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ABSTRACT

A disc mounting assembly for a disc plough is disclosed. The disc mounting assembly comprises an axle configured to be fixed to a support structure of a disc plough and a disc assembly which is rotationally mounted to the axle about a rotation axis. The disc assembly includes a spool disposed between adjacent disc mounting flanges and discs mounted to the respective adjacent disc-mounting flanges. Each disc is mounted to a respective disc-mounting flange by at least one bolt which has an axis that is spaced radially further than the spool from the rotational axis of the disc assembly. A disc plough including a disc mounting assembly is also disclosed.

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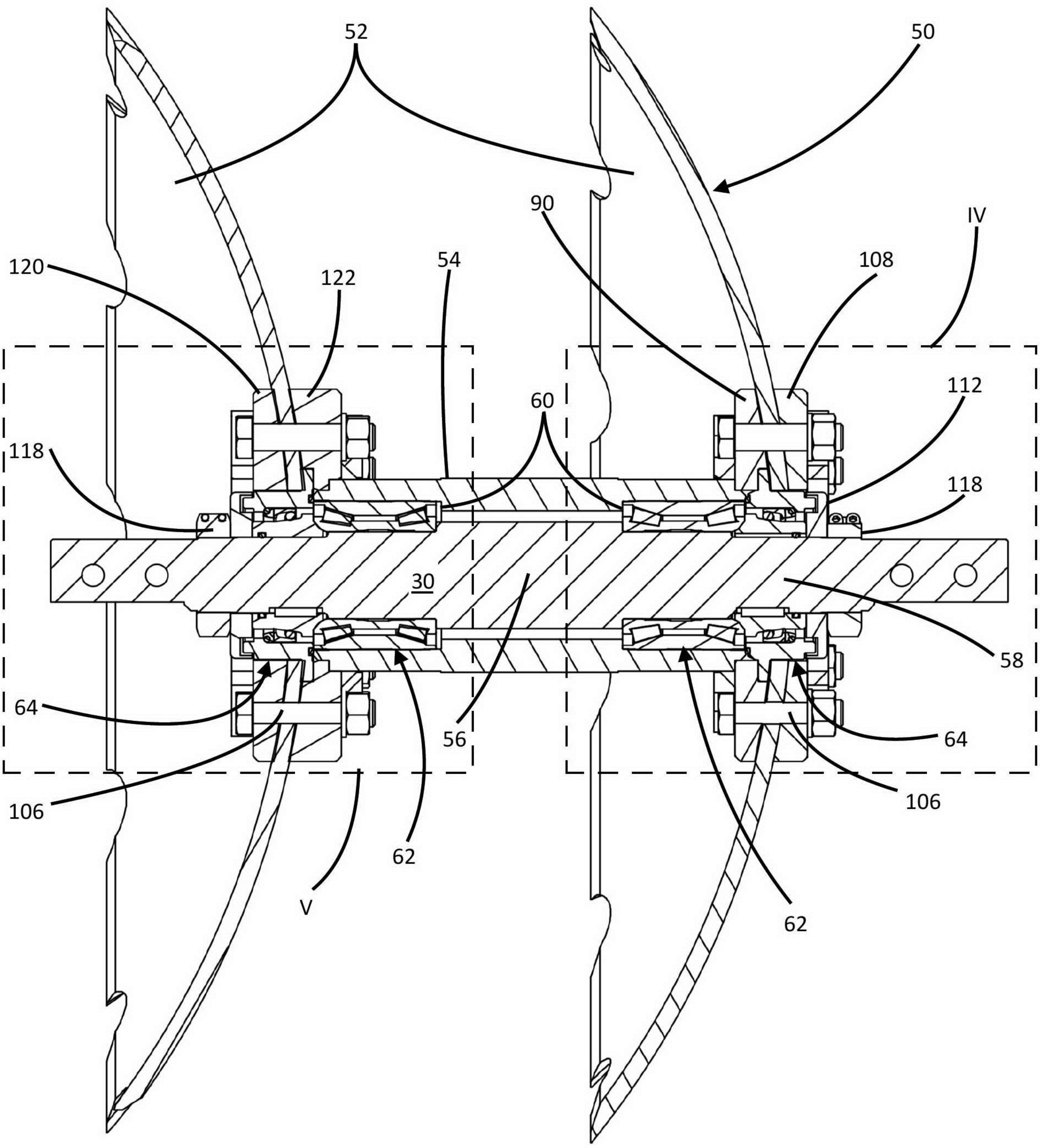

Figure 2

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DISC MOUNTING ASSEMBLY

TECHNICAL FIELD

This disclosure relates to agriculture and land development. The disclosure relates to equipment for those applications and relates particularly to disc ploughs. More specifically, the disclosure relates a disc mount assembly for disc ploughs and relates to disc ploughs that incorporate the disc mount assembly.

BACKGROUND

The load capacity of a disc plough plays a large role in determining the plough's ploughing depth for different types of soils. For example, heavier soils, such as those exposed to high annual rainfall, are more difficult to plough. Disc ploughs have been limited to plough depths of around 25 cm for this reason.

Ploughing at deeper depths requires a plough to have a higher load capacity. This in turn requires the plough to have more robust components that can withstand higher loads. For a very considerable time, disc mounting assemblies have employed long bolts which extend between adjacent discs to link them and which terminate at a thrust flange on one disc and at the leading flange on a disc in a linked group of discs (i.e. the bolts terminate on respective disc surfaces which face way from the linked discs) as shown in Figure 1.

In this arrangement which has been used since the 1950's, the bearings comprise ball-bearing units which fit about a stationary axle and which support the respective flanges. The shape of the ball-bearing units means that the bolts must be located radially outwardly of the ball-bearing units and this, in turn, means that the spool must be located radially further way from the axle to protect the bolts and the ball-bearing units. These disc mounting assemblies are not well suited to deep ploughing due to the ball-bearing units having a lower load capacity than required to handle deeper ploughing Additionally, the radial spacing of the spool from the axle reduces the clearance between the spool and the perimeter of the disc and, therefore, limits the depth to which the discs can plough into the soil.

It was thought that the only way to increase the load capacity was through using oil bath bearings with discs mounted to a rotating axle. However, the increased load capacity of the oil bath bearings is off-set by the limit on the number of bolts possible to secure discs to a rotating axle. To the knowledge of the applicant, the number of bolts has been limited to one large bolt, typically 2 inches (5 cm), and this has limited the load capacity of disc ploughs to 750 kg/disc. This load capacity is still not high enough to plough some types of soils at the depths desired (i.e. up to 40 cm). Even still, a sufficiently high load capacity isn't enough to ensure that ploughing at the desired depth can take place because there is the additional requirement for a suitable clearance between the perimeter of the discs and the spool. As explained above, the arrangement of the ball-bearing units and the bolts that fasten the discs in the disc mounting assembly were configured such that the spool was positioned so far away from the axle that it reduces the clearance between the spool and the perimeter of the discs. The reduced clearance impedes disc penetration to the desired ploughing depths.

It follows that an alternative disc mounting assembly is required to improve disc ploughing depth. It is anticipated that an alternative configuration may improve disc ploughing depth by improving disc cutting clearanceor improving disc load capacity or by improving both.

SUMMARY OF THE DISCLOSURE

In one aspect, there is provided a disc mounting assembly for a disc plough, the assembly comprising:

(a) an axle configured to be fixed to a support structure of a disc plough;

(b) a disc assembly which is rotationally mounted to the axle about a rotation axis and the disc assembly includes a spool disposed between adjacent disc mounting flanges and discs mounted to the respective adjacent disc-mounting flanges; and

wherein each disc is mounted to a respective disc-mounting flange by at least one bolt which has an axis that is spaced radially further than the spool from the rotational axis of the disc assembly.

In another aspect, there is provided a disc mounting assembly for a disc plough, the assembly comprising:

(a) an axle configured to be fixed to a support structure of a disc plough;

(b) a disc assembly which is rotationally mounted to the axle about a rotation axis and the disc assembly includes a spool disposed between adjacent disc mounting flanges and discs mounted to the respective adjacent disc-mounting flanges; and

wherein a clearance ratio comprising a ratio of the disc diameter to the spool diameter is in the range of 4 to 8.

The clearance ratio may be in the range of 5 to 7. Alternatively, the clearance ratio may be greater than 4.5 or may be greater than 5.5.

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A clearance comprising a spacing between the spool and a perimeter of the disc in a radial direction from the rotation axis may be sufficient to enable plough depths of up to 40 cm. The clearance between the spool and the disc may be more than 40 cm.

Each disc may be mounted to a respective adjacent flange by a plurality of bolts. Each disc may be mounted to a respective adjacent flange by six bolts. Each disc may be mounted to a respective adjacent flange by eight of bolts.

The disc assembly and the axle may be configured such that the disc assembly rotates about the axle.

In a further aspect, there is provided a disc mounting assembly for a disc plough, the assembly comprising:

(a) an axle configured to be fixed to a support structure of a disc plough;

(b) a disc assembly which is rotationally mounted to the axle about a rotation axis and the disc assembly includes a spool disposed between adjacent disc mounting flanges and discs mounted to the respective adjacent disc-mounting flanges; and

wherein the disc mounting assembly has a load capacity of at least 775 kg/disc.

The disc mounting assembly may have a load capacity of at least 800 kg/disc, 825 kg/disc or 850 kg/disc.

The disc mounting assembly may have a load capacity in the range of 775 to 900 kg/disc.

The disc assembly may include bearings which link the spool and the disc-mounting flanges to the axle to enable rotation of the spool and the flanges relative to the axle.

The bearings may be enclosed in a space between the spool and/or flanges and the axle. The space may comprise an oil bath.

The disc mount assembly may include a leading disc and a thrust disc and two bearing units and wherein the bearing units are located between the leading disc and a thrust disc.

The spool may be supported on the bearing units for rotation relative to the axle and may be linked to the discs.

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Each disc may be fixed between a leading flange and a thrust flange and neither flange contacts the bearing units.

The leading and thrust flanges for a disc may be supported on a sealing unit which is located radially between the flanges and the axle.

The sealing units may seal the space. The sealing units may include ring seals that accommodate rotation of the discs which they support.

The spool is a load-bearing link between discs in the disc mounting assembly and which spool causes the discs to rotate in unison.

In a further aspect, there is provided a disc plough that includes a disc mounting assembly according to any one or more of the aspects described above.

BRIEF DESCRIPTION OF THE DRAWINGS

Notwithstanding any other forms which may fall within the scope of the apparatus as set forth in the Summary, an embodiment will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a vertical cross-section through the rotational axis of a disc gang to show an existing disc-mounting assembly;

Figure 2 is a cross-sectional view of a disc mounting assembly for two discs in the gang shown in Figure 2 and according to an embodiment of the above aspects;

Figure 3 is an exploded isometric view of the disc assembly;

Figure 4 is a close-up view of region IV shown in Figure 2;

Figure 5 is a close-up view of region V shown in Figure 2;

Figure 6 is a cross-sectional view of another embodiment of the above aspects in a disc mounting assembly for two discs;

Figure 7 is a cross-sectional view of another embodiment of the above aspects in a disc mounting assembly for three discs; and

Figure 8 is a close-up view of region VII shown in Figure 7.

DESCRIPTION OF EMBODIMENT

A preferred embodiment of the present invention will now be described in the following text which includes reference numerals that correspond to features illustrated in the accompanying Figures. To maintain clarity of the Figures, however, all reference numerals are not included in each Figure.

The applicant recognized the load capacity limitations of existing disc mounting assemblies that employ oil bath bearings and decided to mount discs with multiple bolts. However, that required a re-design of the disc mounting assembly to address the problem (created by adopting multiple bolts) of disc clearance from the spool.

The applicant has adopted a disc mounting assembly which resolves the disc clearance problem of previous assemblies by locating the bolt or bolts which mount the discs to respective disc-mounting flanges radially outwardly from the spool. The arrangement is shown in Figures 2 to 4 and is described below.

Figure 1 shows a front elevation of a cross-section of a disc gang 20 for a disc plough. The gang 20 includes a support beam 22 with downwardly depending support plates 24. The end of each support plate 24 includes a wall 26 which is configured to couple with one end of at least one disc mounting assembly 50. That is, support plates 24 in a middle section of the gang 20 couple with two adjacent disc mounting assemblies 50 and one support plate 24 at one end of the beam 22 couples with only one disc mounting assembly 50.

In the embodiment shown in Figure 1, the gang 20 includes four disc mounting assemblies 50 mounted between the support plates 24. The disc mounting assemblies 50 in the gang 20 have rotation axles that are aligned on a common axis. Each disc mounting assembly 50 includes a pair of spaced apart discs 52, an axle 30 and a spool 54, as shown in Figure 3. It will be appreciated however that other embodiments of disc mounting assemblies 50 may have more than two discs 52. An example of such an embodiment is shown in Figure 7 and is described in further detail below.

Having regard to Figures 2 to 5, the axle 30 has a central body portion 32, a neck portion 34 and an end portion 38 that is adapted to secure to the wall 26 of one of the support plates 24. The body portion and the neck portion 34 each have a circular profile.

However, the circular profile of the neck portion 34 has a smaller diameter than the profile of the body portion 32. The transition between the body portion 32 and the neck portion 34 is an annular shoulder 36 which extends radially between the neck portion 34 and the body portion 32. The end portion 38 has a generally square profile and a pair of apertures through which bolts can pass for securing the end portion to the wall 26 of the support plate 24.

The spool 54 comprises a tube and has an internal diameter that is slightly greater than the external diameter of the body portion 32 so as to define a space between them. The spool 54 also has steps 60 separating the central section 56 from the end sections with end sections 58 of the spool. As a result, the spool 54 has a thinner wall thickness in the end sections 58 than in the central section 56. In the assembly, the central section 56 and the end sections 58 of the spool 54 overlap the body portion 32 and part of the neck portion 34, respectively. This results in the step 60 coinciding with the shoulder 36. The widened spacing between the axle 30 and the spool 54 accommodates bearing units 62 such that the spool is supported by the bearing units 62 to rotate relative to the axle. In this embodiment, the bearing units 62 are double tapered roller bearings. These are selected to provide a high load capacity and for longevity and durability. However, any suitable bearing units may be used provided that they have a relatively narrow profile to fit between the spool and the axle.

A sealing unit 64 abuts the bearing unit 62 to form a seal. In the embodiment shown in Figure 2 and referring firstly to the right-hand portion of the disc mounting assembly 50 identified in region IV (a close-up view of which is shown in Figure 4), the sealing unit 64 is located axially relative to the bearing unit and fits about the axle 30. The sealing unit 64 includes an inner ring 70, a thrust seal casing 68, a seal 86 and o-rings 82. The inner ring 70 includes an inner wall which faces the axle and includes a slot which is adapted to receive a key. The axle 30 includes a seat which is also adapted to engage the key such that when the key engages the seat and the slot, the inner ring is retained stationary relative to the axle 30. Adjacent the slot is a radially inwardly facing groove 78 in the inner wall for receiving an o-ring to form a seal between the axle and the inner ring.

The thrust seal casing 68 fits circumferentially about the inner ring 70 and provides a gap between them that accommodates the seal 86. However, the radially outer wall of the inner ring 70 tapers outwardly in profile toward the spool 54 so that the gap between the inner ring 70 and the thrust seal casing also tapers inwardly in the same direction. While any suitable seal may be used, the seal 86 in this embodiment is a duo cone seal.

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The thrust seal casing 68 further includes a radial flange 74 which is configured to sit flush against the concave surface of the disc. The configuration of the radial flange 74 is provided by an annular face which is shaped to match the concave shape of the disc where they sit together. In this embodiment, the radial flange 74 has a profile that narrows in width from its base to its radially outer perimeter.

The thrust seal casing 68 further includes an axial flange 76 projecting from an end of the thrust seal casing 68 opposite to the end which contacts the spool. The axial flange 76 assists to align a retaining washer 112 with the sealing unit 64 so that it is held in position when a nut 118 is fitted. In particular, the retaining washer 112 includes an annular groove 116 in the axial direction which is shaped to receive the axial flange 76 of the thrust seal casing 68. The annular groove 116 allows the thrust seal casing 68 to rotate with the disc 52 and the spool 54. The nut 118 has an internal thread which mates with a thread on the neck portion 34 of the axle 30 so that tightening of the nut 118 along the axle 30 causes the retaining washer 112 to push the sealing unit 64 toward the spool 54. The nut 118 may further include one or more screws which increase contact between the nut 118 and the axle 30. This reduces the chance of the nut 118 loosening.

A further o-ring 82 is located between the axial ends of the thrust seal casing 68 and the spool 54. It follows that tightening of the nut 118 along the axle 30 compresses the o-ring 82 between the thrust seal casing 68 and the spool 54 to form a seal between them. As a result, the sealing unit 64 at each end of the spool 54 forms a sealed cavity between the axle 30 and the spool 54 and which cavity which includes the bearing units 62. The cavity is filled with oil so the bearing units are oil bath bearings.

The disc 52 is fitted as part of the disc mounting assembly by clamping between a leading flange 88 and a thrust flange 90. The leading flange 88 contacts the concave surface of the disc and includes a corresponding shaped curved annular wall 92. The wall 92 terminates at a step 94 which is recessed from the wall 92. The step 94, therefore, defines a space to receive the radial flange 72 between the disc 52 and the step 94. As shown in Figure 4, the radial flange includes circumferentially spaced screw holes 100 and the step 94 includes a corresponding arrangement of threaded holes 102 for receiving screws 104 to fasten the thrust seal casing 68 to the leading flange 90.

The leading flange 90 further includes a raised profile section 96 that defines recesses 98 for receiving respective heads of bolts 106. The recesses 98 are each formed to prevent rotation of the bolt 106 when the head is received in the recess 98. In the embodiment, the bolt heads are hexagonal and, therefore, the recesses 98 are also hexagonal and have a slightly larger dimension than the bolt heads to enable the bolts 106 to be inserted and removed when necessary.

While this embodiment shows that the disc mounting assembly 50 includes 8 bolts for each disc 52, it will be appreciated that more or fewer bolts 106 may be used to fit the discs 52.

The thrust flange 108 contacts the convex surface of the disc 52 and includes a correspondingly shaped curved annular wall 110. The thrust flange 108 further includes apertures through which the bolts 106 can pass so that nuts 126 can be fitted to their ends, thereby clamping the disc 52 between the thrust flange 108 and the leading flange 91.

In this arrangement, the spool 54, disc 52, leading flange 90, thrust flange 108, thrust seal casing 68 and associated fasteners rotate relative to the axle 30 during operation. The remaining components described above are fixed relative to the axle. In this embodiment, the axle 30 is fixed to the support plates 24 and, therefore, remains stationary (i.e. does not rotate with the discs) during use of the disc mounting assembly 50.

Referring now to the region V on the left-hand side of the disc mounting assembly 50 shown in Figure 2 and which region is magnified in Figure 5, the region includes a mirror image arrangement of the spool 54, the bearing unit 62, o-rings 82, the retainer washer and the nut 118. However, as the disc 52 in region V is arranged in the same orientation as the disc 52 in region IV, the leading flange 120 and the thrust flange 122 have the same arrangement as in region IV, but the sealing unit 64 is configured slightly differently. For the most part it is configured as a mirror image of the sealing unit 64 in the region IV, the only difference being that the thrust seal casing 68 is replaced by a lead seal casing 66. The lead seal casing 66 differs from the thrust seal casing 68 by having a radial flange 72 which is configured to contact the convex surface of the disc 52. Accordingly, the radial flange 72 has a profile that broadens from its base to its radially outer perimeter.

With the radial flange 72 being adapted to contact the convex side of the disc 52, the leading flange 120 and the thrust flange 122 differ from the leading flange 90 and the thrust flange 108 by virtue of the thrust flange 122 including a recessed step 124 which accommodates the radial flange 72 when the thrust flange 122 is assembled with the

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leading seal casing 66 and the disc 52. Furthermore, the leading flange 120 does not include a step like the step 94 formed in the leading flange 90.

The disc mounting assembly 50 described above provides for a 24 mm gap between the leading flanges 90, 120 and the thrust flanges 108, 122. This means that the discs 52 have a wall thickness of 24 mm. In the event that the disc 52 is thinner than 24 mm, the spool 54 needs to be replaced with another spool having a length that accommodates the difference in the gap. One alternative is shown in Figure 6 which is a cross-section of another disc mounting assembly 130. The features of the disc mounting assembly 130 are the same as the disc mounting assembly 50 described above, save for having a disc 52 with a wall thickness of 12 mm and an additional disc 132, also with a wall thickness of 12 mm. The additional disc 132 reinforces the disc 52 so that the disc assembly has a higher load capacity than it would have if it included only the discs 52 with a wall thickness of 12 mm. A further alterative is shown in Figures 7 and 8 and is described in more detail below.

As mentioned above, the disc mounting assembly 50 may be modified to include more than two discs 52. The disc mounting assembly 140 shown in Figures 7 and 8 is includes three discs 52. The disc mount assembly 140 includes an axle 142 in the same form as the axle 30, but has a longer body portion 144 to account for the longer disc mounting assembly 140. Discs 52 at the ends of the disc mounting assembly 140 are incorporated in the same way as shown in Figures 4 and 5. The description above relating to regions IV and V in Figure 2 are applicable to the disc mounting assembly 140. The corresponding regions in the disc mounting assembly 140 are denoted with the same region markings IV and V.

Where the disc mounting assembly 140 differs from the disc mounting assembly 50 is the incorporation of the third disc 52. This is achieved by adopting two spools 54 in the same form as described above for the disc mounting assembly 50. The centre-ends of the spools 54 are bridged by a sleeve 146. The sleeve 146 is formed as a tube and has an inner diameter that is greater than the out diameter of the body portion 144 so that the sleeve 146 is spaced from the axle 144. One end of the sleeve 146 occupies the part of the space that would otherwise be occupied by a bearing unit if that end of the spool 54 was at an outer end of the disc mounting assembly. Another part of the sleeve 146 has a form similar to the thrust seal casing 68. That is, the sleeve 148 includes a radial flange 148. The radial flange 148 is in the same form as the radial flange 74 of the thrust seal casing 68.

Leading and thrust flanges 150, 152 have profiles that complement the profiles of the spools 54 and the sleeve 148. In particular, the leading and thrust flanges 150, 152 have radially inwardly-facing profiles which steps that complement steps formed by the spools 54 and the sleeve 146. More particularly, the leading flange 150 includes the step 94 described above for the leading flange 90. The step 94 defines a space which receives the radial flange 148 so that it is clamped between the disc 52 and the leading flange 150. The thrust flange 152 is in the same form as the thrust flange 122. However an annular washer 154 is fitted to the thrust flange 152 in the space that would otherwise be occupied by the radial flange 72 of the leading seal casing 66. The washer 154 is fitted by threaded screws 156 which interact with threaded holes formed in the thrust flange 152.

The sleeve 146 includes two radial grooves 158 and an axial groove 160. These grooves 158, 160 are fitted with o-rings 82 to seal the cavity between the axle 142 and the spools 54.

The disc 52 has a wall thickness of 16 mm. A packer 162 makes up the reminder of the gap so that the disc is firmly held between the leading and thrust flanges 150, 152. This is a further alternative to the second disc option shown in Figure 6 and described above. The packer 162 in this embodiment has an 8 mm wall thickness. However, it will be appreciated that the packer 162 selected for the disc mounting assembly 140 will depend on the wall thickness of the disc 52. That is, packers 162 of different wall thicknesses will be required for discs of different wall thicknesses to fill the 24 mm gap between the leading and thrust flanges 150, 152.

The embodiments described above are adapted to provide a load capacity that is greater than 750 kg/disc. The load capacity is anticipated to be 775 kg/disc, 800, kg/disc, 825 kg/disc, 850 kg/disc or greater. The higher load capacity available with this embodiment is thought to make it suitable for ploughing heavier soil types, such as soils that receive high annual rainfall. One advantage of having a higher load capacity is that plough depth can be increased. Disc ploughs, however, have a plough depth which is limited by the disc penetration depth, which is a function of the clearance between the spool and the disc perimeter. Previous attempts to build more robust disc ploughs with higher load capacity have resulted in a reduced clearance, so while the disc ploughs could be used in heavier soil types, ploughing depth has been limited.

The embodiments disclosed above is based on a spool radius of 88mm and a disc radius of 532mm (measured as a radial line that is perpendicular the rotational axis of the

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disc). This provides a clearance between the spool and the disc perimeter of more than 40 cm. It follows that the disc mounting assembly 50 enables plough depths of up to 40 cm. Based on these measurements, the clearance ratio (disc radius to spool radius) is 6.05. The clearance ratio of the disc mounting assembly 50 will vary depending on the radial size of the spool 54 and the size of the disc 52, but the applicant anticipates that the ratio may be in the range of 4 to 8 or may be in the range of 5 to 7. Alternatively, the clearance ratio may be greater than 4.5 or may be greater than 5.5.

However, it is anticipated that the configuration described above may be retailed, although with, less robust components to provide a disc mounting assembly with a similar clearance ration that can be used in lighter soil where lower load capacities are suitable. It follows that the disc mounting assembly configuration described above doesn't require to high load capacities to be associated with an improved clearance ration and vice versa. For example, fewer bolts may be used to fastened discs to the assembly and less robust bearing units may be used to provide a disc mounting assembly with a lower load capacity and the same or greater clearance ratio.

Whilst a specific embodiment of the disc mounting assembly has been described, it should be appreciated that the disc mounting assembly may be embodied in many other forms.

Those skilled in the art of the present invention will appreciate that many variations and modifications may be made to the preferred embodiment without departing from the spirit and scope of the present invention.

In the claims which follow, and in the preceding description, except where the context requires otherwise due to express language or necessary implication, the word "comprise" and variations such as "comprises" or "comprising" are used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments of the apparatus as disclosed herein.

In the foregoing description of preferred embodiments, specific terminology has been resorted to for the sake of clarity. However, the invention is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar technical purpose. Terms such as "front" and "rear", "inner" and "outer", "above", "below", "upper" and "lower" and the like are used as words of convenience to provide reference points and are not to be construed as limiting terms. The terms "vertical" and "horizontal" when used in reference to the disc mounting assembly throughout the specification, including the claims, refer to orientations relative to the normal operating orientation. The terms "radial" and "axial" when used in reference to the disc mounting assembly throughout the specification, including the claims, refer to orientations relative to the axis about which the discs rotate in their normal operating orientation.

Furthermore, invention has been described in connection with what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the invention. Also, the various embodiments described above may be implemented in conjunction with other embodiments, for example, aspects of one embodiment may be combined with aspects of another embodiment to realize yet other embodiments. Further, each independent feature or component of any given assembly may constitute an additional embodiment.

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CLAIMS

1. A disc mounting assembly for a disc plough, the assembly comprising:
   (a) an axle configured to be fixed to a support structure of a disc plough;
   (b) a disc assembly which is rotationally mounted to the axle about a rotation axis and the disc assembly includes a spool disposed between adjacent disc mounting flanges and discs mounted to the respective adjacent disc-mounting flanges; and

wherein each disc is mounted to a respective disc-mounting flange by at least one bolt which has an axis that is spaced radially further than the spool from the rotational axis of the disc assembly.

2. A disc mounting assembly for a disc plough, the assembly comprising:
   (a) an axle configured to be fixed to a support structure of a disc plough;
   (b) a disc assembly which is rotationally mounted to the axle about a rotation axis and the disc assembly includes a spool disposed between adjacent disc mounting flanges and discs mounted to the respective adjacent disc-mounting flanges; and

wherein a clearance ratio comprising a ratio of the disc diameter to the spool diameter is in the range of 4 to 8.

3. The disc mounting assembly of claim 1 or claim 2, wherein the clearance ratio is in the range of 5 to 7.

4. The disc mounting assembly of claim 1 or claim 2, wherein the clearance ratio is greater than 4.5 or may be greater than 5.5.

5. The disc mounting assembly of any one of claims 1 to 4, wherein a clearance comprising a spacing between the spool and a perimeter of the disc in a radial direction from the rotation axis is sufficient to enable plough depths of up to 40 cm.

6. The disc mounting assembly of claim 5, wherein the clearance between the spool and the disc is more than 40 cm.

7. The disc mounting assembly of any one of the preceding claims, wherein each disc is mounted to a respective adjacent flange by a plurality of bolts.

8. The disc mounting assembly of claim 7, wherein each disc is mounted to a respective adjacent flange by six bolts.

9. The disc mounting assembly of claim 7, wherein each disc is mounted to a respective adjacent flange by eight of bolts.

10. A disc mounting assembly for a disc plough, the assembly comprising:

(a) an axle configured to be fixed to a support structure of a disc plough;

(b) a disc assembly which is rotationally mounted to the axle about a rotation axis and the disc assembly includes a spool disposed between adjacent disc mounting flanges and discs mounted to the respective adjacent disc-mounting flanges; and

wherein the disc mounting assembly has a load capacity of at least 775 kg/disc.

11. The disc mounting assembly of any one of the preceding claims, wherein the disc mounting assembly has a load capacity of at least 800 kg/disc, 825 kg/disc or 850 kg/disc.

12. The disc mounting assembly of any one of the preceding claims, wherein the disc mounting assembly has a load capacity in the range of 775 to 900 kg/disc.

13. The disc mounting assembly of any one of the preceding claims, wherein the disc assembly includes bearings which link the spool and the disc-mounting flanges to the axle to enable rotation of the spool and the flanges relative to the axle.

14. The disc mounting assembly of claim 13, wherein each disc is fixed between disc-mounting flanges comprising a leading flange and a thrust flange.

15. The disc mounting assembly of claim 14, wherein the leading and thrust flanges for each disc are supported on a sealing unit which is located radially between the flanges and the axle.

16. The disc mounting assembly of claim 15, wherein the bearings are enclosed in a space between the spool and/or flanges and the axle.

17. The disc mounting assembly of claim 16, wherein the space comprises an oil bath.

18. The disc-mounting assembly of claim 16 or claim 17, wherein the sealing units seal the space.

19. The disc-mounting assembly of claim 18, wherein the sealing units include ring seals that accommodate rotation of the discs which they support.

20. The disc mounting assembly of any one of the preceding claims, wherein the disc mount assembly includes a leading disc and a thrust disc and two bearing units and wherein the bearing units are located between the leading disc and the thrust disc.

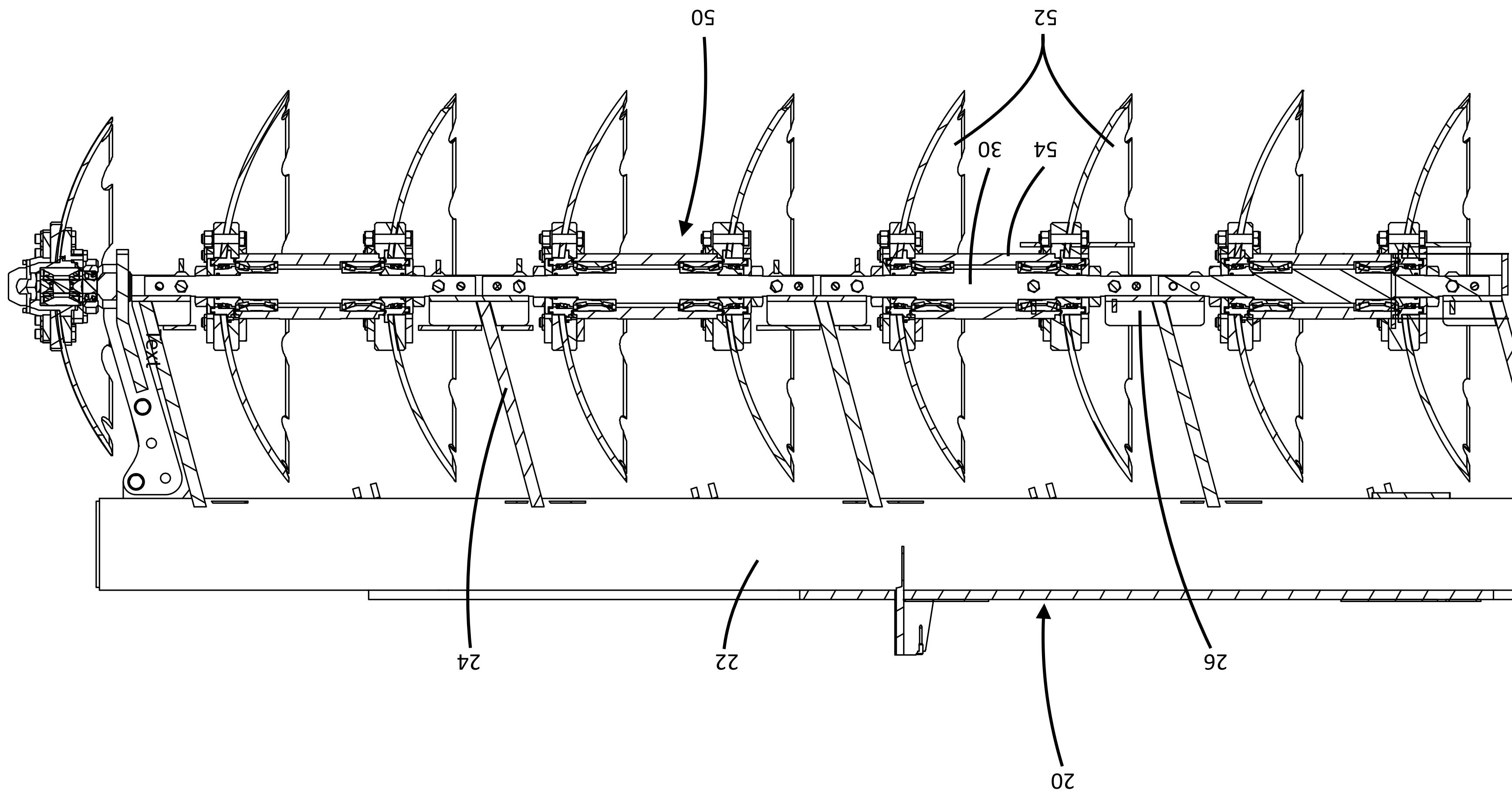
21. The disc-mounting assembly of claim 20, wherein neither the leading flange nor the thrust flange contact the bearing units

22. The disc mounting assembly of claim 20 or claim 21, wherein the spool is supported on the bearing units for rotation relative to the axle and is linked to the discs.

23. The disc mounting assembly of any one of the preceding claims, wherein the spool is a load-bearing link between the discs in the disc mounting assembly and which spool causes the discs to rotate in unison.

24. A disc plough that includes a disc mounting assembly according to any one of claims 1 to 23.

Figure 1



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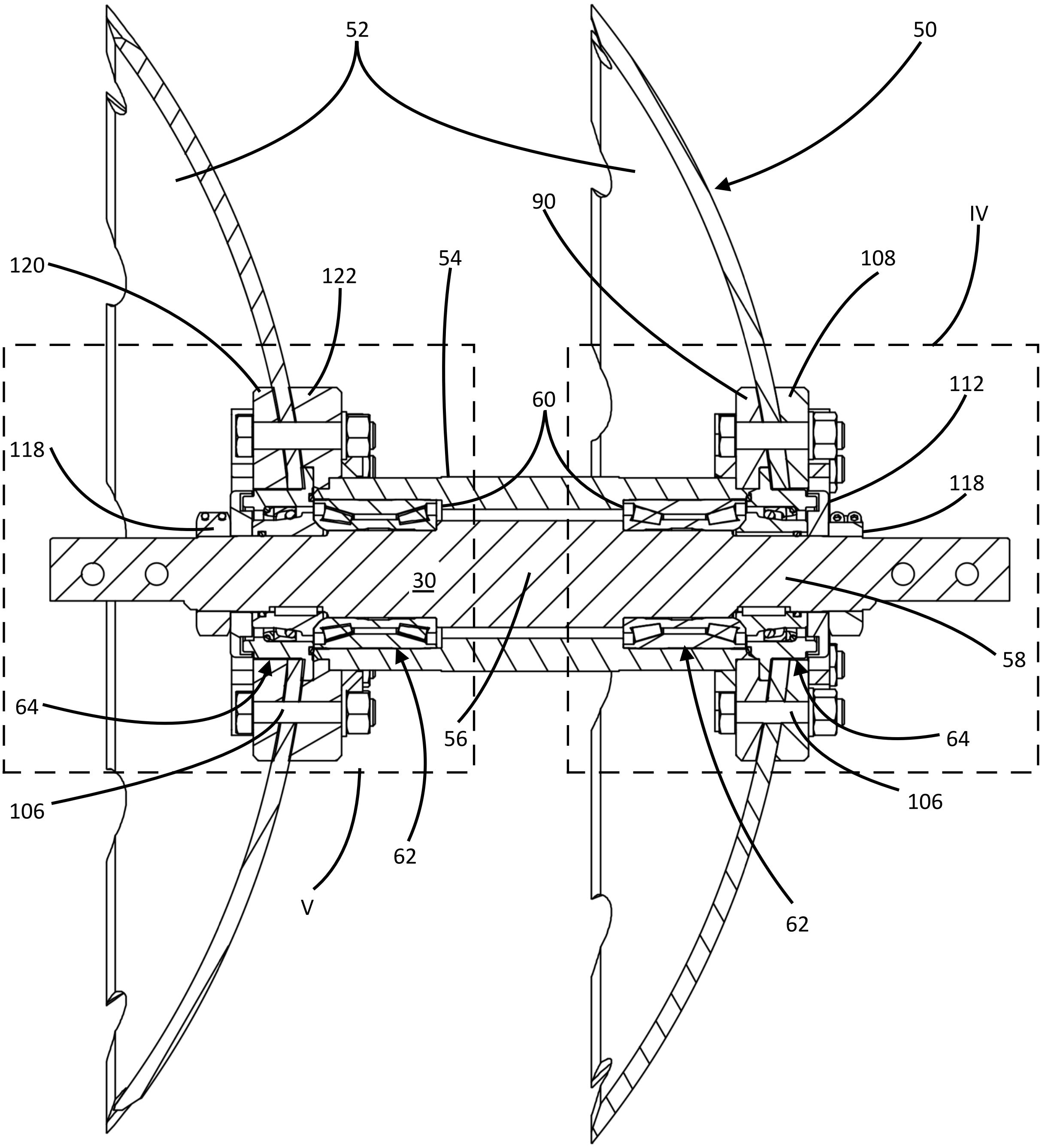

Figure 2

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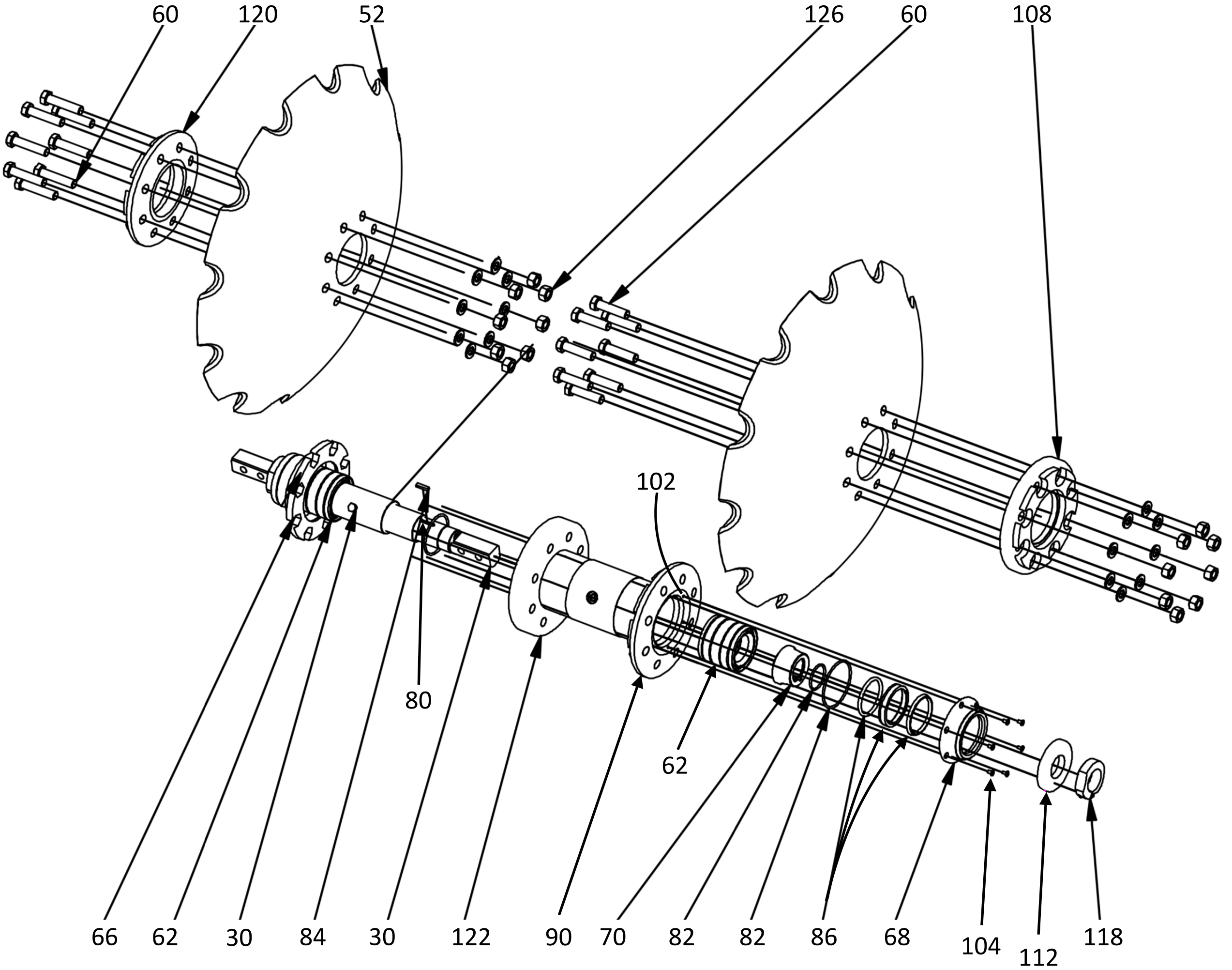

Figure 3

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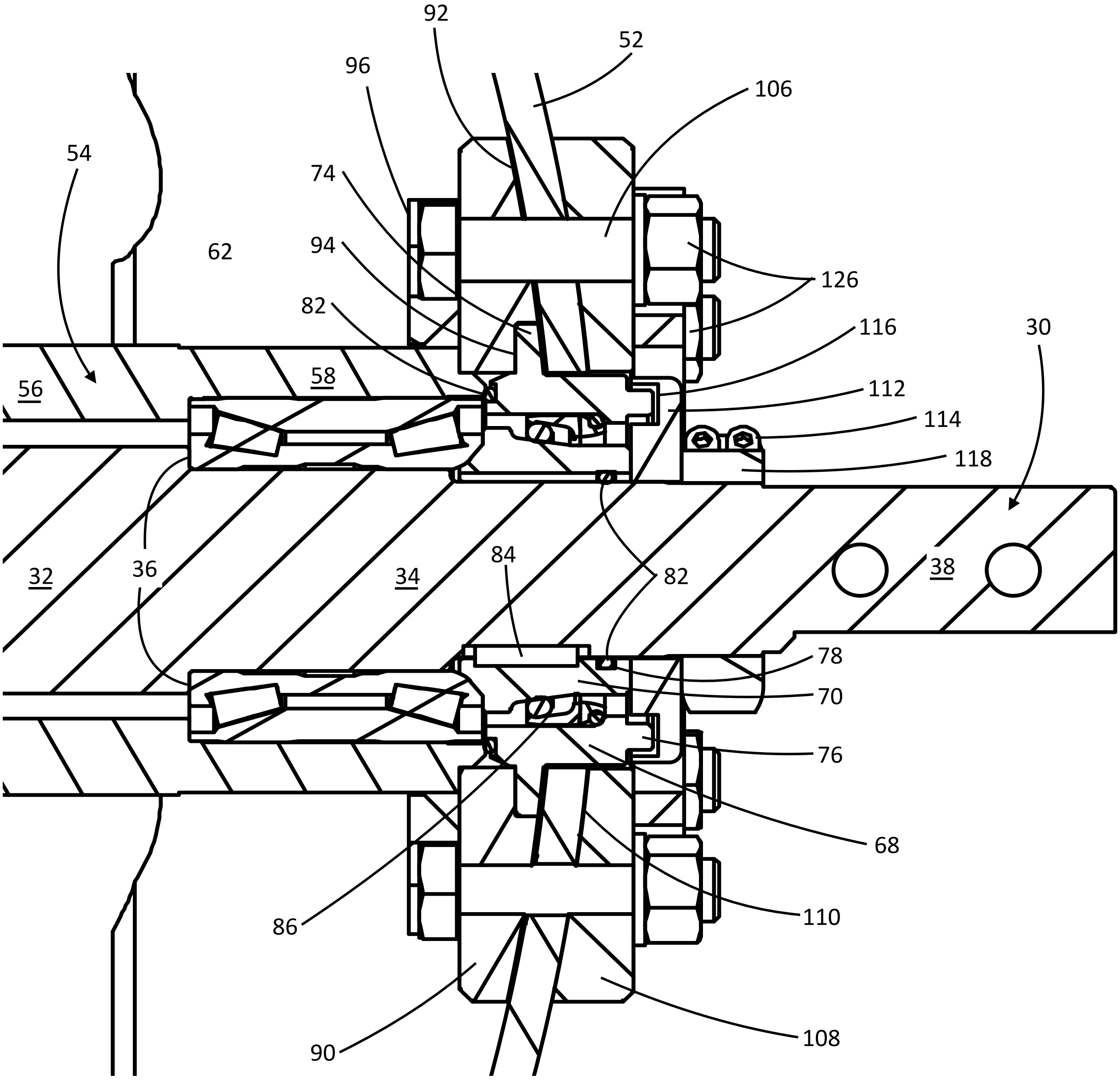

Figure 4

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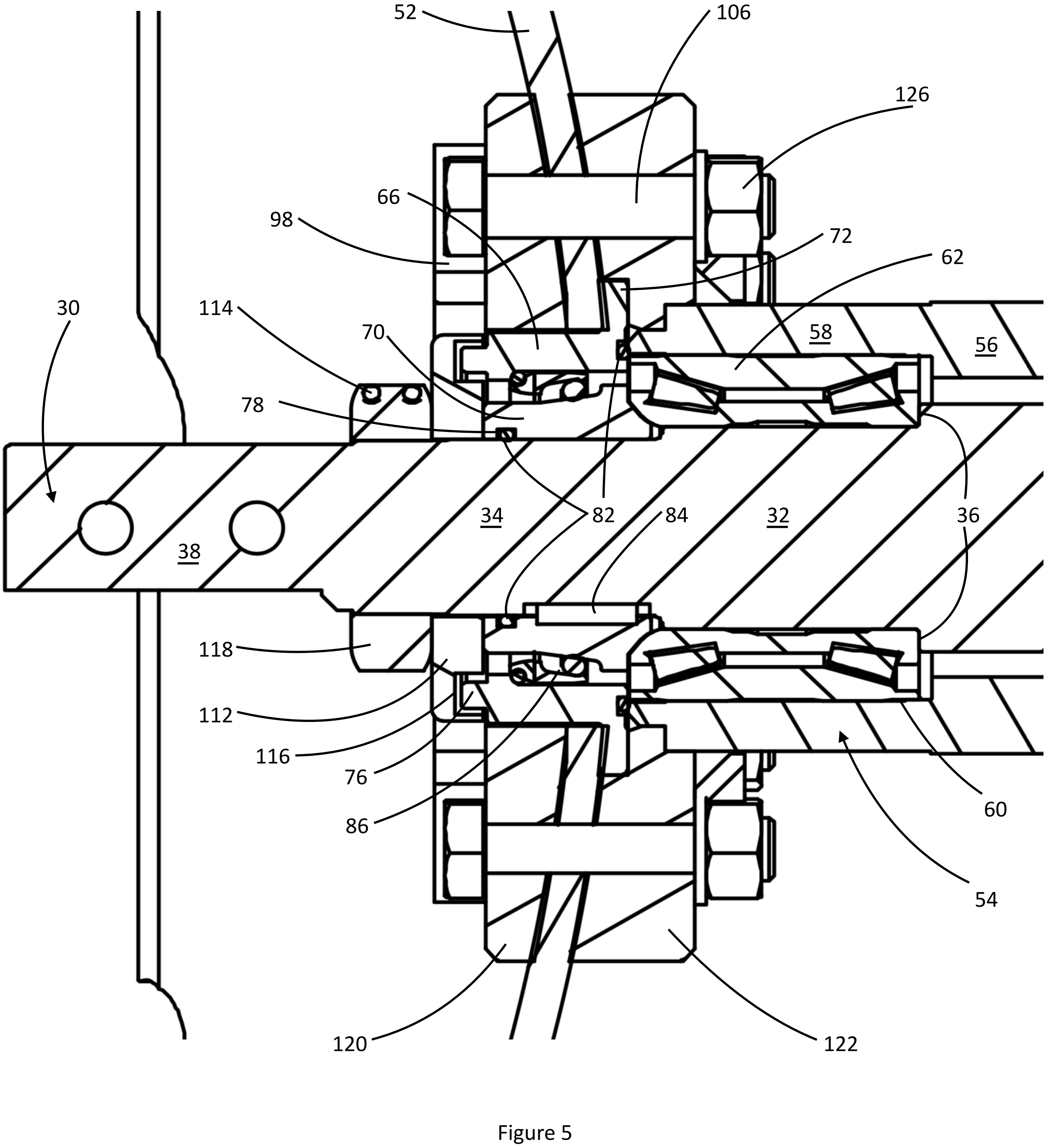

Figure 5

2021218022 17 Aug 2021

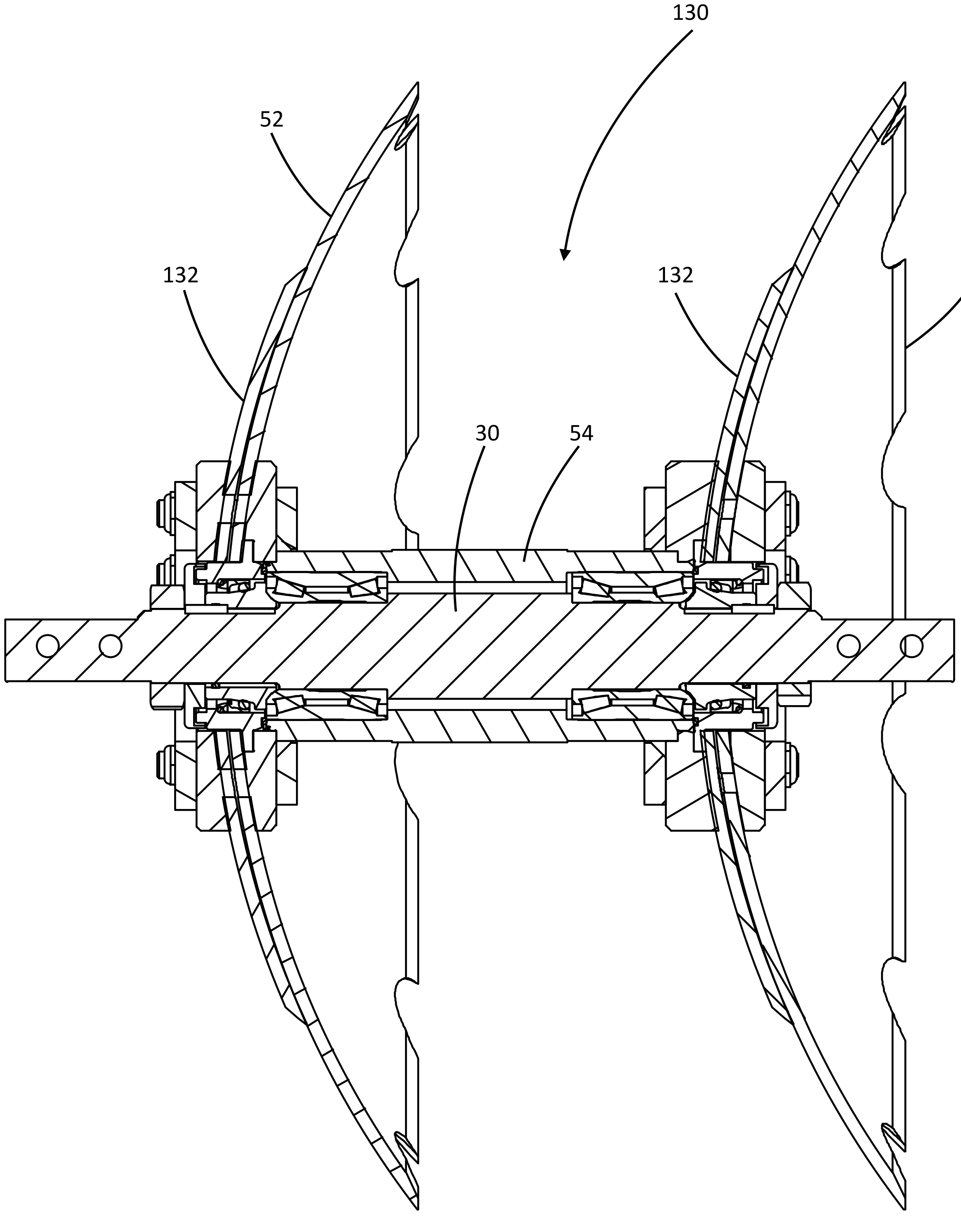

Figure 6

2021218022 17 Aug 2021

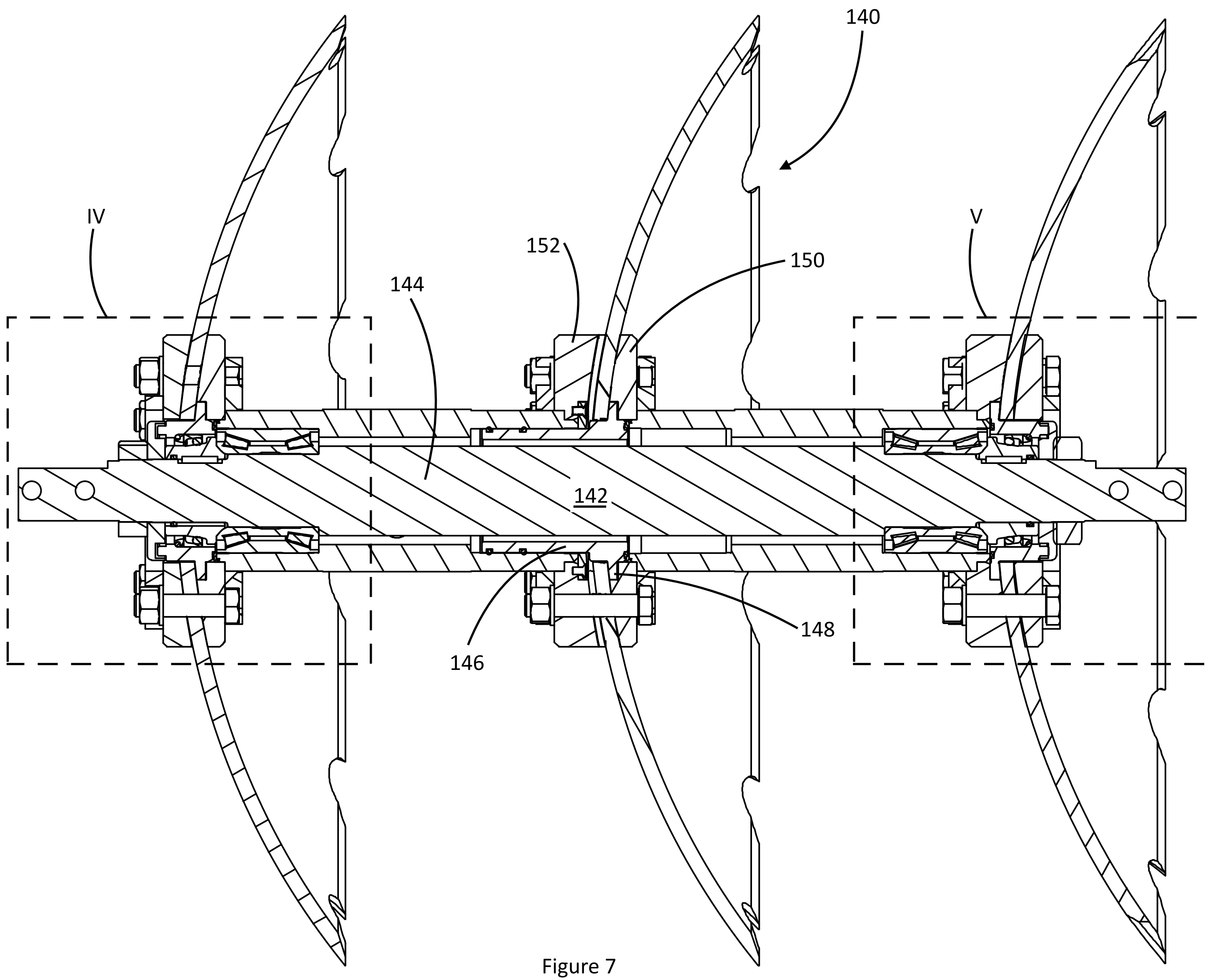

Figure 7

2021218022 17 Aug 2021

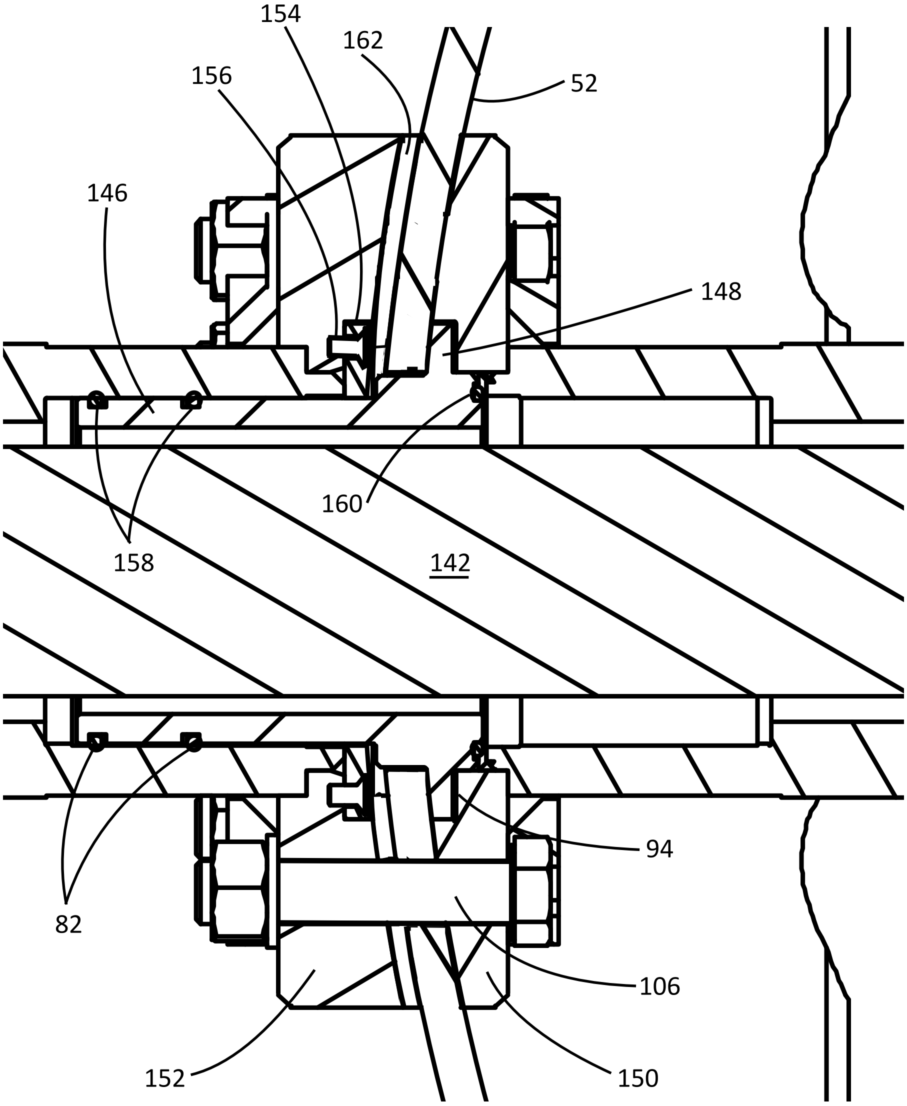

Figure 8