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(54) **DEVICE FOR HANDLING OF ROPE AND USE THEREOF**

VORRICHTUNG ZUR HANDHABUNG VON SEILEN UND VERWENDUNG DAVON

DISPOSITIF DE MANIPULATION D'UNE CORDE ET UTILISATION DE CE DISPOSITIF

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(56) References cited:
CH-A5- 673 274
GB-A- 2 166 704
US-A- 3 934 482
US-B1- 7 134 645

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Description

[0001] The present invention relates to a method for coiling a slack hawser onto a winch drum, where the hawser is conducted through a braking body that provides a firm and approximately constant tightening of the hawser, in order to prevent the hawser from sinking down between the layers on the storage drum when handling of load, as can be seen in the introduction of the subsequent claim 1.

[0002] More specifically, it is an aim of the invention to be able to tighten a slack hawser, such as a fibrous hawser, so that it can be wound tightly onto a drum.

[0003] The solution according to the invention is intended for use on board anchor handling vessels, but can also be used in other applications. At deep waters, synthetic hawsers are often used as anchor lines for floating offshore installations. The manufacturers of hawsers supply the hawsers loosely wound onto storage drums. The hawsers are normally spooled over onto the winches of the vessel at an offshore base.

[0004] So that the hawser can be made slack out from the winch on the anchor handling vessel with a load, the hawser must initially be tightly coiled.

[0005] As the hawser is coiled loosely on the storage drums, it is initially spooled loosely onto the winches of a ship. This is because the hawser will sink down between the layers on the storage drum if the tension is too great, something which can lead to the hawser becoming damaged. Thereafter, the end of the hawser is fastened ashore and the hawser is spooled off as the ship moves away from the shore. When the whole of the hawser is spooled off, it is wound up with such force that it lies compact and tight on the drum. This known solution outlined here is consequently a time demanding and costly procedure.

[0006] With regard to prior art reference shall be made to the British patent GB 2.311.269 A1. Here, a winch arrangement is described that is intended to control the tension in a steel rope or wire so that it can be spooled tightly from a storage drum to a crane winch, or the like. This solution can be compared with a traditional warping end, with the exception that guides are installed that prevents the steel rope from spinning axially along the drum core when this rotates.

[0007] In the US patent US 4,285,502, a disc device controlled by hydraulic cylinders is described, which is intended to hold a steel rope taut, and which can simply release the rope when the device is not to be used. With this embodiment one achieves a pre-tightening of the steel rope with the help of a set of hydraulic cylinders coupled to discs that exert pressure in a sidewise direction against the steel rope. This deviates considerably from the present construction as will become apparent in the following.

[0008] A reference is also made to the prior art patent document CH-673 274, which discloses a device which operates with a method according to the preamble of claim 1.

[0009] It is an aim of the invention to provide a method for a winch system with a drum for coiling of a hawser such that the hawser is rolled onto the drum with a smoother and stronger tightening.

[0010] In particular, it is an aim of the invention to provide a new method that can increase the level of tightening on a hawser from a lower tightening level to a higher tightening level.

[0011] Thereby, it is also an aim of the invention to provide a solution which can utilise the capacity of the drum in a better way, and that the coiling is smoother than what is normal for today's solutions.

[0012] Furthermore, it is a main aim of the invention to provide a method which is particularly suited to handling of fibrous ropes or fibrous hawsers that shall be coiled, or spooled onto a drum.

[0013] It is a further aim of the invention to provide a solution where the surface of the disc groove creates the highest possible friction against the fibrous hawser, at the same time as one shall get the smallest wear damage on the hawser if such gliding occurs.

[0014] Thus, one wants to avoid disc grooves with a coating with a coarse or rough surface. If a gliding and subsequent wear do occur, it is less damaging that the contact coating (the rubber disc) is worn than that the hawser is worn.

[0015] The method of the present invention is characterized in that the hawser is conducted in loops of a number of hawser guiding discs of the braking body one or more of said discs including braking means that give a tightening creating moment on the discs and tightens the hawser, each said hawser guiding disc having a V- or U-shaped guiding groove geometry with a friction coating of a smooth surface structure and minimum roughness to provide a high friction between the hawser and the guiding grooves of the discs.

[0016] According to a preferred embodiment use is made of three hawser guiding discs mutually set up so that the hawser runs in a loop across discs said hawser encircling each disc to a large degree in direct contact with the disc groove

[0017] According to another preferred embodiment the hawser makes direct contact with about 270° of the circumference groove of one of the hawser guiding discs.

[0018] According to yet another preferred embodiment the groove of each hawser guiding disc includes a friction coating of rubber, a rubberised material or a plastic material.

[0019] According to a further preferred embodiment the hawser is conducted through a first guiding wheel to guide the hawser part in a correct path in towards the hawser guiding discs of the braking unit and a second guiding wheel to lead a taut hawser part from the hawser tightening unit and further onto the winch drum.

[0020] According to yet another preferred embodiment use is made of a brake body comprises a hydraulic motor, an electro motor or is made from a disc brake or other

brake unit.

[0021] Preferably the method is for handling of anchor hawsers that are loosely coiled onto a storage drum from the supplier, with the hawser from the storage drum being transferred into a very taut state by being coiled onto a winch drum with such a force that it lies compact and taut onto the drum.

[0022] Further the method is for tightening of wires, fibrous hawsers and the like on a winch drum in connection with cranes.

[0023] Consequently, with this invention one has achieved that the hawser can be coiled directly from storage drums and onto the winch of a ship with the correct tightening. This can be carried out as shown in the enclosed figures and the subsequent description.

[0024] With the present invention a solution is provided where two or more guiding discs with individual brakes are used. One avoids the problem of axial movement along a drum, as is the case with the construction according to the above mentioned British patent GB 2.311.269. This can cause much damage with the use of synthetic rope as heat is generated from the friction. That the brakes can be adjusted individually is important for the optimisation of the transfer of force from the discs to the rope. The discs form V-shaped guiding grooves and are rubber coated to give a good and gentle transfer of force between the discs and the hawser/rope. To use such appliances onboard an anchor handling vessel in connection with the handling of fibrous ropes has not been practiced previously and will be able to simplify many of today's operations.

[0025] The invention shall be explained in more detail with reference to the enclosed figures in which:

Figure 1 shows an example of a preferred embodiment of the device according to the invention.

Figure 2 shows a detail in the guiding of the hawser through the hawser tightening unit according to the invention.

Figure 3 shows a side section of a hawser tightening unit with a guiding disc according to the invention.

Figure 4 shows a side section of the guiding disc.

Figure 5 illustrates the disc composed of two halves and the coating of a suitable material, such as rubber.

[0026] In figure 1 a drum in a winch system is shown with the reference number 10 with a drum 11 for winding up of a hawser 12, for example, a slack hawser that is rolled off a storage drum and shall be coiled on a winch. The drum 11 is placed on a foundation 13 and comprises a motor for the winding on and off (not shown) of the hawser 12. Up to the winch 10, the hawser runs as a non-tightened hawser 12a, according to a preferred embodiment, across a guiding disc 16 that directs it up to a tightening arrangement 20 before it runs on as a hawser stretch 12b with a higher tightening level in towards the drum 11 where it is coiled. The drum 11 with the motor are fixed constructions on the installation where they are used. The hawser is preferably a fibrous hawser, such as one built up from polyester fibres and/or Kevlar fibres (non-limiting examples).

[0027] The guiding pulley 16 comprises an upper 16a and a lower 16b guiding wheel that are pulleys which roll freely on a permanent shaft 18. In this example, the incoming, "slack" hawser part 12a (with a lower tightening level) is led in round the upper guiding pulley 16a and up to, and through, the hawser tightening unit 20, while the taut hawser part 12b runs across the lower guiding pulley 16 and on to the winch drum 11. It will appear that the guiding pulleys 16 can be used to guide the direction one wishes the hawser parts 12a,12b to have during the tightening and coiling process.

[0028] The hawser 12 does not necessarily need to be led into the tightening body via the described guiding pulleys 16a and 16b. It can also be led directly into the tightening device 20 i.e., as in the example where the hawser part 12a (with lower tightening) is led directly into the disc 22 and further out from the disc 21 as the taut hawser part 12b and directly onto the drum.

[0029] The two pulleys 16a and 16b shown do not need to be placed across from each other as the figure shows, but can be placed individually at different places in the area.

<u>The tightening unit 20 according to the invention.</u>

[0030] The aim is to coil the hawser onto the drum with such tightening that the hawser coils in the spirals from the inner layer outwards shall not bury themselves down between the hawser parts that lies underneath.

[0031] According to a preferred embodiment of the invention the hawser tightening unit 20 comprises three discs 21, 22, 23 that rotate in the same plane in the given example. The hawser part 12a, which initially has a lower tightening level from the disc 16, runs initially

round a first disc 22,
further round a second disc 23, to
run into and round a third disc 21

and thereafter further as a hawser part 12b with a higher tightening level, via the guiding pulley 16b and further onto the drum 10 where it is placed in a tight coil. So that the discs will get a good grip on/around the hawser, it is important to have a large degree of encircling on each disc, this means that as much as possible of the circumference of the guiding disc comes in direct contact with the hawser. For example, it is indicated in figure 3 that the hawser makes contact with the groove of the disc 23 via about 270° of the circumference of the periphery.

[0032] The discs 21,22,23 are mutually placed, as shown in figure 2, so that the hawser-loop round the discs

form said tightened hawser part 12b in toward the winch. The third disc 23 is placed so that the hawser defines, for example, a U-shaped loop 24 at the exiting hawser from the first disc 21, around the second disc 23 and onto the third disc 22.

[0033] The disc groove 30 where the hawser is placed has a V or a U shaped cross section. The V-shape is particularly preferred, as the figures 3 to 5 show. The groove surfaces are preferably covered by a rubber coating (with a ring-disc shape), with a suitable hardness. (a hard rubber type), and which can have a thickness of the order of 1-2 cm, in particular 1 cm, a thickness that can be varied, depending on the dimensions of the hawser and winch system. The coating can be from other suitable materials, such as plastic, as long as they have the above mentioned preferred characteristics with regard to high friction and a smooth surface.

[0034] The V-shaped groove surfaces of the discs 21,22,23 are, as shown in figure 5, covered by a coating 38 of a material that gives the highest possible friction against the gliding at the same time as it has the smoothest surface possible so that a gentle contact between the natural fibres of the hawser and the surface is made if it should slip in the groove. The coating is preferably from rubber or a rubberised material with a suitable hardness, and particularly with a relatively smooth surface structure with minimum roughness. As it appears in figure 4, the surfaces of the disc groove form an angle α with each other, and in a typical case an angle of 60°.

[0035] One or more of the discs 21,22,23 comprises a braking body 40 or a hawser tightening unit, as shown in figure 4, and which can provide a tightening creating moment on the discs when the winch 10 works and coils the hawser. The braking body can comprise a hydraulic motor, an electro motor, or is made from a disc brake or other brake unit. The hawser tightening unit 40 preferably comprises a motor 36 with a gear 34, and which can be operated as a braking body. In addition, the motor 36 can be driven so that the unit 20 can be used to pull in a hawser 12. In the present case, all the three discs 21,22,23 can be connected to their own motor unit 40.

[0036] An example is shown where the hawser 12b is placed in the pulley groove 30 of the disc 21. The pulley is fitted in a shaft (not shown) that is driven by the motor 36.

[0037] As figure 5 illustrates, the disc 21 is composed of two disc halves and the groove forming surfaces are coated with a suitable material, such as rubber. In figure 3, a fitting bracket with reference number 32 is indicated, that is used for the fitting of the tightening unit 40 in connection with a deck construction, for example, so that the gear 34 and motor 36 are placed below the deck of the vessel with only the disc lying above the deck level where the hawsers are handled. The construction can, of course, be placed anywhere and in any desirable position. The construction according to the invention with the motor-driven guiding discs can also be driven to pull hawsers across the discs, for example, when the hawser shall be pulled off the drum 11.

[0038] The following characteristics of the present described construction are given, with regard to prior art, for example, as shown in the above mentioned patents:

1) The solution is directed towards application of fibrous hawsers and not wires.
2) The disc groove is V-shaped and has a friction coating in the form of a rubber coating.
3) With the solution, individual braking of the guiding discs 21,22,23 is used.
4) With the use of such guiding discs, one avoids any axial movement of the hawser as in, for example, the GB patent.
5) A great extent of surface contact, i.e. the hawser lies against the disc groove for most of its circumference.
6) One obtains a solution that offers low wear of the fibrous hawser if slipping occurs in the disc groove.

Claims

1. Method for coiling a slack hawser onto a winch drum (11), where the hawser is conducted through a braking body (20) that provides a firm and approximately constant tightening of the hawser, in order to prevent the hawser from sinking down between the layers on the storage drum when handling of load,
characterised in that
the hawser is conducted in loops of a number of hawser guiding discs (21,22,23) of the braking body (20) one or more of said discs (21,22,23) including braking means that give a tightening creating moment on the discs and tightens the hawser, each said hawser guiding disc (21,22,23) having a V- or U-shaped guiding groove geometry with a friction coating of a smooth surface structure and minimum roughness to provide a high friction between the hawser and the guiding grooves of the discs.

2. Method according to claim 1, **characterised in that** use is made of three hawser guiding discs (21,22,23) mutually set up so that the hawser (24) runs in a loop across discs (21,22,23) said hawser encircling each disc to a large degree in direct contact with the disc groove

3. Method according to claim 2, **characterised in that** that the hawser makes direct contact with about 270° of the circumference groove of the centre hawser guiding disc (23).

4. Method according to claim 1, **characterised in that** the groove of each hawser guiding disc (21,22,23) includes a friction coating of rubber, a rubberised material or a plastic material.

5. Method according to any of the preceding claims, **characterised in that** the hawser is conducted through a first guiding wheel (16a) to guide the hawser part (12a) in a correct path in towards the hawser guiding discs (21,22,23) of the braking unit (20) and a second guiding wheel (16b) to lead a taut hawser part (12b) from the hawser tightening unit (20) and further onto the winch drum (10).

6. Method according to any of the preceding claims, **characterised in that** use is made of a brake body (20) comprises a hydraulic motor, an electro motor (36) or is made from a disc brake or other brake unit.

7. Method according to the preceding claims 1-6 for handling of anchor hawsers that are loosely coiled onto a storage drum from the supplier, with the hawser from the storage drum being transferred into a very taut state by being coiled onto a winch drum (11) with such a force that it lies compact and taut onto the drum.

8. Method according to the preceding claims 1-6 for tightening of wires, fibrous hawsers and the like on a winch drum (11) in connection with cranes.

Patentansprüche

1. Verfahren zum Aufwickeln eines schlaffen Taus auf einer Windentrommel (11), wobei das Tau durch einen Bremskörper (20) geführt wird, welcher ein festes und ungefähr konstantes Spannen des Taus bereitstellt, um zu verhindern, dass das Tau zwischen den Lagen auf der Speichertrommel nach unten sinkt, wenn eine Last bedient wird,
dadurch gekennzeichnet, dass
das Tau in Schleifen einer Anzahl von Tauführungsscheiben (21, 22, 23) des Bremskörpers (20) geführt wird, wobei eine oder mehrere der Scheiben (21, 22, 23) Bremsmittel umfassen, welche ein das Spannen erzeugendes Moment auf die Scheiben beaufschlagen und das Tau spannen, wobei jede der Tauführungsscheiben (21, 22, 23) eine V- oder U-förmige Führungsnutgeometrie mit einer Reibungsbeschichtung von glatter Oberflächenstruktur und minimaler Rauigkeit aufweisen, um eine hohe Reibung zwischen dem Tau und den Führungsnuten der Scheiben bereitzustellen.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** drei Tauführungsscheiben (21, 22, 23) eingesetzt werden, welche gemeinsam so aufgesetzt sind, dass das Tau (24) in einer Schleife um die Scheiben (21, 22, 23) läuft, wobei das Tau jede Scheibe zu einem großen Grad in direktem Kontakt mit der Scheibennut umfängt.

3. Verfahren nach Anspruch 2, **dadurch gekennzeichnet, dass** das Tau in direktem Kontakt über ungefähr 270° mit der Umfangsnut der zentralen Tauführungsscheibe (23) steht.

4. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Nut jeder Tauführungsscheibe (21, 22, 23) eine Reibungsbeschichtung aus Gummi, einem gummierten Material oder einem Kunststoffmaterial umfasst.

5. Verfahren nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** das Tau durch ein erstes Führungsrad (16a) geleitet wird, um den Tauteil (12a) in einen richtigen Pfad in Richtung der Tauführungsscheiben (21, 22, 23) der Bremseinheit (20) zu lenken, und durch ein zweites Führungsrad (16b), um einen gespannten Tauteil (12b) von der Tauspanneinheit (20) weg und weiter auf eine Wickeltrommel (10) zu leiten.

6. Verfahren nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** ein Bremskörper (20) eingesetzt wird, welcher einen Hydraulikmotor oder einen Elektromotor (36) umfasst oder aus einer Scheibenbremse oder einer anderen Bremseinheit aufgebaut ist.

7. Verfahren nach den vorangehenden Ansprüchen 1-6 zum Handhaben von Ankertrossen, welche locker auf eine Speichertrommel vom Lieferanten aufgewickelt sind, wobei die Trosse von der Speichertrommel in einen sehr gespannten Zustand gebracht wird, indem sie auf eine Wickeltrommel (11) mit solch einer Kraft aufgewickelt wird, dass sie kompakt und gespannt auf der Trommel liegt.

8. Verfahren nach den vorangehenden Ansprüchen 1-6 zum Spannen von Drähten, Fasertauen und Ähnlichem auf einer Wickeltrommel (11) in Verbindung mit Kränen.

Revendications

1. Méthode pour enrouler une amarre lâche autour du tambour d'un treuil (11), où l'amarre est dirigée à travers un corps de freinage (20) qui assure un serrage ferme et à peu près constant de l'amarre, afin d'empêcher l'amarre de s'enfoncer entre les couches du tambour de stockage pendant la manutention d'une charge,
caractérisée en ce que
l'amarre est conduite en boucle autour d'un certain nombre de disques de guidage de l'amarre (21, 22, 23) du corps de freinage (20), un ou plusieurs des dits disques (21, 22, 23) incluant un moyen de freinage qui donne un moment de création de serrage

sur les disques et serre l'amarre, chacun des dits disques de guidage de l'amarre (21, 22, 23) ayant une géométrie de la gorge de guidage en forme de V ou de U avec un revêtement à friction sur une structure à surface lisse et de rugosité minimale afin d'assurer une friction élevée entre l'amarre et les gorges de guidage des disques.

2. Méthode selon la revendication 1, **caractérisée en ce qu'**elle utilise trois disques de guidage de l'amarre (21, 22, 23) mutuellement installés de manière à ce que l'amarre (24) passe en boucle à travers les disques (21, 22, 23), la dite amarre encerclant chaque disque en contact direct en grande partie avec la gorge du disque.

3. Méthode selon la revendication 2, **caractérisée en ce que** l'amarre est en contact direct avec environ 270° de la gorge de circonférence du disque de guidage central (23) de l'amarre.

4. Méthode selon la revendication 1, **caractérisée en ce que** la gorge de chacun des disques de guidage (21, 22, 23) de l'amarre comporte un revêtement de friction de caoutchouc, d'un matériau caoutchouté ou d'une matière plastique.

5. Méthode selon l'une quelconque des revendications précédentes, **caractérisée en ce que** l'amarre est conduite à travers une première roue de guidage (16a) pour guider une partie de l'amarre (12a) dans un trajet correct vers les disques de guidage (21, 22, 23) de l'amarre de l'unité de freinage (20) et une deuxième roue de guidage (16b) pour conduire une partie tendue (12b) de l'amarre à partir de l'unité de serrage de l'amarre (20) et jusqu'au tambour du treuil (10).

6. Méthode selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**elle utilise un corps de freinage (20) composé d'un moteur hydraulique, d'un moteur électrique (36) ou qui est réalisé à l'aide d'un disque de freinage ou d'une autre unité de freinage.

7. Méthode selon les revendications précédentes 1 à 6 pour la manutention des amarres d'ancrage qui sont lâchement enroulées autour d'un tambour de stockage par le fournisseur, l'amarre du tambour de stockage étant transférée dans un état très tendu en étant enroulée sur un tambour de treuil (11) avec une force telle qu'elle est compacte et tendue sur le tambour.

8. Méthode selon les revendications précédentes 1 à 6 pour le serrage de câbles, des amarres fibreuses et autres sur le tambour d'un treuil (11) en connexion avec des grues.

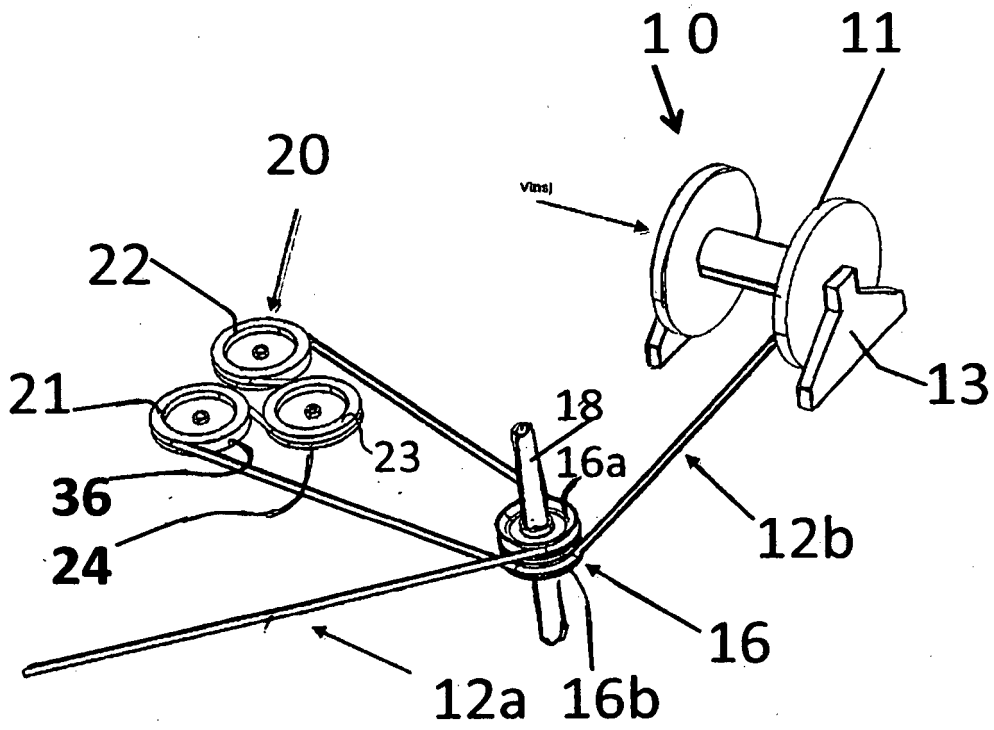


FIG. 1

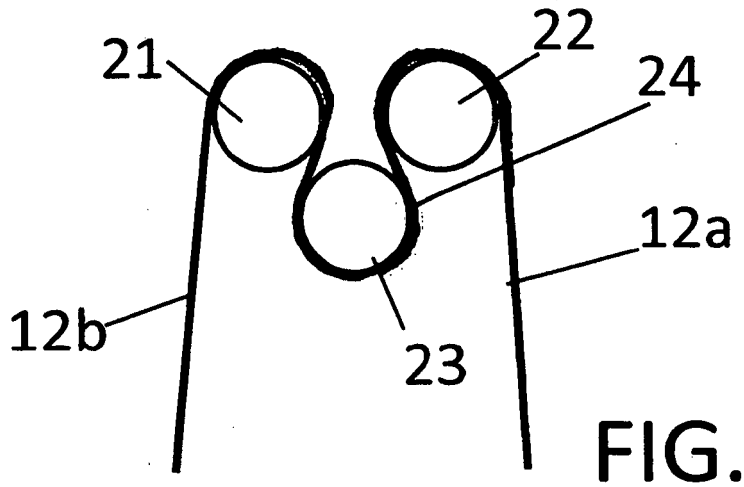


FIG. 2

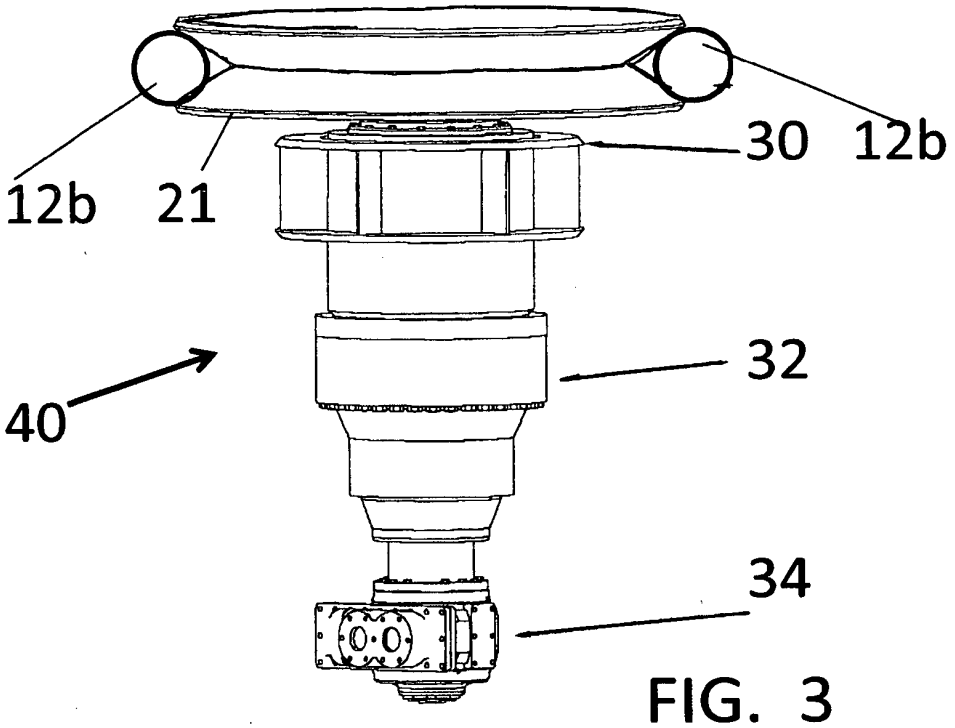


FIG. 3

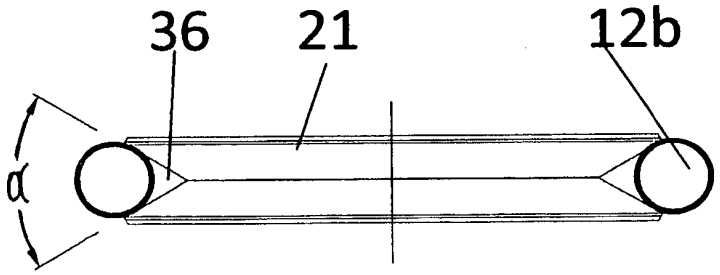


FIG. 4

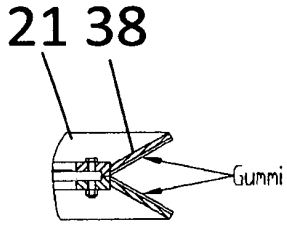


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 2311269 A1 **[0006]**
- US 4285502 A **[0007]**
- CH 673274 **[0008]**
- GB 2311269 A **[0024]**