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Clamping Device with Screwed Bush

The invention relates to a clamping device of the kind corresponding to the introductory part of claim 1.

Such a clamping device is known from DE-A-34 44 608. The construction as a clamping device signifies a clamping arrangement forming a structural unit with a cylindrical inner surface and a cylindrical outer surface, which, for example can be introduced in the space between the outer surface of a shaft and the inner surface of an external component around the shaft. In this way neither the shaft nor the external component which is to be secured on it requires any particular machining of its surfaces, in particular it does not require the provision of conical surface which, in many particularly heavy components, would involve a substantial additional outlay on machining.

The known clamping device comprises two conical bushes which, for clamping, are displaced axially relative to one another by tightening the screwed sleeve and thereby dilate radially as a result of sliding of the conical surfaces, resulting in clamping of the external component on the shaft. The inner conical bush carries axially adjacent to the conical surface an external screw-thread onto which an internal thread on the screwed sleeve can be screwed. The screwed sleeve abuts axially against the outer conical bush and on rotation it causes axial displacement of the latter. The screwed sleeve has an axial projection by which it engages the end of a radially outwardly projecting collar, with resilient enlargement of the slit end of the outer conical bush, engaging in a corresponding internal circumferential groove in the latter so that the screwed sleeve which is screwed onto

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the inner conical bush can both pull and push axially on the outer conical bush and the clamping device can both be stressed and also released by means of the screwed sleeve.

A similar state of the art is illustrated in EP-A-7 217, in which however the screwed sleeve engages in an external peripheral groove in the outer conical ring.

A common feature of this state of the art is that in fact on stressing there are large axial forces applied by direct engagement of the screwed sleeve, but, for release, the engagement of radially projecting collars in grooves in the other element is necessary, which represents an additional outlay, is mostly difficult to apply in practice and in particular is subjected to limitations on the ability to handle axial forces because the collars only offer the engaging flanks, of which the engagement depth cannot be large, for reasons of design and/or assembly. However, when the cone angles are self-jamming and within the self-jamming range indeed still have a particularly flat cone angle, so that the self-jamming effect is greatly enhanced, the forces which are necessary for axially disengaging the conical surface from one another are substantial and they exceed the values which can be applied with known constructions, at any rate with large shaft diameters.

The invention is based on solving the problem of constructing a clamping device of the kind indicated so that it can be engaged and released with a high force. This problem is solved in a first aspect by the invention stated in claim 1.

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By the use of a screwed sleeve with threads of different pitch the elements carrying the clamping conical surfaces can both be axially drawn together and also axially urged apart according to the direction of rotation. In this arrangement it requires no external stops because the screwed sleeve is axially connected through the threads with both of the elements carrying the conical surface and is able to transmit both the engaging and also the releasing forces at the same order of magnitude. It is not necessary to provide special arrangements for releasing the conical bushes, which indeed, by the self-jamming angle, convert the axial clamping forces with a high degree of efficiency into radial jamming forces, but for the same reason after engagement has taken place also remain tightly engaged after removal of the axial clamping forces.

A screw-thread offers several engaging surfaces corresponding to the number of its flanks so that the loading of the individual engaging surfaces is reduced to a corresponding fraction and the axial force that can be transmitted is substantially increased in comparison with the inter-engaging collars of the state of the art. The provision of screw threads is simpler from the manufacturing point of view than the manufacture of undercut grooves and/or collars, which then on assembly must also be subjected to elastic deformation of at least one of the adjacent components for engagement.

A screwed sleeve with opposite screw threads is known in itself in the field of a pipe coupling from DE-C-894 339. In this arrangement, however, the conical surfaces lie at the same height as the screwed sleeve so that the radial structural heights of the elements which carry the conical surfaces and of the

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screwed sleeve add together, which leads to projections which are sometimes unacceptable. An important advantage of the invention lies by contrast in the fact that the region of the screwed sleeve and the clamping region of the conical surfaces are axially one behind the other so that in the region of the conical surfaces a construction is possible which is radially independent of the screw arrangement and in the clamping region of the conical surfaces only requires very little space. The inner peripheral surface of the external component therefore needs to have only a relatively slightly greater diameter than the shaft.

A screwed sleeve with opposing screw threads is also known in itself from CH-A-265 280. However, in this case it is not concerned with a clamping device as the one conical surface is present directly on the external component. The threads of the screwed sleeve are in the form of internal and external threads, increasing the radial height of the arrangement. The cone angles are not self-jamming and so the torque that can be transmitted is only relatively small.

In a second aspect the invention is embodied in the subject matter of Claim 2 which relates to a form of construction which in itself is known, taken from US-A-4 268 185, Fig. 8. The advantages are the same as the embodiment according to claim 1.

In the preferred embodiment according to claim 3 the screwed sleeve has respectively a right hand and a left hand thread. This has the advantage amongst other things that large clamping travels for overcoming a play necessitated by tolerances can be relatively rapidly covered.

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The alternative according to claim 4 is however at the same time not excluded. With threads of the same hand but of different pitch there likewise arises a relative axial movement between the components. If powerful threads are chosen, of only little difference in pitch, then with a predetermined torque on the screwed sleeve particularly high axial forces and particularly high torque transmission can be achieved.

The radii of the threads could be equal or different (Claim 5, 6). It is a question of the particular design layout in the individual situation.

In order to avoid losses of engaging torque through friction in the threads it can be of advantage to construct at least one thread as a recirculating ball thread (Claim 7).

In the embodiment which comes into consideration primarily the threaded extension is provided on the thin-walled end of the outer conical bush. On tightening, the outer conical bush is drawn onto the inner conical component.

If there is a requirement, in this embodiment, to locate the external component seated on the outer conical bush axially on tightening, a longitudinal stop can be provided in accordance with claim 9.

An important embodiment of this construction is the subject matter of claim 10. If the conical surfaces extend under the threaded extension the latter is likewise widened out on tightening of the clamping device whereby the screw thread overlap on this threaded extension is improved with increasing clamping force, i.e. the engaging surface in the thread

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increases. In this way the surface engagement in this thread can be kept low.

In another embodiment coming into consideration in accordance with claim 11, the longitudinal displacement of the outer conical ring takes place not under tension but by longitudinal pressure.

In this case, for locating the external component in the longitudinal direction on the shaft, a longitudinal stop can be provided, for example in the form of reduction in diameter.

As the screwed sleeve is tightened up, generally speaking there is normally no rotation of the inner conical ring without the inner conical body so that no special steps are required for locating these components against rotation during tightening.

However, in order to be independent of the adhesion of the inner conical ring on the shaft and furthermore to be able to bring about a conversion of the torque, it is advisable to use a rotary tool abutting itself on the external component in accordance with claim 13. The torque arising on tightening of the clamping device then leads only to residual forces within the clamping arrangement so that sudden slipping is simply no longer possible.

In the preferred embodiment according to claim 14 the rotary tool incorporates a toothed pinion of which the arcuate diameter is substantially smaller than the diameter of the screwed sleeve. When a rotation is applied to the pinion by suitable means, for example a spanner or crank, there is a torque conversion corresponding to the ratio of the diameters.

The opposing teeth in relation to the pinion can be provided directly on the outer periphery of the screwed sleeve or on a separate tool which can be secured on the screwed sleeve against rotation, the outer periphery of the tool then carrying the teeth (Claims 15, 16).

Generally speaking the tool can only be fitted onto the screwed sleeve from the side, the sleeve then having a polygonal outline, onto which the tool can be fitted at different angular positions. The teeth need not then extend over the whole periphery but only over an arc corresponding to the difference in angle between two different positions of the tool on the screwed sleeve.

For mounting and supporting the pinion on the outer component the embodiment according to claim 18 is advisable, in which the pin can be rotatable in the bore or can be secured in it with a pinion rotatable about the pin.

The torque lock of claims 19, 20 and 21 comes into action when the limiting torque is exceeded, that is to say when the clamping device slips suddenly in use and leads, according to the direction of rotation, to loosening of the screwed sleeve, in order to avoid damage to the shaft and the inner conical ring, or to a tighter tightening of the screwed sleeve and thereby of the clamping device.

Fig. 1 shows a side view of a first embodiment of the invention, partly in longitudinal section through the axis;

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Fig. 2 and 3 show diagrammatic views of the threaded region of the screwed sleeve;

Fig. 4. shows a view of an upper part of a further embodiment of the invention, partly in longitudinal section through the axis;

Fig. 5 shows a corresponding view of a further embodiment;

Fig. 6 shows diagrammatically the operation of a rotary tool.

Fig. 7 is a partial view according to Fig. 6, looking from the left;

Fig. 8 and 9 show corresponding partial views of further embodiments of the rotary tool;

Fig. 10 and 11 show views corresponding to Fig. 7 and 6 of an embodiment with torque locks.

By means of the clamping device 100 in Fig. 1 there can be clamped onto a shaft 1 forming the "internal component" a gear wheel 2 mounted on it, indicated in broken lines and forming the "external component". The gear wheel 2 has a central opening with a cylindrical inner surface 4 which has a somewhat greater diameter than the cylindrical outer surface 5 of the shaft 1 which engages concentrically within the opening. The right-hand ends, arranged one over the other, of an outer conical bush 6 and an inner conical bush 7 enter the space between. The outer conical bush 6 has a cylindrical external surface 8 by which it engages the inner surface 4 of the external component 2. The inner surface of the outer sleeve 6 forms the

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"inner conical surface" 11 with a self-jamming cone angle, which engages the external conical surface 12 of the inner conical sleeve 7, which in its turn has its cylindrical inner surface 9 seated on the cylindrical external surface 5 of the shaft 1.

When the outer bush 6 is displaced axially in relation to the inner bush 7 in the direction of the arrow 3 there is a radially dilation in the direction of the arrow 13 in the region of the conical surfaces 11, 12, i.e. in the clamping region, whereby the gear wheel 2 is securely clamped onto the shaft 1.

In order to convert as much as possible of the applied axial displacement force into a radial stressing force in accordance with the arrow 13, the bushes 6, 7 are provided with longitudinal slits passing through them at a point in their peripheries as indicated in the case of the sleeve 6 by the fact that its cross-section is not fully cross-hatched. The slitting can also occur, looked at longitudinally, only partially and can be at several points in the periphery as indicated in the case of the sleeve 7.

The axial region in which the conical bushes 6, 7 are present in the external component 2 and exert their clamping force is the stress region 20.

The conical sleeves 6, 7 have, axially adjacent to the stress region 20, i.e. as shown in Fig. 1 to the left of the gear wheel forming the external component 2, screwed threaded extensions 14 and 15 in the form of a radially projecting collar or peripheral web with external threads. The threaded extension 14, carries a right-hand thread 16 and the threaded extension 15 carries a left-hand thread 17 of the same diameter.

The arrangement of the threads could be the other way round.

Seated on the threads 16, 17 is a screwed sleeve 30 with two axially adjacent internal threads 18, 19 co-operating with the threads 16, 17 when the screwed sleeve is turned, for example by the engagement of a rotary tool in longitudinal grooves distributed around its periphery.

On rotation of the screwed sleeve 20 in one direction the conical bush 16 is shifted with respect to the bush 7 for example in the direction indicated by the arrow 3, and on rotation of the sleeve 30 in the other direction it is displaced in the opposite direction. In the one direction there is a clamping of the external component 2 on the shaft 1 and in the other direction a release of the self-jamming conical stressed connection formed by the coned bushes 6, 7.

From Fig. 1 it can be seen that the screwed sleeve 30 and the threaded extensions 14, 15 are axially separate from the stress region 20 and that the conical bushes 6, 7 can consequently be made really thin-walled in a radial direction so that the diameter of the inner peripheral surface 4 of the external component 2 only needs to be relatively slightly greater than the diameter of the external surface 5 of the shaft 1.

When it is required that the external component 2 should maintain a predetermined position in relation to the shaft 1 on clamping, this can be achieved in that an inwardly projecting peripheral web 21 is provided at the right-hand edge of the inner surface 4, lying in front of the outer end face of the inner coned bush 7 or, when the external component 2 is to be secured on

the end of the shaft 1, also in front of the end of the shaft 1.

In Fig. 2 and 3 there are diagrammatically indicated by way of example thread formations for the screwed sleeve 30 and correspondingly naturally for the threaded extensions 14, 15, and corresponding thread formations could also be provided in the screwed sleeves to be described further. The pitch of the thread is shown exaggerated for added clarity. In Fig. 2 the thread 18 is a single-start left-hand thread and the thread 19 is a single-start right-hand thread of the same pitch. The pitches could if desired, however, also be selected to be different. In the example of Fig. 3 the thread 19 is again a single-start right-hand thread and the thread 18" is likewise a right-hand thread but of twice the pitch. Also in this version the portions driven by the threads 19, 18" are shifted relatively in an axial direction on rotation of the screwed sleeve 30.

Whereas in the clamping device 100 the threaded extension 14 is arranged on the thin-walled end of the outer coned bush 6 and the threaded extension 15 on the thick-walled end of the inner bush 7, this arrangement is inverted in the clamping device 400 of Fig. 4. The threaded extension 14 is seated on the thick-walled end of the outer coned bush 6' and the threaded extension 15 on the other hand is on the thin-walled end of the inner coned bush 7'. When the screwed sleeve 30' is screwed on, the clamping takes place in the stress region 20 in that the bush 6' is displaced over the bush 7'.

A further difference in relation to the clamping device 100 lies in the fact that the co-operating

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threads 16', 18' on the one hand and 17', 19' on the other hand are of different diameters, so that the threaded bush 30' is a stepped bush.

Where the clamping device 400 is placed against a shoulder 10 on the shaft 1 in the manner shown in Fig. 4 so that the right hand end face of the outer coned bush 6' and/or the right-hand side of the external component 2 engage against the shoulder 10, the external component 2 remains axially exactly located on tightening of the clamping device 400.

In the case of the clamping device 500 of Fig. 5 the external component 2 is arranged with its cylindrical internal surface 4 directly in contact with the cylindrical external surface 5 of the shaft 1 and the end of the latter. The shaft 1 has a co-axial cylindrical recess 32 which leaves only a peripheral wall 34 of relatively small wall thickness. The clamping device 500 is arranged in the recess 32 and comprises an outer coned bush 6 which has outside the clamping region 20 a threaded extension 14 with an external screw-thread 16 formed as a right-hand or left-hand thread, clear of the end face of the shaft 1.

Inside the coned bush 6 there is arranged a conical inner body 33 which carries on its thicker end axially outside the threaded extension 14 a radial project threaded extension 15 with an external thread 17 which has the same diameter but opposite pitch, compared to the external thread 16 on the threaded extension 14. Co-operating with the threads 16 is the screwed sleeve 30 which corresponds to the sleeve 30 of Fig. 1. On tightening of the clamping device 500 by rotation of the screwed sleeve 30 the peripheral wall 34 of the recesses 32 is radially dilated and the

components 1, 2 are clamped together against rotation at their surfaces 5, 4.

Instead of engaging in grooves 31 on the periphery of the screwed sleeve 30 for tightening the sleeve 30 using an appropriate tool, e.g. a hook spanner, a special rotary tool can be provided in accordance with Fig. 6 and 9.

In the embodiment of Fig 6 and 7 the screwed sleeve 30 has teeth 35 provided on its outer periphery engaged by the teeth of a pinion 40 which is mounted rotatably by means of a spindle 41 in a bore 42, parallel to the axis, in the external component 2, the spindle carrying on its other end an extension 43 with key faces which can be engaged by a crank or spanner or key. The diameter of the arc of the teeth on the pinion 40 amounts, in the example shown, to only about a quarter of the arc of the teeth 35 so that for a predetermined torque for rotating the pinion 40, about four times the torque is exerted on the sleeve 30. An alternative embodiment is shown in Figure 8. A tool 50 is provided, having a spanner jaw 51 matching an external hexagon surface 52 on the sleeve 30. On the opposite side of the tool 50 from the jaw 51 there are teeth 53 engaged by the teeth of the pinion 40. On rotation of the pinion 40 by means of its hexagon socket 44 the screwed sleeve 30 is again turned as in the embodiment of Fig. 6 and 7. The advantage of this embodiment lies in the fact the the tool 50 can be fitted onto the sleeve 30 from the side and therefore no open end is needed on the shaft 1 and the teeth 53 only have to be provided once, namely on the tool 50, whereas in the embodiment of Fig. 6 and 7 every individual screwed sleeve must be provided with teeth.

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Where, as the sleeve 30 of Figure 8 is tightened, the pinion reaches the end of the row of teeth 53 which extend over an angle of about 90° , the tool 30 is correspondingly shifted in position on the sleeve 30.

The tool 60 in Fig. 9 differs from the tool 50 in that instead of the external teeth 53 an arcuate opening 61 is provided with teeth 63 over its radially outer face, engaged from inside by the pinion 40. The arcuate opening 61 in the tool 60 is wide enough so that the pinion 40 engages in the outer row of teeth 63 and because of the inner face of the arcuate opening 612 it cannot jump out.

In Fig. 10 and 11 there is shown a torque lock 70 which is fitted onto the already tightened clamping device 6, 7, 30. In this embodiment by way of example the screwed sleeve 30 again has an external hexagon 52 and the torque locking device 70 is in the form of a plate with a spanner jaw 51 matching the hexagon 52. Outside the jaw 51, which therefore forms a notch matching the outer periphery 52 of the torque lock 70, there is provided a hole 71 perpendicular to the plane of the plate, through which a screw 72 passes and engages in a threaded hole 73 in the external component 2. The torque lock 70 thus connects the screwed sleeve 30 securely against rotation with respect to the external component 2. However, that is not its actual function as the coned rings 6, 7 engage one another securely anyway, once the screwed sleeve has been tightened, on account of the self-jamming angle. The actual function of the torque lock 70 begins when the limiting torque of the clamping device is exceeded and when the device therefore starts to slip on the shaft 1. Then the external component carries the torque lock 70 with it and thereby takes the screwed sleeve 30 in

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the direction of the torque whereby according to the arrangement of the thread, a loosening of the coned rings 6, 7 or a greater tightening of them takes place. The first can be desirable in order to relieve the stress and protect the device in the event of excessive torque, protecting against the co-operating cylindrical surfaces of the shaft 1 and the coned ring 7 being damaged. The second version can be desirable in order to counteract the excessive torque by immediate increased tightening of the clamping device. The action of the torque lock 70 can be altered in the same direction of rotation in that the clamping device is turned around and the torque lock 70 is fitted on the other axial side of the external component 2.

A torque lock can also be achieved in that for example the tool 50 in Figure 8 is left on the screwed sleeve 30 after tightening and is connected in a none-rotary fashion to the external component 2 by means of a screw applied outside the spanner jaw 51, engaging in the bore 71' indicated in broken lines.

The thickness of the torque lock should not be too small, so that the screwed sleeve can also be reliably engaged even with differing positions in the longitudinal direction.



C l a i m s:

1. Clamping device for transmitting torques between at least one internal component (1) having a cylindrical external surface (5), in particular a shaft, and at least one external component (2) having an opening in which the internal component (1) engages concentrically, the external component having a cylindrical internal surface (4), in particular a hub,

with an outer coned bush (6,6') with a cylindrical external surface (8) designed for engagement with the inner surface (4) of the external component (2) and an inner conical surface (11) co-axial with it, with a cone angle in the self-jamming range,

with an inner coned bush (7,7') with a cylindrical inner surface (9) design for engagement on the external peripheral surface (5) of the internal component (1) and an outer conical surface (12) co-axial with it, having a cone angle equal to the inner conical surface (11)

and with a screwed sleeve (30, 30') around the inner coned bush (7,7') with an internal screw-thread (19) on a threaded extension (15) which is axially adjacent the stress region (20) of the conical surface (12) designed for disposition axially clear of one side of the external component (2), screwed onto external threads, (17, 17') on the inner coned bush (7, 7') and by means of which the coned bushes (6,6';7,7') can be axially drawn together and pushed apart with sliding of the conical surfaces (11, 12),

characterised in that,

also the outer coned bush (6,6') has a threaded extension (14) axially adjacent the stress region (20) of the conical surface 11, designed for disposition



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axially outside the external component (2) on the same side, with an external thread (16,16'),

that the screwed sleeve (30,30') has axially adjacent the first internal screw-thread (19,19') a second internal screw-thread (18,18') of different pitch

and that the second internal screw-thread (18,18') of the screwed sleeve (30,30') engages the external screw-thread (16,16') on the outer coned bush (6,6').

2. Clamping device for transmitting torque between an internal component (1) having a cylindrical external surface (5), in particular a shaft, and at least one external component (2) in particular a hub, having a cylindrical internal surface (4) which is arranged on the cylindrical external surface (5) of the internal component (1) in the neighbourhood of the axial end of the internal component (1),

with an open concentric cylindrical recess (32) provided on the end of the internal component (1),

with a coned bush (6) with a cylindrical external surface (8) designed for engagement in the recess (32) and an inner conical surface (11) co-axial with it, with a cone angle lying on the self-jamming range,

with a conical inner body (33) with an outer conical surface (12) designed for engaging the inner conical surface (11) of the coned bush (6) with a cone angle equal to that of the inner conical surface (11)

and with a screw arrangement by means of which the coned bush (6) and the conical inner body (33) can be axially drawn together and urged apart with sliding of the conical surfaces (11,12),

characterised in that,

the conical inner body (33) has a threaded extension (15) with an external screw-thread (17) axially adjacent the stress region (20) of the conical

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surface (12) for disposition axially clear of one side of the external component (2),

that the outer coned bush (6) has a threaded extension (14) with an external screw-thread (16) axially adjacent the stress region (20) of the inner conical surface (11) designed for disposition axially clear of the external component (2) on the same side of the latter,

that a screwed sleeve (30) surrounding the conical inner body (33) is provided with two axially adjacent internal screw-threads (18,19) of different pitch

and that the one internal screw-thread (19) of the screwed sleeve (30) engages the external screw-thread (16) of the outer coned bush (6) and the other internal screw-thread of the screw (30) engages the external screw-thread (17) of the conical inner body (33).

3. Clamping device according to Claim 1 or 2, characterised in that the screw-threads (18,19) comprise a right-hand thread and a left-hand thread.

4. Clamping device according to Claim 1 or 2, characterised in that the thread (18",19) comprise threads of the same hand but different pitch.

5. Clamping device according to Claim 1 or 2, characterised in that the radius of the threads (16,18;17,19) of different pitch is equal.

6. Clamping device according to Claim 1 or 2, characterised in that the radius of the threads (16,18;17,19) of different pitch is different.

7. Clamping device according to one of Claims 1 to 6, characterised in that at least one of the pairs

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of co-operating screw-threads (16,18;17,19) is formed as a recirculating ball thread.

8. Clamping device according to one of Claims 1 to 7, characterised in that the screw-threaded extension (14) is arranged on the thin-walled end of the outer coned bush (6) and the screw-threaded extension (15) is arranged on the thick-walled end of the inner coned bush (7) or of the conical inner body (33).

9. Clamping device according to Claim 8, characterised in that a longitudinal stop (21) is provided on the external component (2) engaging the end of the inner coned ring or a shaft end.

10. Clamping device according to Claim 8 or 9, characterised in that the conical surfaces (11,12) extend axially as far as below the threaded extension (14) which is towards the external component (2).

11. Clamping device according to one of Claims 1 to 7, characterised in that the screw-threaded extension (14) is arranged on the thick-walled end of the outer coned bush (6') and the screw-threaded extension (15) is arranged on the thin-walled end of the inner coned bush (7') or of the conical inner body (33).

12. Clamping device according to Claim 11, characterised in that a longitudinal stop (10) is provided on the internal component (1) engaging the outer coned ring (6') and/or the external component (2).

13. Clamping device according to one of Claims 1 to 12, characterised in that a rotary tool is provided,

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supported on a pivotal axis (41) on the external component (2) and engaging the periphery of the screwed sleeve (30,30').

14. Clamping device according to Claim 13, characterised in that the rotary tool comprises a toothed pinion (40) of which the arcuate diameter is substantially smaller than the outside diameter of the screwed sleeve (30,30').

15. Clamping device according to Claim 14, characterised in that the screwed sleeve (30,30') has on its outer periphery a set of teeth (35) matching the pinion (40).

16. Clamping device according to Claim 14, characterised in that a tool (50,60) is provided, capable of being fitted in a non-rotary manner onto the screwed sleeve (30) and provided on its periphery with the teeth (53,63).

17. Clamping device according to Claim 16, characterised in that the tool (50,60) can be fitted onto the screwed sleeve (30) in different angular positions and the teeth (53,63) occupy an arc corresponding to at least one angle step.

18. Clamping device according to one of Claims 13 to 17, characterised in that there is provided on the external component (2) a bore (42) which is parallel to the axis and in which the pinion (40) is rotatable around a spindle (41).

19. Clamping device according to one of Claims 1 to 18, characterised in that a torque lock (70) for the



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screwed sleeve (30) is provided engaging the external component (2).

20. Clamping device according to Claim 19, characterised in that the torque lock (70) is in the form of a plate which has a notch (51) matching the non-circular external periphery (52) of the screwed sleeve (30) and has beyond the notch (51) a hole (71) for engagement of a bolt (72) engaging in the external component (2).

21. Clamping device according to Claim 20, characterised in that the torque lock is formed by the tool (50,60) which has an additional hole (71') for entry of a bolt engaging in the external component (2).