



- (51) International Patent Classification: Not classified
- (21) International Application Number:
PCT/TR2012/000070
- (22) International Filing Date:
11 May 2012 (11.05.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
2011/04607 11 May 2011 (11.05.2011) TR
- (72) Inventor; and
- (71) Applicant : ARABACIOGLU, Murat [TR/TR]; Sürsürü Mahallesi Çeşme Sokak Nurs, Apartmanı A Blok Kat:3 D:6, 23040 Elazığ (TR).
- (74) Agent: DESTEK PATENT,INC.; Konak Mah. Lefkose Cad. NM Ofis Park B, Blok No: 36 / 5 Besevler NİLÜFER, 16110 Bursa (TR).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,

CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- without international search report and to be republished upon receipt of that report (Rule 48.2(g))

(54) Title: CONNECTION COMPONENT MOUNTING/DEMOUNTING APPARATUS

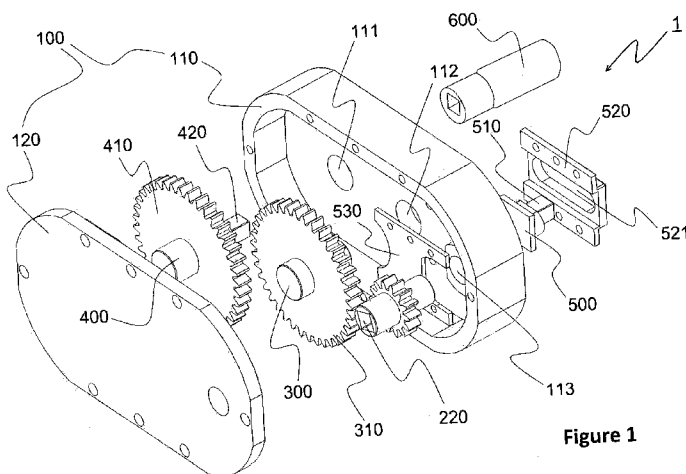


Figure 1

- (57) Abstract: The invention relates to the apparatus (1) used in mounting or demounting of connection components, especially wheel nuts, by making transfer of torque by means of a certain number of runner shafts (200, 300, 400).

DESCRIPTION

CONNECTION COMPONENT MOUNTING/DEMOUNTING APPARATUS

5 **The Related Art**

The invention relates to the apparatus for mounting or demounting of connection components, especially wheel nuts (capscrew used for mounting of wheels on the vehicle) providing connection of vehicle wheels with the vehicle.

- 10 The invention particularly relates to the apparatus used in demounting and mounting of wheels of all vehicles brands and also used for easy demounting and mounting of the jammed wheel nuts in truck, articulated lorries, construction equipments etc. vehicles that require high amount of power in demounting and mounting operations of the wheels.

15

The Prior Art

- Nowadays, blown tires of vehicles are either changed by the users or via calling service. Repaired tire is mounted to the vehicle by means of wheel nut tightening apparatus operating via compressor. If a tire with wheel nuts tightened via
20 compressor pressure is not demounted for a long time, then demounting of the wheel nuts may become quite difficult. Moreover, demounting of wheel nuts to change the tire becomes much more difficult for women and handicapped users in places out of residential areas and during intercity trips. Also, arrival of the service may take a long time in places far from residential areas. In this case, user may have to demount the
25 tire on his/her own and demounting of the jammed wheel nuts via wheel nut wrench may cause problem for the user because of the high physical strength required.

- In the prior art, for demounting of wheel via wheel nut wrench, the nut has to be rotated with high torque especially in truck, bus, construction equipment etc. heavy
30 tonnage vehicles, which causes great difficulty for the driver.

As a result, the need for connection component mounting/demounting apparatus, and the inadequacy of the present solutions have necessitated improvement in the related technical field.

5 **Brief Description of the Invention**

The invention is formed by being inspired from the prior art and aims to solve the above said problems.

10 Primary purpose of the invention is to perform demounting of jammed wheel nuts of vehicles, wheel nuts of bus, construction equipment etc. heavy tonnage vehicles, and connection components requiring high torque easily with low torque by means of the gearwheel embodiment increasing the torque and found in the structure of the apparatus.

15 The invention provides easy application on wheel rims of all brands of vehicles having different hub distances (the distance of the wheel nuts from the centre of the wheel rim) by means of the movable support wheel nut housing configured in its structure.

20 A purpose of the invention is to prevent deformation of the body by the body fixing component, which prevents undesired motion of the apparatus, via the bearing support plate and thus extend the expected life of the apparatus as much as possible.

25 Another purpose of the invention is to provide connection to the wheel nuts of all kinds of vehicles or any connection component via the intermediate adapting component it uses.

30 The structural and characteristic features of the invention and all advantages will be understood better in detailed descriptions with the figures given below and with reference to the figures, and therefore, the assessment should be made taking into account said figures and detailed explanations.

Figures for Better Understanding of the Invention

Figure-1, is the front perspective view of the demounted state of a preferred embodiment of the invention with all of its components.

5 Figure-2, is the rear perspective view of the demounted state of a preferred embodiment of the invention with all of its components.

Figure-3, is the front view of a preferred embodiment of the invention.

Figure-4, is the rear view of a preferred embodiment of the invention.

Figure-5, is the front view of the present invention showing the runner shafts while the body cover is removed.

10

Drawings do not have to be scaled and details not necessary for understanding the present invention may be neglected. Moreover, components which are at least widely equal or which have at least widely equal functions are shown with the same number.

Description of Parts References

1. Connection component

mounting/demounting apparatus

	400. Motion output shaft
100. Main body	410. Gearwheel
110. Chamber	420. Connection component end
111. Output shaft channel	
112. Centre shaft bearing	500. Body fixing component
113. Input shaft bearing	510. Connection component end
114. Fixing component bearing housing	520. Fixing component bearing
115. Cover connection component channel	521. Fixing component channel
120. Cover	530. Bearing support plate
121. Input shaft channel	600. Intermediate adapting component
122. Centre shaft bearing	
123. Output shaft bearing	
200. Motion input shaft	
210. Gearwheel	
220. Key hole	
300. Gradual centre runner shaft	
310. Large gearwheel	
320. Small gearwheel	

Detailed Description of the Invention

- 5 The invention relates to an apparatus (1) for mounting or demounting of connection components, especially wheel nuts providing connection of vehicle wheels with the vehicle.

The invention comprises:

- 10 • at least one carrier main body (100),

- at least one motion input shaft (200) positioned in this body (100) and comprising at least one gearwheel (210) peripherally formed on it and rotating around its own axis,
- at least one gradual centre runner shaft (300) taking the motion coming from said gearwheel (210) by means of the large-diameter gearwheel (310) and rotating around its own axis,
- at least one motion output shaft (400), which transmits the motion it takes from the small-diameter gearwheel (320) of said centre runner shaft (300), taken from this small-gearwheel (320) via at least one large-diameter gearwheel (410), to said wheel nut or connection component by rotating around its own axis, and
- at least one body fixing component (500) preventing movement of said main body (100).

Preferred Embodiments of the invention:

- 15 In this detailed description, the preferred embodiments of the connection component mounting/demounting apparatus (1), which is the subject of the invention, will only be disclosed for better understanding of the subject, and will not form any limiting effect.

In Figure 1, the front perspective view of the demounted state of connection component mounting/demounting apparatus (1) is given with all of its components. The main body (100) of the invention is formed of two parts, which are the chamber (110) and the cover (120). Chamber (110) has semi-elliptical geometry and it has a hollow structure obtained by leaving a certain wall thickness at the edges. Chamber (110) performs the task of bearing and chassis for said runner shafts (200, 300, 400). And the cover (120) has a structure complementing the chamber (110). It is closed over the chamber (110) and thus provides protection of the apparatus (1) against external impacts (dust, particles etc.) and provides bearing for the mechanism. Connection between the cover (120) and the chamber (110) is preferably made by means of the connection components placed within the channels (115) opening to the wall thickness found in the chamber (110).

The invention comprises at least one connection component end (420) formed on said motion output shaft (400) and providing rotation of said wheel nut or connection component and at least one output shaft channel (111) formed on the main body (100) to provide said end (420) extend out of the body (100). The output shaft
5 channel (111) found on the chamber (110) is a hole with the geometry of a circle and its task is to enable the connection component end (420) extend outwards and also bear the motion output shaft (400).

Centre shaft bearing (112) again formed on the chamber (110) has circular geometry
10 and its task is to bear the gradual centre runner shaft (300). Input shaft bearing (113) has circular geometry and its task is to bear the motion input shaft (200).

The invention preferably comprises at least one fixing component bearing (520) providing adjustment of the distance between said output shaft (400) and said body
15 fixing component (500), and wherein the fixing component (500) can move linearly. And the fixing component bearing housing (114) found on the chamber (110) is a certain depth housing (114), wherein the fixing component bearing (520) is placed, which has rectangular geometry, and which is opened by metal removing.

20 The input shaft channel (121) formed on the cover (120) and providing said input shaft (200) extend/go out of the body (100) is a hole with circular geometry and it is the counter-bearing of the motion input shaft (200) on the cover (120). Centre shaft bearing (122) has circular geometry and provides counter bearing to the gradual centre runner shaft (300) on the cover (120). Output shaft bearing (123) also has
25 circular geometry and provides counter bearing to the motion output shaft (400) (Figure-2).

Motion input shaft (200) has cylindrical structure and preferably has integral structure with the gearwheel (210) found around it. Moreover, key hole (220) form is given to
30 the inner part of the shaft (200) at the cover (120) side and it thus enables giving the first motion by means of placing and turning the key (Figures-1 and 2). The gearwheel (210) found on the input shaft (200) preferably has approximately the same diameter with the small-diameter gearwheel (320) of the middle grade shaft. Preferred diameter length of the invention is about 35 mm.

Gradual centre runner shaft (300) has cylindrical structure and has integral structure with the large gearwheel (310) and the small gearwheel (320). The shaft (300) enters into the bearings (112, 122) and thus bears the gearwheels (310, 320), to which it is integrated (Figures-1 and 2). As mentioned before, the input shaft gearwheel (210) and the small gearwheel (320) of the centre shaft approximately have the same diameter, which preferably is 35 mm. The large-diameter gearwheel (310) of the shaft is smaller than the output shaft gearwheel (410) and preferably has 95 mm diameter.

10 Motion output shaft (400) preferably has cylindrical structure like other shafts (200, 300) and has integral structure with the gearwheel (410) and the connection component end (420) it has. The shaft (400) enters into the output shaft bearing (123) and bears the gearwheel (410), to which it is integrated. Gearwheel (410) preferably has 100 mm diameter length. Connection component end (420) preferably
15 has square geometry and has complementary structure with the intermediate adapting component (600), which provides demounting of all kinds of wheel nuts or any connection component (Figure-1).

Body fixing component (500) preferably has square plate shape and it is fitted in the housing (114) found on the chamber (110). Fixing component bearing (520) is placed
20 on it and the bearing (520) is mounted on the chamber (110) via screws. Bearing (520) is in the form of gradual plate and fixing component channel (521) is opened on it in the form of cocoon channel. The purpose of opening the channel (521) is to provide back-and-forth motion of the connection component end (510), which is
25 found in integral structure with the body fixing component (500), and thus provide adjustment of its distance with the connection component end (420). Connection component end (510) is attached to one of the wheel nuts, except the one to be demounted. In order to enable performing of this mounting operation with all kinds of wheel nut or connection components, one more of said intermediate adapting
30 component (600) can be used. The intermediate adapting component (600) connected to the output shaft connection component end (420) is also mounted to the connection component to be mounted or demounted, and thus the apparatus (1) would be supported by the opposite connection component. The reason of adjustment of the distance between the ends (420, 510) by moving the connection

component end (510) back-and-forth within the channel (521) is due to the varying distance found between the wheel nuts and the wheel rim centre of various brands and sizes of wheel rims. In this way, the apparatus (1) can become compatible with all kinds, brands, and sizes of wheel rims.

5

Bearing support plate (530) is made of metal sheet pieces of certain thickness and the areas where the shaft bearings (112, 113) are found are cleared in semi-circular geometry. Strong mounting of the fixing component bearing (520) is made on the chamber (110) by means of certain numbers of connection component housings
10 found on it and corresponding to the fixing component bearing (520).

The user brings the apparatus (1) close to the wheel to be demounted and mounts the intermediate adapting component (600), which is used if required and mounted to the connection component end (420), to the wheel nut. Afterwards, mounts another
15 intermediate adapting component (600) to the fixing component connection component end (510) and by rotating, matches the apparatus (1) with the supporter wheel nut found across the wheel nut to be demounted, and then mounts the adapting component (600). Afterwards, easily demounts the wheel nut by fitting a wrench preferably having ratchet arm into the key hole (220) and rotating.
20 Demounting operation takes 2 minutes in total. The power saved with the gearwheel rotating ratio of the apparatus is approximately 8 folds. For instance, 12,5 kg/m torque is required for demounting a 12 x 1.5 wheel nut of a special brand car model. The apparatus can easily demount this wheel nut with 1,6 kg/m torque. Moreover, in addition to the apparatus (1) design;

- 25
- If the apparatus (1) is desired to generate more power, gearwheel, body (100) scales and ratios and materials can be changed.
 - Body fixing component (500) may have fixed centre for standard factory production wheel rims.
 - Movable body fixing components (500) can be marked, enumerated on the fixing
30 component bearing housing (114) as 1, 2, 3, and 4, and vehicle brands corresponding to each number can be provided as a list. This mechanism can be formed in a grooved and protrusive structure that would guide the user and enable stopping at the relevant place.

- It should be stated to make tightening of the connection components using the same force used for demounting.
- Intermediate adapting components can be formed that are compatible with some vehicles using special nuts and wheel nuts.

5

As an alternative usage of the invention, a pulley (preferably having 10 cm diameter) can be fitted at said output shaft connection end (420) instead of the intermediate adapting component (600). By means of connection hook/ring that can be preferably formed on the body (100) and fitted at the towing ring of a vehicle, the apparatus (1)

10 can be used to rescue another vehicle that is jammed to an obstacle of a certain strength by using steel rope passed through said pulley. In order to prevent any discharge in the shafts (200, 300, 400) during the pulling operation with said rope, a safety mechanism can be placed in the system, which prevents rolling back and is known in the prior art. In this way, the users would have an apparatus (1) that would

15 not require high strength and can be used in small sized rescue works.

CLAIMS

1. The invention is an apparatus (1) used in mounting or demounting of connection components, especially wheel nuts providing connection of vehicle wheels to the vehicle, and it is characterized in that; it comprises:
- at least one carrier main body (100),
 - at least one motion input shaft (200) positioned in this body (100) and comprising at least one gearwheel (210) peripherally formed on it and rotating around its own axis,
 - at least one gradual centre runner shaft (300) taking the motion coming from said gearwheel (210) by means of the large-diameter gearwheel (310) and rotating around its own axis,
 - at least one motion output shaft (400), which transmits the motion it takes from the small-diameter gearwheel (320) of said centre runner shaft (300), taken from this small-gearwheel (320) via at least one large-diameter gearwheel (410), to said wheel nut or connection component by rotating around its own axis, and
 - at least one body fixing component (500) preventing movement of said main body (100).
2. Connection component demounting or mounting apparatus (1) according to claim 1, and it is characterized in that; said motion input shaft (200) comprises at least one key hole (220) providing its rotation by means of a key.
3. Connection component demounting or mounting apparatus (1) according to claim 2, and it is characterized in that; it comprises at least one input shaft channel (121) formed on the main body (100) to provide said key hole (220) extend out of the body (100).
4. Connection component demounting or mounting apparatus (1) according to claim 1, and it is characterized in that; it comprises at least one connection component end (420) formed on said motion output shaft (400) and providing rotation of said wheel nut or connection component and at least one output shaft channel (111) formed on the main body (100) to provide said end (420) extend out of the body (100).

- 5 **5.** Connection component demounting or mounting apparatus (1) according to claim 1, and it is characterized in that; said fixing component (500) comprises at least one connection component end (510) providing its connection with at least one connection component except wheel nut or connection component to be rotated.
- 10 **6.** Connection component demounting or mounting apparatus (1) according to claim 1, and it is characterized in that; it comprises at least one fixing component bearing (520) providing adjustment of the distance between said output shaft (400) and said body fixing component (500), and wherein the fixing component (500) can move linearly.
- 15 **7.** Connection component demounting or mounting apparatus (1) according to claim 6, and it is characterized in that; it comprises at least one support plate (530) supporting the connection of said fixing component bearing (520) with the main body (100) and providing a durable connection.
- 20 **8.** Connection component demounting or mounting apparatus (1) according to claim 6, and it is characterized in that; it comprises at least one bearing housing (114) formed on the main body (100) and on which said fixing component bearing (520) is fixed.
- 25 **9.** Connection component demounting or mounting apparatus (1) according to claim 1, and it is characterized in that; it comprises at least one intermediate adapting component (600) fitted at said output shaft connection component end (420) and/or fixing component connection component end (510) and making the apparatus (1) usable/available for all kinds of connection components or wheel nuts.
- 30 **10.** Connection component demounting or mounting apparatus (1) according to claim 1, and it is characterized in that; said main body (100) comprises at least one chamber (110) on which said shafts (200, 300, 400) are embedded and at least one cover (120) covering this chamber (110).

11. Connection component demounting or mounting apparatus (1) according to claim 1, and it is characterized in that; said input shaft gearwheel (210) and the centre shaft small gearwheel (320) approximately have equal diameters and the output shaft gearwheel (410) has larger diameter than the centre shaft large gearwheel.

5

12. Connection component demounting or mounting apparatus (1) according to claim 1, and it is characterized in that; said input shaft gearwheel (210) and the centre shaft small gearwheel (320) approximately have 35 mm diameter and the output shaft gearwheel (410) approximately has 100 mm diameter, while the centre shaft large gearwheel (310) approximately has 95 mm diameter.

10

1/4

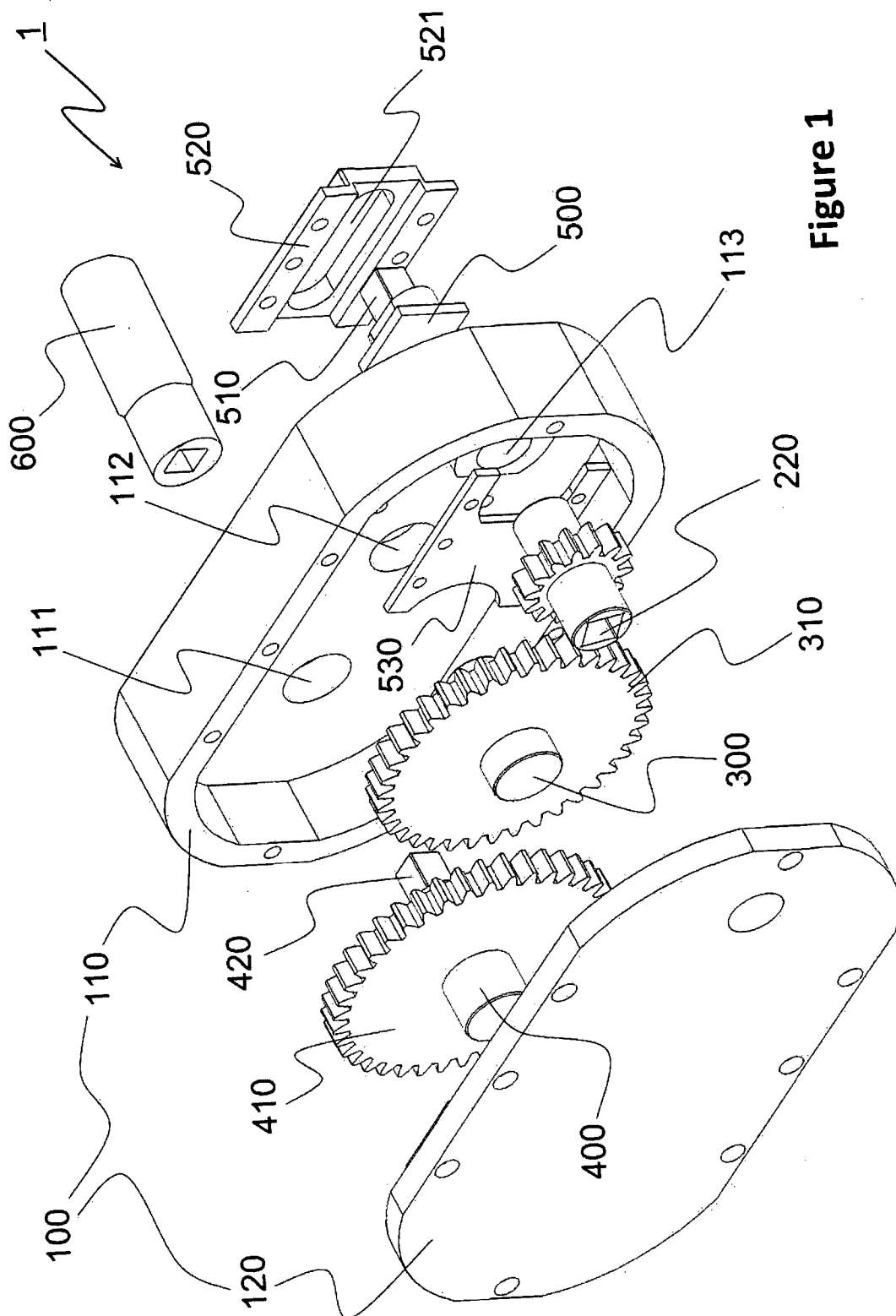


Figure 1

2/4

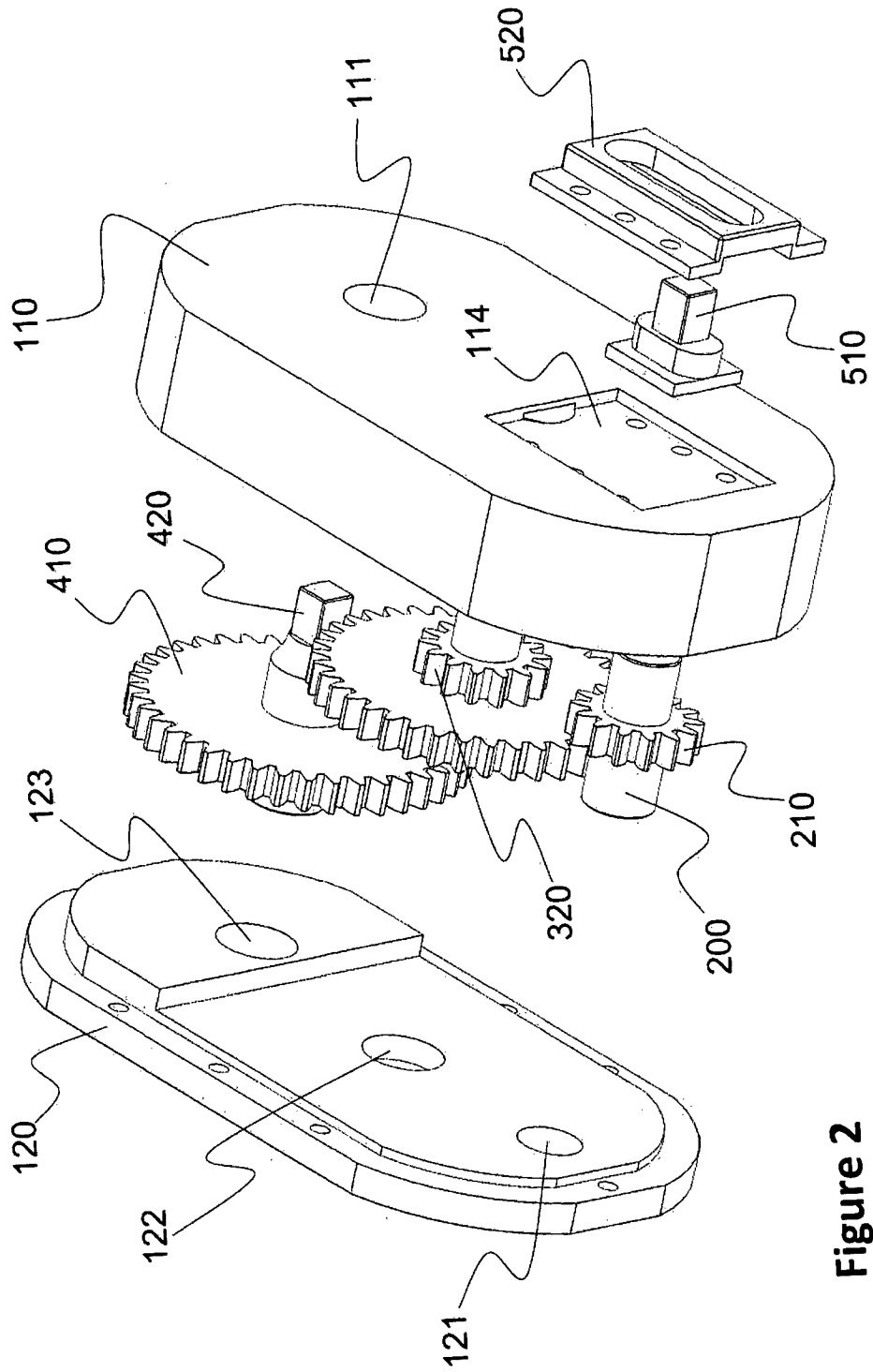


Figure 2

3/4

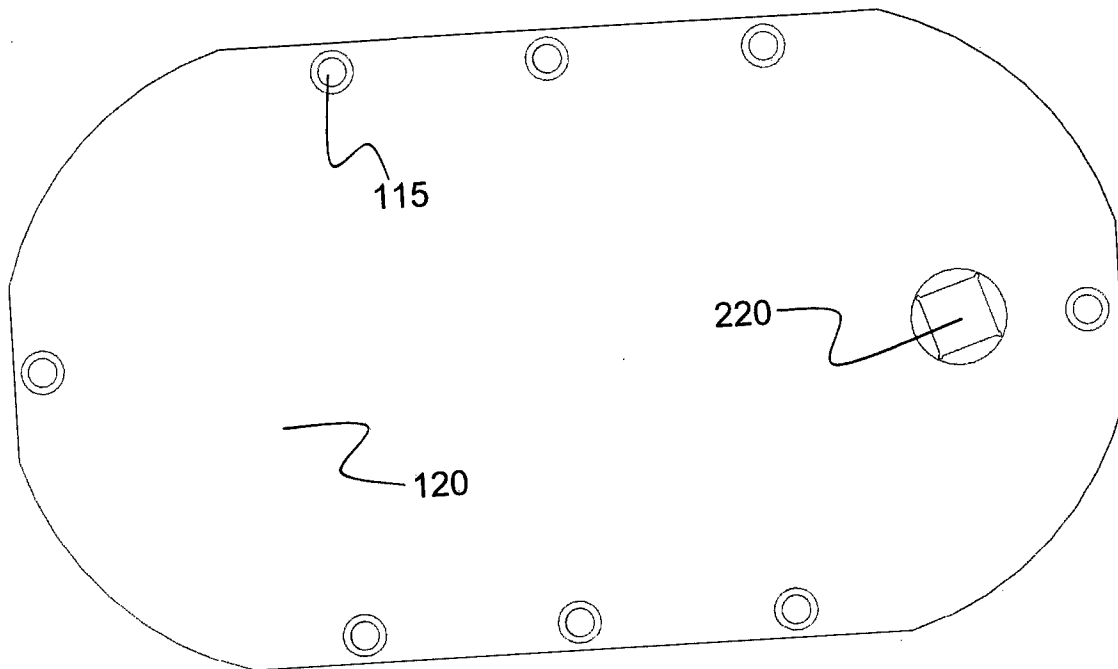


Figure 3

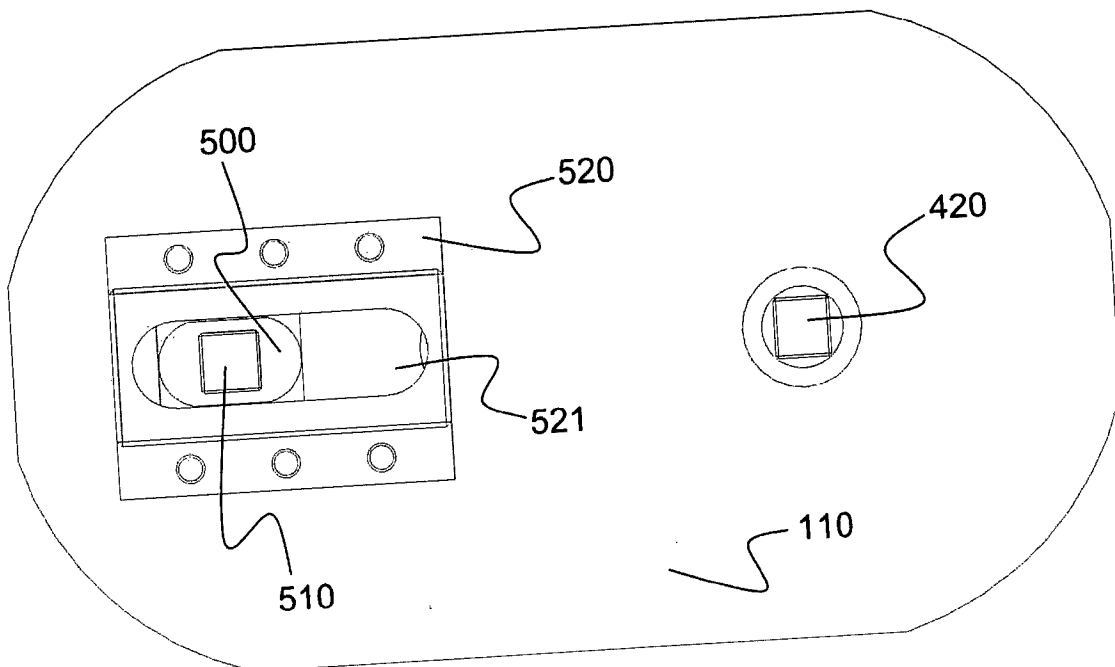


Figure 4

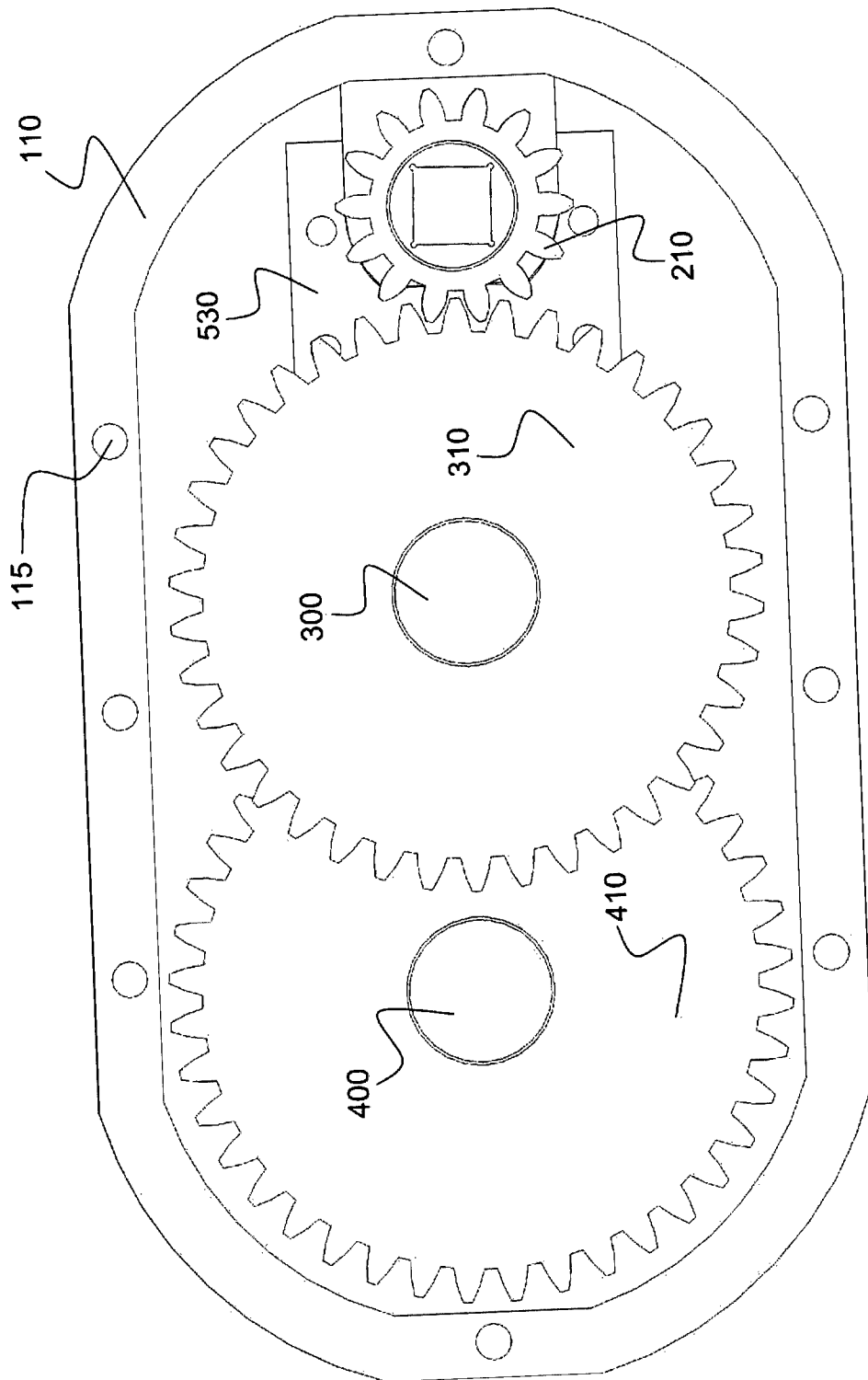


Figure 5