

SPLIT GEARBOX

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Non-Provisional Application claiming priority to U.S. Provisional Patent Application No. 63/535,514, entitled “Split Gearbox”, filed August 30, 2023, which is herein incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] This section is intended to introduce the reader to various aspects of art that may be related to various aspects of the present disclosure, which are described and/or claimed below. This discussion is believed to be helpful in providing the reader with background information to facilitate a better understanding of the various aspects of the present disclosure. Accordingly, it should be understood that these statements are to be read in this light, and not as admissions of prior art.

[0003] Advances and technologies deployed in the automotive industry have allowed for an increase in the number of hybrid gas-electric automobiles in use. Hybrid automobiles allow for the reduction of fuel consumption and the emissions associated therewith. In contrast, propulsion systems for aircraft typically continue to utilize traditional gas turbine engines.

[0004] Hybrid technology is starting to become more and more accepted in the marine industry as a method of reducing the fuel consumption and the emissions associated with carrying out the industrial marine mission of a vessel.

[0005] A vessel's suitability to hybrid technology mainly depends on its duty cycle and operational profile. For example, an application that is typically well suited for hybrid propulsion is one in which the vessel design is based on a broad spectrum of power needs, yet a significant amount of the time is expected to be spent at low power. Vessels that may fit this profile include patrol boats, tug boats, work boats, offshore

supply vessels (OSVs), platform supply vessels (PSVs), pilot vessels, research vessels, fishing boats, buoy tenders, ice breakers, navy vessels, and many more.

[0006] When a vessel is being considered for new construction, application of hybrid technology may not be considered difficult to integrate into the vessel design, and the additional capital expenditures may be offset by expected future savings (e.g. fuel expenses). The majority of the vessels that will operate over the next 30 years are already built, and except for a very small number of early adopters, these existing vessels are fitted with conventional power systems.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] These and other features, aspects, and advantages of the present disclosure will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

[0008] FIG. 1 illustrates a cross-sectional side view of a drive system, in accordance with an embodiment; and

[0009] FIG. 2 illustrates a flow chart describing installation of the drive system of FIG. 1, in accordance with an embodiment.

DETAILED DESCRIPTION

[0010] One or more specific embodiments of the present disclosure will be described below. In an effort to provide a concise description of these embodiments, all features of an actual implementation may not be described in the specification. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another. Moreover, it should be appreciated that such a development effort might be

complex and time consuming, but would nevertheless be a routine undertaking of design, fabrication, and manufacture for those of ordinary skill having the benefit of this disclosure.

[0011] When introducing elements of various embodiments of the present disclosure, the articles “a,” “an,” “the,” and “said” are intended to mean that there are one or more of the elements. The terms “comprising,” “including,” and “having” are intended to be inclusive and mean that there may be additional elements other than the listed elements. Any examples of operating parameters and/or environmental conditions are not exclusive of other parameters/conditions of the disclosed embodiments.

[0012] There is a large opportunity for hybridization of existing vessels that have an operational profile that supports a hybrid design. There are only a few examples worldwide of successful conversion of existing vessels to hybrid power systems. This is in part due to challenges associated with any vessel conversion. Also, modification of propulsion shaft lines to integrate an electric motor into a conventional propulsion mechanical drive line is currently a disruptive and costly exercise. The associated loss of revenue for the vessel and cost of modification will typically remove the business case for hybrid conversion. Conventional electric motor design prevents the electric machine from being fitted in the propulsion system without interrupting the shaft line.

[0013] In the systems disclosed herein, a drive system can be fitted to existing propulsion shaft lines without the need to interrupt or modify the existing shaft. This may lead to decreased installation time and/or costs for retrofitting existing vessels with hybrid power systems. For example, elements of the drive system may be modular and/or scalable to facilitate its installation in a wide variety of vessel types.

[0014] The drive system described herein utilizes a split gear assembly (or a split gear collar assembly) to allow for the installation of one or more drive sources (e.g., motor or generators) to an existing marine vessel shaft (e.g., drive shaft or propeller shaft), without the removal of the shaft. In some embodiments, a gear train may be employed between the one or more drive sources and the shaft whereby the gear train can include a variety of mechanical gear types (sprocket, helical, planetary, etc.) and

ratios. Other forms of transmission, such as belt or chain drive, may be implemented in conjunction with various embodiments.

[0015] Additionally, in some embodiments, the gear train may include a lubrication component, including oil injection or bath. Furthermore, the one or more drive sources can be mounted in any number and orientation. Likewise, embodiments provide various manners of isolating noise, vibrations, and/or harshness between connections of the system (e.g. motor mount to hull, bearing to motor mount, motor to motor mount, etc.) may be implemented.

[0016] Through the use of the split gearing assembly, environmental benefits may help to be realized by making the hybridization of existing vessels commercially viable. Indeed, through incorporation of the drive system described herein, the efficiency and/or the power of the vessel can be increased (e.g., depending on the operation of the drive system). For example, the drive system may operate in an electric mode in which the drive system rotates the shaft without engine (e.g., combustion engine) assistance, in a hybrid mode in which the drive system rotates the shaft in conjunction with the vessel engine (e.g., with the engine operating at a lower output level), or in an augmented mode in which the vessel engine operates at normal output and the drive system provides additional rotation to the shaft to increase the overall rate of rotation of the shaft relative to the vessel engine operating alone. Moreover, as further described below, the drive system may also operate to generate power from rotation of the shaft in a charging mode to replenish charge in a power source coupled to the drive system. Use of the drive system as described herein has the potential to significantly reduce the environmental impact associated with marine operations around the world.

[0017] With the foregoing in mind, FIG. 1 illustrates cross sectional view of a drive system 10 that can be coupled to a shaft 12 (e.g., a propeller shaft or a drive shaft) of a vessel, for example, a marine vessel. As will be described in greater detail, the drive system 10 allows for overcoming typical obstacles encountered in retrofitting an existing vessel (e.g., a marine vessel) with an electric drive system. In some embodiments, the drive system 10 includes a split gearbox 14 that operates as an enclosure for one or more gears and a drive source 16 that can be a motor, for example, an electric motor and may operate as a motor generator. While one drive source 16 is

illustrated, as noted above, one or more drive sources 16 can be utilized. As illustrated, the split gearbox 14 can be an enclosure that is separable. For example, the split gearbox 14 can have an upper portion 18 and a lower portion 20 that can be affixed or otherwise coupled to one another, for example, via one or more connectors or fasteners, such as a bolt and nut, a pin, a screw, a nail, an anchor, a rivet, etc. to form the split gearbox 14. As illustrated, the split gearbox 14 is segmented along plane 22, which bisects the centerline of the shaft 12. However, divisions of the split gearbox 14 in different locations other than along plane 22 are envisioned and/or divisions of the split gearbox 14 into more than two sections can similarly be employed.

[0018] As illustrated, the split gearbox 14 consists of two gears, gear 24 and gear 26. However, additional gears (e.g., as part of a gear train) can be utilized. Similarly, gear 26 can be omitted. Gear 24 and gear 26 can each correspond to a respective axle and bearing(s) and can be enclosed in respective structural gearboxes or can be enclosed via the split gearbox 14. As the split gearbox 14 is designed to be installed about an existing shaft 12, without removal of the shaft 12, several components of the split gearbox 14 can be split to allow for installation about an existing shaft 12.

[0019] For example, as described above, the split gearbox 14 can include sections, for example, an upper portion 18 and a lower portion 20. Additionally, gear 24 can be a split gear (i.e., gear 24 is made up of two or more sections coupled together, for example, via a connector or fastener, such as a bolt and nut, a pin, a screw, a nail, an anchor, a rivet, etc. to form gear 24). As illustrated, gear 24 is segmented along plane 28. However, divisions of the gear 24 in different locations other than along plane 28 are envisioned and/or divisions of the gear 24 into more than two sections can similarly be employed.

[0020] In some embodiments, the gear 24 interacts with a motor gear 30 (e.g., via a direct coupling therebetween) so that rotation of the motor gear 30 causes rotation of the gear 24 (or vice versa). In other embodiments, the gear 24 interacts with gear 26 (e.g., the outer teeth of gear 26 interact with the outer teeth of gear 24 or a second smaller gear coupled to gear 26 about the shaft at the center of gear 26 is coupled to the outer teeth of gear 24) and gear 26 interacts with motor gear 30 (e.g., via a direct

coupling therebetween), so that rotation of the motor gear 30 causes rotation of the gear 26 which, in turn, causes rotation of gear 24 (or vice versa).

[0021] Additionally illustrated is drive source 16. As previously noted, drive source 16 can be a motor, for example, an electric motor and may operate as a motor generator. The drive source 16 can operate to provide a torque to the motor gear 30, which provides a contact transfer of torque to the gear 24 (e.g., either directly or via gear 26, as illustrated in FIG. 1). Gear 24 can be coupled either directly about the shaft 12 (e.g., circumferentially about the shaft 12) or can be coupled about a collar 32 (e.g., a shaft clamp), which is directly coupled about the shaft 12 (e.g., circumferentially about the shaft 12). In this manner, rotation of the gear 24 provides rotation to the shaft 12. In some embodiments, one or more techniques to isolate noise, vibration, and/or harshness may be implemented. For example, vibration isolators, dampeners, flexible mount connectors, vibration control, etc. can be utilized in conjunction with the drive system 10. In one embodiment, a dampener can be disposed between the coupler and the gear 24 to isolate vibration between the shaft 12 (and associated drivetrain, which can include, for example, a combustion engine and propeller, and the split gearbox 14 and drive source 16. Use of one or more dampers in this manner may also allow for misalignment between the shaft (12) and drive system 10.

[0022] The collar 32 can include two or more sections coupled together. In this manner, the collar 32 is a split collar 32 (i.e., collar 32 is made up of two or more sections coupled together, for example, via a connector or fastener, such as a bolt and nut, a pin, a screw, a nail, an anchor, a rivet, etc. to form collar 32). The collar 32 can additionally be coupled to the gear 24, for example, as a single element (e.g., sections of the gear 24 and sections of the collar 32 are fused or otherwise non-removable connected) or as separate elements (e.g., coupled together, for example, via a connector or fastener, such as a bolt and nut, a pin, a screw, a nail, an anchor, a rivet, etc. to connect sections of the collar 32 to sections of the gear 24). In operation, collar 32 (when present) can be affixed directly about the shaft 12 such that the collar 32, for example, completely circumferentially surrounds the shaft 12 so that rotation of the collar 32 is directly imparted to the shaft 12 (or, if gear 24 coupled to the collar 32 is not being rotated by the drive source 16, the shaft 12 rotates the collar 32). Additionally, the collar 32 can be installed about an existing shaft 12 without removal

of the shaft 12 from the vessel by coupling sections of the collar 32 to one another about the shaft 12.

[0023] The gear 24 can be installed about an existing shaft 12 without removal of the shaft 12 from the vessel. For example, the gear 24 can be coupled about the collar 32 subsequent to installation of the collar 32 by coupling the sections of the gear 24 to one another and to the collar 32 so that the gear 24 is directly constructed on an existing shaft 12 of the vessel. Instead, if no collar 32 is employed, the sections of the gear 24 can be directly coupled about the shaft 12 and to one another to directly couple the gear 24 to the shaft 12. Finally, if sections of the collar 32 and the gear 24 are fused or otherwise non-removably attached, these fused sections can be coupled to one another about the shaft 12 (and coupled to the shaft 12).

[0024] Thus, in operation, the motor gear 30 is physically coupled to the drive source 16 and receives a torque from the drive source 16, which is transferred to the gear 24 through direct contact between the motor gear 30 and the gear 24 or indirect contact between the motor gear 30 and the gear 24 via gear 26. Driving of this gear 24 operates to transmit torque to the shaft 12 of the vessel (either directly or via the collar 32 disposed between the gear 24 and the shaft 12) and allows for rotation to be imparted to the shaft 12 to rotate the shaft 12 (either alone in an electric mode or in conjunction with an engine of the vessel in a hybrid mode or an augmented mode to provide additional power to the vessel). Moreover, as will be described in greater detail below, the drive system 10 can be installed to interface with an existing shaft 12 without dismantling or disturbing the shaft 12 of the vessel. In this manner, the drive system 10 is a split drive system.

[0025] In some embodiments, when indirect coupling of the drive source 16 to the shaft 12 is employed, that indirect coupling can include a gear train between the drive source 16 and the shaft 12 and can include a variety of mechanical gear types (sprocket, helical, planetary, etc.) and ratios. Other forms of transmission, such as belt or chain drive, may be implemented to couple the drive source 16 to the shaft 12. Moreover, inclusion of lubrication techniques and devices for the direct or indirect coupling can be employed including, for example, oil splash lubrication (e.g., oil bath lubrication) whereby one or more of the gear 24, the motor gear 30, or other gears in a gear train

(e.g., gear 26) rotate through a reservoir filled with oil (or another lubricant) such that as they rotate, the lubricant is applied to the rotating gear 24, motor gear 30, and/or gear(s) (e.g., gear 26) of the gear train. In another embodiment, oil mist or spray (or another lubricant) can be atomized and sprayed on the gear 24, motor gear 30, and/or gear(s) (e.g., gear 26) of the gear train. Other lubrication techniques can, alternatively, be employed.

[0026] As additionally illustrated in FIG. 1, the drive system 10 can include one or more friction reducing elements 34 (e.g., a bearing). The one or more friction reducing elements 34 can be disposed on or otherwise coupled to the split gearbox 14 and the collar 32 (or the shaft 12 if no collar 32 is present). The one or more friction reducing elements 34 can be disposed on opposite sides of the gear 24 and can interact with opposite faces of the split gearbox 14 to provide an interface between the shaft 12 and the split gearbox 14. The one or more friction reducing elements 34, as illustrated, includes an inner surface through which the shaft 12 can pass. The inner surface allows for rotation of the shaft 12 therethrough with respect to the split gearbox 14.

[0027] Additionally, the one or more friction reducing elements 34 can be installed about an existing shaft 12 without removal of the shaft 12 from the vessel. For example, the one or more friction reducing elements 34 can include two or more sections coupled together. In this manner, the one or more friction reducing elements 34 are split (i.e., the one or more friction reducing elements 34 are made up of two or more sections coupled together, for example, via a connector or fastener, such as a bolt and nut, a pin, a screw, a nail, an anchor, a rivet, etc. to form the one or more friction reducing elements 34). The one or more friction reducing elements 34 can additionally be coupled to the collar 32, for example, as a single element (e.g., sections of the one or more friction reducing elements 34 and sections of the collar 32 are fused or otherwise non-removably connected) or as separate elements (e.g., coupled together, for example, via a connector or fastener, such as a bolt and nut, a pin, a screw, a nail, an anchor, a rivet, etc. to connect sections of the collar 32 to sections of the one or more friction reducing elements 34). In operation, the one or more friction reducing elements 34 can be affixed directly about the shaft 12 such that the one or more friction reducing elements 34, for example, completely circumferentially surrounds the shaft 12. Thus, the one or more friction reducing elements 34 can be installed about an existing shaft 12 without

removal of the shaft 12 from the vessel by coupling sections of the one or more friction reducing elements 34 to one another about the collar 32 (or shaft 12 if collar 32 is not present).

[0028] The one or more friction reducing elements 34 can be coupled about the collar 32 subsequent to installation of the collar 32 by coupling the sections of the one or more friction reducing elements 34 to one another and to the collar 32. Instead, if no collar 32 is employed, the sections of the one or more friction reducing elements 34 can be directly coupled about the shaft 12 and to one another to directly couple the one or more friction reducing elements 34 to the shaft 12. Finally, if sections of the collar 32 and the one or more friction reducing elements 34 are fused or otherwise non-removably attached, these fused sections can be coupled to one another about the shaft 12 (and coupled to the shaft 12).

[0029] Additionally illustrated is mount 36 and mount 38. Mount 36 and mount 38 can be legs or other supports that can be affixed to the split gearbox 14 and, for example, the hull 40 (or deck or other area) of the vessel. Mount 36 and mount 38 can operate to support the weight of the drive system 10. In some embodiments, the mount 36 and the mount 38 can be a table or frame that operates to support the drive system 10 and allows for rotation of the gear 24 above the hull 40. In some embodiments, one or more techniques to isolate noise, vibration, and/or harshness between connections (e.g. mount 36 to hull 40, mount 38 to hull 40, etc.) may be implemented. For example, vibration isolators (e.g., resilient supports), dampeners, flexible mount connectors, vibration control, etc. can be utilized in conjunction with the drive system 10. Likewise, mount 36 and/or mount 38 can be adjustable to allow for positioning adjustments of drive system 10 relative to the shaft (12).

[0030] Additional elements of the split gearbox 14 may be present. For example, as described above, the split gearbox 14 can serve as a reservoir for lubrication fluid (e.g. oil), and inclusive of supporting equipment such as pump, lines, oil squirters. The split gearbox 14 can include the motor gear 30 as well as intermediate gear(s) (e.g., gear 26). Likewise, a flange for mounting the drive source 16 can be present. Furthermore, mounting points to attach the split gearbox 14 to a supporting structure (e.g., hull 40) in addition to or separate from mount 36 and mount 38 may be provided.

[0031] As noted above, the drive source 16 may be an electric motor and can also operate as an electric generator. The drive source 16 can be coupled to a power source, for example, one or more batteries (e.g., lithium ion batteries or other rechargeable batteries), one or more fuel cells, and/or similar or additional sources of electrical power. Additionally, a controller may be included to control an amount of power transmitted between the drive source 16 and the power source. For example, the controller can operate to cause the drive source 16 to operate as a motor to provide rotation to the shaft 12 via the gear 24, or the gear 24 and gear 26, for example, to allow for either electric propulsion of a vessel when the engine of a vessel is shut off or hybrid propulsion of the vessel when the drive system 10 operates in parallel or otherwise in conjunction with an engine of the vessel. Likewise, the drive source 16 can operate as a generator (e.g., by receiving torque from the shaft 12 via the gear 24 or the gear 24 and gear 26, causing electricity to be generated and transmitted to the power source to recharge the power source). In other embodiments, the power source can be independently be charged or replaced separate from operation of the drive system 10. Similarly, the controller can operate, for example, to electrically decouple the drive source 16 from the power source so that an engine of the vessel can solely power the shaft 12 (i.e., so that the shaft 12 rotates without assistance from the drive system 10 and no recharging of the power source coupled to the drive system 10 occurs).

[0032] The controller may be part of a larger computing system or a centralized control system. Alternatively the controller may be part of a standalone unit electric power controller that operates to control functionality of the drive system and/or its associated elements (e.g., the power source). In some embodiments, the controller may be communicatively coupled to a main control system, for example, a control system in a command room or a bridge of a vessel that allows for centralized control of one or more portions of the vessel. The controller and/or any computing or control system associated therewith, may operate in conjunction with software systems implemented as computer executable instructions stored in a (tangible) non-transitory machine readable medium, such as memory, a hard disk drive, or other short term and/or long term storage. Particularly, the techniques to described below with respect to control of aspects of the power source and/or other components of the drive system 10 may be accomplished, for example, using code or instructions stored in the non-transitory machine readable medium and may be executed, for example, by the controller as well

as by additional separate controllers controlling aspects of the operation of the drive system 10 inclusive of or separate from the operation of the drive source 16.

[0033] The controller may be a general purpose or a special purpose processing device, such as one or more application specific integrated circuits (ASICs), one or more processors, or another processing device that interacts with one or more tangible, non-transitory machine-readable medium (e.g., machine readable media) that collectively stores instructions executable by the controller to perform the methods and actions described herein. By way of example, such machine-readable media can comprise RAM, ROM, EPROM, EEPROM, CD-ROM or other optical disk storage, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to carry or store desired program code in the form of machine-executable instructions or data structures and which can be accessed by the controller. In some embodiment, the instructions executable by the controller are instead generated and transmitted to the controller via separate processing device of a computing system and are used to generate, for example, control signals or input signals to effect control of the power source and/or the drive source 16.

[0034] Any computing system controlling the controller or control system inclusive of the controller may also include one or more input structures (e.g., one or more of a keypad, mouse, touchpad, touchscreen, one or more switches, buttons, or the like) to allow a user to interact with the computing system, for example, to start, control, or operate a graphical user interface (GUI) or applications running on the computing system and/or to start, control, or operate, for example, components utilized in a drive operation. Alternatively, the control system of computing system operating the controller may instead automatically control the operation of the controller based either on inputs from a user or measured inputs of the drive system 10 that correspond to predetermined operations.

[0035] FIG. 2 illustrates a method 42 to install the drive system 10 on a vessel. It should be noted that method 42 may be performed in connection with installation of a power source and any associated controllers and/or control systems. Furthermore, one or more of the steps of method 42 can be performed in a different order than that describe below.

[0036] In step 44, mount 36 and/or mount 38 can be installed. Step 44 may include installation of one or more mounting brackets to the hull 40 (or deck or other area) of the vessel. Step 44 can be performed on a vessel without removal or disconnection of the shaft 12. In step 46, the gear 24 can be coupled to the shaft 12. As previously discussed, this process can include direct coupling of the gear 24 to the shaft 12 or coupling of a collar 32 to the shaft 12 and coupling of the gear 24 to the collar 32. Moreover, as each of the gear 24 and collar 32 can include sections, step 46 can be performed on an existing shaft 12 of a vessel without removal or disconnection of the shaft 12.

[0037] In step 48, the enclosure can be installed. Step 48 may include the one or more friction reducing elements 34 being coupled to the shaft 12. As previously discussed, this process can include direct coupling of the one or more friction reducing elements 34 to the shaft 12 or coupling of the one or more friction reducing elements 34 to a collar 32 to the shaft 12. Step 48 can also include coupling of the one or more friction reducing elements 34 to the split gearbox 14, namely the upper portion 18 and lower portion 20 of the split gearbox 14. Step 48 can also include coupling the upper portion 18 and the lower portion 20 to one another to form an enclosure as the split gearbox 14. As each of the one or more friction reducing elements 34 and the split gearbox 14 can include sections, step 48 can be performed on an existing shaft 12 of a vessel without removal or disconnection of the shaft 12.

[0038] Step 50 can similarly be performed by coupling the drive source 16 to the split gearbox 14 and/or to a mount. The drive source 16 placement can be adjusted to ensure engagement between the motor gear 30 and the gear 24 (or the gear 26, if it is utilized). Thereafter, in operation, rotation of the drive source(s) 16 results in rotation of the shaft 12 and vice-versa. Moreover, step 50 can be performed without removal or disconnection of the shaft 12.

[0039] This written description uses examples to disclose the above description to enable any person skilled in the art to practice the disclosure, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the disclosure is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal

language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims. Accordingly, while the above disclosed embodiments may be susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and have been described in detail herein. However, it should be understood that the embodiments are not intended to be limited to the particular forms disclosed. Rather, the disclosed embodiment are to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the embodiments as defined by the following appended claims.

[0040] While only certain features have been illustrated and described herein, many modifications and changes will occur to those skilled in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the disclosure.

[0041] The techniques presented and claimed herein are referenced and applied to material objects and concrete examples of a practical nature that demonstrably improve the present technical field and, as such, are not abstract, intangible or purely theoretical. Further, if any claims appended to the end of this specification contain one or more elements designated as “means for (perform)ing (a function)...” or “step for (perform)ing (a function)...”, it is intended that such elements are to be interpreted under 35 U.S.C. 112(f). However, for any claims containing elements designated in any other manner, it is intended that such elements are not to be interpreted under 35 U.S.C. 112(f).

CLAIMS

What is claimed is:

1. A system, comprising:
 - an enclosure housing a gear, wherein the gear comprises at least two first sections, wherein the at least two first sections are configured to be directly coupled to one another and disposed circumferentially about a shaft of a vessel;
 - one or more friction reducing elements comprising at least two second sections and coupled to the enclosure, wherein the at least two second sections are configured to be directly coupled to one another to form an inner surface through which the shaft passes, wherein the inner surface when in operation contacts the shaft;
 - and
 - a drive source configured to be coupled to the gear, wherein the drive source when in a first mode of operation provides rotation to the gear to impart to the shaft.
2. The system of claim 1, comprising a first split collar section coupled to a second split collar section to form at least a portion of a collar.
3. The system of claim 2, wherein the collar is configured to directly couple the collar to the shaft.
4. The system of claim 3, wherein the first split collar section is configured to be directly coupled to a first gear section of the at least two first sections and the second split collar section is configured to be directly coupled to a second gear section of the at least two first sections.
5. The system of claim 1, wherein the drive source comprises a motor gear configured to interface with the gear to provide the rotation to the gear.
6. The system of claim 5, wherein the enclosure houses a second gear configured to directly contact the motor gear and directly contact the gear to transfer rotation from the motor gear to the gear.

7. The system of claim 1, wherein a first friction reducing element of the one or more first friction reducing elements is disposed on a first side of the enclosure and a second friction reducing element of the one or more first friction reducing elements is disposed on a second side of the enclosure opposite the first side of the enclosure.

8. The system of claim 7, wherein the enclosure comprises at least two third sections.

9. The system of claim 8, wherein a first friction reducing element section of the friction reducing elements is coupled to a first enclosure section of the at least two third sections and a second friction reducing element section of the friction reducing elements is coupled to a second enclosure section of the at least two third sections.

10. The system of claim 9, comprising a fastener configured to directly couple the first friction reducing element section of the first friction reducing element to the second friction reducing element section of the of the first friction reducing element.

11. A device, comprising:
a first gear segment;
a second gear segment, wherein the first gear segment and the second gear segment are configured to be directly coupled together circumferentially about a shaft, wherein the first gear segment and the second gear segment when directly coupled together form at least a portion of a gear circumferentially disposed about the shaft;
a first housing segment; and
a second housing segment, wherein the first housing segment and the second housing segment are configured to be directly coupled together to enclose the gear and at least a portion of the shaft.

12. The device of claim 11, wherein the first housing segment and the second housing segment comprise an enclosure surrounding the gear.

13. The device of claim 12, wherein the enclosure comprises a fluidly sealed enclosure configured to house at least one lubricant.

14. The device of claim 12, comprising a mount configured to couple the enclosure to a vessel.
15. The device of claim 11, comprising a second gear coupled to the gear as at least a portion of a gear train.
16. The device of claim 15, wherein the first housing segment and the second housing segment additionally enclose the second gear.
17. A method, comprising:
disposing a first gear segment about a shaft;
disposing a second gear segment about the shaft;
directly coupling the first gear segment and the second gear segment together circumferentially about the shaft to form at least a portion of a gear circumferentially disposed about the shaft;
disposing a first housing segment about the shaft;
disposing a second housing segment about the shaft; and
directly coupling the first housing segment and the second housing segment together circumferentially about the shaft to form a housing circumferentially disposed about the gear and about at least a portion of the shaft.
18. The method of claim 17, comprising:
directly coupling the first gear segment to the shaft; and
directly coupling the second gear segment to the shaft.
19. The method of claim 17, comprising:
disposing a first collar section about the shaft; and
disposing a second collar section about the shaft.
20. The method of claim 19, comprising:
directly coupling the first gear segment to the first collar section; and
directly coupling the first gear segment to the first collar section.