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(54) **ATTACHMENT STRUCTURE FOR MARINE VESSEL**

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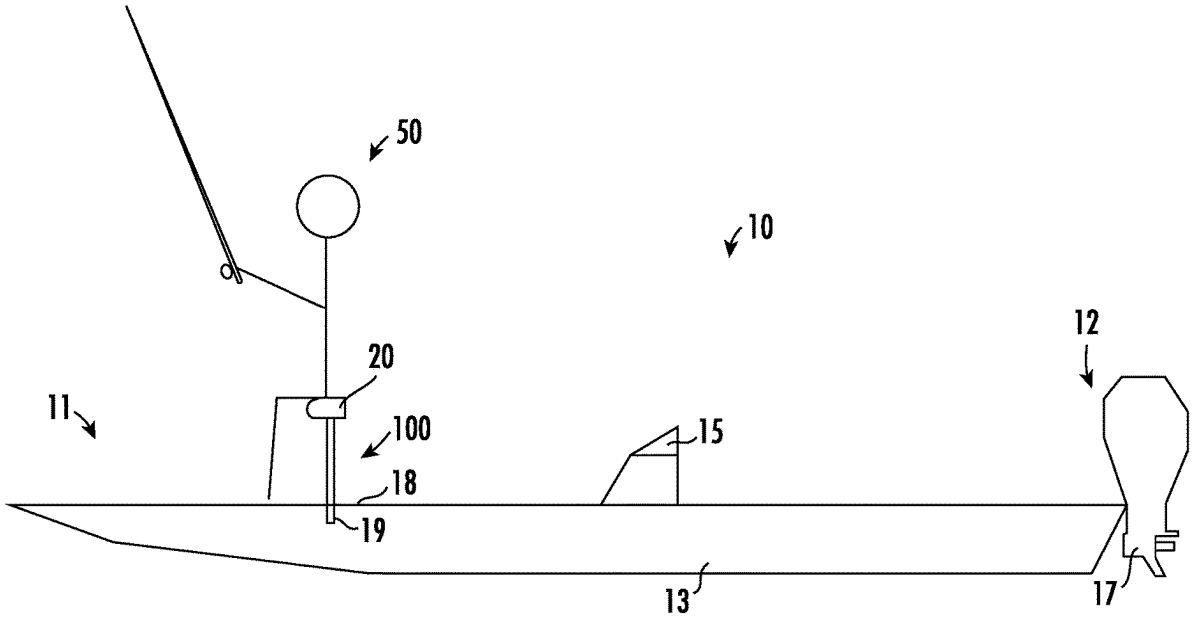
(57) **ABSTRACT**

An attachment structure for an auxiliary component for a marine vessel includes a first structure configured to be attached to an attachment portion of the marine vessel, an elastic structure, and a second structure connected to the first structure via the elastic structure so as to allow axial movement of the first structure with respect to the second structure.



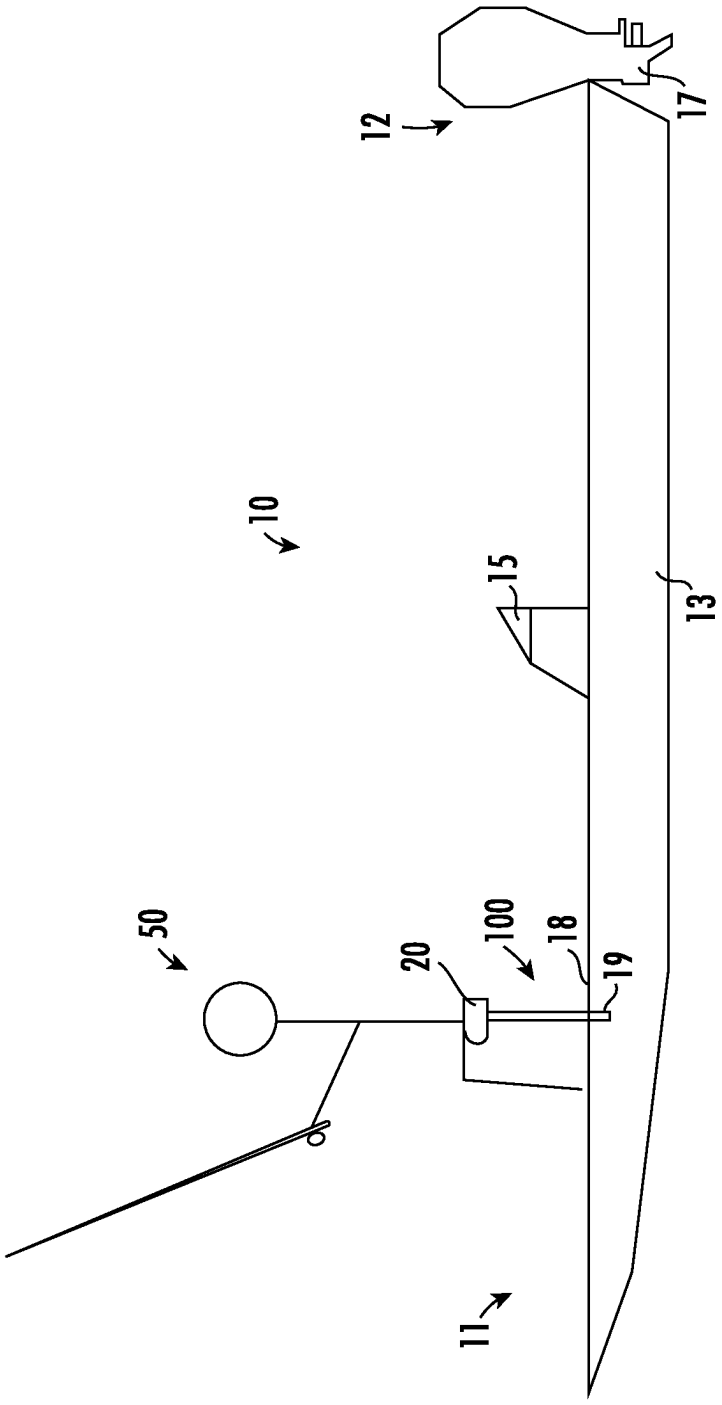


FIG. 1

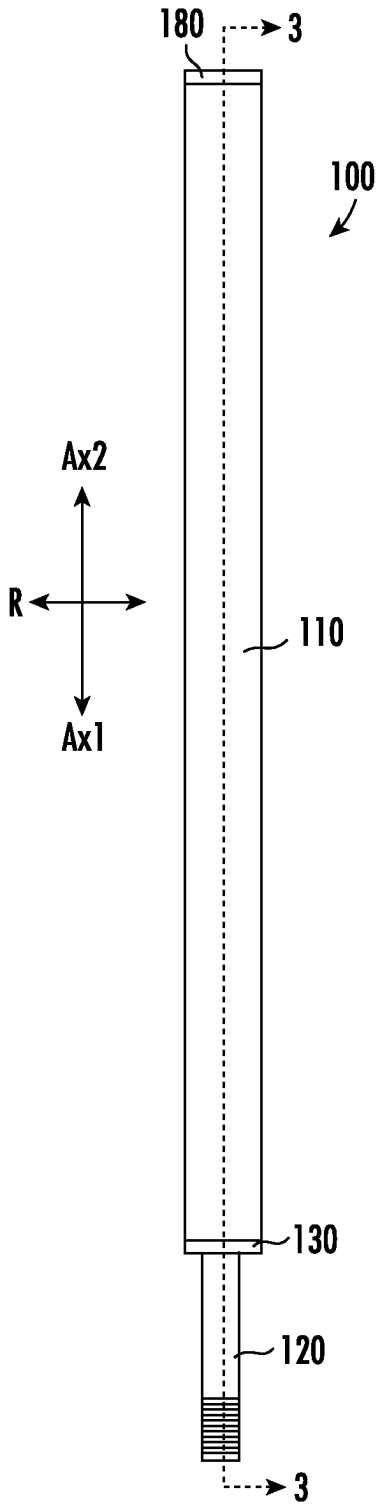

180
3
100
Ax2
R
Ax1
110
130
120
3

FIG. 2

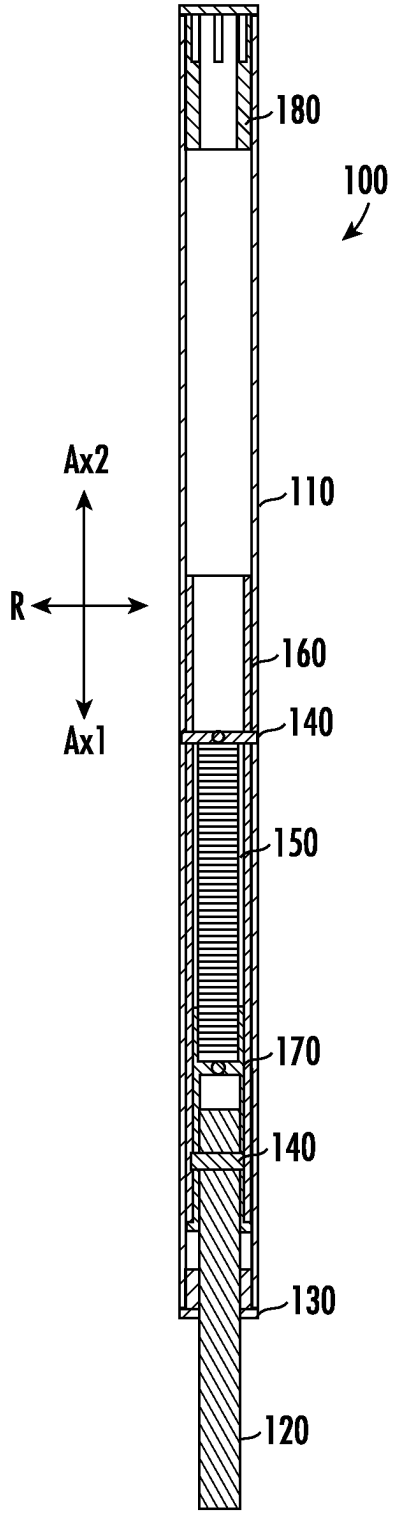

180
100
Ax2
R
Ax1
110
160
140
150
170
140
130
120

FIG. 3

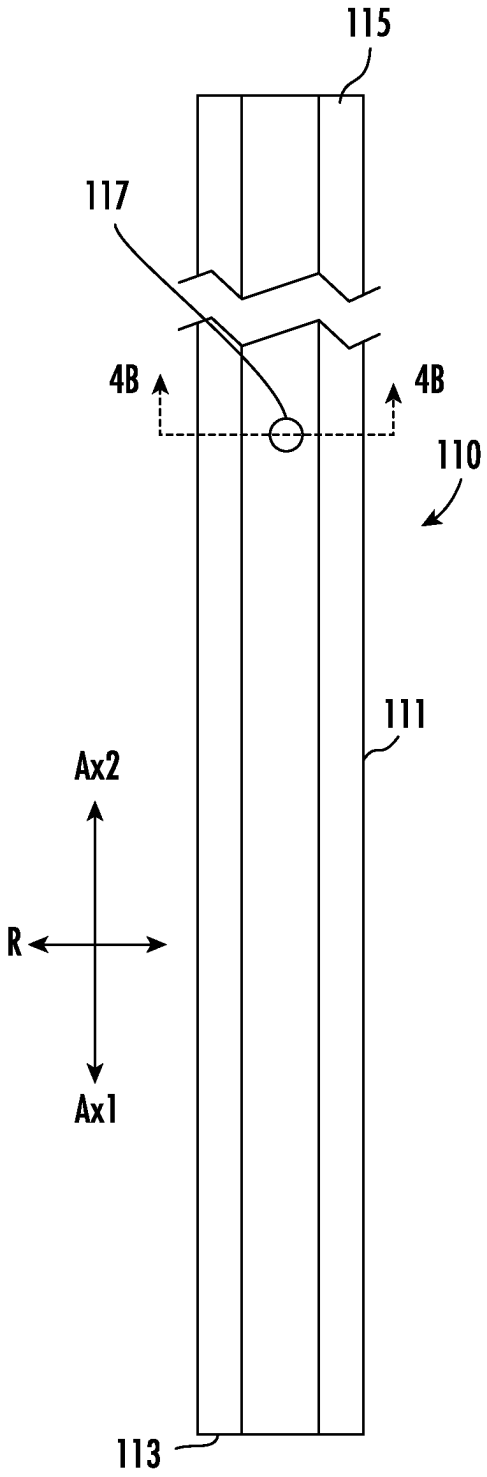


FIG. 4A

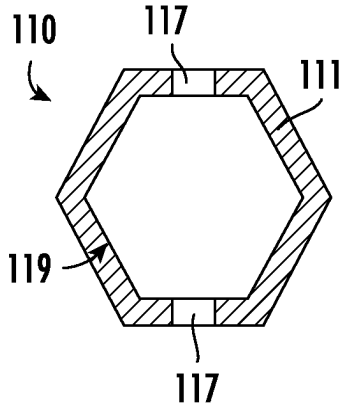


FIG. 4B

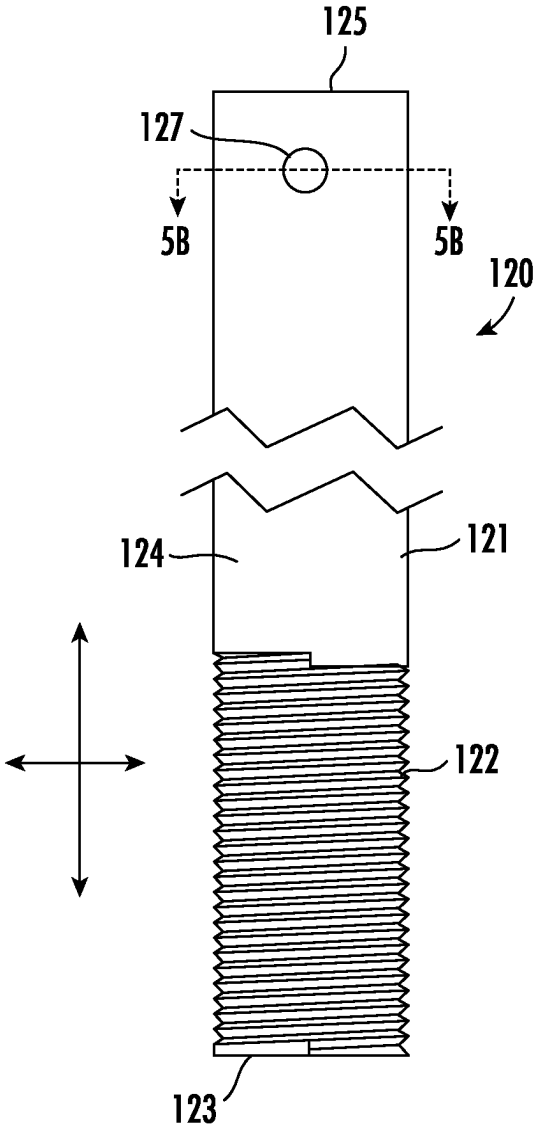


FIG. 5A

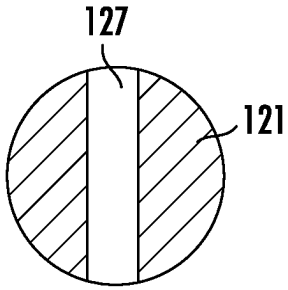


FIG. 5B

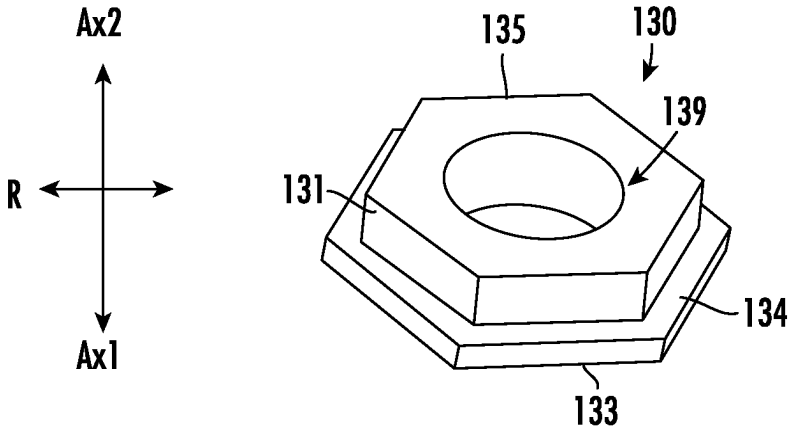


FIG. 6

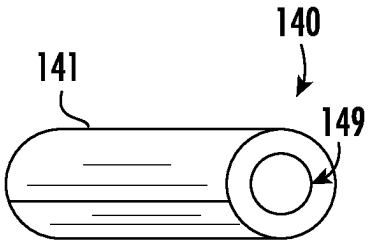


FIG. 7

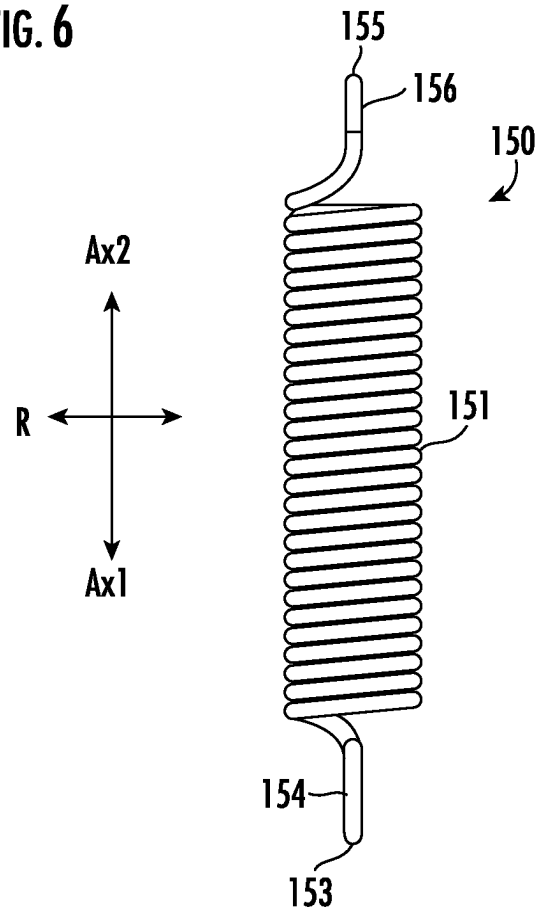


FIG. 8

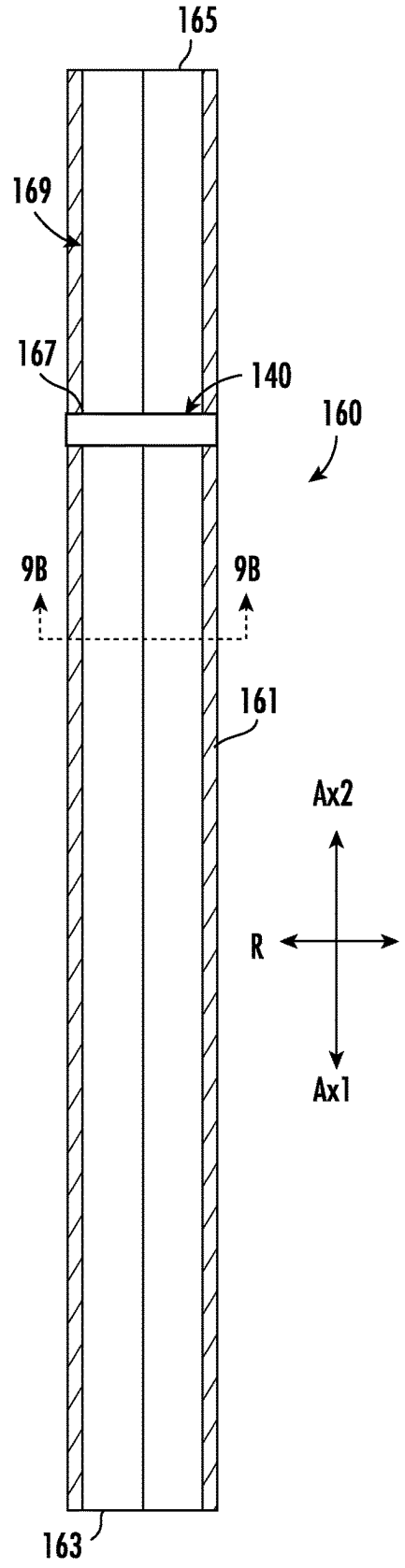


FIG. 9A

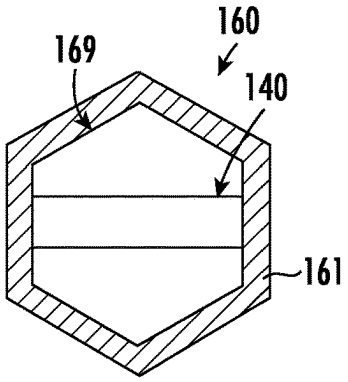


FIG. 9B

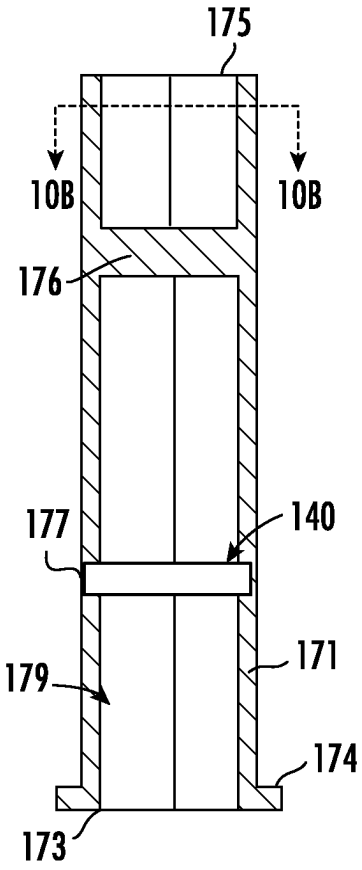
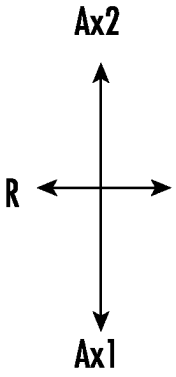


FIG. 10A



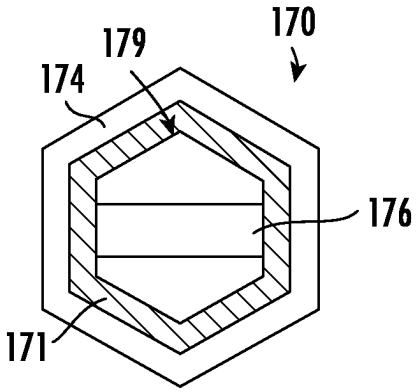


FIG. 10B

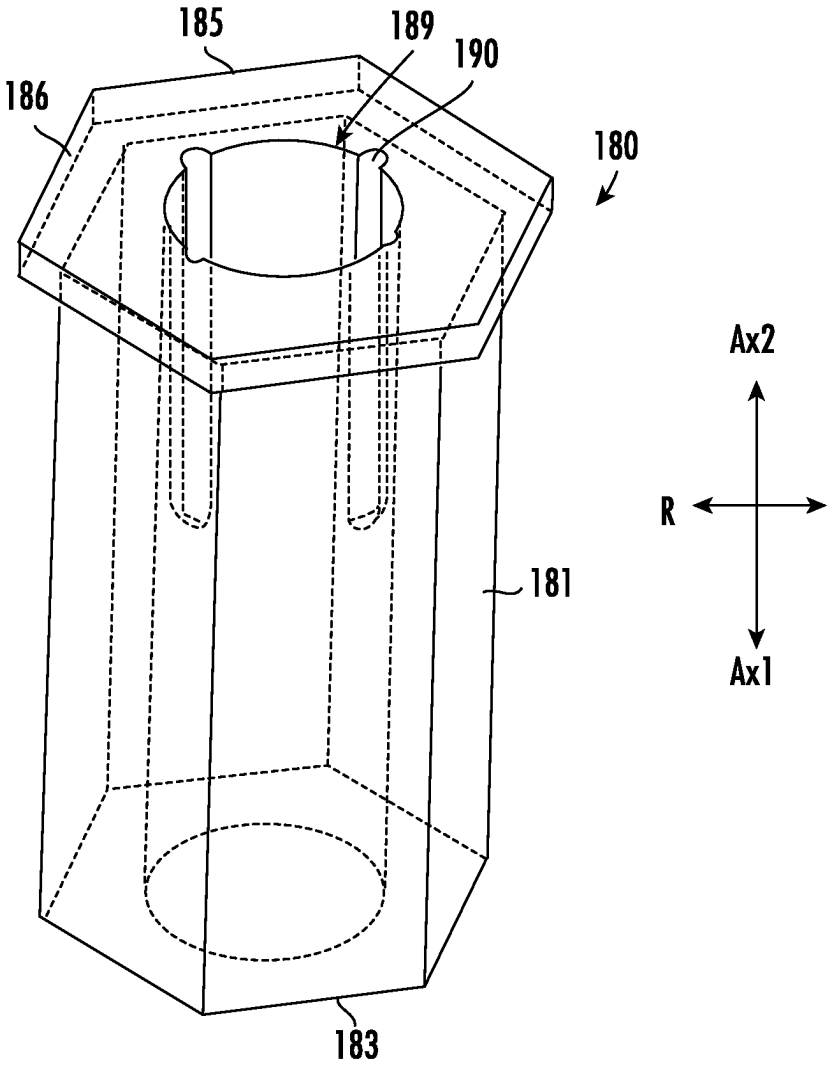


FIG. 11

ATTACHMENT STRUCTURE FOR MARINE VESSEL

BACKGROUND

[0001] The present disclosure relates to marine vessels and, more particularly, to an attachment structure for auxiliary components for a marine vessel.

[0002] Marine vessels, such as boats, include integral structures. Marine vessels may also have auxiliary components that are attached thereto. An improvement in the attachment structure for the auxiliary components may be desirable.

SUMMARY

[0003] In accordance with a non-limiting example, an attachment structure for an auxiliary component for a marine vessel comprises a first structure configured to be attached to an attachment portion of the marine vessel, an elastic structure, and a second structure connected to the first structure via the elastic structure so as to allow axial movement of the first structure with respect to the second structure.

[0004] In addition to one or more of the features described herein, the elastic structure is a tension spring.

[0005] In addition to one or more of the features described herein, the first structure comprises an inner sleeve, the second structure comprises an outer sleeve, the inner sleeve is positioned at least partially within the outer sleeve, and the elastic structure is positioned at least partially within the inner sleeve.

[0006] In addition to one or more of the features described herein, the first structure further comprises a rod fixed to the inner sleeve, and the rod is configured to be directly attached to the attachment portion of the marine vessel.

[0007] In addition to one or more of the features described herein, the rod comprises a threaded portion configured to engage with threading within the attachment portion of the marine vessel to attach the attachment structure to the marine vessel.

[0008] In addition to one or more of the features described herein, the second structure further comprises a housing fixed to the outer sleeve, and the outer sleeve and the inner sleeve are disposed within the housing.

[0009] In addition to one or more of the features described herein, the second structure further comprises an end cap fixed to the housing, and the end cap includes a bore configured to receive the auxiliary component.

[0010] In addition to one or more of the features described herein, the bore includes at least one guide groove configured to restrict rotation of the auxiliary component.

[0011] In addition to one or more of the features described herein, the second structure is configured to receive the auxiliary component.

[0012] In addition to one or more of the features described herein, the housing is fixed to the outer sleeve via a fastener, the inner sleeve comprises a bridge portion on which a first attachment portion of the elastic structure is attached, and a second attachment portion of the elastic structure is attached to the fastener.

[0013] In addition to one or more of the features described herein, the elastic structure is a tension spring that biases the inner sleeve towards the outer sleeve in an axial direction.

[0014] In addition to one or more of the features described herein, the inner sleeve comprises a flange that abuts an axial end of the outer sleeve to limit movement of the inner sleeve with respect to the outer sleeve in the axial direction.

[0015] In addition to one or more of the features described herein, the second structure is not rotatable with respect to the first structure.

[0016] In addition to one or more of the features described herein, the outer sleeve is not rotatable with respect to the inner sleeve.

[0017] In addition to one or more of the features described herein, the inner sleeve and a bore within the outer sleeve have a hexagonal cross-sectional shape.

[0018] In addition to one or more of the features described herein, the inner sleeve comprises a bridge portion, the elastic structure is attached to the bridge portion, at least a portion of the rod is positioned within the inner sleeve in a first axial direction of the bridge portion, and at least a portion of the elastic structure is disposed within the inner sleeve in a second axial direction of the bridge portion.

[0019] In addition to one or more of the features described herein, wherein the inner sleeve, the outer sleeve, and the housing are positioned radially around the elastic structure.

[0020] In addition to one or more of the features described herein, when the first structure is inserted within the attachment structure of the marine vessel, a portion of the first structure attached to a first attachment portion of the elastic structure moves away in an axial direction from a portion of the second structure attached to a second attachment portion of the elastic structure such that the elastic structure biases the first structure towards the second structure.

[0021] In accordance with a non-limiting example, an attachment structure for an auxiliary component for a marine vessel, the attachment structure defining a first axial direction and a second axial direction and comprises a housing, an end cap disposed on a terminal end of the housing in the second axial direction and having a bore configured to accept the auxiliary component, an outer sleeve disposed at least partially within the housing and fixed to the housing via a first fastener, an inner sleeve disposed at least partially within the outer sleeve and comprising a bridge portion, an elastic structure having a first attachment portion attached to the bridge portion and a second attachment portion attached to the first fastener so as to allow axial movement of the first structure with respect to the second structure, and a rod disposed at least partially within the inner sleeve and fixed to the inner sleeve via a second fastener. The attachment structure is configured such that, when the rod is inserted into an attachment portion of the marine vessel, the inner sleeve is moved in the first axial direction with respect to the outer sleeve, thereby generating a biasing force in the elastic structure that pulls the inner sleeve towards the outer sleeve.

[0022] In accordance with a non-limiting example, a marine vessel comprises the attachment structure, a hull comprising the attachment portion, and the auxiliary component attached to the attachment structure.

[0023] The above features and advantages, and other features and advantages of the disclosure are readily apparent from the following detailed description when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. **1** shows a schematic diagram of a marine vessel with an attachment structure according to one or more embodiments;

[0025] FIG. **2** shows a side view of an attachment structure for a marine vessel according to one or more embodiments;

[0026] FIG. **3** shows a cross-sectional view of the attachment structure taken at **3**-**3** in FIG. **2**.

[0027] FIG. **4**A shows a housing according to one or more embodiments;

[0028] FIG. **4**B shows a cross-sectional view of the housing taken at **4**B-**4**B in FIG. **4**A;

[0029] FIG. **5**A shows a rod according to one or more embodiments;

[0030] FIG. **5**B shows a cross-sectional view of the rod taken at **5**B-**5**B in FIG. **5**A;

[0031] FIG. **6** shows a first end cap according to one or more embodiments;

[0032] FIG. **7** shows a fastener according to one or more embodiments;

[0033] FIG. **8** shows an elastic structure according to one or more embodiments;

[0034] FIG. **9**A shows an outer sleeve according to one or more embodiments;

[0035] FIG. **9**B shows a cross-sectional view of the outer sleeve taken at **9**B-**9**B in FIG. **9**A;

[0036] FIG. **10**A shows an inner sleeve according to one or more embodiments;

[0037] FIG. **10**B shows a cross-sectional view of the inner sleeve taken at **10**B-**10**B in FIG. **10**A; and

[0038] FIG. **11** shows a second end cap according to one or more embodiments.

DETAILED DESCRIPTION

[0039] The following description is merely exemplary in nature and is not intended to limit the present disclosure, its application or uses. It should be understood that throughout the drawings, corresponding reference numerals indicate like or corresponding parts and features.

[0040] A marine vessel **10** having an attachment structure **100** according to a non-limiting example is shown in FIG. **1**. The marine vessel **10** may be, according to a non-limiting example, a motor boat. The marine vessel **10** may include a hull **13**, and a prime mover **17** may be disposed at a stern **12** of the hull **13**. The prime mover **17** may be, according to a non-limiting example, a motor. A helm **15** may be disposed proximate to a central portion of the hull **13**. The hull **13** may include an upper surface **18** and an attachment portion **19** formed in the upper surface **18** at or near a bow **11** of the hull **13**. The attachment portion **19** may be, for example, a hole with threading. An attachment structure **100** according to one or more embodiments may be attached to the attachment portion **19**. As a non-limiting example, the attachment structure **100** may be inserted into the attachment portion **19**. An auxiliary component **20** may be disposed on the attachment structure **100**. As a non-limiting example, the auxiliary component **20** may be a seat. A user **50**, which may be a helmsman or a passenger, may use the auxiliary component. In the case that the auxiliary component **20** is a seat, the user **50** may sit on the auxiliary component **20**. According to a non-limiting example, the auxiliary component **20** disposed on the attachment structure **100** may function as a pedestal seat.

[0041] An attachment structure **100** according to one or more embodiments is shown in FIG. **2**, and a cross-sectional view of the attachment structure **100** taken at **3**-**3** in FIG. **2** is shown in FIG. **3**. The attachment structure **100** extends along an axis including a first axial direction Ax**1** and a second axial direction Ax**2** and may include a housing **110**, a rod **120**, a first end cap **130**, a plurality of fasteners **140**, an elastic structure **150**, an outer sleeve **160**, an inner sleeve **170**, and a second end cap **180**. The attachment structure **100** further defines radial directions R extend perpendicular to the first axial direction Ax**1** and the second axial direction Ax**2**.

[0042] FIG. **4**A shows the housing **110** according to one or more embodiments, and FIG. **4**B shows a cross-sectional view of the housing **110** taken at **4**B-**4**B in FIG. **4**A. The housing **110** extends along the axis including the first axial direction Ax**1** and the second axial direction Ax**2**. The housing **110** may include a housing body **111** that extends from a first end **113** in the first axial direction Ax**1** to a second end **115** in the second axial direction Ax**2**. The housing body **111** may be hexagonal in shape. Alternatively, the housing body **111** may be cylindrical, or any other shape known in the art. The housing body **111** may define a housing bore **119** extending from the first end **113** to the second end **115**. The housing bore **119** may be hexagonal in shape. Alternatively, the housing bore **119** may be cylindrical, or any other shape known in the art. A housing fastener hole **117** may extend through the housing body **111** in a radial direction R.

[0043] FIG. **5**A shows the rod **120** according to one or more embodiments, and FIG. **5**B shows a cross-sectional view of the rod **120** taken at **5**B-**5**B in FIG. **5**A. The rod **120** extends along the axis including the first axial direction Ax**1** and the second axial direction Ax**2**. The rod **120** may include a rod body **121** that extends from a first end **123** in the first axial direction Ax**1** to a second end **125** in the second axial direction Ax**2**. The rod body **121** may be cylindrical in shape. Alternatively, the rod body **121** may be any other shape known in the art. The rod body **121** may include a threaded portion **122** formed on a part of the rod body **121** at or near the second end **125**, and a non-threaded portion **124**. A rod fastener hole **127** may extend through the rod body **121** in a radial direction R.

[0044] FIG. **6** shows the first end cap **130** according to one or more embodiments. The first end cap **130** may include a first end cap body **131** that extends from a first end **133** in the first axial direction Ax**1** to a second end **135** in the second axial direction Ax**2**, and a first end cap flange **134** extending radially outward from the first end cap body **131** at or near the first end **133**. The first end cap body **131** and/or the first end cap flange **134** may be hexagonal in shape. Alternatively, the first end cap body **131** and/or the first end cap flange **134** may be cylindrical, or any other shape known in the art. The first end cap body **131** may define a first end cap bore **139** extending from the first end **133** to the second end **135**. The first end cap bore **139** may be cylindrical in shape. Alternatively, first end cap bore **139** may be any other shape known in the art.

[0045] FIG. **7** shows the fastener **140** according to one or more embodiments. The fastener **140** may include a fastener body **141** which may be cylindrical. Alternatively, the fastener body **141** may be any other shape known in the art. The fastener body **141** may define a fastener through-hole **143** extending therethrough. Alternatively, the fastener body **141**

may be a solid body with no hole formed therein or a partial hole therein. The fastener **140** may be, for example, a pin, a shaft, or another fastener known in the art.

[0046] FIG. **8** shows an elastic structure **150** according to one or more embodiments. The elastic structure **150** may include a first attachment portion **154** at or near a first end **153** in the first axial direction Ax**1** and a second attachment portion **156** at or near a second end **155** in the second axial direction Ax**2**, and an elastic body **151** extending axially between the first attachment portion **154** and the second attachment portion **156**. According to one or more embodiments, the elastic structure **150** may be a spring, and/or the first and second attachment portions **154**, **156** may be hooks.

[0047] FIG. **9**A shows the outer sleeve **160** according to one or more embodiments, and FIG. **9**B shows a cross-sectional view of the outer sleeve **160** taken at **9**B-**9**B in FIG. **9**A. The outer sleeve **160** extends along the axis including the first axial direction Ax**1** and the second axial direction Ax**2**. The outer sleeve **160** may include an outer sleeve body **161** that extends from a first end **163** in the first axial direction Ax**1** to a second end **165** in the second axial direction Ax**2**. The outer sleeve body **161** may be hexagonal in shape. Alternatively, the outer sleeve body **161** may be cylindrical, or any other shape known in the art. The outer sleeve body **161** may define an outer sleeve bore **169** extending from the first end **163** to the second end **165**. The outer sleeve bore **169** may be hexagonal in shape. Alternatively, the outer sleeve bore **169** may be cylindrical, or any other shape known in the art. An outer sleeve fastener hole **167** may extend through the outer sleeve body **161** in a radial direction R.

[0048] FIG. **10**A shows the inner sleeve **170** according to one or more embodiments, and FIG. **10**B shows a cross-sectional view of the inner sleeve **170** taken at **10**B-**10**B in FIG. **10**A. The inner sleeve **170** extends along the axis including the first axial direction Ax**1** and the second axial direction Ax**2**. The inner sleeve **170** may include an inner sleeve body **171** that extends from a first end **173** in the first axial direction Ax**1** to a second end **175** in the second axial direction Ax**2**. The inner sleeve **170** further includes an inner sleeve flange **174** extending radially outward from the inner sleeve body **171** at or near the first end **173**. The inner sleeve body **171** and/or the inner sleeve flange **174** may be hexagonal in shape. Alternatively, the inner sleeve body **171** and/or the inner sleeve flange **174** may be cylindrical, or any other shape known in the art. The inner sleeve body **171** may define an inner sleeve bore **179** extending from the first end **173** to the second end **175**. The inner sleeve bore **179** may be hexagonal in shape. Alternatively, the inner sleeve bore **179** may be cylindrical, or any other shape known in the art. An inner sleeve fastener hole **177** may extend through the inner sleeve body **171** in a radial direction R. The inner sleeve **170** may further include a bridge portion **176** extending radially between inner walls of the inner sleeve body **171** through the inner sleeve bore **179**. According to one or more embodiments, the bridge portion **176** may be formed integrally with the inner sleeve body **171**. Alternatively, the bridge portion **176** may be formed separately from the inner sleeve body **171** and attached to the inner sleeve body **171** or inserted into holes and/or indentations formed in the inner sleeve body **171**.

[0049] FIG. **11** shows the second end cap **180** according to one or more embodiments. The second end cap **180** may include a second end cap body **181** that extends from a first end **183** in the first axial direction Ax**1** to a second end **185** in the second axial direction Ax**2**, and a second end cap flange **186** extending radially outward from the second end cap body **181** at or near the second end **185**. The second end cap body **181** and/or the second end cap flange **186** may be hexagonal in shape. Alternatively, the second end cap body **181** and/or the second end cap flange **186** may be cylindrical, or any other shape known in the art. The second end cap body **181** may define a second end cap bore **189** extending from the first end **183** to the second end **185**. Alternatively, the second end cap bore **189** may be defined only partially through the second end cap body **181** from the second end **185** partially towards the first end **183**. The second end cap bore **189** may be cylindrical in shape. Alternatively, the second end cap bore **189** may be any other shape known in the art. The second end cap body **181** may further define guide grooves **190** at or near the second end **185**. Each of the guide grooves **190** may be a partial cylinder. Alternatively, the guide grooves **190** may be any other shape known in the art. While FIG. **11** shows four guide grooves **190**, the second end cap body **181** may include any number of guide grooves, including a single guide groove **190**, two guide grooves **190**, three guide grooves **190**, five guide grooves **190**, etc. The guide grooves **190** may be defined only partially through the second end cap body **181** from the second end **185** partially towards the first end **183**. Alternatively, the guide grooves **190** may extend entirely through the second end cap body **181**.

[0050] The attachment structure **100** may be formed by assembling the housing **110**, the rod **120**, the first end cap **130**, the fasteners **140**, the elastic structure **150**, the outer sleeve **160**, the inner sleeve **170**, and the second end cap **180**.

[0051] The elastic structure **150** may be disposed partially within the inner sleeve bore **179** of the inner sleeve **170** on a side of the bridge portion **176** in the second axial direction Ax**2**, and the first attachment portion **154** may be attached to the bridge portion **176**. For example, the first attachment portion **154** may be a hook that is hooked onto the bridge portion **176**. The first attachment portion **154** may be fixed to the bridge portion **176** by welding, adhesives, and/or other fixing methods known in the art. The rod **120** may be disposed partially within the inner sleeve bore **179** of the inner sleeve **170** on a side of the bridge portion **176** in the first axial direction Ax**1** with the rod fastener hole **127** of the rod **120** aligned with the inner sleeve fastener hole **177** of the inner sleeve **170**. One of the fasteners **140** may be inserted through the inner sleeve fastener hole **177** and the rod fastener hole **127**. According to one or more embodiments, the fastener **140** may be fixed to the inner sleeve **170** and/or the rod **120** by welding, adhesives, and/or other fixing methods known in the art. The rod **120** is thus fixed to the inner sleeve **170** via the fastener **140**.

[0052] The inner sleeve **170** may be disposed partially or entirely inside the outer sleeve bore **169** of the outer sleeve **160**. The inner sleeve flange **174** of the inner sleeve **170** may abut the first end **163** of the outer sleeve **160**.

[0053] The outer sleeve **160** may be disposed inside the housing bore **119** of the housing **110** with the outer sleeve fastener hole **167** aligned with the housing fastener hole **117**, and the elastic structure **150** attached to the bridge portion **176** of the inner sleeve **170** via the first attachment portion **154** may be disposed inside the outer sleeve bore **169** of the outer sleeve **160**. One of the fasteners **140** may be inserted through the housing fastener hole **117** and the outer sleeve

fastener hole **167**, and the second attachment portion **156** of the elastic structure **150** may be attached to the fastener **140**. For example, the second attachment portion **156** may be a hook that is hooked onto the fastener **140**. According to one or more embodiments, the fastener **140** may be fixed to the housing **110**, the outer sleeve **160**, and/or the second attachment portion **156** by welding, adhesive, and/or other fixing methods known in the art.

[0054] The inner sleeve **170** may be disposed within the outer sleeve **160** without being fixed thereto. The elastic structure **150** may be tensioned to generate a tension force on the inner sleeve **170** towards the outer sleeve **160** in the second axial direction Ax**2**, and the inner sleeve flange **174** abutting the first end **163** of the outer sleeve **160** may maintain the tension force. Thus, the inner sleeve **170** may be attached to the outer sleeve **160** along the axis including the first axial direction Ax**1** and the second axial direction Ax**2** via the elastic structure **150**, while the elastic structure **150** may allow limited axial movement of the inner sleeve **170** with respect to the outer sleeve **160**.

[0055] The first end cap **130** may be disposed partially or entirely within the housing bore **119** of the housing **110** at the first end **113**, with the rod **120** being disposed within the first end cap bore **139** of the first end cap **130**. The first end cap flange **134** may abut the first end **113** of the housing **110**.

[0056] The second end cap **180** may be disposed partially or entirely within the housing bore **119** of the housing **110** at the second end **115**. The second end cap flange **186** may abut the second end **115** of the housing **110**.

[0057] Referring to FIG. **1**, the attachment structure **100** may be attached to the attachment portion **19** formed in the bow **11** of the hull **13**. The attachment portion **19** may be, for example, a hole with threading. As a non-limiting example, the attachment structure **100** may be inserted into the attachment portion **19**, with the threaded portion **122** of the rod **120** being threaded onto the threading in the attachment portion **19**. The auxiliary component **20** may be disposed on the attachment structure **100**. The auxiliary component **20** may include a shaft portion (not shown) corresponding to the second end cap bore **189** such that the shaft portion may be inserted into the second end cap bore **189**. The shaft portion may include radial protrusions (not shown) corresponding to the guide grooves **190** such that the radial protrusions may fit into the guide grooves **190** as the shaft portion is inserted into the second end cap bore **189**. The guide grooves **190** may function to control the depth of insertion of the auxiliary component **20** within the attachment structure **100**. Furthermore, the guide grooves **190** may prevent rotation of the auxiliary component **20** with respect to the attachment structure **100** about the axis including the first axial direction Ax**1** and the second axial direction Ax**2**. According to one or more embodiments, the guide grooves **190** may also function as keying features.

[0058] As described above, the housing bore **119**, the second end cap body **181**, the outer sleeve body **161**, the outer sleeve bore **169**, and the inner sleeve body **171** may be hexagonal such that the second end cap body **181** and the outer sleeve body **161** cannot rotate within the housing bore **119** about the axis including the first axial direction Ax**1** and the second axial direction Ax**2** and the inner sleeve body **171** cannot rotate within the outer sleeve bore **169**. The rotation may still be prevented if, instead of hexagonal, the housing bore **119** and the outer sleeve body **161**, the outer sleeve bore **169**, and the inner sleeve body **171** are other polygonal shapes including triangular, rectangular/square, pentagon, heptagon, etc.

[0059] A rigid attachment structure threaded into the attachment portion **19** of the marine vessel **10** and on which the auxiliary component **20** is disposed may translate vibrational forces from the auxiliary component **20** directly to the threaded portion of the rigid attachment structure. Furthermore, there may be some tolerance between the threaded portion of the rigid attachment structure and the threading in the attachment portion **19**. The vibrational forces may move the threads of the threaded portion of the rigid attachment structure within the tolerance and may loosen the threaded portion of the rigid attachment structure from the attachment portion **19**. Thus, the rigid attachment structure may eventually become detached from the attachment portion **19**. The rigid attachment structure may thereby unintentionally be removed from the attachment portion **19** during use of the auxiliary component **20**. For example, if the auxiliary component **20** is a seat, the user **50** may sit on the seat, and vibrations being translated to the threaded portion may eventually remove the rigid attachment structure from the attachment portion **19**. Such unintentional removal may result in injury to the user **50**.

[0060] When the attachment structure **100** according to one or more embodiments is being attached to the attachment portion **19** of the marine vessel **10**, the rod **120** may be inserted into the attachment portion **19** in the first axial direction Ax**1**. Once a portion of the rod **120** outside of the housing **110** is fully inserted into the attachment portion **19**, the first end cap **130** may abut the upper surface **18** of the hull **13** of the marine vessel **10**. As described above, the elastic structure **150** connecting the outer sleeve **160** and the inner sleeve **170** allows for limited axial movement between the outer sleeve **160** and the inner sleeve **170**. Thus, after the first end cap **130** abuts the upper surface **18**, the elastic structure **150** allows the rod **120** to be further inserted into the attachment portion **19** in the first axial direction Ax**1**. As the rod **120** is fixed to the inner sleeve **170** via the fastener **140**, the inner sleeve **170** moves toward the first axial direction Ax**1** while the first end cap **130** pushes against the upper surface **18** to keep the housing **110** and the outer sleeve **160** stationary. Thus, the first end **153** of the elastic structure **150** is pulled in the first axial direction Ax**1** by the inner sleeve **170** while the second end **155** of the elastic structure **150** remains in place. This relative movement of the inner sleeve **170** in the first axial direction Ax**1** with respect to the outer sleeve **160** resulting from the insertion of the rod **120** into the attachment portion **19** thus creates a tension force pulling the inner sleeve **170** in the second axial direction Ax**2** towards the outer sleeve **160**. This tension force is translated to the rod **120** and the threaded portion **122** thereof via the fastener **140**. This tension force in turn keeps surfaces of threads of the threaded portion **122** facing the second axial direction Ax**2** in contact with surfaces of the threads of the attachment portion **19** facing the first axial direction Ax**1**. That is, the threads of the threaded portion **122** may not move within the threads of the attachment portion **19** when the rod **120** and/or the attachment portion **19** vibrate, reducing or eliminating the occurrence of the threaded portion **122** becoming loose from the attachment portion **19** due to vibrations.

[0061] Furthermore, the first end cap **130** maintains a force against the upper surface **18** due to the tension force of

the elastic structure **150** such that the attachment structure **100** is less likely to experience vibrational movement with respect to the attachment portion **19**.

[0062] While the first end cap **130** abutting the upper surface **18** is described above, according to one or more embodiments, the first end cap **130** may be omitted such that a terminal end of the housing **110** in the first axial direction Ax**1** abuts the upper surface **18**.

[0063] This limited axial movement may absorb and/or dampen the vibrations between the auxiliary component **20** inserted into the second end cap **180** and the rod **120** inserted into the attachment portion **19** of the marine vessel. The limited axial movement may reduce or prevent the occurrence of the unintentional removal of the attachment structure **100** from the attachment portion **19** due to vibrations.

[0064] The attachment structure **100** may be formed of a first structure and a second structure that are connected by the elastic structure **150** so as to allow limited axial movement between the first and second structures. As a non-limiting example, the first structure may be an assembly that includes the rod **120**, the inner sleeve **170**, and the fastener **140** fixing the rod **120** to the inner sleeve **170**. As a non-limiting example, the second structure may be an assembly that includes the outer sleeve **160**, the housing **110**, the fastener **140** fixing the outer sleeve **160** to the housing **110**, the first end cap **130**, and the second end cap **180**.

[0065] The terms "a" and "an" do not denote a limitation of quantity, but rather denote the presence of at least one of the referenced items. The term "or" means "and/or" unless clearly indicated otherwise by context. Reference throughout the specification to "an aspect", means that a particular element (e.g., feature, structure, step, or characteristic) described in connection with the aspect is included in at least one aspect described herein, and may or may not be present in other aspects. In addition, it is to be understood that the described elements may be combined in any suitable manner in the various aspects.

[0066] When an element such as a layer, film, region, or substrate is referred to as being "on" another element, it can be directly on the other element or intervening elements may also be present. In contrast, when an element is referred to as being "directly on" another element, there are no intervening elements present.

[0067] Unless specified to the contrary herein, all test standards are the most recent standard in effect as of the filing date of this application, or, if priority is claimed, the filing date of the earliest priority application in which the test standard appears.

[0068] Unless defined otherwise, technical, and scientific terms used herein have the same meaning as is commonly understood by one of skill in the art to which this disclosure belongs.

[0069] While the above disclosure has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from its scope. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the disclosure without departing from the essential scope thereof. Therefore, it is intended that the present disclosure not be limited to the particular embodiments disclosed, but will include all embodiments falling within the scope thereof.

What is claimed is:

1. An attachment structure for an auxiliary component for a marine vessel, comprising:
- a first structure configured to be attached to an attachment portion of the marine vessel;
- an elastic structure; and
- a second structure connected to the first structure via the elastic structure so as to allow axial movement of the first structure with respect to the second structure.

2. The attachment structure of claim **1**, wherein the elastic structure is a tension spring.

3. The attachment structure of claim **1**,
- wherein the first structure comprises an inner sleeve,
- wherein the second structure comprises an outer sleeve,
- wherein the inner sleeve is positioned at least partially within the outer sleeve, and
- wherein the elastic structure is positioned at least partially within the inner sleeve.

4. The attachment structure of claim **3**,
- wherein the first structure further comprises a rod fixed to the inner sleeve, and
- wherein the rod is configured to be directly attached to the attachment portion of the marine vessel.

5. The attachment structure of claim **4**, wherein the rod comprises a threaded portion configured to engage with threading within the attachment portion of the marine vessel to attach the attachment structure to the marine vessel.

6. The attachment structure of claim **3**,
- wherein the second structure further comprises a housing fixed to the outer sleeve, and
- wherein the outer sleeve and the inner sleeve are disposed within the housing.

7. The attachment structure of claim **6**,
- wherein the second structure further comprises an end cap fixed to the housing, and
- wherein the end cap includes a bore configured to receive the auxiliary component.

8. The attachment structure of claim **7**, wherein the bore includes at least one guide groove configured to restrict rotation of the auxiliary component.

9. The attachment structure of claim **1**, wherein the second structure is configured to receive the auxiliary component.

10. The attachment structure of claim **6**,
- wherein the housing is fixed to the outer sleeve via a fastener,
- wherein the inner sleeve comprises a bridge portion on which a first attachment portion of the elastic structure is attached, and
- wherein a second attachment portion of the elastic structure is attached to the fastener.

11. The attachment structure of claim **3**, wherein the elastic structure is a tension spring that biases the inner sleeve towards the outer sleeve in an axial direction.

12. The attachment structure of claim **11**, wherein the inner sleeve comprises a flange that abuts an axial end of the outer sleeve to limit movement of the inner sleeve with respect to the outer sleeve in the axial direction.

13. The attachment structure of claim **1**, wherein the second structure is not rotatable with respect to the first structure.

14. The attachment structure of claim **3**, wherein the outer sleeve is not rotatable with respect to the inner sleeve.

15. The attachment structure of claim **14**, wherein the inner sleeve and a bore within the outer sleeve have a hexagonal cross-sectional shape.

16. The attachment structure of claim **4**,

wherein the inner sleeve comprises a bridge portion,

wherein the elastic structure is attached to the bridge portion,

wherein at least a portion of the rod is positioned within the inner sleeve in a first axial direction of the bridge portion, and

wherein at least a portion of the elastic structure is disposed within the inner sleeve in a second axial direction of the bridge portion.

17. The attachment structure of claim **6**, wherein the inner sleeve, the outer sleeve, and the housing are positioned radially around the elastic structure.

18. The attachment structure of claim **1**, wherein, when the first structure is inserted within the attachment structure of the marine vessel, a portion of the first structure attached to a first attachment portion of the elastic structure moves away in an axial direction from a portion of the second structure attached to a second attachment portion of the elastic structure such that the elastic structure biases the first structure towards the second structure.

19. An attachment structure for an auxiliary component for a marine vessel, the attachment structure defining a first axial direction and a second axial direction and comprising:

a housing;

an end cap disposed on a terminal end of the housing in the second axial direction and having a bore configured to accept the auxiliary component;

an outer sleeve disposed at least partially within the housing and fixed to the housing via a first fastener;

an inner sleeve disposed at least partially within the outer sleeve and comprising a bridge portion;

an elastic structure having a first attachment portion attached to the bridge portion and a second attachment portion attached to the first fastener so as to allow axial movement of the first structure with respect to the second structure; and

a rod disposed at least partially within the inner sleeve and fixed to the inner sleeve via a second fastener,

wherein the attachment structure is configured such that, when the rod is inserted into an attachment portion of the marine vessel, the inner sleeve is moved in the first axial direction with respect to the outer sleeve, thereby generating a biasing force in the elastic structure that pulls the inner sleeve towards the outer sleeve.

20. A marine vessel comprising:

the attachment structure of claim **1**;

a hull comprising the attachment portion; and

the auxiliary component attached to the attachment structure.

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