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Clamping Assembly for Transmitting Torques
and/or Axial Forces

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

A similar clamping assembly is known from DE-OS-34 44 608. In this arrangement the screw-thread is applied to the thinner end of the inner taper ring and engages the screwed ring by means of a radially outwardly projecting peripheral collar behind a radially inwardly projecting peripheral collar on the outer taper ring. The engagement is established in that the outer taper ring is elastically radially expanded to some extent. On clamping of the assembly the outer taper ring is urged, with engagement of its face on the screwed ring on the inner taper ring, against the thicker end of the latter. On withdrawal the interface comes to bear on the peripheral collars of the screwed ring and of the outer taper ring.

A peripheral collar which is brought into engagement at an interface with elastic expansion of one of the taper rings can only have a small height. Accordingly, the pulling force which can be exerted through such a collar is limited. The step, of which only a small one is possible, is inclined to deformation or distortion under high surface loadings. With self-jamming taper angles, such as are generally necessary for achieving high clamping forces, the releasing forces are in practice just as large as the clamping forces. The clamping assembly according to DE-OS-34 44 608 is therefore only suitable for limited values of torque.

Furthermore, it is a drawback that the screwed ring is present substantially in front of the face of the outer taper ring, i.e. axially outside the taper rings and so increases the axial structural length of the clamping assembly.

From EP-OS 7 217 there is known a clamping assembly of the scope defined, in which the arrangement of the screw-thread relative to the taper surfaces is the same but the screwed ring comprises a cylindrical extension projecting beyond the end of the outer taper ring and having an inwardly projecting collar which engages in an outer peripheral groove in the outer taper ring. Here again the engagement is achieved with elastic deformation of at least one of the partners and is accordingly restricted to the height of engagement at the interface. The stressing of the clamping assembly takes place by engagement of the face of the extension against a flank of the groove of the outer taper ring, whereby on account of the necessity for deformation of the extension in producing the engagement and the resulting thin-walled condition of the extension, there arises the danger of bellling out and other distortions on the application of the axial compression forces for clamping.

From GB-A-624 872 there is known a clamping arrangement for connecting axially aligned shafts, which are surrounded by a connection sleeve. The one shaft has on its end a conical pin over which there engages an internal taper on the connecting sleeve and onto which it is drawn by means of an outer collar of the screwed ring engaging behind the connecting sleeve. An outer component in the form of a bearing is arranged axially outside the conical pin on a cylindrical portion of the connecting sleeve and is secured in a different manner.

The invention is based on solving the problem of arranging a clamping assembly of the kind defined so that large clamping forces are possible.

This problem is solved by the invention stated in claim 1.

The important point in this connection is that by virtue of the construction stated no elastic deformation of the peripheral collars is necessary any longer in order to produce the engagement. The screwed ring can be slipped over the cylindrical outer periphery of the outer taper ring until its inwardly projecting peripheral collar comes into engagement against the outwardly projecting peripheral collar on the outer taper ring. Both together can then be slipped over the inner taper ring from its thinner end, until the internal screw thread on the screwed ring comes into engagement with the external thread on the inner taper ring and starts the stressing action. Naturally the screwed ring can also be slipped over the already assembled-together inner and outer taper rings. All the co-operating components can be made substantially more stable because they no longer have to be distorted to achieve the engagement. Accordingly, the forces which can be applied are also greater.

When the co-operating conical surfaces of the inner and outer taper ring have a cone angle which lies in the self-jamming range, the clamping assembly does not release of its own accord after releasing the screwed ring. On the contrary, forces must be exerted in opposition to the direction of release in order to displace the outer taper ring from the inner one again. This can be put into practice in an embodiment of the invention according to claim 2.

A further embodiment of the invention is the subject matter of claim 3. In this arrangement the

screwed ring can be drawn up as far as is permitted from the torque point of view by the means available. The peripheral collars engage one another with a certain force and a predetermined clamping condition is already achieved. However, the final clamping subsequently follows hydraulically, in that the piston/cylinder units are actuated and the outer taper ring is drawn further onto the inner taper ring.

The same principle can also be used for releasing the clamping assembly in that according to claim 4 piston/cylinder units act against the component seated on the cylindrical outer peripheral surface of the outer taper ring. In this way there is produced a compressive force transmitted through the screwed ring to the inner taper ring and acting to disengage the taper rings.

The play or clearance provided in accordance with claim 5 is of advantage so that no friction arises at the inner periphery of the inwardly projecting peripheral collar of the screwed sleeve on engagement.

The screwing arrangement according to Figure 6 permits axial adjustment of the outer component and is of particular advantage when one is concerned with securing outer components on vertical rods or columns.

A particular embodiment of the invention is the subject matter of claim 7. In this arrangement the inner taper ring is doubled and the other clamping elements are correspondingly also present in double form. This allows the construction of a shaft or tube coupling, the end of the shafts being inserted into the double taper ring from both ends until the end faces come into engagement with one another at the centre. The drawing-on on the two screwed rings can take place in a mutually independent manner.

A shaft coupling with a double taper ring producing the connection and with two outer taper rings

is known in itself from US-A-1 732 355. In this arrangement, however, only one screwed sleeve is present and the constructional layout with regard to the taper rings and their disposition is different.

A further embodiment which is important in practice is that of the coupling flange according to claim 8.

In order to be able to employ also the region of the peripheral collar of the outer taper ring for transmitting radial clamping forces, there is recommended a chamfering or taper in accordance with claim 9, which results in radial components being generated by the axial forces of the screwed ring.

The preferred angle is 45° (claim 10).

In order to ensure that as large as possible a proportion of the longitudinal forces exerted by the screwed ring is converted into radial clamping forces and so that not too much of the deformation energy is lost in overcoming the play, a longitudinal slotting of the taper rings in accordance with claim 11 is recommended.

Although the invention is not bound up with the presence of a self-jamming cone angle, the preferred embodiment does however envisage such a fact in order to be able to transmit the greatest possible torques. The releasing forces which are then necessary can be applied either by additional screws or by screwing of the screwed ring itself.

Generally speaking, when the screwed ring is pulled on there is no rotation of the inner taper ring with it, so that no special steps are necessary in order to secure this component on the shaft or on the inner component to hold it against rotation.

However, in order to be independent of the adhesion of the inner taper ring on the shaft and furthermore to be able to bring about a torque

conversion, there is recommended a torque applying tool in accordance with claim 13, abutting against the outer component. The torque on clamping of the assembly then only leads to forces remaining within the clamping arrangement, so that a slippage is basically no longer caused.

In the preferred embodiment according to claim 14 the torque applying tool includes a toothed pinion, of which the pitch-circle diameter is substantially smaller than the diameter of the screwed ring. When the pinion is turned by suitable means, for example a spanner or a crank, there is a torque conversion corresponding to the ratio of the diameters.

The teeth which co-operate with the pinion can be provided on the outer periphery of the screwed ring or on a separate tool which can be applied in a rotationally coupled manner to the screwed ring, its outer periphery then carrying the teeth (claims 15, 16).

The tool can generally only be fitted onto the screwed ring from the side, which then has a polygonal actuating outline, on which the tool can be fitted in different angular positions. The teeth then do not need to be provided over the whole periphery but only over an arc on the screwed ring corresponding to the angular difference between two different such positions.

For mounting and supporting the pinion on the outer component there is recommended the embodiment according to claim 18, according to which the pin can be rotatable in the bore or it can be secured and have the pinion rotating on it.

The torque lock of claims 19, 20 and 21 arises when the limiting torque is exceeded and therefore on sudden displacement of the clamping assembly, in its operation and leads, according to the direction of rotation, to release of the screwed ring in order to avoid damage to the shaft and the inner taper ring, or

to a more secure drawing-on of the screwed ring and thereby of the clamping assembly.

The invention extends also to further features given in the description of an example, as well as to all combinations of the features disclosed.

Embodiments of the invention by way of example are illustrated in the drawing.

Fig 1 shows an elevation, partially sectioned, of a first embodiment of a clamping assembly according to the invention;

Fig. 2 shows a partial view from Fig. 1 showing an advantageous modification;

Fig. 3 shows a view corresponding to Fig. 1 but of a second embodiment;

Figs. 4 and 5 show views corresponding to Fig. 1 but of further embodiments;

Fig. 6 shows diagrammatically the operation of a torque-applying tool;

Fig. 7 shows a partial view of Fig 6, looking from the left.

Figs. 8 and 9 show corresponding partial views of further embodiments of the torque-applying tool.

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

The clamping arrangement indicated as a whole at 100 serves for securely clamping onto a shaft 1 with a cylindrical external surface 2 an outer component 3 in the form of a gear wheel with a bore having a cylindrical inner surface 4, allowing radial spacing away from the outer surface 2. The right-hand end of the clamping assembly 100 as viewed in Fig. 1 engages in the clearance between the cylindrical surfaces 2 and 4.

The clamping assembly 100 comprises an inner taper ring 10 of which the cylindrical inner surface 5 engages the cylindrical outer surface 2 of the shaft 1

and it has a conical external surface 6 with a taper in the self-jamming range, of which the thicker end, i.e. that which is in the left in Fig 1, has joined on to it a radially outwardly projecting peripheral flange or collar 7 which has on its external surface a screw-thread 8. Release threads 9 are formed, distributed over the periphery, underneath the thread 8 in the portion of the collar 7 which projects radially beyond the thicker end of the conical surface 6, and an engaged clamping assembly can be released again with the aid of these threads.

Arranged on the conical surface 6 of the inner taper ring 10 is an outer taper ring 20 which has a conical internal surface 11 of the same cone angle as the surface 6 and a cylindrical outer peripheral surface 12 which engages the inner surface 4 of the outer component.

Provided on the thinner end of the outer taper ring 20 is a radially outwardly projecting peripheral collar 13 which projects beyond the cylindrical outer surface 12 and of which the engaging surface 14 perpendicular to the axis and towards the thicker end is freely accessible for a ring slipped on to it from the thicker end.

The peripheral collar 13 of the outer taper ring 20 is surrounded by a screwed ring 30 which has on its end an internal thread 15 co-operating with the external thread 8 on the outer periphery of the peripheral flange 7. The inside diameter of the thread 15 is greater than the outside diameter of the collar 13 so that the screwed ring 30 can be slipped from the right as viewed in Fig. 1, over the outer taper ring, and the thread 15 can clear the collar 13.

The screwed ring 30 has on its other end a radially inwardly projecting peripheral collar 17 which engages radially from outside behind the collar 13 on

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the side away from the threads 8, 15 and with its surface 16, perpendicular to the axis, comes into engagement against the engaging surface 14 of the collar 13. The inner surface 18 of the collar 17 is cylindrical and allows some degree of play in relation to the outer surface 12 of the outer taper ring 20 in order to avoid friction at this point.

When the clamping assembly 100 is assembled together the outer taper ring 20 can be slipped onto the inner taper ring 10 and then the screwed ring 30 is slipped over from the right as viewed in Fig. 1 and the threads 8, 15 are brought into engagement. In this way the clamping assembly 100 forms an assembly that holds together. By tightening of the screwed ring 30 the outer taper ring 20 is drawn to the left in Fig. 1 on the inner taper ring 20, whereby a radial spreading or expansion of the outer taper ring 20 takes place and thereby the clamping against the inner surface 4.

To avoid excessive losses in the axial clamping force applied by the screwed ring 30 the outer taper ring 20 is radially slotted right through at one point, indicated by the absence of hatching, whilst the inner taper ring 10 is slotted at several points distributed over its periphery in the region of its tapered surface 6.

To release a clamping assembly 100 provided with self-jamming taper surfaces 6, 11 releasing screws are screwed into the release bores 9 and come up against the face 19 of the collar 13 of the outer taper ring 20 which is opposite the engaging face 14. However, the screwed ring 30 can be brought also with its face which is towards the outer component 3 to engage against it and to effect the release by further screwing in this direction.

When the clamping assembly 100 of Fig. 1 is in its clamped condition, the outer component 3 which is to be

clamped on the shaft 1 shares in the axial displacement of the outer taper ring 20 in relation to the inner taper ring 20 which is securely seated on the shaft 1. In many cases this does not matter. However, if it is desired that the outer component 3 remains fixed axially in relation to the shaft 1 when the clamping assembly 100 is tightened, an arrangement according to Fig. 2 can be chosen. In this arrangement the outer component 3 has an extension 3' projecting radially inwards as far as the face 21 of the inner taper ring 20 at the thinner end of the latter, and the projection 3' abuts either directly against the face 21 or through an interposed ring 22. Then on displacement of the outer taper ring 20 to the left in Fig. 2 the outer component 3 can no longer share in the movement in relation to the shaft 1.

In order to be able to apply to the screwed ring 30 the torque needed for tightening, there are provided grooves 23 extending parallel to the axis and distributed over its periphery and in which an appropriate torque-applying tool can be engaged.

In the clamping assembly 200 of Fig. 3 components of corresponding function are identified by the same reference numerals.

The difference from the clamping assembly 100 lies in that in the assembly 200, in the engaging face 16 of the collar 17 of the screwed ring 30 which is towards the collar 13 of the outer taper ring 20 there are arranged a number of small piston/cylinder units circumferentially distributed and acting parallel to the axis, the pistons of these units being displaced out of the associated cylinder bore 26 in the collar 17 against the engaging face 14 of the collar 13 when a hydraulic pressure medium is introduced through the connections 27. In this way the outer taper ring 20 is drawn to the left in Fig. 3 in relation to the inner

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taper ring 10. The force is transmitted through the screwed ring 30 and the threads 18, 15 to the inner taper ring 10. The pistons 25 could project to some extent towards the engaging faces 16 from the start i.e. when they engage against the base of the bore 26 of the cylinder, or alternatively they could initially be retracted completely below the engaging face 16.

The screwed ring 30 is therefore first drawn up by a certain degree of tightening, after which the further clamping is undertaken hydraulically in that the pistons 25 are forced out under high pressure.

With similar piston/cylinder units which however act on the other side and come into engagement against the outer component 3 secured on the outer taper ring, the release of the clamping assembly 200 can be performed. In the application of pressure against the left hand side (as viewed in Fig. 3) of the outer component 3 this first leads to relative movement of the taper surfaces 6, 11 and thereby causes release of the clamping assembly 200.

The bores 29 in the flange 7 serve, at the start of the clamping step, when the inner taper ring 10 is not yet firmly seated on the shaft 1 to be able to oppose the torque applied by a suitable torque applying tool to the screwed ring 30.

In Fig. 3 an alternative is indicated in broken lines in that the bore 4, instead of having a smooth cylindrical internal surface, can also be provided with an internal screw thread 31 which is screwed onto an external thread 32 on the right hand end in Fig. 3 i.e. the thicker end, of the outer taper ring 20. The outer component 3 can be adjusted axially within a limited range. On tightening of the clamping assembly 200 the outer component 3 is secured on the outer taper ring 20.

In Fig. 4 there is illustrated a clamping assembly 300, which is made mirror symmetrical about a central

plane 33 perpendicular to its axis. The double-taper ring 10' comprises two inner taper rings 10 corresponding to Fig. 1 joined together integrally in the region of their flanges 7. The remaining elements are present in double form correspondingly. The clamping assembly 300 serves as a shaft coupling. The ends of two shafts 1 engage in the double-taper ring 10' from opposite ends and are separately joined to the ring 10' by operation of the clamping rings 30,30. The "outer components 3" in this case are thick-walled clamping rings which simply have to take the peripheral tension needed to achieve the radial clamping force.

A particular feature in this embodiment lies in the fact that the engaging surfaces 14,16 of the outer taper ring 20 and of the screwed ring 30 do not, as in the embodiments of Figs. 1 and 3, extend perpendicular to the axis but have an inclined position, i.e. they are conical. The angle 32 in relation to the axis amounts, in the embodiments by way of example in Fig. 4, to about 45°. In this way, also in the region of the collar 13 of the outer taper ring 20 there is a certain degree of radial pressure on the latter which delivers an added amount to the torque that can be transmitted.

In Fig. 5 there is illustrated an embodiment by way of example in which the outer component 3 is in the form of a coupling flange which can be secured onto the region of the end of a shaft 1 by means of a clamping assembly 400. In the clamping assembly 400 likewise the engaging surfaces 14,16 have the inclined arrangement shown in Fig. 4.

A feature common to the clamping assemblies 300,400 of Figs. 4 and 5 is that the screwed rings 30 are made of hexagonal form at their

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peripheries, like a nut, in order to offer the possibility of engagement by a spanner.

Instead of the tightening of the screwed ring being by using a corresponding rotating means, for example a hooked key engaging in grooves 31 on the periphery of the screwed ring 30 (Figs. 1,3) or using a normal spanner (Figs. 4,5) engaging on the periphery of the screwed ring 30, according to Figs. 6 to 9 a special torque-applying tool can also be provided.

In the embodiment according to Figs. 6 and 7 the screwed ring 30 has on its outer periphery an array of teeth 35 engaged by the teeth of a pinion 40 rotatably mounted by means of a pin 41 in a bore 42 in the outer component 3 parallel to the axis, and has on its other end a projection 43 with faces for engagement by a spanner, on which a crank or spanner can engage. The diameter of the pitch circle of the teeth on the pinion 40 amounts in the embodiment shown to only about a quarter of the pitch circle of the teeth 35 so that on the application of a predetermined torque for rotating the pinion 40 about four times the torque is exerted on the screwed ring 30. An alternative embodiment is shown in Fig. 8. A tool 50 is provided with a spanner jaw 51 which fits on to a male hexagon 52 on the screwed ring 30. The tool 50 has on the side of it furthest from the jaw 51 an array of teeth 53 engaging the teeth of the pinion 40. On rotation of the pinion 40 by means of the hexagon socket 44 the screwed ring 30 is turned just as in the embodiment of Figs. 6 and 7. The advantage of this embodiment lies in the fact that the tool 50 can be fitted on to the screwed ring 30 from the side and therefore the shaft 1 does not need to have an accessible end, and that the teeth 53 only have to be provided once on the tool 50, whilst in the embodiment

of Figs. 6 and 7 each individual screwed ring must have its own teeth.

During tightening of the screwed ring 30 of Fig. 8, when the pinion comes to the end of the teeth 53 which extend only over an angle of about 90° , the tool 50 is correspondingly shifted on the ring 30.

The tool 60 of Fig. 9 differs from the tool 50 in that, instead of the external teeth 53, an arcuate opening 61 is provided with an array of teeth 63 on its outer periphery, 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 teeth 63 on its outside and is prevented from jumping out by the inner limiting surface of the arcuate recess 61.

In Figs. 10 and 11 there is illustrated a torque lock 70 which is fitted to the already tightened assembly 6,7,30. Again the screwed ring 30 has in this embodiment an external hexagon 52 and the torque lock 70 is formed as a plate with a spanner jaw 51 which fits the external hexagon 52. Outside the spanner jaw 51 which therefore forms an opening fitting the outer periphery 52 of the torque lock 70, is a hole 71 perpendicular to the plane of the plate and engaged by a screw 72 which passes through it and engages in a threaded bore 73 in the outer component 3. The torque lock 70 thus connects the screwed ring 30 to the outer component 3 against rotation. However that is not its actual function as the taper rings 6,7 are seated securely in relation to one another, once the screwed ring 30 has been tightened, on account of the self-jamming angle. The actual function of the torque lock 70 only starts when the limiting torque of the clamping assembly is exceeded, and when the assembly therefore starts to shift on the shaft 1. Then the outer component carries the torque lock 70 with it and thereby the screwed

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ring 30 in the direction of the torque whereby, according to the arrangement of the thread, a loosening of the taper rings 6,7 or an increased tightening of them takes place. The first may be desirable in order, in the event of excessive torque, to provide simultaneous relief and to protect against the co-operating cylindrical surfaces of the shaft 1 and the taper ring 7 being damaged. The latter may be desirable in order immediately to cope with the excessive torque by immediate increased tightening of the assembly. With the same direction of rotation the action of the torque lock 70 can be altered in that the clamping assembly is turned around and the torque lock 70 is applied to the other axial side of the outer component 3.

A torque lock can also be put into effect in that for example the tool 50 of Fig. 8 is left on the screwed ring 30 after tightening and is secured to the outer component 3 against rotation by means of a screw applied clear of 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 ring can also be grasped securely in the longitudinal direction in different positions.

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C l a i m s

1. Clamping assembly for transmitting torques and/or axial forces between an inner component (1), in particular a shaft, having a cylindrical external surface (2) and at least one outer component (3), in particular a hub, arranged on it and having an opening (4) with a cylindrical internal surface,

with an inner taper ring (10) with a cylindrical inner surface (5) designed to engage the outer surface (2) of the inner component (1) and a conical outer surface (6),

with an outer taper ring (20) with an outer surface (12) designed to engage the cylindrical inner surface (4) of the opening and a conical inner surface (11) designed to co-operate with the conical outer surface (6) of the inner taper ring (10),

and with a screwed ring (30) which can be screwed on to a thread (8) on the inner taper ring (10) and having a radially inwardly projecting peripheral collar (17) by which it engages behind a radially outwardly projecting peripheral collar (13) of the outer taper ring (20),

characterised in that,

the peripheral projection (13) on the outer taper ring (20) is provided on the smaller end of the latter and projects outwards beyond the outer periphery (12) of the portions of the outer taper ring (20) preceding the thicker end of the outer taper ring (20)

and that the thread (8) is provided on the thicker end of the inner taper ring (10) and projects outwards over the outer periphery of the portions of the inner taper ring (10) preceding the thinner end of the inner



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taper ring (10) and over the outer periphery of the peripheral collar (13).

2. Clamping assembly according to claim 1, characterised in that the inner taper ring (10) has a radially outwardly projecting peripheral flange (7), on the outer periphery of which the thread (8) is provided and which has axial through-going threaded bores (9) for release screws in front of the face (19) of the radially outwardly projecting peripheral collar (13).

3. Clamping assembly according to claim 1 or 2, characterised in that circumferentially distributed hydraulic piston/cylinder units (24) are arranged in the engaging surface (16) of the peripheral collar (17) of the screwed ring (30) which is towards the peripheral collar (13) of the outer taper ring (20), the pistons of the units engaging, on actuation, against the engaging face (14) of the peripheral collar (13).

4. Clamping assembly according to one of claims 1 to 3, characterised in that circumferentially distributed hydraulic piston/cylinder units (28) are arranged in the face which is towards the outer component (3) of the radially inwardly projecting peripheral collar (17) of the screwed ring (30), the pistons of the units, on actuation, engaging against the opposed face of the outer component (3).

5. Clamping assembly according to one of claims 1 to 4, characterised in that the inner periphery (18) of the radially inwardly projecting collar (17) of the screwed ring (30) has radial clearance in relation to the outer surface (12) of the outer taper ring (20).



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6. Clamping assembly according to one of claims 1 to 5, characterised in that the outer component (3) has in its opening (4) a screw thread (31) and the outer taper ring (20) has an external thread (32) on its outer periphery and the outer component (3) is screwed on to the outer taper ring (20).

7. Clamping assembly according to one of claims 1 to 6, characterised in that it is made mirror-symmetrical about a central plane perpendicular to its axis and includes an inner double taper ring (10') with two outer taper rings (20) arranged on it and two clamping rings (30).

8. Clamping assembly according to one of claims 1 to 6, characterised in that the outer component (3) is in the form of a coupling flange.

9. Clamping assembly according to one of claims 1 to 8, characterised in that the engaging faces (14, 16) of the outer taper ring (20) and the screwed ring (30) are inclined in such a way that the outer taper ring (20) experiences on tightening of the clamping assembly a radially inwardly directed force component in the region of its peripheral collar (13).

10. Clamping assembly according to claim 9, characterised in that the angle (32) of the inclination amounts to about 45°.

11. Clamping assembly according to one of claims 1 to 10, characterised in that the inner and/or the outer taper ring (10, 20) is longitudinally slotted radially right through in the region of the taper face (6, 11).



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12. Clamping assembly according to one of claims 1 to 11, characterised in that the cone angle of the taper surfaces (6, 11) is in the self-jamming range.

13. Clamping assembly according to one of claims 1 to 12, characterised in that a torque-applying tool is provided supporting itself on an axis of rotation (41) on the outer component (3) and engaging the periphery of the screwed ring (30).

14. Clamping assembly according to claim 13, characterised in that the torque-applying tool includes a toothed pinion (40) of which the pitch circle diameter is substantially smaller than the outer diameter of the screwed ring (30).

15. Clamping assembly according to claim 14, characterised in that the screwed ring (30) has on its outer periphery an array of teeth (35) matching the pinion (40).

16. Clamping assembly according to claim 14, characterised in that the tool (50, 60) is capable of being placed in a non-rotational manner on the screwed ring (30) and has the teeth (53, 63) on its periphery.

17. Clamping assembly according to claim 16, characterised in that the tool (50, 60) can be placed on the screwed ring in different angular positions and the teeth (53, 63) cover an arc corresponding at least to one angular step.

18. Clamping assembly according to one of claims 13 to 17, characterised in that there is provided in the outer component (3) a bore (42) which is parallel



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to the axis and in which the pinion (40) is rotatable about a pin 41.

19. Clamping assembly according to one of claims 1 to 18, characterised in that a torque lock (70) for the screwed ring (30) is provided, engaging on the outer component (3).

20. Clamping assembly according to claim 19, characterised in that the torque lock (70) is in the form of a plate which has an opening (51) matched to the non-circular outer periphery (52) of the screwed ring (30) as well as a hole (71) clear of the opening (51) for the passage of a bolt (72) engaging in the outer component (3).

21. Clamping assembly according to claim 20, characterised in that the torque lock is formed by the tool (50, 60) which has an additional hole (71') for the passage of a bolt engaging in the outer component (3).

