whose ends rest respectively against said nut 7 and the bottom of a wider portion 6a of the axial cavity 6 which is formed at the end directed towards the nut 7 and is adapted to fully contain said nut in the screwed-on configuration.

[0015] The friction coupling means 3 can be provided in four substantially equivalent embodiments.

[0016] According to a first embodiment, they are constituted by a plurality of balls 10 which are accommodated in corresponding hollow seats 11 so as to protrude slightly from them; said hollow seats 11 are formed in the face 4b of the end of the handgrip 4 that is directed towards the adaptor base 2, and in the opposite face 2a of said base there are provided corresponding hemispherical cavities 12, in practice domes, which are adapted to contain the protruding portions of said balls 10.

[0017] In a second embodiment, the friction coupling means 3 are constituted by corresponding complementarily shaped sets of teeth 13 and 14 which are again formed on the opposite faces 4b of the handgrip 4 and 2a of the adaptor base 2.

[0018] In the third possible embodiment of the invention, the friction coupling means 3 are constituted by a male-female coupling which has a frustum-shaped profile; more precisely, the male body 15 is axially associated with the adaptor base 2 and the corresponding female seat 16 is formed in the facing end of the handgrip 4.

[0019] In the fourth possible embodiment, the friction coupling means 3 are constituted by two plates 17 and 18 made of materials having known grip coefficients, applied to the respective facing faces 4b of the handgrip 4 and 2a of the adaptor base 2.

[0020] The operation of the invention is as follows: the adaptor base 2 is fixed in a conventional manner to any body to be tightened.

[0021] The handgrip 4 is fitted over the base 2, making the threaded pivot 5 slide inside the axial cavity 6 until its end protrudes into the wider portion 6a.

[0022] The spring 9, which is helical or of the Belleville washer type or the like and has a preset modulus of elasticity, is then fitted onto said end and the handgrip is fastened with the nut 7, which is preferably of the so-called self-locking type.

[0023] The tightening of said nut 7 pre-loads the spring 9, and when a torque is applied to the handgrip 4 in order to fasten the body on which the knob 1 is applied to another body, if the intensity of said torque is lower than the reactive value of the pre-loading of the

spring 9, the knob transmits said torque in full.

[0024] If the intensity of said torque is higher than said preset value, the friction coupling means 3 mutually disconnect the handgrip 4 and the adaptor base 2.

[0025] In detail, in the first embodiment of the invention the balls 10 are kept coupled to the corresponding seats 12 until the applied force exceeds said predefined value, beyond which the handgrip 4 moves backward on the pivot 5, overcoming the contrast of the spring 9 and rotating without being connected to the base 2 in steps which are determined by the rotary succession of the stepwise movements of the balls 10 in the mutually opposite seats 12.

[0026] If the intensity of the applied torque decreases, the rigid connection between the handgrip 4 and the adaptor base 2 is automatically restored.

[0027] The same also occurs for the other three possible embodiments of the knob 1: when the applied torque exceeds the preset loading value of the spring 9, in the second embodiment the teeth of the set of teeth 13 perform a ratcheting motion over the teeth of the complementarily set of teeth 14, mutually disconnecting the handgrip 4 and the base 2, and mutually reengage when the value of said applied torque decreases.

[0028] Thus, in the third embodiment of the invention, the male body 15 and the corresponding female seat 16, clad with, or directly made of, materials having known adhesion coefficients, remain mutually engaged until the maximum torque value is reached; once this value has been exceeded, grip becomes friction and the surfaces in mutual contact slide over each other, mutually disconnecting the handgrip 4 and the adaptor base 2.

[0029] In a fully similar manner, the plates 17 and 18 transmit the torque applied until the limit value of mutual grip is reached; after this, grip becomes friction, causing their mutual slippage and the disconnection of the handgrip 4 from the adaptor base 2.

[0030] By fitting on the pivot 5 springs 9 which in each instance have several coefficients of elasticity and by acting on the tightening of the nut 7, it is possible to determine an extremely wide range of presetting values for the knob 1 so as to prevent an excessive applied torque from damaging the bodies to be joined by means of it.

[0031] In practice it has been found that the described invention achieves the intended aim.

[0032] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0033] All the details may further be replaced with other technically equivalent ones.

[0034] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the protection of the appended claims.

[0035] The disclosures in Italian Utility Model Application No. M099U000056 from which this application claims priority are incorporated herein by reference.

[0036] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A screw tightening knob with preadjustable active torque, characterized in that it is composed of an adaptor base (2) which can be rigidly coupled to a body to be tightened and onto which a handgrip (4) can be screwed with interposed pre-loaded friction coupling means (3).

2. The knob according to claim 1, characterized in that a threaded axial pivot (5) protrudes from said adaptor base (2) for freely-sliding precision insertion in a corresponding axial cavity (6) that passes through said handgrip (4), protruding beyond said cavity (6) for the screwing of a corresponding self-locking fastening nut (7), an elastic means (8) for reactive contrast by compression being interposed between said nut (7) and said handgrip (4).

3. The knob according to claim 2, characterized in that said elastic contrast means (8) is constituted by at least one helical spring (9) whose turns are wound coaxially on the portion of said pivot (5) protruding from said axial cavity (6) of the handgrip (4) and whose ends rest respectively against said nut (7) and against the opposite face of said handgrip (4).

4. The knob according to claim 2, characterized in that said elastic contrast means (8) is constituted by at least one spring (9) of the Belleville washer type which is fitted on the end of said pivot (5) protruding from said axial cavity (6) and is interposed between said nut (7) and the opposite face of said handgrip (4).

5. The knob according to claims 2 and 3, characterized in that said axial cavity (6) of said handgrip (4) has, at its end directed towards said lock nut (7), a wider portion (6a) which is meant to fully contain said nut (7) in the screwed-on configuration.

6. The knob according to claim 1, characterized in that said friction coupling means (3) are constituted by a plurality of balls (10) which are accommodated so as to protrude in corresponding hollow seats (11) formed in the face (4b) of the end of said handgrip (4) that is directed towards said adaptor base (2), in the face (2a) of which that lies opposite said hand-

grip (4) there are provided corresponding hemispherical cavities (12) for containing the protruding portions of said balls (10).

7. The knob according to claim 1, characterized in that said friction coupling means (3) are constituted by corresponding complementary sets of teeth (13, 14) formed on the opposite faces of said handgrip (4) and said adaptor base (2).

8. The knob according to claim 1, characterized in that said friction coupling means (3) are constituted by a male-female coupling (15, 16) which has a frustum-shaped profile with contacting surfaces which have known grip coefficients.

9. The knob according to claim 8, characterized in that, in said coupling, the male body (15) is axially associated with said adaptor base (2) and the corresponding female seat (16) is formed in the facing end (4b) of said handgrip (4).

10. The knob according to claim 1, characterized in that said friction coupling means (3) are constituted by two plates (17,18) made of materials having known grip coefficients which are applied to the respective opposite faces (4b, 2a) of the handgrip (4) and of the adaptor base (2).

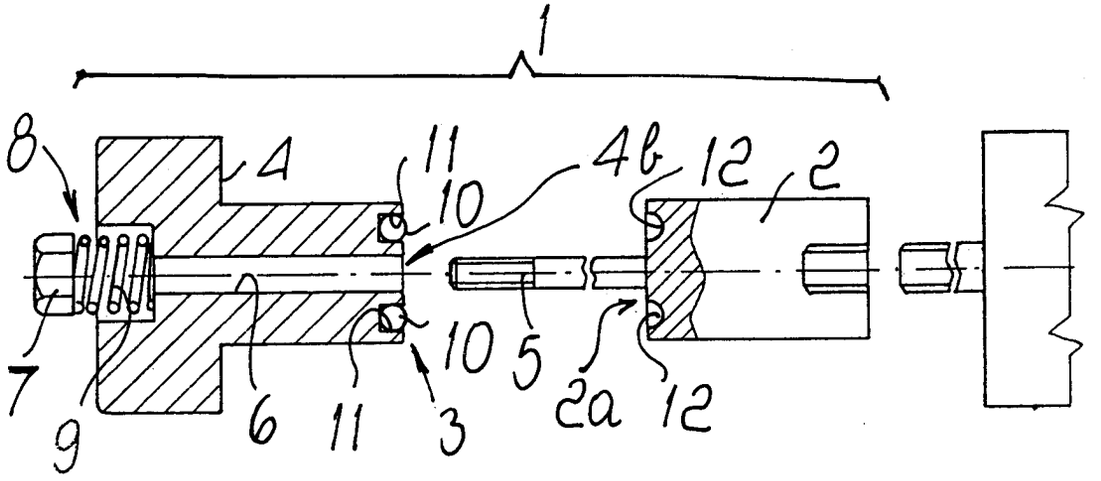

Fig. 1

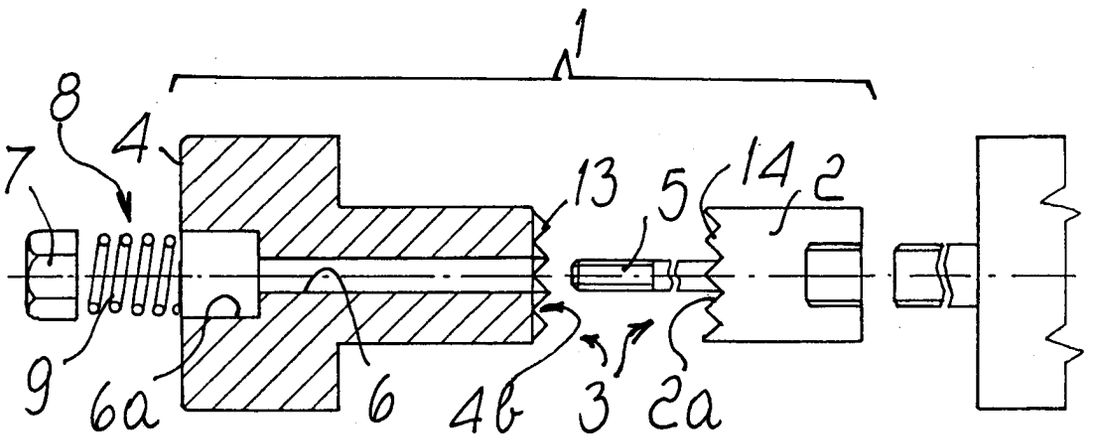

Fig. 2

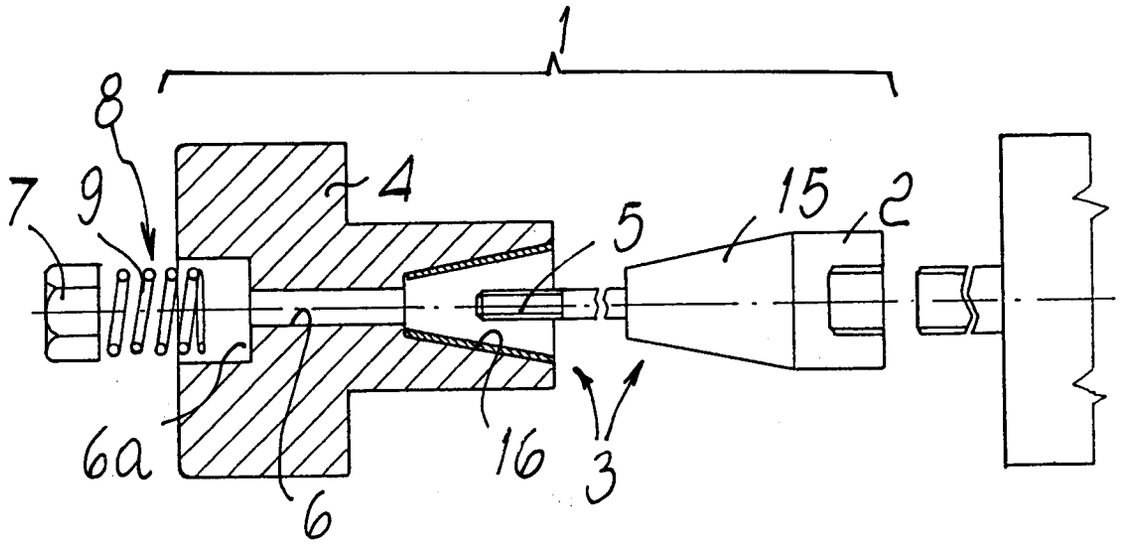

Fig. 3

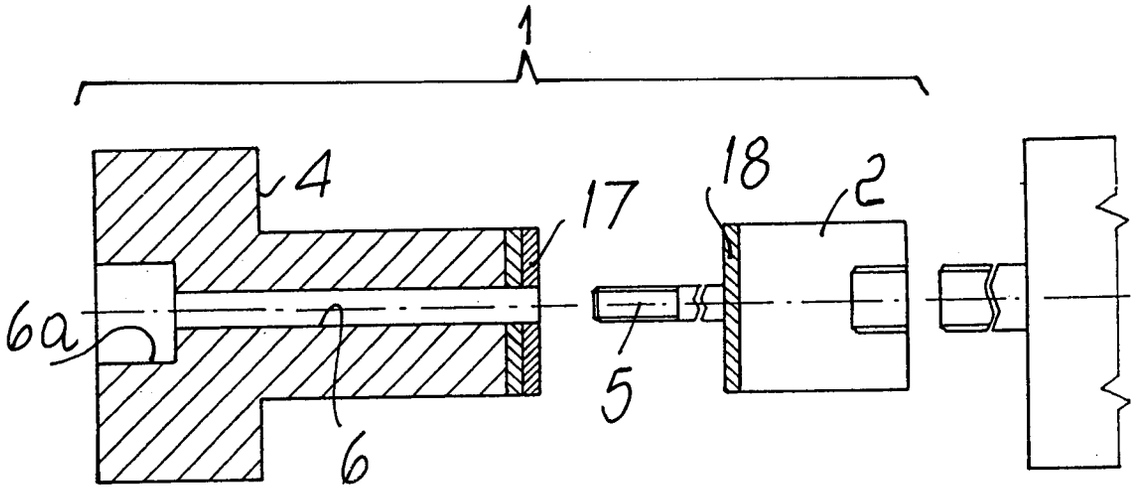

Fig. 4