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(54) **Propeller for boat**

Propeller für ein Boot

Hélice pour bateau

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a propeller for use in a boat and more specifically, to a propeller that has shock-absorbing effect and can bear relatively higher torsion.

2. Description of the Related Art

[0002] WO 2006/002463 discloses a propeller drive for a propeller hub. Said drive has an axially extending, non-circular, tapering aperture through the hub. The drive includes a hollow drive bush formed of a resilient material and having an external surface corresponding in shape to that of the tapering aperture surface of the hub so that the bush closely engages within the hub aperture. The inner surface of the hollow drive bush has a tapered shape with a plurality of spaced generally axially extending grooves to receive corresponding drive keys of a drive sleeve which drivingly engages on a drive shaft of a marine power system.

[0003] US 5,630,704 a shock absorbing drive sleeve that mounts a marine drive propeller to a propeller shaft. The drive sleeve has an asymmetric spring rate such that the sleeve has a higher spring rate and greater torque bearing capability for the forward boat direction, and a softer spring rate and greater shock absorption for the reverse boat direction, to protect the weaker reverse drive components of the gear train.

[0004] US 4,452,591 discloses a resilient rotary coupling and a marine drive including same. The coupling includes inner and outer rotary members. The inner surface of the outer rotary member and the periphery of the inner member are of similar configuration and include at least two arcs of greater radius of curvature symmetrically disposed about the axis of rotation connected in alternate manner by an equal number of arcs of lesser radius of curvature. Thereby, the arcs of greater radius of curvature are located closer to the axis of rotation than the arcs of lesser radius of curvature. The center of curvature of each of said arcs lies on or within the boundary of the closed figure defined by the inner surface in said section. The arcs are connected to one another without any abrupt change of radius or radius of curvature. Resilient means are disposed between the outer and inner rotary members. The resilient means is in radial compression and contacts completely in the circumferential direction of the members at least a portion of the inner surface of the outer member and the periphery of the inner member. The coupling is designed to permit torsional shock absorption up to a maximum torque load at which time the inner and outer rotary members mechanically lock up relative to one another thereby preventing further angular displacement of them relative to one another.

other.

[0005] FIG. 7 shows a conventional propeller 80 for use in a boat according to a prior art. The propeller 80 comprises a propeller shaft 81 inside which a shaft sleeve 82 is firmly installed. An adapter 83 is disposed inside the shaft sleeve 82. A driving shaft 84 of the boat passes through the adapter 83 and is fastened to the adapter 83 by a tab washer 85 and a lock nut 86. Accordingly, the adapter 83 and the shaft sleeve 82 can be driven to rotate by an engine of the boat through the driving shaft 84, resulting in a synchronous rotation of the propeller shaft 81.

[0006] According to this design, the shaft sleeve 82 is made of rigid materials. If the propeller 80 bumps hard things during rotation, the shaft sleeve 82 may be broken, or even that the driving shaft 84 of the engine may be damaged. Besides, if the driving shaft 84 outputs an exceeding torsion or receives an extreme impact suddenly, the shaft sleeve 82 may be also broken because the shaft sleeve 82 is driven by the adapter 83, which is driven by the driving shaft 84. If the shaft sleeve 82 is broken, the adapter 83 cannot run well. Thus, the conventional design of the propeller 80 is unable to be connected to a high-powered engine due to this potential defect. In addition, the adapter 83 and the shaft sleeve 82 must be coaxially aligned with the driving shaft 84 when they are assembled. However, because the adapter 83 and the shaft sleeve 82 are independently produced, any size inaccuracy in production of the adapter 83 or the shaft sleeve 82 will cause a possible clearance of assembly among the shaft sleeve 82, the adapter 83 and the driving shaft 84, resulting in a working vibration when the shaft sleeve 82 and the adapter 83 are driven to rotate by the driving shaft 84 in high speed.

SUMMARY OF THE INVENTION

[0007] The present invention has been accomplished under the circumstances in view. It is therefore one objective of the present invention to provide a propeller for a boat, which provides a shock-absorbing effect for protecting an engine of the boat from damage.

[0008] It is another objective of the present invention to provide a propeller for a boat, which can bear a relatively higher torsion and generate less vibration when rotating.

[0009] It is still another objective of the present invention to provide a propeller for a boat, which is easy to manufacture.

[0010] To achieve these objectives of the present invention, the propeller for a boat comprises a propeller shaft, a shaft sleeve and a lock unit. The propeller shaft has a shaft hole surrounded by an inner surface of the propeller shaft. The shaft sleeve is mounted in a shaft hole of the propeller shaft and provided with a metal core with a through hole for insertion of a driving shaft of the boat, and a rubber shock-absorbing member covering an outer surface of the metal core and having an outer

surface contacted with the inner surface of the propeller shaft that surrounds the shaft hole. The lock unit is mounted on the driving shaft for fixing the driving shaft in the through hole of the shaft sleeve, so that the propeller is rotatable by the driving shaft. The invention is characterized in that the metal core has four ribs which have concave sides. These ribs are equiangularly spaced around a center portion of the metal core and extend along a longitudinal axis of the metal core. Therefore, when the propeller of the present invention bumps hard things during rotation to result in vibration to the propeller, the shock-absorbing member can absorb the vibration to protect the driving shaft and a gearbox of an engine of the boat connected with the driving shaft from damage.

[0011] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present invention will become more fully understood from the detailed description given herein below and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a perspective view of a preferred embodiment of the present invention;
 FIG. 2 is an exploded view of the preferred embodiment of the present invention;
 FIG. 3 is a sectional assembly view of the preferred embodiment of the present invention;
 FIG. 4 is a perspective view of a shaft sleeve of the preferred embodiment of the present invention;
 FIG. 5 is an end view of the shaft sleeve of the preferred embodiment of the present invention;
 FIG. 6 is a sectional view of the shaft sleeve of the preferred embodiment of the present invention; and
 FIG. 7 is an exploded view of a propeller of the prior art.

DETAILED DESCRIPTION OF THE INVENTION

[0013] As shown in FIG. 1 to FIG. 3, a propeller 10 for a boat in accordance with a preferred embodiment of the present invention comprises a propeller shaft 20, a shaft sleeve 30, and a lock unit 40. The boat comprises an engine (not shown), a gearbox (not shown), and a driving shaft 12 connected with the engine through the gearbox and rotatable by the engine. The driving shaft 12 is provided with a teeth portion 122 at the middle part thereof and a thread portion 124 at the rear part thereof.

[0014] The propeller shaft 20 is provided with a hub 22 and a plurality of propeller blades 24, which extend equiangularly outwardly and curvedly from the hub 22. The hub 22 is provided with a shaft hole 26 through the front side and the back side thereof.

[0015] As shown in FIG. 4 and FIG. 5, the shaft sleeve 30 is provided with a metal core 32 with a center through hole 322 for the insertion of the driving shaft 12, and a shock-absorbing member 34 covering an outer surface of the metal core 32. A thrust washer 36 is sleeved onto the driving shaft 12 and attached to the front end of the shaft sleeve 30. If the propeller 10 is going to be connected with a driving shaft having relatively higher output torsion, the metal core 32 is preferably made of stainless steel. If the propeller 10 is going to be connected with a driving shaft having relatively smaller output torsion, the metal core 32 can be made of aluminum alloy. The metal core 32 has four ribs 324 equiangularly spaced around a center portion thereof and extending along the longitudinal axis of the metal core from the front end to the rear end thereof. As shown in FIG. 6, the center through hole 322 of the metal core 32 is provided with a transmission teeth portion 326 at the rear part thereof, which is designed to be engaged with the teeth portion 122 of the driving shaft 12. The shock-absorbing member 34 is made of rubber. The shaft sleeve 30 is mounted in the shaft hole 26 of the propeller shaft 20 to make the outer surface of the shock-absorbing member 34 to be firmly contacted with the inner surface that surrounds the shaft hole 26. The driving shaft 12 is inserted into the through hole 322 and pushes the thrust washer 36 to firmly attach on the front end of the shaft sleeve 30.

[0016] The lock unit 40 comprises an adapter 50, a tab washer 60 and a lock nut 70. The adapter 50 is provided with an adapter hole 52 with a teeth portion 54 for engagement with the teeth portion 122 of the driving shaft 12, and a plurality of lock sockets 56 at rear end surface of the adapter 50. The tab washer 60 is mounted onto the driving shaft 12 and coupled with the adapter 50. The tab washer 60 has a plurality of tabs 62, each of which can be bent to embed in each lock socket 56 for fixing the tab washer 60 to the adapter 50, such that the tab washer 60 can be synchronously rotated with the adapter 50. The lock nut 70 is fastened to the thread portion 124 of the driving shaft 12 and firmly stopped against the tab washer 60 for fixing the driving shaft 12 in the through hole 322, so that the propeller 10 can be driven to rotate by the driving shaft 12.

[0017] When the propeller 10 bumps hard things during rotation to result in vibration to the propeller 10, the shock-absorbing member 34 that covers the metal core 32 can absorb the vibration so as to avoid the metal core 32 from breaking, such that the driving shaft 12 inserted in the shaft sleeve 30 and the gearbox connected with the driving shaft 12 can be further protected from damage. In addition, if the driving shaft 12 inserted in the shaft sleeve 30 has relatively higher output torsion, the torsion can be borne by the shaft sleeve 30 through the ribs 324, which

is covered with the shock-absorbing member **34**. Therefore, the propeller **10** of the present invention can be connected to a high-powered engine. Moreover, as long as the through hole **322** is coaxially processed with the driving shaft **12**, an assembly clearance between the through hole **322** and the driving shaft **12** can be decreased to the lowest level, thereby eliminating the possible vibration in high-speed rotation generated due to the assembly clearance.

[0018] Consequently, the propeller of the present invention is easy to manufacture and provides a shock-absorbing effect for protecting the gearbox and/or the driving shaft of the boat from damage. The propeller of the present invention can bear relatively higher torsion and therefore can be connected to a high-powered engine.

Claims

1. A propeller (10) for a boat having a driving shaft (12), the propeller comprising:

a propeller shaft (20) having a shaft hole (26) surrounded by an inner surface of the propeller shaft;

a shaft sleeve (30) mounted in the shaft hole (26) having a metal core (32) with a through hole (322) for insertion of the driving shaft (12), and a rubber shock-absorbing member (34) covering an outer surface of the metal core and having an outer surface contacted with the inner surface of the propeller shaft (20); and

a lock unit (40) mounted on the driving shaft (12) for fixing the driving shaft in the through hole (322) of the shaft sleeve (30), so that the propeller (10) is rotatable by the driving shaft (12), **characterized in that** the metal core (32) has four ribs (324) which have concave sides, and **in that** the ribs (324) are equiangularly spaced around a center portion of the metal core (32) and extend along a longitudinal axis of the metal core (32).

2. The propeller as claimed in claim 1, wherein the locking unit (40) comprises an adapter (50) coupled with the shaft sleeve (30) and engaged with the driving shaft (12), a tab washer (60) mounted on the driving shaft (12) and coupled with the adapter (50), and a lock nut (70) engaged with the driving shaft (12) and stopped against the tab washer (60).
3. The propeller as claimed in claim 1, further comprising a thrust washer (36) sleeved onto the driving shaft (12) and attached to the shaft sleeve (30).
4. The propeller as claimed in claim 1, wherein the metal core (32) is made of stainless steel.

5. The propeller as claimed in claim 1, wherein the metal core (32) is made of aluminum alloy.

Patentansprüche

1. Propeller (10) für ein Boot mit einer Antriebswelle (12), worin der Propeller umfasst:

eine Propellerwelle (20) mit einem Wellenloch(26) das von einer inneren Oberfläche der Propellerwelle umgeben ist;

eine Wellenbuchse (30), die in dem Wellenloch(26) befestigt ist und einen Metallkern (32) mit einem Durchgangsloch (322) zur Insertion der Antriebswelle (12) aufweist, und ein stoßabsorbierendes Gummi-Element (34), das eine äußere Oberfläche des Metallkerns bedeckt, worin dessen äußere Oberfläche mit der inneren Oberfläche der Propellerwelle (20) in Kontakt steht; und

eine Sperreinheit (40), die an der Antriebswelle (12) befestigt ist, um die Antriebswelle in dem Durchgangsloch (322) der Wellenbuchse (30) zu befestigen, so dass der Propeller (10) durch die Antriebswelle (12) drehbar ist,

dadurch gekennzeichnet, dass der Metallkern (32) vier Rippen (324) aufweist, die konkave Seiten aufweisen, und dass die Rippen (324) im gleichen Winkel um einen zentralen Bereich des Metallkerns (32) beabstandet sind und sich entlang einer Längsachse des Metallkerns (32) erstrecken.

2. Propeller nach Anspruch 1, worin die Sperreinheit (40) einen Adapter (50) umfasst, der mit der Wellenbuchse (30) gekoppelt ist und mit der Antriebswelle (12) in Eingriff steht, eine Laschenscheibe (60), die an der Antriebswelle (12) befestigt und mit dem Adapter (50) gekoppelt ist, und eine Sperrnut (70), die mit der Antriebswelle (12) in Eingriff steht und gegen die Laschenscheibe (60) stoppt.
3. Propeller nach Anspruch 1, welcher weiter eine Druckscheibe (36) umfasst, die auf die Antriebswelle (12) aufgezogen und an der Wellenbuchse (30) angebracht ist.
4. Propeller nach Anspruch 1, worin der Metallkern (32) aus rostfreiem Stahl besteht.
5. Propeller nach Anspruch 1, worin der Metallkern (32) aus einer Aluminiumlegierung besteht.

Revendications

1. Une hélice (10) pour un bateau ayant un arbre de

transmission (12), l'hélice comportant :

- un arbre porte-hélice (20) ayant une perforation pour la tige (26) entouré d'une paroi interne de l'arbre porte-hélice; 5
- une chemise d'arbre (30) montée sur la perforation pour la tige (26) ayant un noyau métallique (32) avec une perforation traversante (322) pour l'insertion de l'arbre de transmission (12), et un élément antichocs en caoutchouc (34) recouvrant la face externe du noyau métallique et ayant une surface extérieure avec la paroi interne de l'arbre porte-hélice (20); et 10
- une unité de verrouillage (40) montée sur l'arbre de transmission (12) afin de fixer l'arbre de transmission sur la perforation traversante (322) de la chemise d'arbre (30), pour que l'hélice (10) soit rotative par l'arbre de transmission (12), **caractérisé par** le noyau métallique (32) ayant quatre côtés (324) qui ont des bords concaves, et par les côtés (324) étant équi-angulairement espacés autour de la partie centrale du noyau métallique (32) et étendus le long de l'axe longitudinal du noyau métallique (32). 15 20 25
- 2. L'hélice revendiquée dans la revendication 1, où l'unité de verrouillage (40) comporte un adaptateur (50) couplé à la chemise d'arbre (30) et engagé avec l'arbre de transmission (12), une rondelle à ergot (60) montée sur l'arbre de transmission (12) et couplée avec l'adaptateur (50), et un écrou de blocage (70) engagé avec l'arbre de transmission (12) et bouché contre la rondelle à ergot (60). 30
- 3. L'hélice revendiquée dans la revendication 1, comprenant en outre une rondelle de butée (36) émanché sur l'arbre de transmission (12) et attaché à la chemise d'arbre (30). 35
- 4. L'hélice revendiquée dans la revendication 1, où le noyau métallique (32) est fait en acier inoxydable. 40
- 5. L'hélice revendiquée dans la revendication 1, où le noyau métallique (32) est fait en alliage d'aluminium. 45

50

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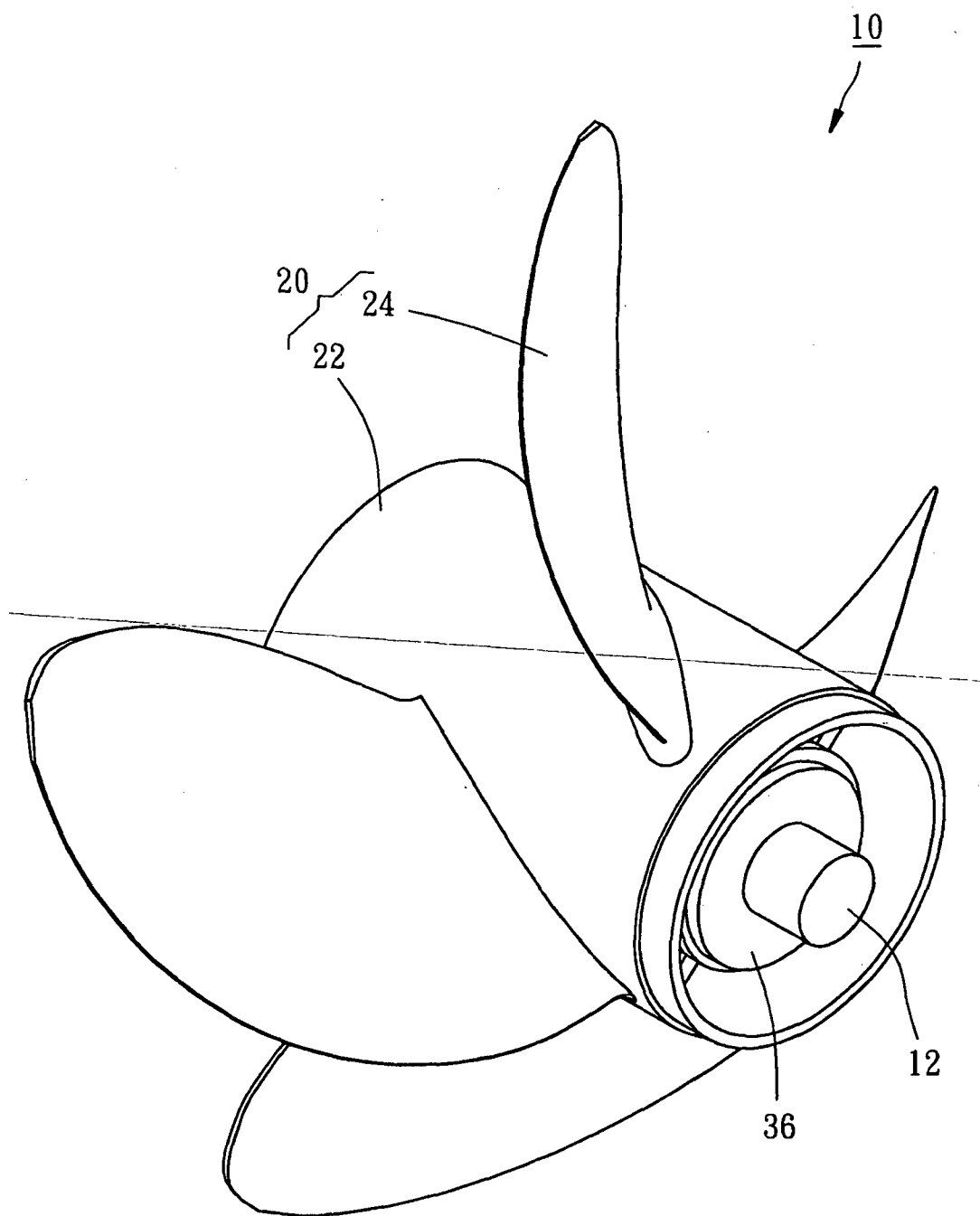


FIG. 1

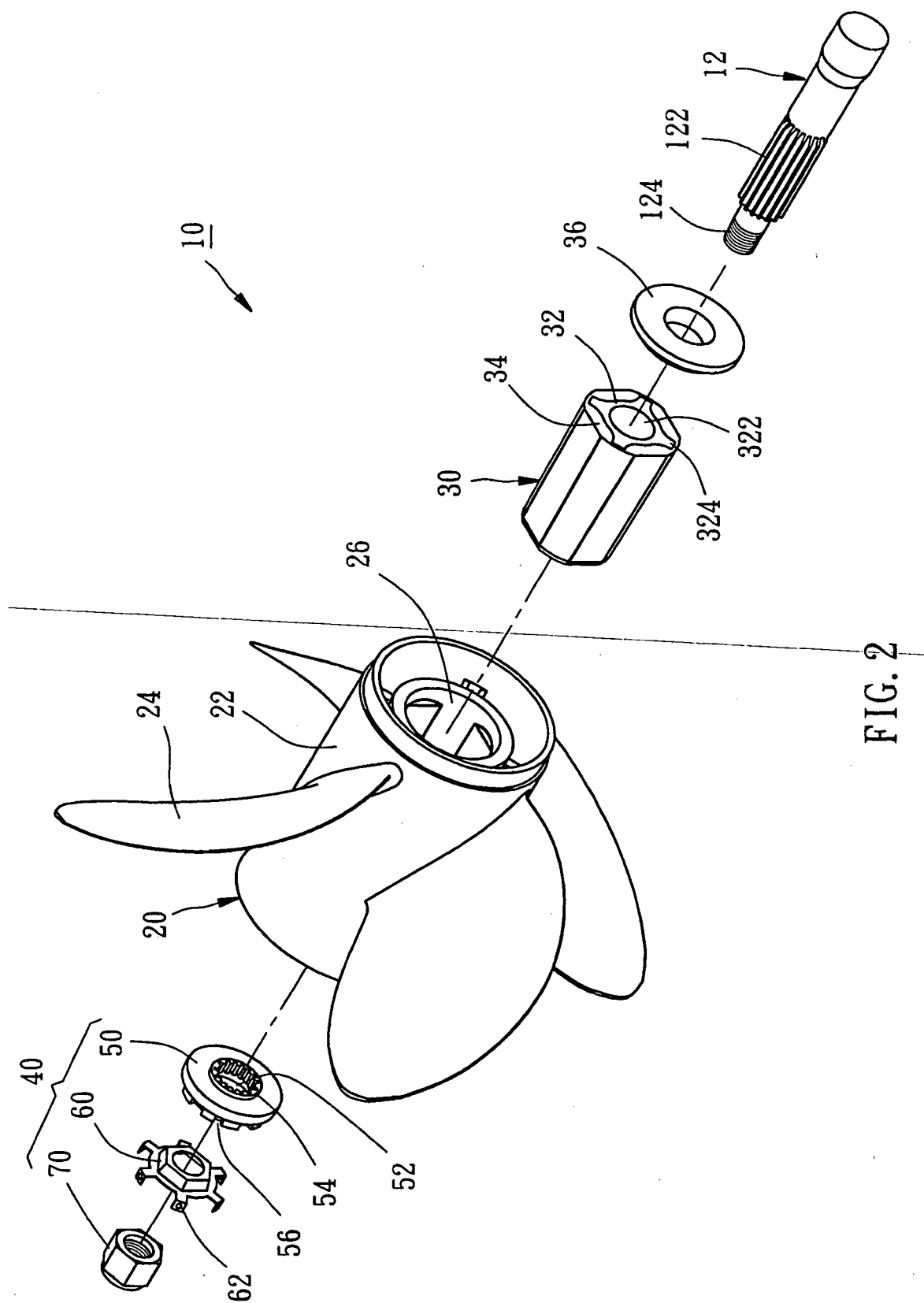


FIG. 2

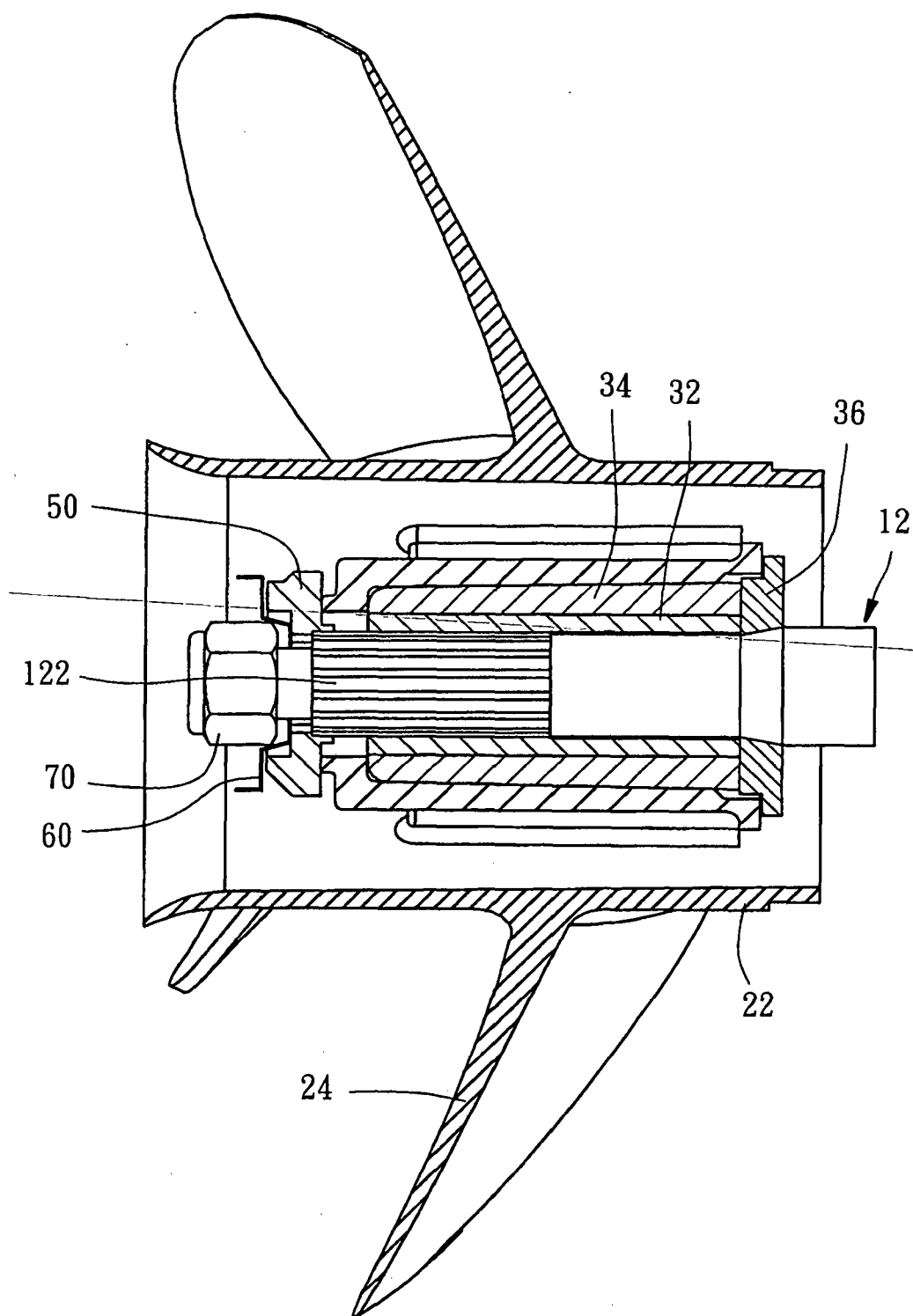


FIG. 3

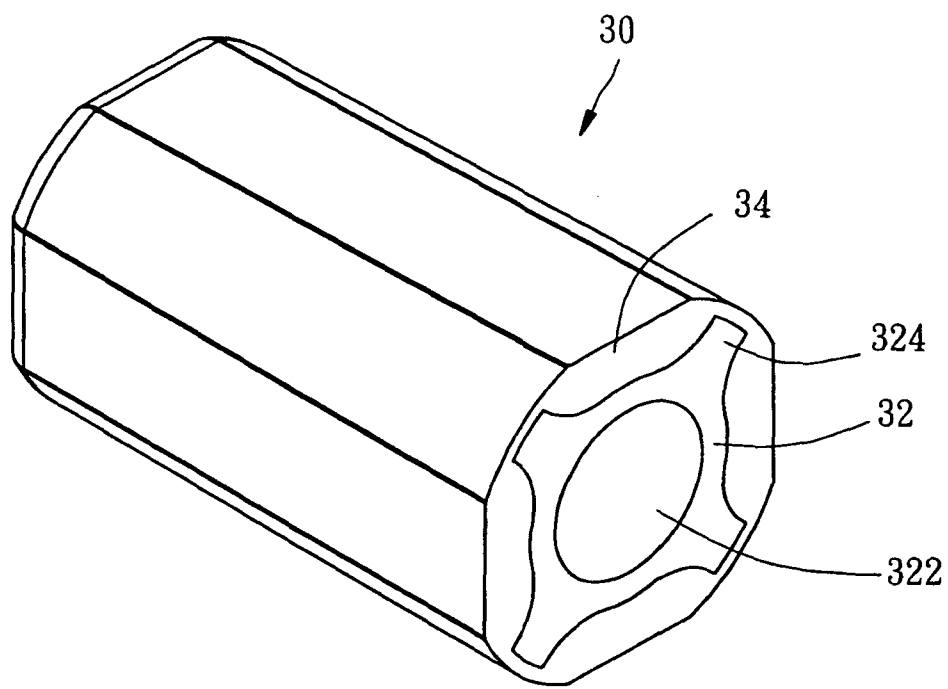


FIG. 4

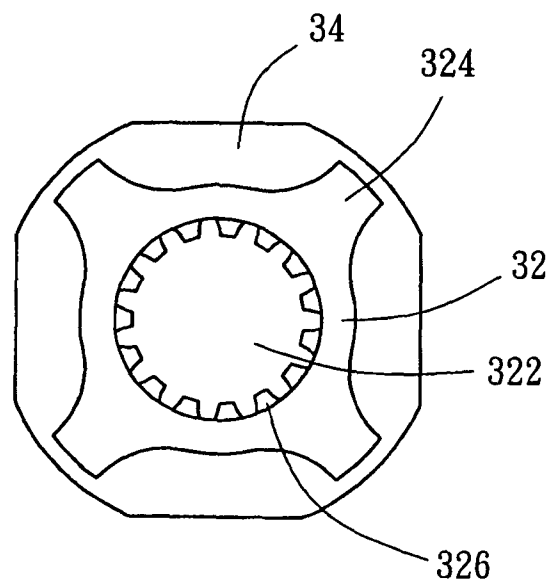


FIG. 5

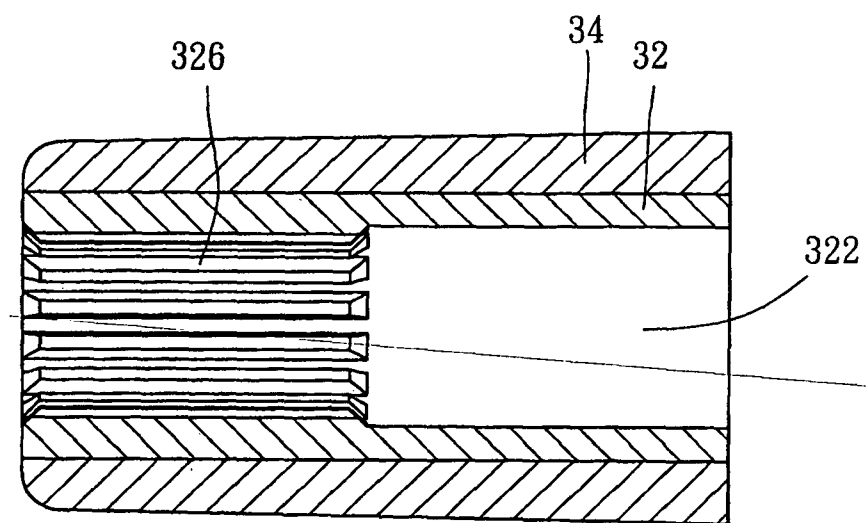


FIG. 6

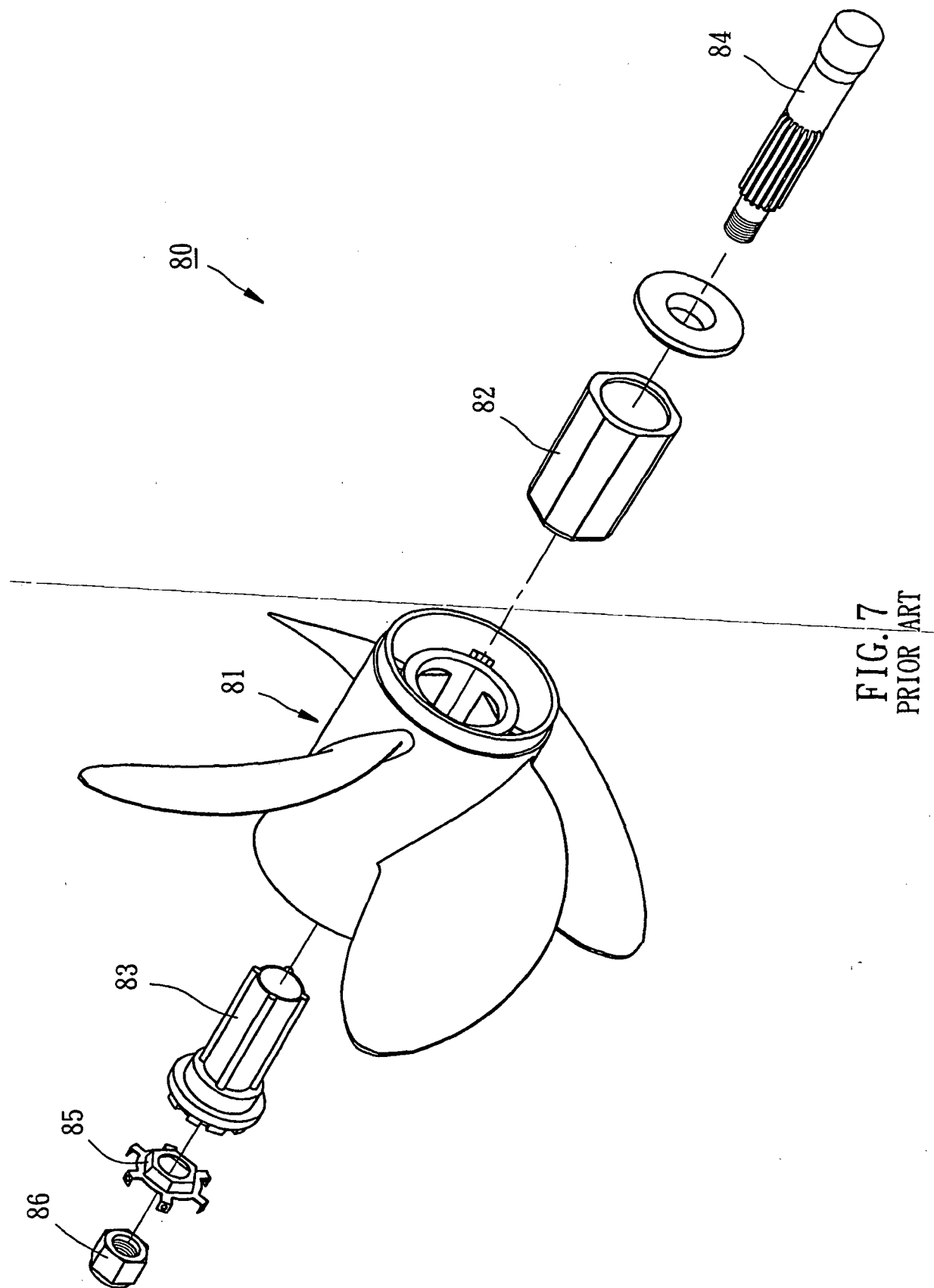


FIG. 7
PRIOR ART

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

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- US 5630704 A [0003]
- US 4452591 A [0004]

Szabadalmi igénypontok

1. Hajócsavar (10), amelynek van meghajtótengelye (12), hajócsavar tartalmaz:
hajócsavar tengelyt (20), amelynek van tengely lyuka (26), amely a hajócsavar tengely
belső felülete által van körülveve;
5 tengely perselyt (30), amely a tengely lyukban van szerelve (26), amelynek van fém
magja (32) átmenő lyuk (322) a meghajtó tengely (12) bedugására, és gumi
lengéscsillapító tagja (34), amely a fém mag külső felületét fedi és van külső felülete,
amely érintkezik a hajócsavar tengely (20) belső felületével; és
záróegységet, amely (40) a meghajtó tengelyre (12) van szerelve, meghajtó tengely a
10 tengely persely (30) átmenő lyukában (322) történő rögzítésére, úgy hogy a hajócsavar
(10) forgatható a meghajtó tengely (12) által,
azzal jellemezve, hogy a fém magnak (32) négy bordája (324) van, amelynek vannak
konkáv oldalai, és hogy a bordák (324) azonos szögekben vannak a fém mag (32)
központi része körül egymástól és kiterjednek a fém mag (32) hossztengelye mentén.
- 15 2. Az 1. igénypont szerinti hajócsavar, ahol a záróegység (40) tartalmaz adaptert (50),
amely csatolva van a tengely persellyel (30) és kapcsolódik meghajtó tengelyhez (12),
hevederalátét (60) van szerelve a meghajtó tengelyre (12) és csatolva van az adapterrel
(50), és záróvázat (70) kapcsolódik a meghajtó tengellyel (12) és a heveder által van
megállítva.
- 20 3. Az 1. igénypont szerinti hajócsavar, amely továbbá tartalmaz nyomótárcsát (36),
amely fel van húzva a meghajtótengelyre (12) és kapcsolva van a tengely perselyhez
(30).
4. Az 1. igénypont szerinti hajócsavar, ahol a fém mag (32) rozsdamentes acélból van
készítve.
- 25 5. Az 1. igénypont szerinti hajócsavar, ahol a fém mag (32) alumíniumötvözetből van
készítve.