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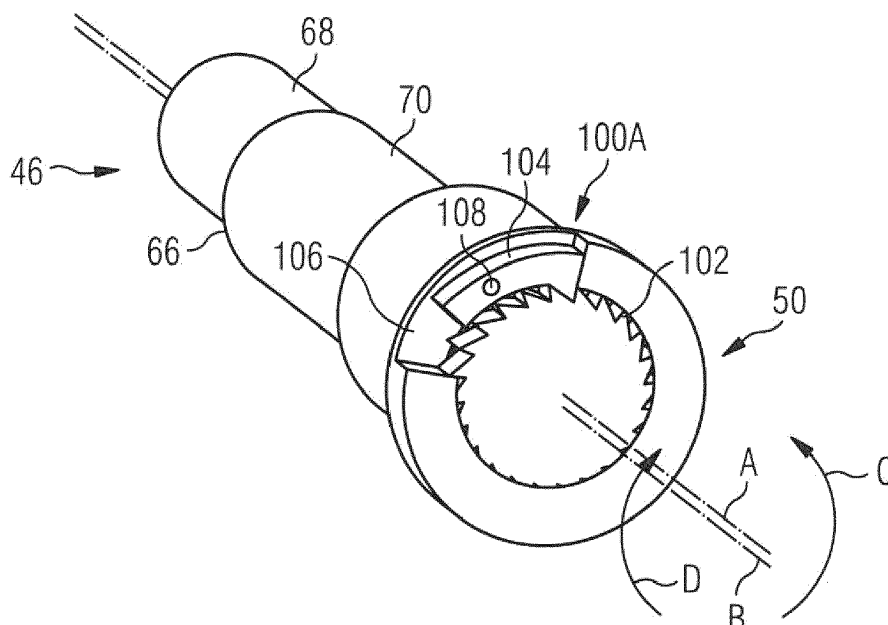
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(54) **TAMPER DEVICE OF A PAVER SCREED**

(57) The present disclosure relates to a tamper device (40) with a tamper bar (42) for a screed assembly (18) of a road paver (10). The tamper device (40) includes an eccentric tamper bushing (50) for adjusting a stroke of the tamper bar (42). The tamper device (40) further includes an eccentric tamper shaft (46) extending along a tamper shaft axis (A) and being inserted in the eccentric

tamper bushing (50). The eccentric tamper bushing (50) and the eccentric tamper shaft (46) are connected via a freewheel mechanism (100A, 100B, 100C). The freewheel mechanism allows to adjust the stroke of the tamper bar (42) by rotating the tamper shaft (46) and the tamper bushing (50) relative to each other.

FIG 4



Description

Technical Field

[0001] The present disclosure generally relates to a screed assembly of a road paver, and more particularly, to a tamper device for a screed assembly, an eccentric tamper shaft for a tamper device, an eccentric tamper bushing for a tamper device, and a method for adjusting a stroke of a tamper device.

Background

[0002] Paving machines are commonly used to apply, spread and compact a paving, i.e., a mat of material, relatively evenly over a work surface. These machines are generally used in the construction of roads, parking lots and other areas. An asphalt paving machine generally includes a hopper for receiving asphalt material from a truck, a conveyor system for transferring the asphalt rearwardly from the hopper for discharge onto a roadbed, and a set of augers to evenly spread the paving material in front of the screed. A screed plate smoothes and compacts the asphalt material, ideally leaving behind a mat of uniform depth, density, texture and smoothness.

[0003] A tamper bar may be provided forward of the screed plate. During paving, the tamper bar reciprocates up and down to effect a pre-compaction of the paving material. The tamper bar is moved up and down by reciprocating connecting rods that support the tamper bar. The connecting rods are reciprocated by a rotation of an eccentric tamper shaft transmitted to the connecting rods via an eccentric tamper bushing installed in a connecting rod eye and surrounding the eccentric tamper shaft.

[0004] Depending on the desired mat thickness and other paving parameters, the stroke of the tamper bar can be changed in particular tamper devices. Conventionally, this is carried out during a break of the paving operation. Specifically, the eccentric tamper bushing, which is fixed in position on an eccentric section of the tamper shaft, is released by a tool. Then the eccentric tamper bushing is manually rotated relative to the eccentric section of the tamper shaft, and, again, fixed in position with respect to the tamper shaft. This has the effect that the sum of the eccentricities of the eccentric section of the tamper shaft and the eccentric bushing, which are effective in the direction of the stroke of the tamper bar, change and consequently the stroke of the tamper bar changes as well.

[0005] The present disclosure is directed, at least in part, to improving or overcoming one or more aspects of prior systems.

Summary of the Disclosure

[0006] In one aspect, the present disclosure relates to a tamper device with a tamper bar for a screed assembly of a road paver. The tamper device includes an eccentric

tamper bushing for adjusting a stroke of the tamper bar, and an eccentric tamper shaft extending along a tamper shaft axis and being inserted in the eccentric tamper bushing. The eccentric tamper bushing and the eccentric tamper shaft are connected via a freewheel mechanism.

[0007] In another aspect, the present disclosure relates to an eccentric tamper shaft for a tamper device of a screed assembly of a road paver. The eccentric tamper shaft comprises an elongated shaft body with at least one eccentric section, and a bushing connection member for connecting to an eccentric tamper bushing surrounding the bushing connection member. The bushing connection member is configured to form a drive member of a freewheel mechanism.

[0008] In yet another aspect, the present disclosure relates to an eccentric tamper bushing for a tamper device of a screed assembly of a road paver. The eccentric tamper bushing comprises a body portion including a shaft connection member for connecting to an eccentric tamper shaft inserted in the eccentric tamper bushing. The shaft connection member is configured to form a driven member of a freewheel mechanism.

[0009] In another aspect, the present disclosure relates to a method for operating a tamper device of a screed assembly of a road paver. The tamper device includes a freewheel mechanism connecting an eccentric tamper shaft and an eccentric tamper bushing. The method comprises adjusting a stroke length of the tamper bar by causing a disengagement of the freewheel mechanism and rotating the eccentric tamper shaft and the eccentric tamper bushing relative to one another.

[0010] Other features and aspects of this disclosure will be apparent from the following description and the accompanying drawings.

Brief Description of the Drawings

[0011] The accompanying drawings, which are incorporated herein and constitute a part of the specification, illustrate exemplary embodiments of the disclosure and, together with the description, serve to explain the principles of the disclosure. In the drawings:

Fig. 1 is a diagrammatic side view of a paving machine towing a screed assembly according to the present disclosure,

Fig. 2 is a perspective view of a tamper device according to the present disclosure,

Fig. 3 is a perspective view of a schematic portion of a tamper shaft inserted in an eccentric tamper bushing for showing a connection mechanism between the tamper shaft and the eccentric tamper bushing according to the present disclosure,

Fig. 4 is a perspective cut view through the tamper shaft and eccentric tamper bushing of Fig. 3 for showing the connecting mechanism according to the present disclosure in more detail,

Fig. 5 is a schematic drawing of another embodiment

of a connecting mechanism between the tamper shaft and the eccentric tamper bushing according to the present disclosure, and

Fig. 6 is a schematic drawing of yet another embodiment of a connecting mechanism between the tamper shaft and the eccentric tamper bushing according to the present disclosure.

Detailed Description

[0012] The following is a detailed description of exemplary embodiments of the present disclosure. The exemplary embodiments described therein and illustrated in the drawings are intended to teach the principles of the present disclosure, enabling those of ordinary skill in the art to implement and use the present disclosure in many different environments and for many different applications. Therefore, the exemplary embodiments are not intended to be, and should not be considered as, a limiting description of the scope of patent protection. Rather, the scope of patent protection shall be defined by the appended claims.

[0013] The present disclosure is based in part on the realization that a stroke length of a tamper bar can be easily adjusted by providing a freewheel mechanism to connect an eccentric tamper shaft and an eccentric tamper bushing. The freewheel mechanism is configured to provide a torque-proof connection between the tamper shaft and the tamper bushing during paving operation when the tamper shaft is rotated in a first circumferential direction, and to disengage the bushing from the tamper shaft during a stroke length adjusting operation of the tamper device when the bushing is rotated in the first circumferential direction and the tamper shaft does not rotate (i.e., is not driven). Accordingly, for adjusting the stroke length of the tamper bar, the eccentric tamper bushing is rotated relative to the eccentric tamper shaft as allowed by the freewheel mechanism to change the sum of the eccentricities of the eccentric section of the tamper shaft and the eccentric bushing, which are effective in the direction of the stroke of the tamper bar. This may be carried out manually without requiring any tools to release and fix the eccentric tamper bushing with respect to the tamper shaft.

[0014] The present disclosure is further based in part on the realization that the freewheel mechanism can be configured as any one of a number of freewheel mechanisms known in the art, including, but not limited to, pawl-and-ratchet wheel mechanisms, sprag body mechanisms, or wrap spring mechanisms.

[0015] The present disclosure is further based in part on the realization that a pawl-and-ratchet wheel mechanism is particularly suitable as the freewheel mechanism in terms of simple structure, minimum package space, reliability and costs.

[0016] Referring to Fig. 1, a paving machine 10 includes a frame 12 with a set of ground-engaging elements 14 such as wheels or tracks coupled with the frame

12. The ground-engaging elements 14 may be driven by an engine 16 in a conventional manner. The engine 16 may further drive an associated generator 17 that can be used to power various systems on the paving machine 10 and a screed assembly 18.

[0017] The screed assembly 18 is attached at the rear end of the paving machine 10 to spread and compact paving material into a mat 20 having a desired shape, thickness, texture, width, density and smoothness. The paving machine 10 also includes an operator station 22 having a seat and a console 24, which includes various controls for directing operations of the paving machine.

[0018] The paving machine 10 further includes a hopper 26 for storing paving material, and a conveyor system including one or more conveyors 28 configured to move paving material from the hopper 26 to the screed assembly 18 at the rear of the paving machine 10.

[0019] One or more augers 30 are arranged near the forward end of the screed assembly 18 to receive the paving material supplied by the conveyor 28 and spread the material evenly in front of the screed assembly 18. The height of the augers 30 is adjustable via one or more height adjustment actuators 32, for example, hydraulic cylinders.

[0020] The screed assembly 18 may be pivotally connected behind the paving machine 10 by a pair of tow arms 34 (only one of which is shown in Fig. 1) that extend between the frame 12 of the paving machine 10 and the screed assembly 18. The tow arms 34 are pivotally connected to the frame 12 such that the relative position and orientation of the screed assembly 18 relative to the frame 12 and to the surface being paved may be adjusted by raising or lowering the tow arm actuators 36, for example, in order to control the thickness of the paving material deposited by the paving machine 10. To this end, tow arm actuators 36 are provided that are arranged and configured to raise and lower the tow arms 34 and thereby raise and lower the screed assembly 18. The tow arm actuators 36 may be any suitable actuators, for example, hydraulic cylinders.

[0021] The screed assembly 18 may have any of a number of configurations known in the art. For example, it may be a single or multiple section screed. In some embodiments, the screed assembly 18 may include a screed extension provided behind and adjacent to each of the left and right main screed sections. The screed extensions are slideably movable laterally between retracted and extended positions such that varying widths of paving material can be laid. The lateral movement of the extensions may be driven by respective screed width actuators such as hydraulic or electric actuators. It should be noted, however, that in other embodiments the screed extensions may be omitted.

[0022] The screed assembly 18 also includes a screed plate 38, and a tamper device 40 positioned forward of the screed plate 38. The tamper device 40 extends transversely to the direction of travel of the paving machine 10.

[0023] As one skilled in the art will appreciate, each of

a main screed, an extendable extension screed, and other screed broadening parts may be provided with at least one tamper device 40 as exemplary explained herein for the main screed. Tamper shafts may be connected to one another or may be driven individually.

[0024] Turning to Fig. 2, an exemplary tamper device 40 is shown in more detail. The tamper device 40 comprises at least one tamper bar 42, connecting rods 44, a tamper shaft 46, bearing supports 48, and eccentric tamper bushings 50.

[0025] The tamper bar 42 cyclically acts on the laying material with essentially vertical strokes and a selectable stroke length. The tamper bar 42 is mounted on lower ends of two connecting rods 44 via a plurality of mounting screws 43. The connecting rods 44 generate strokes through the rotation of the rotatingly driven tamper shaft 46 and transmit them to the tamper bar 42. The tamper bar 42 may be continuous over the complete width of the component as depicted, or may be divided into individual sections.

[0026] The tamper shaft 46 is stationarily supported at a screed frame 52 of the screed assembly 18 (see Fig. 1) in bearing supports 48. Said bearing supports 48 are fixed with mounting screws 54 at the screed frame 52. A vertical height of the bearing supports 48 is adjustable with adjusting screws 64, for example, to align and flush the bottom dead center of the stroke length of the tamper bar 42 with the screed plate 38 mounted at a bottom side of the screed frame 52.

[0027] The eccentric tamper shaft 46 comprises an eccentric section in the area of the respective connecting rod 44 on which the eccentric tamper bushing 50 is arranged and rotatably supported in the eye of the connecting rod 44 at an upper end thereof. The tamper shaft 46 is driven via a drive motor (not shown), for example a hydraulic motor or an electric motor. The drive motor may be connected to the tamper shaft 46 via a belt or chain drive, or may be directly connected to the tamper shaft 46.

[0028] Referring to Figs. 3 and 4, a schematic drawing showing a perspective view of a portion of the tamper shaft 46 and the eccentric tamper bushing 50 according to an exemplary embodiment are shown.

[0029] The tamper shaft 46 is formed as an elongate shaft body 66 including cylindrical sections 68 (regular/circular cylinder) and eccentric sections 70 (only one is shown in Figs. 3 and 4) arranged side-by-side. The cylindrical sections 68 are axially aligned with each other shown as axis A. An axis B of the cylindrical section 68 is offset by a set distance from the axis A. The shaft rotates about the axis A. It is noted that the dimensions of the individual sections of the tamper shaft are shown in an exaggerated representation for the sake of the present description.

[0030] In some embodiments, a length of the tamper shaft 46 may be within a range between about 200 mm and about 1500 mm, a length of one of the cylindrical sections 68 may be within a range between about 30 mm

and about 100 mm, and/or a length of one of the eccentric sections 70 may be within a range between about 40 mm and about 240 mm. In some embodiments, a radius of the cylindrical sections 68 may be within a range between about 10 mm and about 40 mm, and/or a greatest radius of the eccentric sections 70 may be within a range between about 10 mm and about 40 mm.

[0031] The tamper shaft 46 may include one or more eccentric sections 70. For example, the tamper shaft 46 shown in Fig. 2 includes in total two eccentric sections 70, one for each eccentric tamper bushing 50 (connecting rod 44).

[0032] The eccentric tamper bushing 50 includes a first body portion or section 72 and a second body portion or section 74. In the shown embodiment, the first and the second body portion 72, 74 are integrally formed, for example, connected to one another by welding. In other embodiments, the first and the second body portions 72, 74 may be connected to one another in any other fashion, for example screwing, such as that both portions 72, 74 are rigidly connected (connected in a torque-proof manner).

[0033] The first and the second body portions 72, 74 are formed as hollow cylinders. Specifically, the first body portion 72 includes an inner circumferential face (not visible in Figs. 3 and 4) having a circular cross-section in a plane perpendicular to a longitudinal axis of the tamper bushing 50 (that coincides with the longitudinal axis B of the tamper shaft 46). Additionally, the first body portion 72 has an outer circumferential face 76 having an eccentric cross-section in a plane perpendicular to the longitudinal axis of the tamper bushing 50. The axis of the outer circumferential face 76 is offset by a set distance from the axis of the inner circumferential face of the first body portion 72. The second body portion 74 includes an inner circumferential face 78 having a circular cross-section in a plane perpendicular to the tamper bushing longitudinal axis. Additionally, the second body portion 74 includes an outer circumferential face 80 having a circular cross-section in a plane perpendicular to the tamper bushing longitudinal axis.

[0034] In some embodiments, a length of the tamper bushing 50 may be within a range between about 40 mm and about 240 mm, a length of the first body portion 72 may be within a range between about 30 mm and about 230 mm, and/or a length of the second body portion 74 may be within a range between about 10 mm and about 50 mm. In some embodiments, an inner radius of the first body portion 72 may be within a range between about 10 mm and about 40 mm, and/or a greatest outer radius of the first body portion 72 may be within a range between about 12.5 mm and about 42.5 mm. Further, in some embodiments, an inner radius of the second body portion 74 may be within a range between about 10 mm and about 40 mm, and/or an outer radius of the second body portion 74 may be within a range between about 10 mm and about 50 mm.

[0035] In an assembled state, the tamper bushing 50

surrounds the tamper shaft 46 such that the first body portion 72 of the tamper bushing 50 surrounds at least a portion of the eccentric section 70 of the tamper shaft 46. Accordingly, the tamper shaft 46 extends through the tamper bushing 50. The tamper bushing 50 is allowed to rotate in one direction, and fixed in the other direction relative to axis B of the eccentric section of the tamper shaft 70. The rotation is controlled by the freewheel mechanism of the present disclosure. The eye of the connecting rod 44 is rotatably supported by the first body portion 72 of the tamper bushing 50 (see Fig. 2), and the second body portion 74 of the tamper bushing 50 extends outside of the eye of the connecting rod 44 (also see Fig. 2).

[0036] According to the present disclosure, the tamper shaft 46 and the tamper bushing 50 are connected via a freewheel mechanism. The freewheel mechanism is configured to disengage the tamper shaft 46 (drive member) from the bushing 50 (driven member) in certain situations. Particularly, the freewheel mechanism is configured to disengage the tamper shaft 46 from the bushing 50 when the bushing 50 is rotated in a first circumferential direction C about the tamper shaft axis B (axis of the eccentric portion 70 of the tamper shaft 46 that the tamper bushing 50 is assembled to), and the tamper shaft 46 is not rotationally driven in the first circumferential direction C faster than the tamper bushing 50 is rotationally driven in the first circumferential direction C (i.e., not driven to rotate faster into the first circumferential direction C). Similarly, the freewheel mechanism is configured to disengage the tamper shaft 46 from the bushing 50 when the tamper shaft is rotated in a second circumferential direction D opposite the first circumferential direction C (and the bushing 50 does not rotate faster than the tamper shaft 46 in the second circumferential direction D). Additionally, the freewheel mechanism engages the tamper shaft 46 and the bushing 50 when the tamper shaft 46 is rotated in the first circumferential direction C which is the case during normal paving operation.

[0037] In other words, the freewheel mechanism disengages the tamper shaft 46 from the bushing 50 when the bushing 50 rotates faster than the tamper shaft 46 in the first circumferential direction C, and when the tamper shaft 46 rotates faster than the bushing 50 in the second circumferential direction D. Therefore, the freewheel mechanism engages the tamper shaft 46 and the bushing 50 when the bushing 50 rotates slower than the tamper shaft 46 in the first circumferential direction C, and when the tamper shaft 46 rotates slower than the bushing 50 in the second circumferential direction D.

[0038] The freewheel mechanism may be configured in any known fashion suitable for the environment of tamper devices of road pavers. Figs. 3 and 4 show a first embodiment of such the freewheel mechanism referenced by reference sign 100A. Here, the freewheel mechanism is configured as a ratchet wheel-and-pawl mechanism (click-and-pawl or click-and-dog arrangement).

[0039] The freewheel mechanism 100A includes a ratchet wheel (an example of a bushing connection member) 102 and a detent pawl (an example of a shaft connection member) 104. The ratchet wheel 102 is integrally formed with the tamper shaft 46 concentric to the eccentric section 70. The pawl 104 is disposed in a recess 106 extending radially through the second body portion 74 from the inner circumferential face 78 to the outer circumferential face 80. The pawl 104 is pivotably connected to the second body portion 74 via a pin 108 extending transversely between opposite faces of the recess 106 (parallel to the longitudinal bushing axis). The pin 108 is received at each end in blind holes or throughholes disposed in the tamper bushing 50 (second body portion 74). Furthermore, the pawl 104 is preloaded into an engaged state with the ratchet wheel 102, for example via a spring not shown in further detail. The pawl 104 together with the ratchet wheel 102 function to provide a rigid connection between the tamper shaft 46 and the bushing 50 during paving operation when the tamper shaft 46 is rotated in the first circumferential direction C, and to disengage the bushing 50 from the tamper shaft 46 during a stroke length adjusting operation of the tamper device 40 when the bushing 50 is rotated in the first circumferential direction C and the tamper shaft 46 does not rotate (i.e., is not driven), and/or when the tamper shaft 46 is rotated in the second circumferential direction D if possible.

[0040] In some embodiments, more than one pawl 104 may be provided in one or more recesses 106. For example, the recesses 106 and the pawl 104 may be arranged in equal or unequal distances about a periphery of the second body portion 74. An opening angle of the recess 106 with respect to the longitudinal bushing axis may be within a range between about 45° and about 180° depending on a number of recesses 106 and pawls 104. For example, the opening angle of the recess 106 shown in Figs. 3 and 4 is about 90° with respect to the axis B of the eccentric portion 70 of the tamper shaft 46.

[0041] In some embodiments, the ratchet wheel 102 may be connected to the tamper shaft 46 in any other suitable torque-proof manner for example via a spline connection (key splines or tooth splines) or a feather key. The ratchet wheel 102 may include toothing about its entire circumference. The number of teeth of the ratchet wheel 102 influences the resolution of the stroke length setting. A higher number of teeth leads to a higher number of available stroke length settings. For example, the ratchet wheel 102 may have a number of teeth within a range between about 2 and about 60, or more.

[0042] Referring to Fig. 5, another principle for a freewheel mechanism is shown, which may be used instead of the freewheel mechanism 100A described with reference to Figs. 3 and 4. Here, again, the freewheel mechanism 100B is configured as a ratchet wheel-and-pawl mechanism.

[0043] Specifically, the freewheel mechanism 100B comprises a sleeve portion 120, a pin 122, a pawl 124,

and an elastic member 126 as the drive member of the freewheel mechanism 100B, and comprises a ratchet wheel 128 as the driven member of the freewheel mechanism 100B.

[0044] The sleeve portion 120 may be integrally formed with the tamper shaft 46 (for example, the cylindrical section 68 of the tamper shaft 46 (see Figs. 2 to 4)) or may be connected to the tamper shaft 46 in any other suitable torque-proof manner, for example via a spline connection or a feather key. Similarly, the ratchet wheel 128 may be integrally formed with the tamper bushing 50 or may be connected to the tamper shaft 46 in any other suitable torque-proof manner, for example via a spline connection or a feather key.

[0045] The freewheel mechanism 100B functions similar to the freewheel mechanism 100A. The pawl 124 is preloaded in an engaged state with the ratchet wheel 128 by the elastic member 126. For example, the elastic member 126 may be a spring steel sheet (as depicted in Fig. 5) or may be a coil spring. The pawl 124 is pivotably connected to the sleeve 120 via the pin 122. The ratchet wheel 128 is configured as a ring gear having inner teeth.

[0046] During normal paving operation, the tamper shaft 46 is rotated clockwise (one direction), the pawl 124 engages the inner teeth of the ratchet wheel 128, and the bushing 50 is driven to rotate with the tamper shaft 46 to cause a reciprocating movement of the tamper bar 42 (see Figs. 1 and 2). During a stroke length setting operation, for example, the tamper bushing 50 is rotated clockwise (the one direction) about a certain angle (such as 10°), the pawl 124 disengages from the inner teeth of the ratchet wheel 128, and the tamper shaft 46 is not rotated. As an alternative for adjusting the tamper bar stroke length, for example, the tamper shaft 46 is rotated counterclockwise (the other direction), the pawl 124 disengages from the inner teeth of the ratchet wheel 128, and a rotational angle position of the tamper shaft 46 with respect to the bushing 50 is changed to adapt the stroke length.

[0047] Referring to Fig. 6, yet another principle for the freewheel mechanism is shown as a freewheel mechanism 100C.

[0048] Here, the freewheel mechanism 100C comprises a sleeve 140 connected to the tamper shaft 46 in a torque-proof manner, and preloaded (spring-loaded) sprag bodies 142. The sleeve 140 and the preloaded sprag bodies 142 function as the drive member of the freewheel mechanism 100C. As a driven member of the freewheel mechanism 100C, a ring body 144 is provided. The ring body 144 forms part of the bushing 50. For example, the sprag bodies 142 may be formed as sprag rollers (grip rollers) or as noncircular sprag bodies.

[0049] When the tamper shaft 46 is rotated in a counterclockwise direction (one direction) during paving operation, the sprag bodies 142 engage with the ring body 144 such that the bushing 50 rotates with the tamper shaft 46. The stroke length adjusting operation may include rotating the bushing 50 in a counterclockwise di-

rection (the one direction), or rotating the tamper shaft 46 in a clockwise direction (the other direction) with reference to Fig. 6.

[0050] As noted above, the freewheel mechanism connecting the tamper shaft 46 and the tamper bushing 50 may have any other suitable form known in the art. As another example, the freewheel mechanism may be configured as a wrap spring mechanism, in which a coil spring (helical spring) is wrapped around the tamper shaft 46. The coil spring is attached at one end only at the tamper shaft 46. As one skilled in the art will appreciate, such a freewheel mechanism uses the principle of a one-way clutch known in the art as wrap spring clutch.

15 Industrial Applicability

[0051] The tamper device 40, the tamper shaft 46, and the tamper bushing 50 are applicable in screed assemblies 18 of road pavers 10.

[0052] As described above, the freewheel mechanism between the tamper shaft 46 and the bushing 50, for example the freewheel mechanisms 100A, allows to adjust a stroke length of the tamper device 40 (tamper bar 42) by rotating the bushing 50 relative to the tamper shaft 46 in the first circumferential direction C about a predetermined degree (for example, within a range between 0° to 180°). This may be done manually by an operator without requiring any tools. Accordingly, setting the stroke length can be performed without great effort, but for each bushing 50 individually. As one skilled in the art will appreciate, the sum of the eccentricity lengths of the eccentric section 70 of the tamper shaft 46 and the eccentric bushing 50, which are effective in the direction of the stroke of the tamper bar 42, sum up to the stroke length of the tamper bar 42. Hence, the stroke length is adjustable by causing a relative rotation between the tamper shaft 46 and the bushing 50.

[0053] Alternatively, referring to the freewheel mechanism 100A shown in Figs. 3 and 4, the tamper shaft 46 can be rotated in the second circumferential direction D about a predetermined degree (for example, within a range between 0° to 180°) to adjust the stroke length of the tamper device 40 (tamper bar 42). This can be done manually by an operator.

[0054] Accordingly, herein, also a method for operating the tamper device 40 of the screed assembly 18 of the road paver 10 is disclosed. The method comprises adjusting a stroke length of the tamper bar 42 by causing a disengagement of a freewheel mechanism 100A, 100B, 100C, which connects the eccentric tamper shaft 46 and the eccentric tamper bushing 50, and rotating the eccentric tamper shaft 46 and the eccentric tamper bushing 50 relative to one another.

[0055] This may be performed manually and, in some embodiments, toolless by an operator who rotates the eccentric tamper shaft 46 or the eccentric tamper bushing 50. For example, the operator may turn the eccentric tamper bushing 50 shown in Fig. 3 and 4 and the first

circumferential direction C when the eccentric tamper shaft is not driven by the tamper drive motor.

[0056] As used herein, the term "eccentric tamper shaft" refers to a tamper shaft having at least one eccentric section (such as eccentric section 70), and being configured to be used in a tamper device of a screed assembly (together with a mating eccentric tamper bushing). The term "eccentric tamper bushing" refers to a tamper bushing having an eccentric outer section (such as first body portion 72), and being configured to be used in a tamper device of a screed assembly (together with a mating eccentric tamper shaft).

[0057] Terms such as "about", "around", "approximately", or "substantially" as used herein when referring to a measurable value such as a parameter, an amount, a temporal duration, and the like, is meant to encompass variations of $\pm 10\%$ or less, preferably $\pm 5\%$ or less, more preferably $\pm 1\%$ or less, and still more preferably $\pm 0.1\%$ or less of and from the specified value, insofar as such variations are appropriate to perform in the disclosed invention. It is to be understood that the value to which the modifier "about" refers is itself also specifically, and preferably, disclosed. The recitation of numerical ranges by endpoints includes all numbers and fractions subsumed within the respective ranges, as well as the recited endpoints.

[0058] Although the preferred embodiments of this invention have been described herein, improvements and modifications may be incorporated without departing from the scope of the following claims.

Claims

1. A tamper device (40) with a tamper bar (42) for a screed assembly (18) of a road paver (10), the tamper device (40) including:

an eccentric tamper bushing (50) for adjusting a stroke of the tamper bar (42); and
 an eccentric tamper shaft (46) extending along a tamper shaft axis (A) and being inserted in the eccentric tamper bushing (50);
 wherein the eccentric tamper bushing (50) and the eccentric tamper shaft (46) are connected via a freewheel mechanism (100A, 100B, 100C).

2. The tamper device (40) of claim 1, wherein the freewheel mechanism (100A, 100B, 100C) is configured to:

disengage the tamper shaft (46) from the bushing (50) when the bushing (50) is rotated in a first circumferential direction (C) about an axis (B) of the eccentric portion (70) of the eccentric tamper shaft (46), and the tamper shaft (46) is not driven,

engage the tamper shaft (46) and the bushing (50) when the tamper shaft (46) is driven to rotate in the first circumferential direction (C).

3. The tamper device (40) of claim 1 or claim 2, wherein the freewheel mechanism (100A, 100B, 100C) is further configured to:

to disengage the tamper shaft (46) from the bushing (50) when the tamper shaft (46) is rotated in a second circumferential direction (D) opposite the first circumferential direction (C) and the bushing (50) is stationary.

4. The tamper device (40) of any one of the preceding claims, wherein one of the eccentric tamper bushing (50) or the eccentric tamper shaft (46) includes a pivotable pawl (104, 124), and the other one of the eccentric tamper bushing (50) or the eccentric tamper shaft (46) includes a ratchet wheel (102, 128), the pawl (104, 124) and the ratchet wheel (102, 128) forming the freewheel mechanism (100A, 100B).

5. The tamper device (40) of claim 4, wherein:

the ratchet wheel (128) is a ring gear with internal teeth and rigidly connected with the eccentric tamper bushing (50), or
 the ratchet wheel (102) is a gear with external teeth and rigidly connected with the eccentric tamper shaft (46).

6. The tamper device (40) of claim 4, wherein the ratchet wheel (102, 128) is integrally formed with the eccentric tamper shaft (46) or with the eccentric tamper bushing (50).

7. The tamper device (40) of claim 4, wherein the ratchet wheel (102, 128) is connected with the eccentric tamper shaft (46) or with the eccentric tamper bushing (50) via a spline-connection or a feather key.

8. The tamper device (40) of any one of claims 4 to 7, wherein the pawl (104, 124) is pivotable and preloaded into an engaged state with the ratchet wheel (102, 128).

9. The tamper device (40) of any one of claims 1 to 3, wherein the freewheel mechanism is configured as a sprag body mechanism (100C), or a wrap spring mechanism.

10. The tamper device (40) of any one of the preceding claims, wherein:

the tamper device (40) further includes a connecting rod (44) with a connecting rod eye at a

first end of the connecting rod (44), and a tamper bar (42) mounted to a second end of the connecting rod (44) opposing the first end, and the connecting rod (44) is rotatably supported through the connecting rod eye of the connecting rod (44) by the eccentric tamper bushing (50). 5

or the eccentric tamper bushing (50) .

11. An eccentric tamper shaft (46) for a tamper device (40) of a screed assembly (18) of a road paver (10), wherein the eccentric tamper shaft (46) comprises: 10

an elongated shaft body (66) with at least one eccentric section (70), and
a bushing connection member (102) for connecting to an eccentric tamper bushing (50) surrounding the bushing connection member (102), wherein the bushing connection member (102) is configured to form a drive member of a free-wheel mechanism (100A, 100B, 100C). 20

12. An eccentric tamper bushing (50) for a tamper device (40) of a screed assembly (18) of a road paver (10), wherein the eccentric tamper bushing (50) comprises: 25

a body portion (74) including a shaft connection member (128) for connecting to an eccentric tamper shaft (46) inserted in the eccentric tamper bushing (50), wherein the shaft connection member (128) is configured to form a driven member of a freewheel mechanism (100A, 100B, 100C). 30

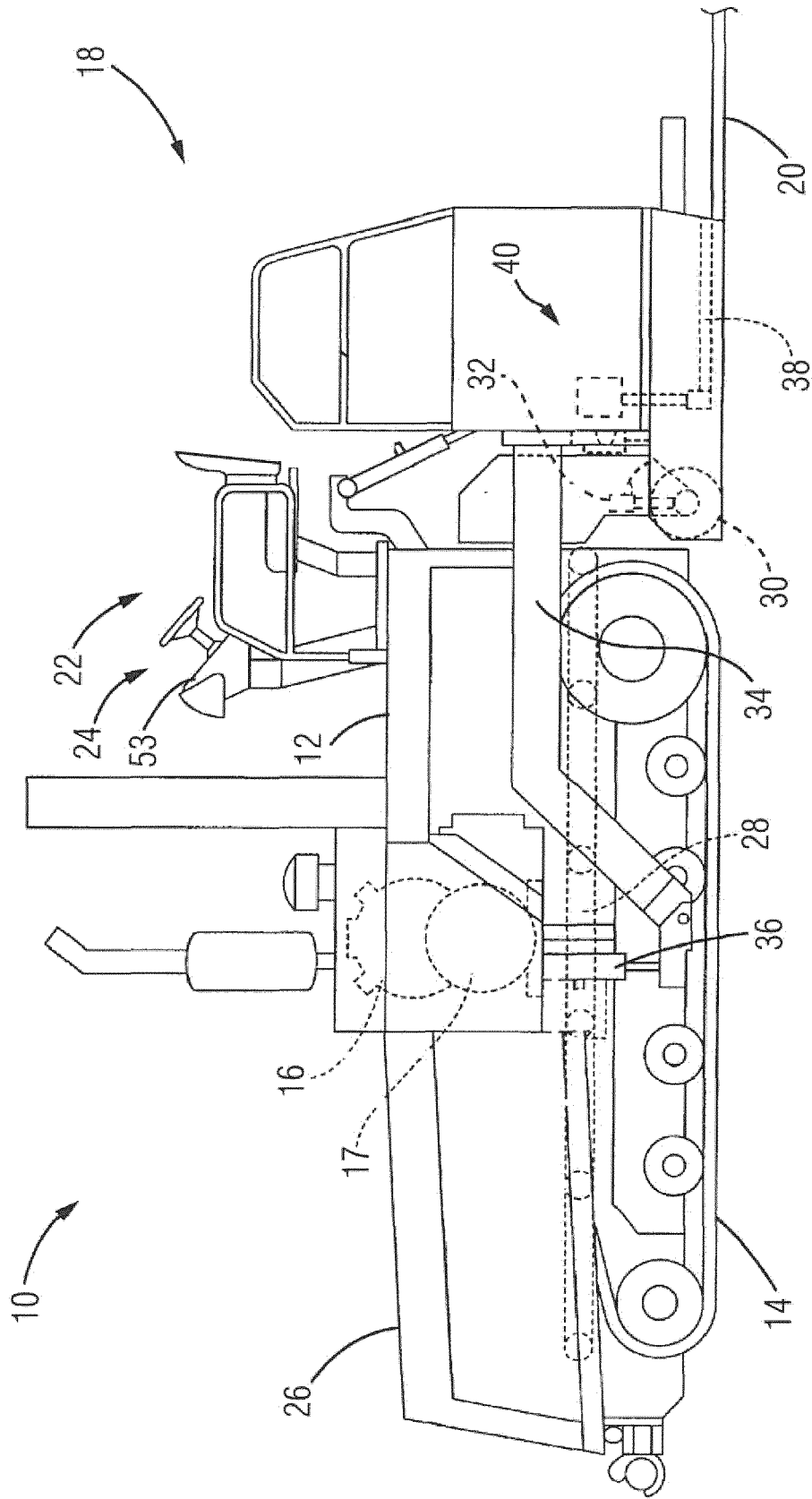
13. The eccentric tamper shaft (46) of claim 11 or the eccentric tamper bushing (50) of claim 12, wherein the freewheel mechanism (100A, 100B, 100C) is configured as a pawl-and-ratchet wheel mechanism, a sprag body mechanism, or a wrap spring mechanism. 35 40

14. A method for operating a tamper device (40) of a screed assembly (18) of a road paver (10), the tamper device (40) including a freewheel mechanism (100A, 100B, 100C) connecting an eccentric tamper shaft (46) and an eccentric tamper bushing (50), the method comprising: 45

adjusting a stroke length of the tamper bar (42) by causing a disengagement of the freewheel mechanism (100A, 100B, 100C) and rotating the eccentric tamper shaft (46) and the eccentric tamper bushing (50) relative to one another. 50

15. The method of claim 14, wherein the step of rotating the eccentric tamper shaft (46) and the eccentric tamper bushing (50) relative to one another comprises manually rotating the eccentric tamper shaft (46) 55

FIG 1



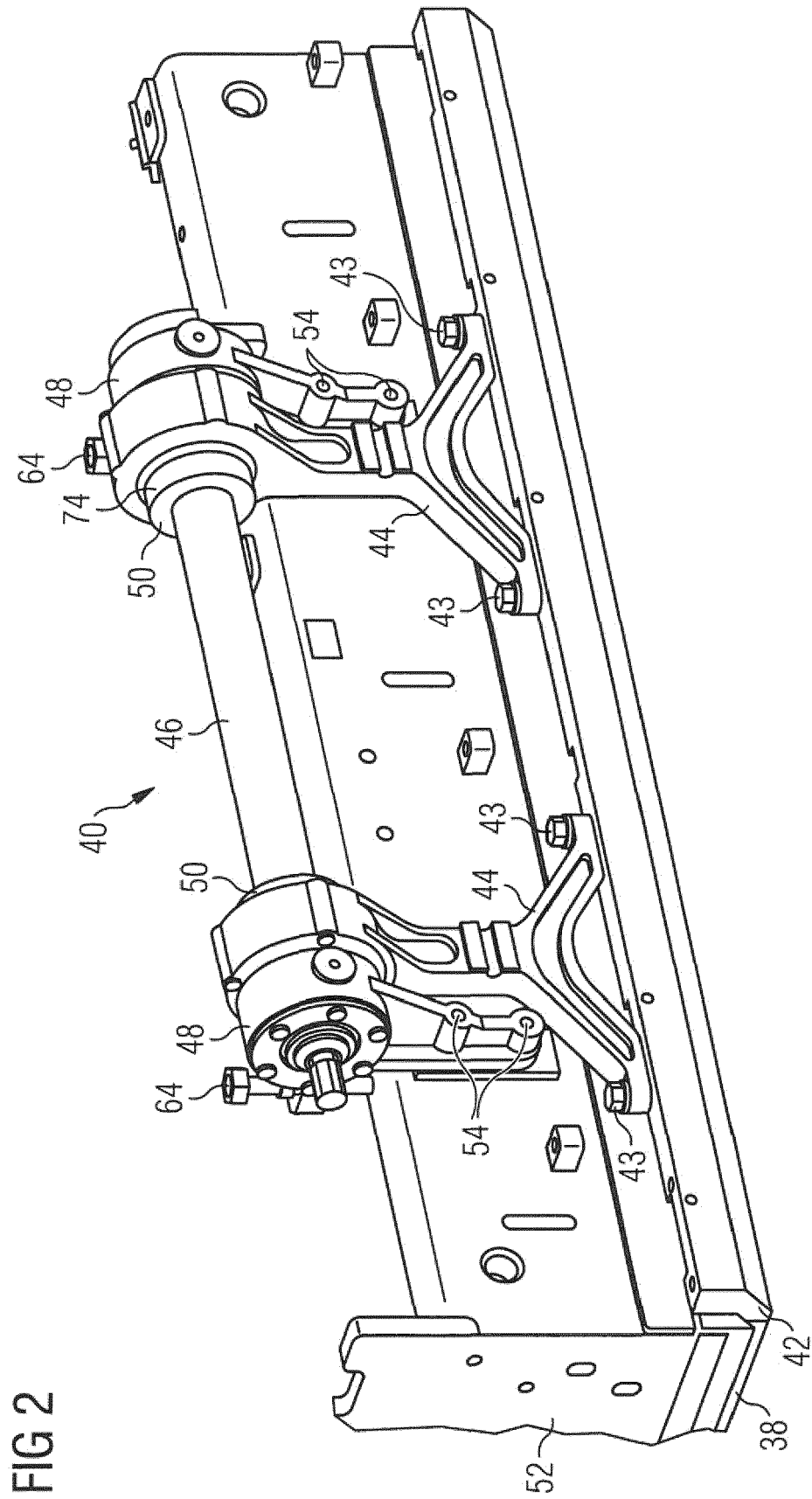


FIG 3

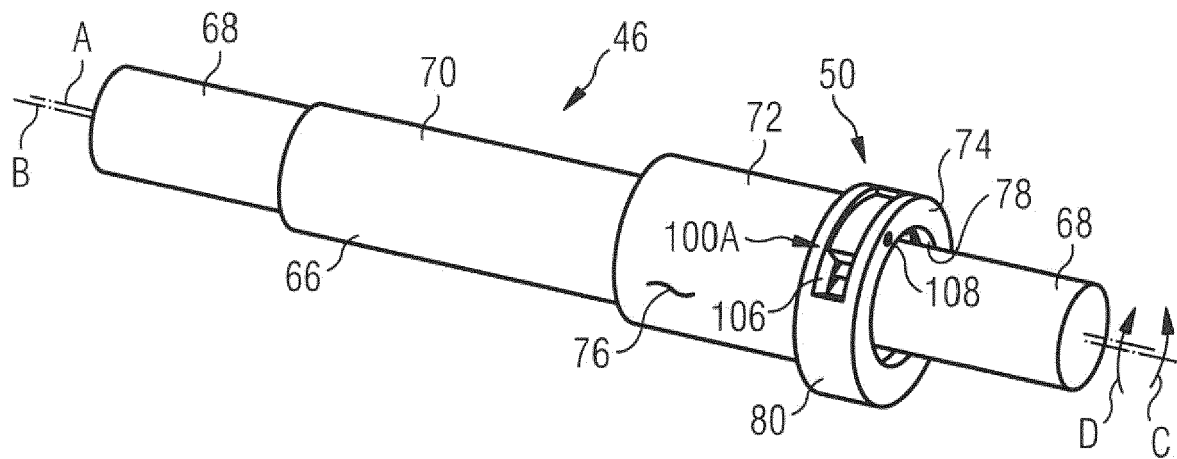


FIG 4

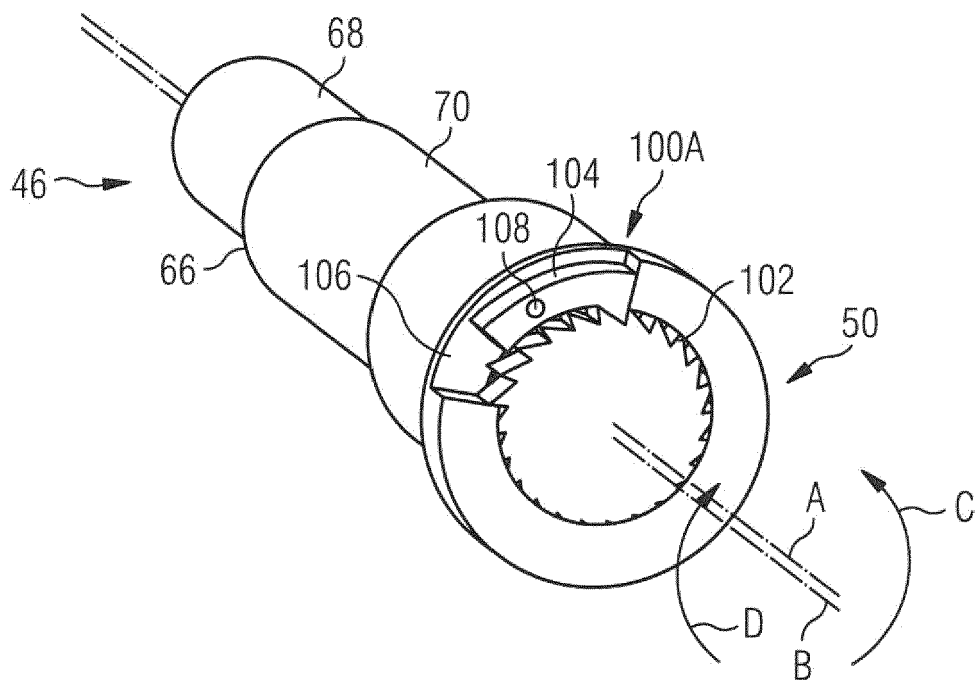


FIG 5

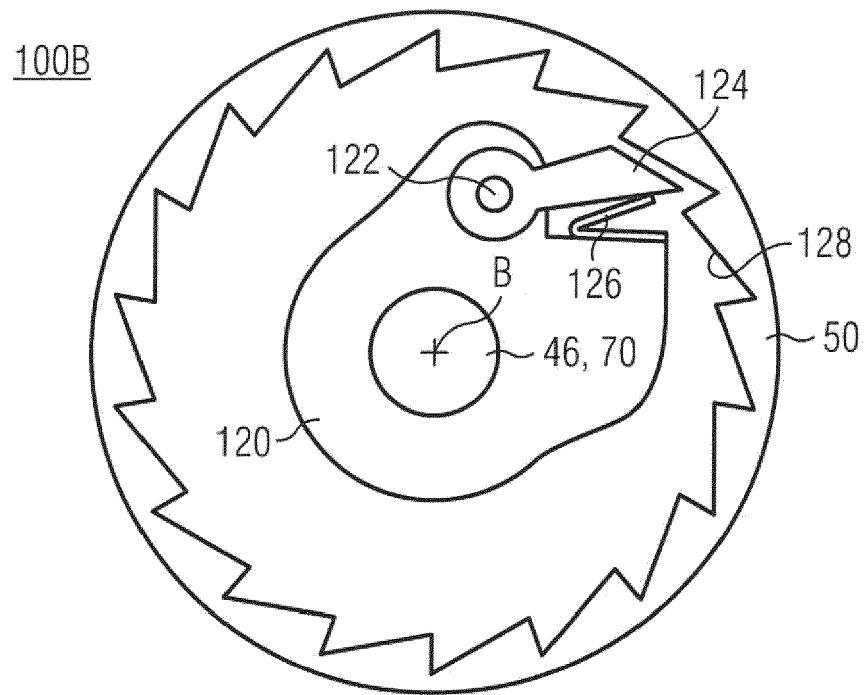
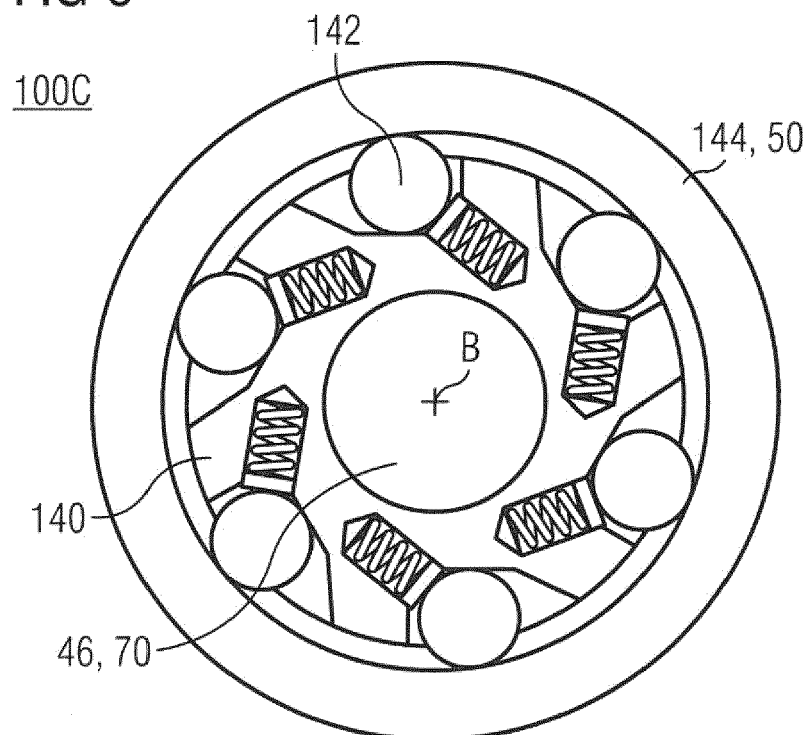


FIG 6





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Place of search Munich		Date of completion of the search 11 November 2016	Examiner Beucher, Stefan
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