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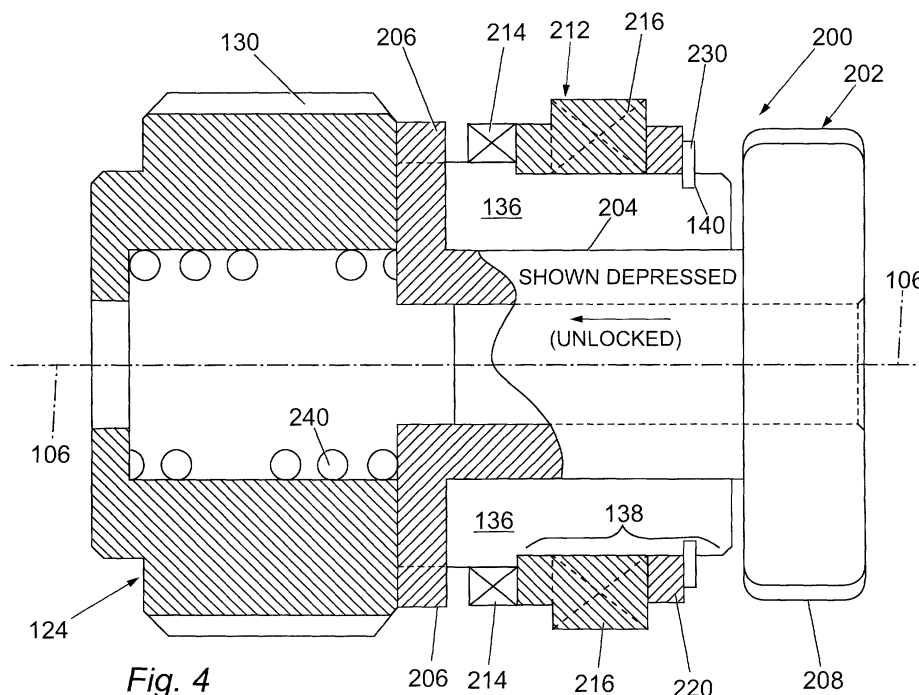
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(54) Rotation locking mechanism

(57) A rotation locking mechanism for locking the rotatable torque adjuster of an adjustable torque wrench against unwanted rotation while permitting wanted rotation for intended torque adjustment. The rotation locking mechanism of the present invention has a selectively rotatable component for locking against unwanted rotation thereof while permitting wanted rotation thereof, the rotatable component comprising rotation application means for selective application of wanted rotation to the

rotatable component by external engagement with the rotation application means, the rotation locking mechanism comprising clutch means coupling the rotatable component to a rotation anchor by way of the clutch means, the clutch means being normally engaged to clutch the rotatable component to the rotation anchor whereby to anchor the rotatable component against unwanted rotation and the clutch means being able to temporarily disengage to unlock the rotatable component for intended rotation.



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Description

[0001] This invention relates to a rotation locking mechanism, and relates more particularly but not exclusively to a mechanism for locking the rotatable torque adjuster of an adjustable torque wrench against unwanted rotation while permitting wanted rotation for intended torque adjustment.

[0002] In the field of hand tools for the controlled manual application of torque to a component (which component may, for example, be a screw-threaded fastener), torque wrenches are known forms of torque-applying tool having torque-limiting means for inhibiting or preventing the application through the tool of torque exceeding some predetermined maximum torque. For increased utility of the tool, such predetermined maximum torque is controllably adjustable. By way of example, adjustable torque wrenches are described in our published patent applications GB1249590 and EP671243A1.

[0003] Where a torque wrench has a predetermined maximum torque that is controllably variable by manipulation of a maximum torque adjustment means forming part of the wrench, it is desirable (and may be mandatory) that the adjusted maximum torque should not vary during torque-applying use of the wrench. Accordingly it is desirable that the maximum torque adjustment means should be reliably locked when the maximum torque level is not undergoing deliberate adjustment, unlocking and re-locking of the adjustment mechanism preferably being simple and automatic.

[0004] According to a first aspect of the present invention there is provided a rotation locking mechanism for locking a selectively rotatable component against unwanted rotation thereof while permitting wanted rotation thereof, the rotatable component comprising rotation application means for selective application of wanted rotation to the rotatable component by external engagement with the rotation application means, the rotation locking mechanism comprising clutch means coupling the rotatable component to a rotation anchor by way of the clutch means, the clutch means being normally engaged to clutch the rotatable component to the rotation anchor whereby to anchor the rotatable component against unwanted rotation and the clutch means being able to temporarily disengage to unlock the rotatable component for intended rotation.

[0005] Preferably the clutch means is disengaged by external engagement with the rotation application means.

[0006] Preferably the clutch means comprises a clutch having a rotation axis together with first and second clutch members that are relatively rotatable about the rotation axis.

[0007] Preferably first and second clutch members are formed to mutually lock against relative rotation when axially engaged and to mutually unlock to permit relative rotation when axially disengaged.

[0008] Preferably first clutch member of the clutch is

rotationally coupled to the rotatable component for conjoint rotation therewith, while the second clutch member of the clutch is rotationally coupled to the rotation anchor.

[0009] Preferably the clutch has bias means biasing the first and second clutch members into axial engagement to lock the first and second clutch members against relative rotation, such biasing being temporarily overcome by the external engagement with the rotation application means.

[0010] Preferably this bias means is a coiled compression spring that is substantially coaxial with the rotation axis of the clutch.

[0011] Preferably rotational coupling of the first clutch member to the rotatable component is by at least one radially projecting key on one of the first clutch member and the rotatable component slidably engaging with at least one longitudinally extending slot in the other of the first clutch member and the rotatable component.

[0012] Preferably the rotation anchor comprises a housing of the rotatable component.

[0013] Preferably rotational coupling of the second clutch member to such housing serving as the rotation anchor is by means of at least one radially projecting key on one of the second clutch member and said casing or housing slidably engaging with at least one longitudinally extending slot formed in the other of the second clutch member and the interior surface of said housing.

[0014] According to a second aspect of the present invention there is provided an adjustable torque wrench of the type whose maximum torque application value is controlled by way of a compressible coil spring wherein the compressible coil spring's compression is controlled by selectable adjustment means, the selectable adjustment means including a rotation locking mechanism according to the first aspect of the present invention.

[0015] Embodiments of the invention will now be described by way of example, with reference to the accompanying drawings wherein: -

Fig. 1 is a longitudinal section, to a reduced scale, of a first embodiment of a rotation locking mechanism incorporated into an adjustable torque wrench;

Fig. 2 is a detail of Fig. 1, to an enlarged scale;

Fig. 3 is a transverse cross-section on the line III-III in Fig. 2;

Fig. 4 is a longitudinal section, to a much enlarged scale, of the rotation locking mechanism of Fig. 1 separate from the torque wrench;

Fig. 5 is a longitudinal section of a body member of the rotation locking mechanism of Fig. 4;

Fig. 6 is a part-sectioned longitudinal elevation of a

first clutch member of the rotation locking mechanism of Fig. 4;

Figs. 7 and 8 are, respectively, left and right end views of the first clutch member of Fig. 6;

Fig. 9 is a longitudinal section of a second clutch member of the rotation locking mechanism of Fig. 4;

Figs. 10 and 11 are, respectively, left and right end views of the second clutch member of Fig. 9;

Figs. 12 and 13 are, respectively, side elevations of a washer and a circlip utilised to retain the first and second clutch members on the body member of the rotation locking mechanism;

Fig. 14 illustrates the procedure for successively assembling the components of Figs. 12 and 13 onto the first clutch member of Fig. 6;

Fig. 15 illustrates the procedure for assembling the second clutch member of Fig. 9 onto the first clutch member of Fig. 6;

Fig. 16 is a longitudinal section, to a much enlarged scale, of a second embodiment of a rotation locking mechanism according to the present invention;

Fig. 17 is a part-sectioned longitudinal elevation of a first clutch member of the rotation locking mechanism of Fig. 16;

Fig. 18 is a plan view of the first clutch member of Fig. 17;

Fig. 19 is an end elevation of a second clutch member of the rotation locking mechanism of Fig. 16; and

Fig. 20 is a side elevation section of the second clutch member of Fig. 19.

[0016] Before referring in detail to the accompanying drawings, it will be explained that Fig. 1 is a longitudinal section of a complete torque wrench constituting an embodiment of the second aspect of the present invention, Fig. 2 is an enlarged-scale detail from Fig. 1 (with Fig. 3 being a cross-section of Fig. 2), and Fig. 4 is a longitudinal section of a rotation locking mechanism which per se constitutes a first embodiment of the first aspect of the present invention, whereas Figs. 5 to 13 show individual components of the rotation locking mechanism of Fig. 4, and Figs. 14 & 15 illustrate assembly procedures for certain of these components. The respective scales of Figs. 1 to 15 are not mutually identical, though Figs. 5 to 15 have a common scale. Fig. 16 is a longitudinal section of a rotation locking mechanism which per

se constitutes a second embodiment of the first aspect of the present invention, whereas Figs. 17 to 20 show individual components of the rotation locking mechanism of Fig. 16. Comparison of any particular component or sub-assembly as depicted in Figs. 2 to 15 with that particular component or sub-assembly as shown in Fig. 1 will disclose the correct dimensional scaling factor for comparison with other components and sub-assemblies.

[0017] Referring now to Fig. 1, this is a longitudinal section of an adjustable torque wrench 100 of a kind similar in general principle (though not identical in detail) to previously known adjustable torque wrenches, for example those disclosed in our published patent applications GB1249590 and EP671243A1. As shown in Fig. 1, the torque wrench 100 comprises a torque-limiting sub-assembly 102, and a handle sub-assembly 104 extending along a longitudinal axis 106 of the wrench 100. The sub-assembly 102 includes a tool coupling 108 that is mounted for rotation about an axis 110 at right angles to the longitudinal axis 106. The tool coupling is rotationally coupled to a combined rotary cam/ratchet ring 112 that is also rotatably mounted within the sub-assembly 102 for rotation around the axis 110. A pawl 114 is mounted for limited sliding movement along the longitudinal axis 106. The pawl 114 is urged against the combined rotary cam/ratchet ring 112 by means of a strong coiled compression spring 116 extending along the axis 106 within the handle sub-assembly 104. The force exerted by the spring 116 on the pawl 114 (through a force-transferring member 117) is essentially the force exerted by the pawl 114 on the combined rotary cam/ratchet ring 112, and together with the precise shape of the peripheral profile of the ring 112, determines the maximum torque applicable by the wrench 100 through the tool coupling 108.

[0018] The end of the spring 116 not bearing on the pawl 114, i.e. the right end of the spring 116 as viewed in Fig. 1, bears against an abutment 118 whose position along the axis 106 is adjustable in order to adjust the spring force, and hence to adjust the maximum torque. The abutment 118 is coupled by a spacer tube 120 to an end slide 122 that is caused by spring reaction force to bear against a rotatable position controller 124. The end of the handle sub-assembly 104 remote from the torque-limiting sub-assembly 102 (i.e. the right end of the handle as viewed in Fig. 1) has a housing 126 that is formed with an internal screw thread 128, and the position controller 124 is formed with a matching external screw thread 130 (more clearly shown in Figs. 4 and 5). By controllably screwing the position controller 124 along the thread 128 on the inside of the handle housing 126, the axial position of the end slide 122, the spacer tube 120, the abutment 118, and the adjacent end of the spring 116 are concomitantly varied, thereby to control the maximum torque. (The handle housing 126 is also formed with two diametrically opposed and longitudinally extending slots or keyways 132 for a purpose to be

detailed subsequently. These keyways 132 are shown in cross-section in Fig. 3, with the outer grip 134 of the handle sub-assembly omitted for clarity.)

[0019] The arrangement for adjusting maximum torque so far described is generally known (for example from GB1249590 and EP671243A1), though certain details may be different. The present invention is primarily concerned with simply and reliably ensuring that the rotatable position controller 124 is prevented from rotating when the torque wrench 100 is in use, since such unwanted rotation would alter the predetermined maximum torque and thereby render the torque wrench unreliable. In order to achieve this objective, the rotatable component of the torque wrench 100 constituted by the rotatable position controller 124 is provided with a rotation locking mechanism 200. The relationship of the rotation locking mechanism 200 (which constitutes the primary aspect of the present invention) to the remainder of the torque wrench 100 (which constitutes the secondary aspect of the present invention when fitted with the mechanism 200) is shown overall in Fig. 1, and in enlarged detail in Fig. 2. The combination of the rotatable position controller 124 and the rotation locking mechanism 200 is shown in Fig. 4 separate from the other components of the torque wrench 100, while individual components of the Fig. 4 combination are shown in Figs. 5 to 13. (Taken as a group, Figs. 5, 9, 12, 13, & 6 in succession can be regarded as an exploded view of the Fig. 4 combination).

[0020] Referring now to Figs. 4 and 5, the rotatable position controller 124 is formed as a hollow tubular component that is radially enlarged at one end (the left end as viewed in Figs. 4 and 5), this radially enlarged end being externally formed with the previously mentioned screw thread 130 that cooperatively engages with the screw thread 128 formed on the internal surface of the handle housing 126. The other end of the position controller 124 is formed with two diametrically opposed and longitudinally extending slots 136 that radially extend through the entire wall thickness of the hollow tubular component 124. The slots 136 serve to provide the rotatable position controller 124 with rotational coupling to part of the rotation locking mechanism 200, as will subsequently be detailed. A portion 138 of the periphery of the rotatable position controller 124 in the region of the slots 136 is formed with an external diameter that permits relative rotational movement of another part of the mechanism 200, as will also be detailed below. A circumferential groove 140 at the outboard end of the portion 138 (the right end as viewed in Figs. 4 and 5) serves as a circlip seating for retention of certain parts of the mechanism 200, as will be explained in due course.

[0021] The rotation locking mechanism 200 is based upon a dog clutch that normally clutches the position controller 124 to a rotation anchor constituted by the handle housing 126, but which can be de-clutched for intentional rotation of the controller 124. This dog clutch

comprises a first clutch member 202 that appears as part of the assembled mechanism in Figs. 1, 2, and 4, and separately in Figs. 6, 7, and 8. (A second clutch member will subsequently be described with reference to Figs. 9 to 11). The first clutch member 202 has a tubular body 204 externally dimensioned to be a clearance fit within the hollow tubular body of the rotatable position controller 124. One end of the first clutch member 202 (the left end as viewed in Fig. 6; the near end as viewed in Fig. 7) is provided with two diametrically opposed and radially projecting keys 206. These keys 206 are dimensioned to be a sliding fit in the slots 136 in the rotatable position controller 124, thereby to couple the controller 124 and the first clutch member 202 for conjoint rotation at all times while permitting the relative longitudinal movement that is required for clutching and de-clutching (as will be subsequently explained). The other end 208 of the first clutch member 202 (the right end as viewed in Fig. 6; the near end as viewed in Fig. 8) is generally disc-shaped with bevelled edges, and has an external diameter that is a clearance fit within the cylindrical interior of the torque wrench handle housing 126 (see Fig. 3). The generally disc-shaped end 208 has two opposed flats 210 cut away for rotational keying to a forked adjusting tool (not shown) that is externally applied to engage the first clutch member 202 when rotation of the position controller 124 is intended, this adjusting tool being absent when such rotation is not intended.

[0022] Figs. 9, 10, & 11 show the second clutch member 212, which has a generally annular or ring-like shape. The internal diameter of the second clutch member 212 is such as to provide the second clutch member 212 with a rotationally sliding clearance fit on the peripheral region 138 of the rotatable position controller 124. One end of the second clutch member 212 (the left end as viewed in Fig. 9; the near end as viewed in Fig. 10) is formed with ten equi-angularly distributed and axially open notches 214. Each of the notches 214 radially extends through the full radial thickness of the annular clutch member 212, and each notch 214 is dimensioned to be a sliding fit around the radially projecting keys 206 of the first clutch member 202. The other end of the second clutch member 212 (the right end as viewed in Fig. 9; the near end as viewed in Fig. 11) is formed with two diametrically opposed and radially projecting keys 216. The keys 216 are dimensioned to be a sliding fit in the longitudinal slots or keyways 132 formed inside the handle housing 126 (refer to Fig. 3). The co-operative interaction of the keys 216 and the slots or keyways 132 allow the second clutch member 212 longitudinal movement within the handle housing 126 as required, while rotationally coupling the second clutch member 212 to the handle housing 126 such that relative rotation of the second clutch member 212 and the housing 126 are always prevented. Since it is rotation of the rotatable position controller 124 relative to the handle housing 126 (specifically, rotation of the screw thread 128 relative to

the screw thread 130) that adjusts the maximum torque of the torque wrench 100, the above-described rotational coupling of the second clutch member 212 to the housing 126 (by means of the keys 216 and the keyways 132) causes the second clutch member 212 to function as the rotation anchor of the rotation locking mechanism 200.

[0023] As shown in Figs. 1 & 2, and particularly in Fig. 4, the rotation locking mechanism 200 is assembled by first emplacing the first clutch member 202, key end first, inside the end of the hollow tubular component 124, with the keys 206 radially projecting through the slots 136. Next, the second clutch member 212 is placed around the peripheral region 138 of the component 124, with the notches 214 towards the keys 216 of the previously installed first clutch member 202. A washer 220 (shown separately in Fig. 12) follows the second clutch member 212, and this assemblage of parts is held together by a circlip 230 (shown separately in Fig. 13) emplaced in the circlip groove 140.

[0024] Since the washer 220 and the circlip 230 have respective internal diameters that exceed the external diameter of the first clutch member 202, special assembly techniques are necessary, as will now be detailed with reference to Figs. 14 and 15.

[0025] In Fig. 14, one side of the circlip 230 is hooked over one of the radially projecting keys 206 of the first clutch member 202, whereupon the circlip 230 is moved sideways until the circlip 230 can hook over the other of the two keys 206, followed by movement of the circlip 230 along the body 204 towards the end 208. This procedure is then repeated for the similarly dimensioned washer 230.

[0026] The second clutch member 212 is then installed on the first clutch member 202 by a procedure similar to that described with reference to Fig. 14, as depicted in Fig. 15 (from which the previously installed circlip 230 and washer 220 have been omitted for clarity). The parts of the rotation locking mechanism 200 (comprising the first clutch member 202 "preloaded" with the second clutch member 212, the washer 220, and the circlip 230) are then coupled to the rotatable position controller 124 to form the assembly shown in Fig. 4.

[0027] Fig. 4 (which shows the rotation locking mechanism 200 assembled and coupled to the rotatable position controller 124) also schematically (and incompletely) depicts a coiled compression spring 240 disposed within the hollow interior of the component 124. The spring 240 serves to urge the first clutch member 202 rightwards (as viewed in Fig. 4) with respect to the rotatable position controller 124 to which the first clutch member 202 is rotationally coupled by means of the previously detailed keys 216 and slots 136. In normal circumstances (i.e. when maximum torque adjustment is not wanted), the keys 206 engage with an opposed pair of the notches 214 such that the first and second clutch members 202 and 212 are clutched together so as pos-

itively to prevent their relative rotation.

[0028] In the configuration depicted in Fig. 4, the first clutch member 202 has been moved leftwards (as viewed in Fig. 4) with respect to the controller 124 by the external application to the part 208 of the previously described adjustment tool (not shown), for which purpose the end closure 142 of the torque wrench handle sub-assembly 104 is temporarily removed. External application of the adjusting tool is initially along the longitudinal axis 106, through the hollow tubular interior of the handle sub-assembly 104, and against the first clutch member 202 initially to move the member 202 longitudinally against the spring 240. Since the second clutch member 212 is restrained against longitudinal movement along the periphery 138 of the first clutch member 202, this initial longitudinal movement of the first clutch member 202 disengages the keys 206 from the notches 214 and thereby declutches the first clutch member 202 from the second clutch member 212. While the first clutch member 202 is declutched from the second clutch member 212, rotational movement of the external adjusting tool turns the first clutch member 202 and thereby also turns the rotatable position controller 124 that is permanently rotationally coupled to the first clutch member 202 by means of the slots 136 and the keys 206. In turn this rotation of the component 124 causes rotation of its external screw thread 128 relative to the internal screw thread 130 on the housing 126. Consequently, the rotatable position controller 124 is controllably moved along the axis 106 relative to the housing 126, in turn causing or allowing corresponding repositioning of the end slide 122, the spacer tube 120, and the abutment 118, with a corresponding change in the length of the spring 116. Thereby (as previously explained) the maximum torque of the torque wrench 100 is controllably adjusted by an amount that is directly controlled by the rotational direction and rotational extent of movement of the adjusting tool.

[0029] After the rotatable position controller 124 has been rotated by an intended extent and direction of rotation to adjust the maximum torque to an intended value, rotation of the adjusting tool is halted, and the tool is axially withdrawn from the housing 126. This withdrawal releases axial pressure on the first clutch member 202, and allows the spring 240 to move the first clutch member 202 axially (towards the right as viewed in Fig. 4) until the keys 206 reenter a pair of the notches 214 thereby again mutually engaging the first and second clutch members 202 and 212 to prevent their relative rotation. Since the first clutch member 202 is permanently rotationally coupled to the rotatable position controller 124 (as previously explained) while the second clutch member 212 is permanently rotationally anchored to the housing 126 (as previously explained), withdrawal of the externally applied adjusting tool not only causes re-engagement of the two dog clutch members 202 and 212, but also rotationally locks the rotatable position controller 124 against further rotation (un-

less and until the external adjusting tool is re-applied). Thereby the rotation locking mechanism 200 renders the torque wrench 100 highly resistant to disturbance of the setting of its maximum torque by vibration and shock.

[0030] Provision of the second clutch member 212 with ten equi-angularly spaced notches 214 allows the position controller 124 to be rotated in steps of 36°, and use of other numbers of notches will allow rotational adjustment in correspondingly sized angular steps. For rotational coupling, use of suitable arrangements of keys and slots in other than diametrically opposed pairs is optional. Means of rotational coupling other than keys and slots may be employed in place of those described above. Suitable bias means other than the spring 240 can be utilised for biasing the two clutch members into mutual engagement. While the end 208 of the first clutch member 202 is shaped for operative engagement only by a dedicated adjusting tool (with the disadvantage of extra cost being offset by the increased security against unauthorised adjustment), the member 202 can be adapted for operative application of cheaper non-dedicated tools, e.g. if the risk of unauthorised adjustment is considered to be acceptable as against the increased security provided by the necessary utilisation of a unique tool. Suitable clutch means other than dog clutches can be employed as part of the rotation locking mechanism of the invention.

[0031] A second embodiment of the first aspect of the present invention is shown in Fig. 16 to 20. The rotation locking mechanism 300 is similar in general principle to the embodiment described above, and except as otherwise stated parts labelled '3xx' in Figs. 16 to 20 are equivalent to parts labelled '2xx' in Figs. 1 to 15. The main difference is in the form of the clutch assembly. In the embodiment described above the clutch assembly is based upon a dog clutch, in that the radially projecting keys 206 of the first clutch member 202 are a sliding fit into the notches 214 of the second clutch member 212. To disengage the clutch assembly to allow relative movement of the first and second clutch members 202,212 requires an axial force to be exerted on the first clutch member 202 against the spring 240 as detailed above.

[0032] In the alternative embodiment 300 the projecting keys 306 of the first clutch member 302 are not cuboidal form, but of substantially pentagonal prism shape. The keys 306 are effectively shaped to have a triangular prism mating face, the apex of which directs toward the end 308 of the first clutch member 302. The notches 314 of the second clutch member 312 are also of a corresponding triangular cut out shape, the angle of both being 120°.

[0033] In this embodiment there are twelve notches 314 on the second clutch member 312 as compared to ten notches 214 on the second clutch member 212 of the first embodiment 200. Rotational steps of 30° are therefore provided in this second embodiment.

[0034] In the second embodiment the axial force required to disengage the first and second clutch members 302,312 can be significantly reduced or dispensed with entirely. If a purely rotational force is applied to the first clutch member 302, the angled form of the keys 306 and notches 314 allows the two clutch members to slip in relation to each other. The resilience of the spring 340 urges the first clutch member 302 against the second 312 such that when sufficient rotation is applied to the first clutch member 302, the keys 306 will move to the next set of notches 314 and engage therewith. Continued rotation allows the keys 306 to engage with the next set of notches 314 and so forth.

[0035] If only rotational force is applied with the absence of an axial force, this slip feature prevents damage being caused to either the keys 306 or the second clutch member 312. Thus the position controller 300 can be moved along the handle of the torque wrench to adjust the breaking torque value. Sufficient resistance to rotational movement of the locking mechanism 300 under the axial force of the strong coiled compression spring 116 is still provided and therefore resistance to disturbance of the setting of the torque wrench's maximum torque. It should be noted that all other components and features of the second embodiment are substantially equal in construction and detail to those of the first embodiment.

[0036] While the embodiments of the invention have been particularly described in the context of stabilising the adjustment of maximum torque applicable by a torque wrench, the rotation locking mechanism of the invention can be applied in other contexts, particularly but not exclusively in circumstances where it is desired to safeguard rotational adjustments.

[0037] Other modifications and variations can be adopted without departing from the scope of the invention.

Claims

1. A rotation locking mechanism for locking a selectively rotatable component against unwanted rotation thereof while permitting wanted rotation thereof, the rotatable component comprising rotation application means for selective application of wanted rotation to the rotatable component by external engagement with the rotation application means, the rotation locking mechanism comprising clutch means coupling the rotatable component to a rotation anchor by way of the clutch means, the clutch means being normally engaged to clutch the rotatable component to the rotation anchor whereby to anchor the rotatable component against unwanted rotation and the clutch means being able to temporarily disengage to unlock the rotatable component for intended rotation.

2. A rotation locking mechanism according to Claim 1 wherein the clutch means is disengaged by external engagement with the rotation application means.
3. A rotation locking mechanism according to Claims 1 or 2 wherein the clutch means comprises a clutch having a rotation axis together with first and second clutch members that are relatively rotatable about the rotation axis. 5
4. A rotation locking mechanism according to Claim 3 wherein the first and second clutch members are formed to mutually lock against relative rotation when axially engaged and to mutually unlock to permit relative rotation when axially disengaged. 10 15
5. A rotation locking mechanism according to Claims 3 and 4 wherein the first clutch member of the clutch is rotationally coupled to the rotatable component for conjoint rotation therewith, while the second clutch member of the clutch is rotationally coupled to the rotation anchor. 20
6. A rotation locking mechanism according to any of Claims 2 to 5 wherein the clutch has bias means biasing the first and second clutch members into axial engagement to lock the first and second clutch members against relative rotation, such biasing being temporarily overcome by the external engagement with the rotation application means. 25 30
7. A rotation locking mechanism according to Claim 6 wherein the bias means is a coiled compression spring that is substantially coaxial with the rotation axis of the clutch. 35
8. A rotation locking mechanism according to any of Claims 2 to 7 wherein rotational coupling of the first clutch member to the rotatable component is by at least one radially projecting key on one of the first clutch member and the rotatable component slidably engaging with at least one longitudinally extending slot in the other of the first clutch member and the rotatable component. 40 45
9. A rotation locking mechanism according to any preceding claim wherein the rotation anchor comprises a housing of the rotatable component.
10. A rotation locking mechanism according to Claim 9 wherein rotational coupling of the second clutch member to such housing serving as the rotation anchor is by means of at least one radially projecting key on one of the second clutch member and said casing or housing slidably engaging with at least one longitudinally extending slot formed in the other of the second clutch member and the interior surface of said housing. 50 55
11. An adjustable torque wrench of the type whose maximum torque application value is controlled by way of a compressible coil spring wherein the compressible coil spring's compression is controlled by selectable adjustment means, the selectable adjustment means including a rotation locking mechanism according to any preceding claim.

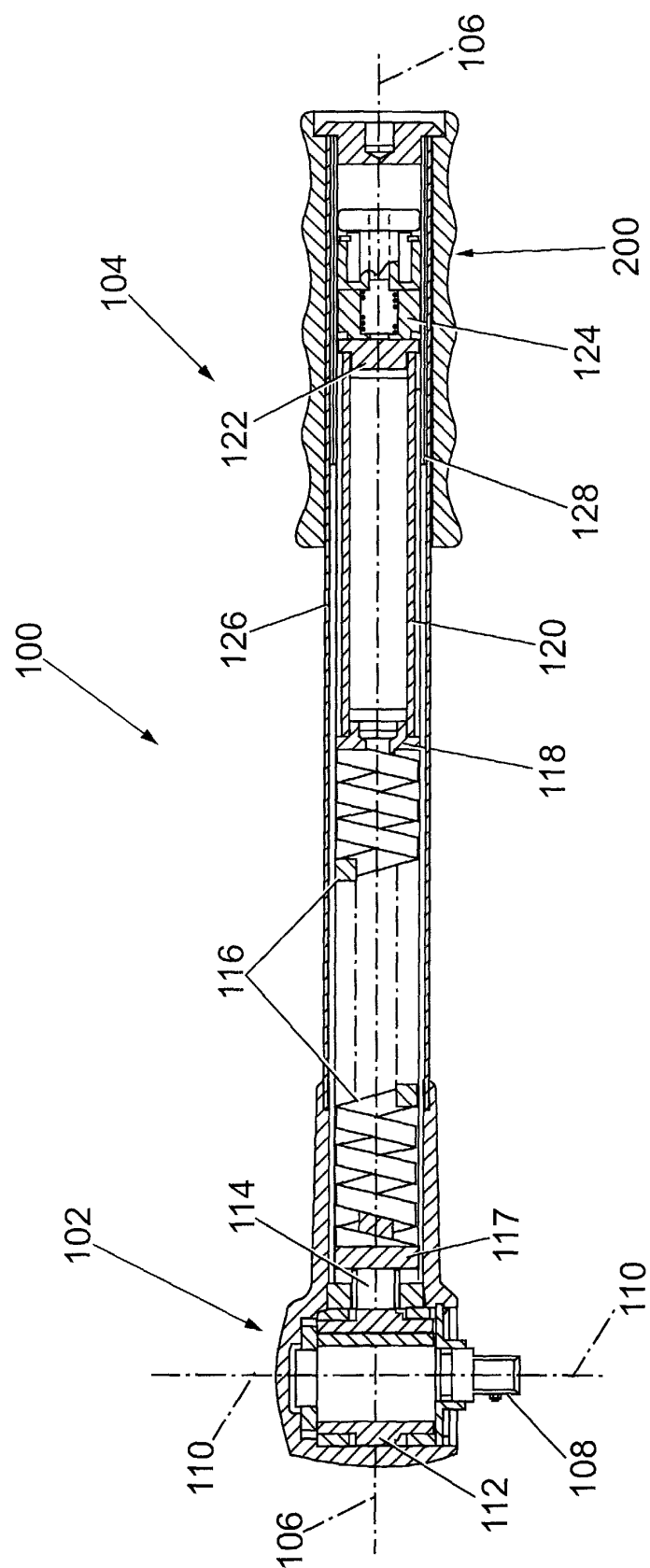


Fig. 1

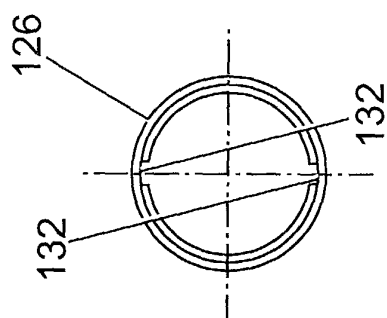


Fig. 3

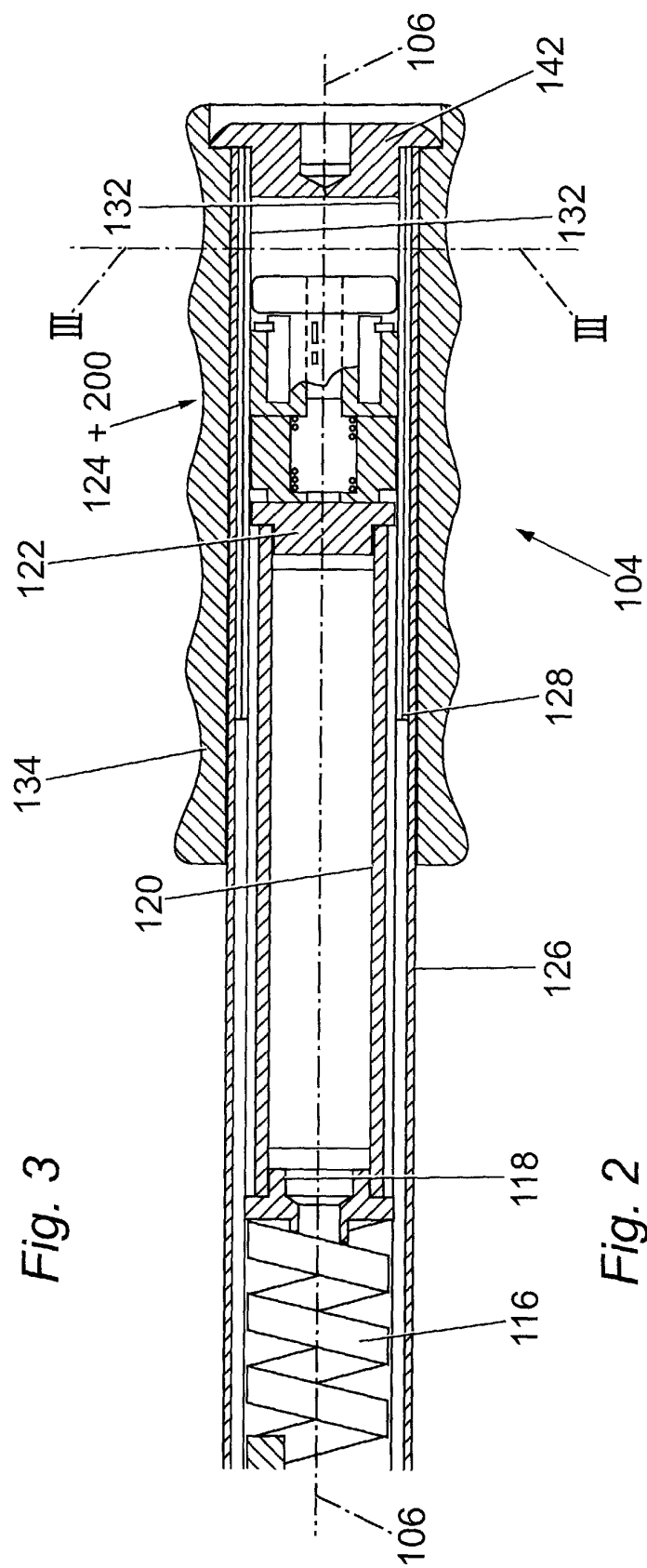


Fig. 2

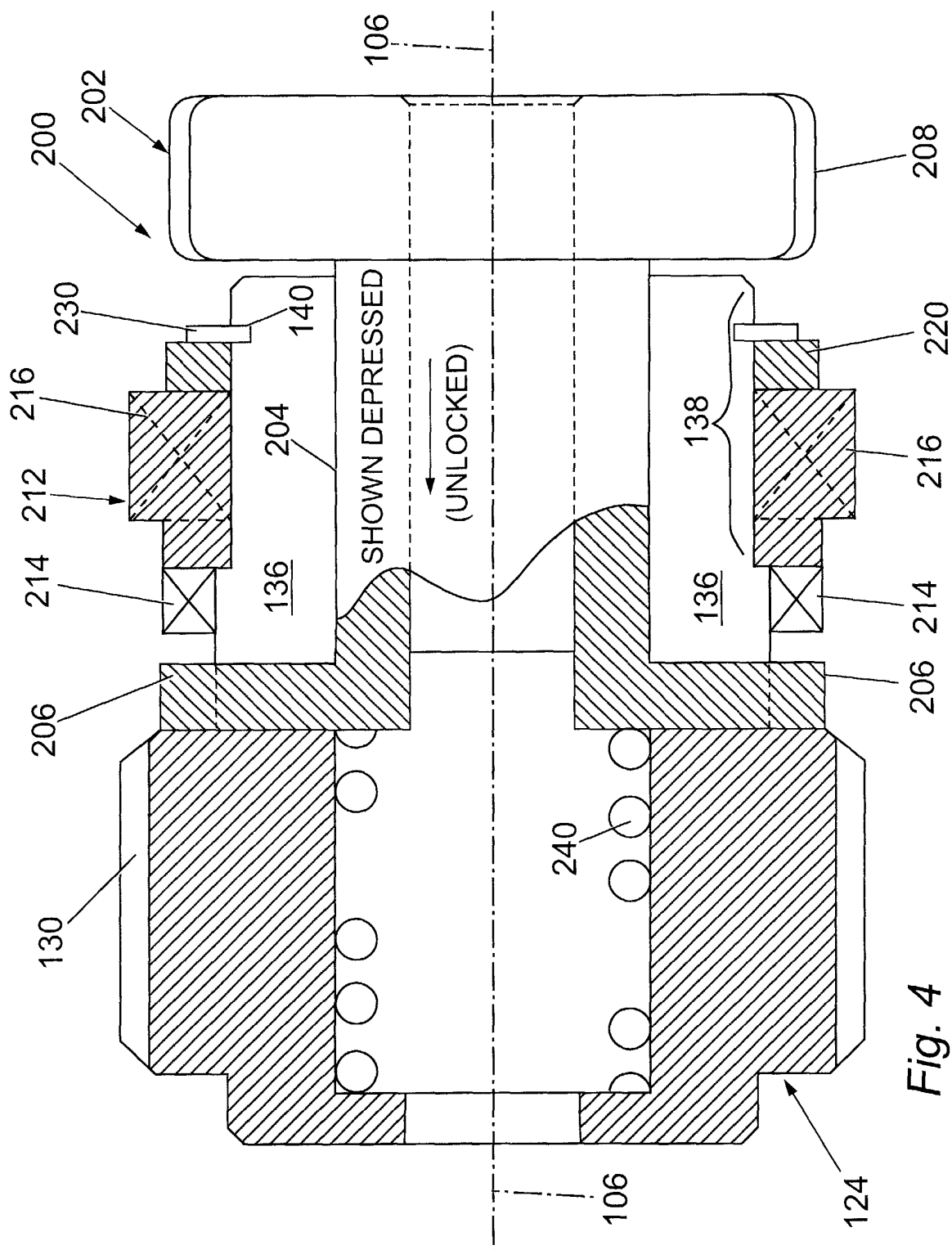


Fig. 4

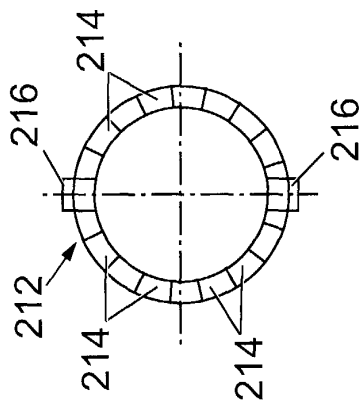


Fig. 10

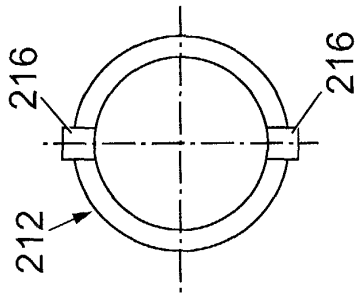


Fig. 11

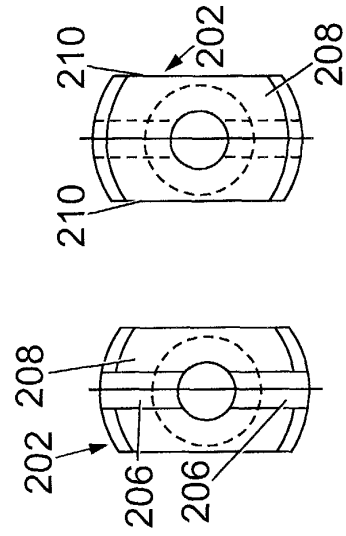


Fig. 7

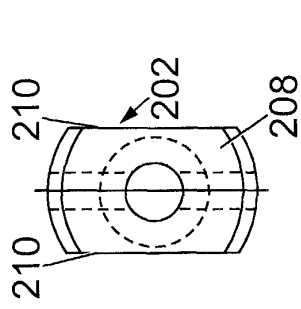


Fig. 8

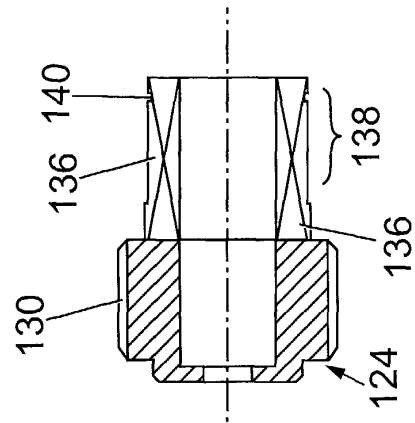


Fig. 5

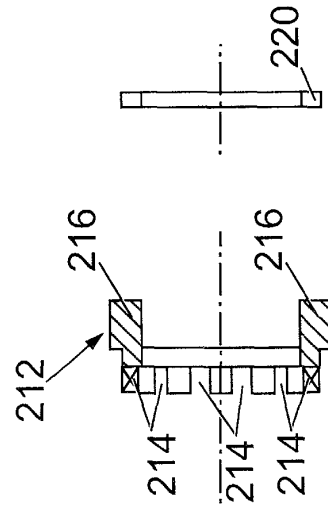


Fig. 9

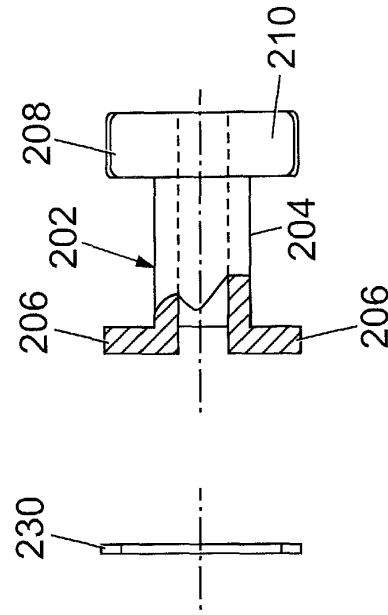


Fig. 12

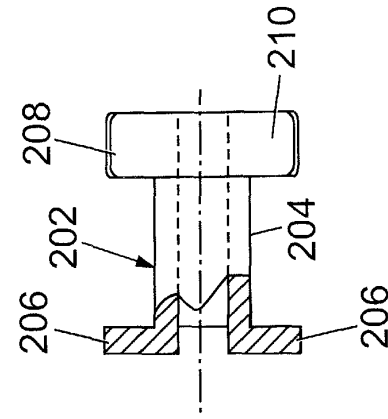


Fig. 6

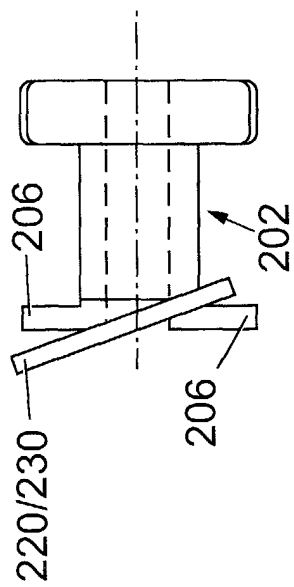


Fig. 14

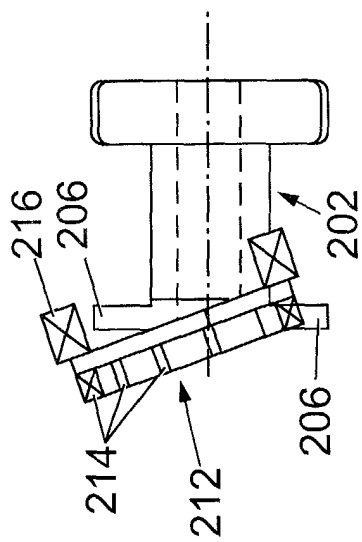


Fig. 15

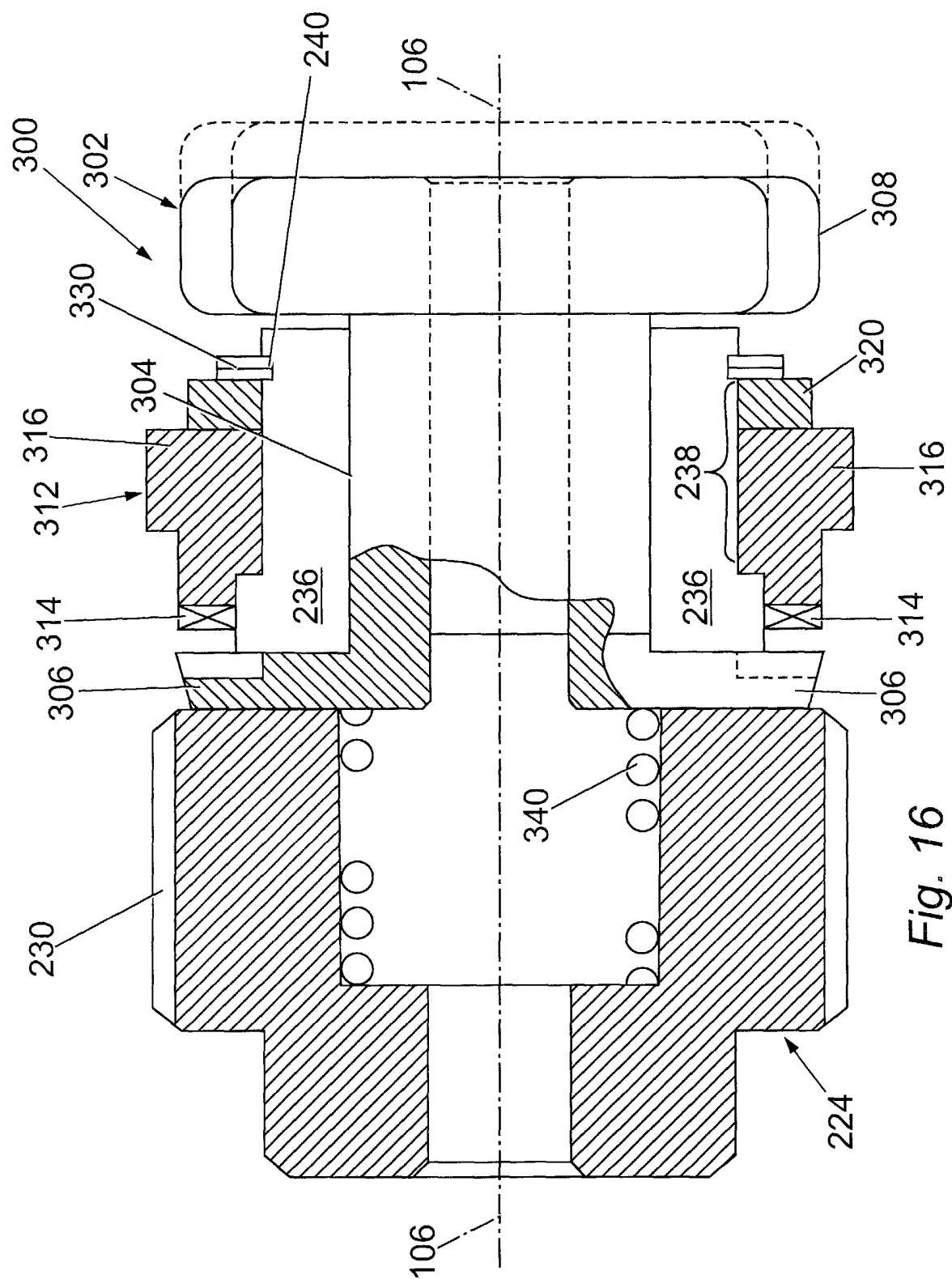


Fig. 16

