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Marine drives having supporting frame and cowling

Abstract

A marine drive is for propelling a marine vessel. The marine drive has a propulsor configured to generate a thrust force in a body of water; a battery that powers the propulsor; and a supporting frame which supports the marine drive relative to marine vessel. The supporting frame has a monolithic body defining a frame interior, and further has a support leg extending downwardly from the monolithic body and a steering arm extending forwardly from monolithic body. A cowling is fixed to the supporting frame via at least one hidden fastener that extends from the frame interior, through the supporting frame, and into engagement with the cowl body, wherein hidden fastener being accessible during installation.

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Background/Summary

FIELD
(1) The present disclosure relates to marine drives for propelling a marine vessel in water.
BACKGROUND
(2) The following U.S. Patents are incorporated by reference in entirety.
(3) U.S. Pat. No. 9,701,383 discloses a marine propulsion support system having a transom bracket, a swivel bracket, and a mounting bracket. A drive unit is connected to the mounting bracket by a plurality of vibration isolation mounts, which are configured to absorb loads on the drive unit that do not exceed a mount design threshold. A bump stop located between the swivel bracket and the drive unit limits deflection of the drive unit caused by loads that exceed the threshold. An outboard motor includes a transom bracket, a swivel bracket, a cradle, and a drive unit supported between first and second opposite arms of the cradle. First and second vibration isolation mounts connect

the first and second cradle arms to the drive unit, respectively. An upper motion-limiting bump stop is located remotely from the vibration isolation mounts and between the swivel bracket and the drive unit.

(4) U.S. Pat. No. 9,963,213 discloses a system for mounting an outboard motor propulsion unit to a marine vessel transom. The propulsion unit's midsection has an upper end supporting an engine system and a lower end carrying a gear housing. The mounting system includes a support cradle having a head section coupled to a transom bracket, an upper structural support section extending aftward from the head section and along opposite port and starboard sides of the midsection, and a lower structural support section suspended from the upper structural support section and situated on the port and starboard sides of the midsection. A pair of upper mounts couples the upper structural support section to the midsection proximate the engine system. A pair of lower mounts couples the lower structural support section to the midsection proximate the gear housing. At least one of the upper and lower structural support sections comprises an extrusion or a casting.

(5) U.S. patent application Ser. No. 17/469,479 discloses a propulsion device for rotating a propulsor to propel a marine vessel. The propulsion device includes a drive housing having a cavity that extends along a first central axis. A motor is positioned within the cavity. The motor rotates a shaft extending along a second central axis that is non-coaxial with the first central axis. The shaft is configured to rotate the propulsor to propel the marine vessel.

(6) U.S. patent application Ser. No. 17/487,116 discloses an outboard motor having a transom clamp bracket configured to be supported on a transom of a marine vessel and a swivel bracket configured to be supported by the transom clamp bracket. A propulsion unit is supported by the swivel bracket, the propulsion unit comprising a head unit, a midsection below the head unit, and a lower unit below the midsection. The head unit, midsection, and lower unit are generally vertically aligned with one another when the outboard motor is in a neutral tilt/trim position. The propulsion unit is detachable from the transom clamp bracket.

(7) U.S. patent application Ser. No. 17/509,739 discloses an apparatus for removably supporting a marine drive on a marine vessel. The apparatus has a transom bracket assembly for mounting to the marine vessel, a steering bracket for coupling the marine drive to the transom bracket assembly so the marine drive is steerable relative to the transom bracket assembly and the marine vessel, and an integrated copilot and locking mechanism configured to retain the steering bracket in a plurality of steering orientations. The mechanism is further configured to lock and alternately unlock the steering bracket relative to the transom bracket assembly such that in a locked position the marine drive is retained on the transom bracket assembly and such that in an unlocked position the marine drive is removable from the transom bracket assembly.

(8) U.S. patent application Ser. No. 17/550,463 discloses a marine drive having a supporting frame for coupling the marine drive to a marine vessel, a gearcase supporting a propulsor for propelling the marine vessel in water, an extension leg disposed between the supporting frame and the gearcase, and an adapter plate between the supporting frame and the extension leg. A tube is in the extension leg. The tube has a lower end which is coupled to the gearcase and upper end which is coupled to the adapter plate by a compression nut threaded onto the tube, wherein threading the compression nut down on the tube compressively engages the compression nut with the adapter plate, which in turn clamps the extension leg between the supporting frame and the gearcase.

(9) U.S. patent application Ser. No. 17/554,540 discloses an outboard motor having a cowling, a gearcase, a midsection located axially between the cowling and the gearcase, a steering arm extending forwardly from the midsection, and an anti-ventilation plate between the midsection and the gearcase. A wing extends laterally from the steering arm. The wing, a lateral side of the cowling, and a lateral side of the gearcase together define a side tripod which supports the outboard motor in a side laydown position. The anti-ventilation plate has a rear edge with laterally outer rear support members, which together with the rear of the cowling form a rear tripod which supports the outboard motor in a rear laydown position.

SUMMARY

(10) This Summary is provided to introduce a selection of concepts that are further described herein below in the Detailed Description. This Summary is not intended to identify key or essential features of the claimed subject matter, nor is it intended to be used as an aid in limiting scope of the claimed subject matter.

(11) In non-limiting examples disclosed herein, a marine drive is for propelling a marine vessel. The marine drive comprises a propulsor configured to generate a thrust force in a body of water, an electric motor which powers the propulsor, a battery having a battery port for outputting battery power, and a supporting frame which supports the marine drive relative to marine vessel, the supporting frame having a frame interior which retains the battery. A cowling is on the supporting frame, the cowling having a first cowl portion and a second cowl portion which is movable relative to the first cowl portion into a closed position enclosing the supporting frame and the battery in a cowling interior and alternately into an open position providing access to the cowling interior enabling insertion and removal of the battery.

(12) In non-limiting examples disclosed herein, the first cowl portion comprises a cowl body disposed on the front, the back, the port side and the starboard side of the supporting frame and the second cowl portion comprises a lid located on the top of the supporting frame. The lid is movable relative to the cowl body into and between the closed position and the open position. The lid comprises a front end that is latched to the supporting frame by a latch and a rear end that is pivotally coupled to the supporting frame by a hinge.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) Examples are described with reference to the following drawing figures. The same numbers are used throughout to reference like features and components.

(2) FIG. **1** is a starboard side perspective view of a marine drive according to the present disclosure.

(3) FIG. **2** is a starboard side exploded view of the marine drive.

(4) FIG. **3** is a starboard side perspective view of a supporting frame for the marine drive.

(5) FIG. **4** is a port side perspective view of the supporting frame.

(6) FIG. **5** is view of the interior of a port side cowl panel for the marine drive.

(7) FIG. **6** is a view of the interior of a starboard side cowl panel for the marine drive.

(8) FIG. **7** is a view of the interior of a rear cowl panel for the marine drive.

(9) FIG. **8** is a view of the interior of a front top cowl panel for the marine drive.

(10) FIG. **9** is a view of the interior of a front bottom cowl panel for the marine drive.

(11) FIG. **10** is starboard side perspective view of a supporting frame of the marine drive, illustrating various accessory components mounted thereon.

(12) FIG. **11** is a port side perspective view of the supporting frame, illustrating various accessory components mounted thereon.

(13) FIG. **12** is a perspective view looking down into a frame interior of the supporting frame.

(14) FIG. **13** is a perspective view of a fuse carrier prior to installation onto the supporting frame.

(15) FIG. **14** is a sectional view of the fuse carrier installed onto the supporting frame.

(16) FIG. **15** is a starboard-side perspective view of the supporting frame having the rear cowl panel and the port side cowl panel mounted thereon.

(17) FIG. **16** is a view of section **16-16**, taken in FIG. **15**.

(18) FIG. **17** is a view of section **17-17**, taken in FIG. **15**.

(19) FIG. **18** is a starboard-side perspective view of the supporting frame having the rear cowl panel, the port side cowl panel, and the starboard side cowl panel mounted thereon.

(20) FIG. **19** is an exploded view of a display screen, an upper front cowl panel and a backing bracket for mounting the display screen to the upper front cowl panel.
(21) FIG. **20** is a partial interior view of the backing bracket, display screen, and upper front cowl panel.
(22) FIG. **21** is an exploded view illustrating the upper front cowl panel and a lower front cowl panel removed from the supporting frame.
(23) FIG. **22** is a front perspective view of the marine drive, illustrating the upper front cowl panel and lower front cowl panel mounted thereon.
(24) FIG. **23** is a view of section **23-23**, taken in FIG. **22**, illustrating a latch in a latched position for closing a lid on the supporting frame, thereby enclosing the frame interior.
(25) FIG. **24** is an interior perspective view of the lid latched to the supporting frame by the latch, and a pedestal for retaining a first embodiment of a motor port cover in a storage position.
(26) FIG. **25** is a view of section **23-23**, taken in FIG. **22**, illustrating the latch in an unlatched position for opening the lid and exposing the frame interior.
(27) FIG. **26** is an interior perspective view of the lid unlatched from the supporting frame.
(28) FIG. **27** is a sectional view illustrating the lid in the closed position, and also illustrating the latch, the motor port cover mounted on the pedestal, and a hinge that pivotably couples the lid to the supporting frame.
(29) FIG. **28** is a view like FIG. **27**, illustrating the lid in the open position.
(30) FIG. **29** a perspective view looking down at the marine drive and illustrating installation of a battery into the frame interior.
(31) FIG. **30** is a sectional view illustrating the battery installed in the frame interior.
(32) FIG. **31** is a partial view of FIG. **30**, illustrating actuation of a latch for removing the battery from the frame interior.
(33) FIG. **32** is a view like FIG. **31**, illustrating the latch unlatched for removal of the battery.
(34) FIG. **33** is a view like FIG. **30**, illustrating the battery being removed from the frame interior.
(35) FIG. **34** is a perspective view of a removal assist mechanism for the battery.
(36) FIG. **35** is a perspective view of the battery removed from the frame interior.
(37) FIG. **36** is a top view of the frame interior, illustrating a motor port for connecting the battery to an electric motor for powering a propulsor on the marine drive.
(38) FIG. **37** is a top view of the frame interior illustrating the motor port cover on the motor port.
(39) FIG. **38** is a side view of a second embodiment of a motor port cover on the motor port for preventing environmental wear or damage of the motor port, the motor port cover illustrated in solid lines on the motor port and illustrated in dashed lines removed from the motor port.
(40) FIG. **39** is a side view of a third embodiment of a motor port cover illustrated on the motor port.
(41) FIG. **40** is a view like FIG. **39**, illustrating the motor port cover removed from the motor port.

DETAILED DISCLOSURE

(42) In the present description, certain terms have been used for brevity, clarity, and understanding. No unnecessary limitations are to be implied therefrom beyond the requirement of the prior art because such terms are used for descriptive purposes only and are intended to be broadly construed. The different apparatuses described herein may be used alone or in combination with other apparatuses. Various equivalents, alternatives and modifications are possible within the scope of the appended claims.
(43) FIGS. **1** and **2** illustrate a marine drive **50** according to the present disclosure. In the illustrated embodiment the marine drive **50** is an outboard motor, however many of the inventive concepts described herein below are not limited for use with outboard motors. In other embodiments the marine drive **50** could be a stern drive, pod drive, inboard/outboard drive and/or the like. In the illustrated example, the marine drive **50** extends from front to rear in a longitudinal direction **52**, from port side to starboard side in a lateral direction **54** that is perpendicular to the longitudinal

direction **52**, and from top to bottom in an axial direction **56** that is perpendicular to the longitudinal direction **52** and perpendicular to the lateral direction **54**. The marine drive **50** has a propulsor **58**, which in the illustrated example includes a propeller **60** configured to generate a thrust force for propelling a marine vessel in the surrounding body water, as is conventional. The type and configuration of the propulsor **58** can vary from what is illustrated and described, and in other examples can include more than one propeller, and/or one or more impellers, and/or the like. In the illustrated example, the propulsor **58** extends from the rear of the gearcase or lower unit **62** of the marine drive **50**, however in other examples the propulsor **58** can extend from the front of the lower unit **62** in a pulling- or tractor-type arrangement. In use, the lower unit **62** remains stationary relative to the rest of the marine drive **50**, however in other examples the lower unit **62** and propulsor **58** could be steerable relative to the rest of the marine drive **50**, for example about an axially extending steering axis. Other configurations are contemplated and are possible within the scope of the present disclosure.

(44) The marine drive **50** has an electric motor **64** located in the lower unit **62** and configured to cause rotation of a propeller shaft supporting the propeller **60**. The type and configuration of the electric motor **64** can vary, and non-limiting examples includes an axial flux motor, a radial flux motor, or a transverse flux motor, such as those produced by Electric Torque Machines of Flagstaff, Arizona (a Graco Company).

(45) The marine drive **50** also has a battery **400**, which will be further described herein below. The battery **400** provides battery power to the electric motor **64** via electrical wires **70** extending into the lower unit **62** via a strut **72**. The battery **400** is further illustrated and described herein below with reference to FIGS. **29**-**36**.

(46) The marine drive **50** is configured to be attached to the marine vessel by a steering arm **76** and a transom bracket **78**. The transom bracket **78** is clamped to the marine vessel in a conventional manner and facilitates steering of the marine drive **50** relative to the marine vessel about a steering axis, and trim of the marine drive **50** relative to the marine vessel about a trim axis. A tiller arm **80** is mounted on the outer end of the steering arm **76** and configured for steering by the operator of the marine drive **50** while situated in the marine vessel.

(47) Referring to FIGS. **2**-**4**, the marine drive **50** has a novel supporting frame **82** for supporting various components of the marine drive **50** and for supporting the entire marine drive **50** relative to the marine vessel. The supporting frame **82** extends from a front to a rear in the longitudinal direction **52**, from port side to starboard side in the lateral direction **54**, and from top to bottom in the axial direction **56**. In a preferred embodiment, the supporting frame **82** is a monolithic component having a monolithic body **84** that defines a frame interior **86** for supporting the noted battery **400**, as will be further explained herein below. The supporting frame **82** further has a support leg **88** which is integrally formed with and extends downwardly from the monolithic body **84**. The support leg **88** is fastened to the strut **72**, as illustrated. The supporting frame **82** also includes a portion of the noted steering arm **76** which is integrally formed with and extends forwardly from the monolithic body **84**. The steering arm **76** is coupled to the transom bracket **78** and the tiller arm **80**.

(48) FIGS. **10** and **11** illustrate the supporting frame **82** during initial stages of an assembly process for the marine drive **50**. As illustrated, the sides, front, rear, and bottom of the monolithic body **84** define a trusswork on which various accessory components of the marine drive **50** are mounted via fasteners, including for example screws, ties, and/or the like. Examples of the accessory components which are mounted to the trusswork include electrical wiring, electrical wiring harnesses, DC converters, printed circuit boards, fuses, and/or various other accessory components for the marine drive **50**. The components illustrated in FIGS. **10** and **11** are typically installed during the initial stages of the assembly process, and particularly prior to mounting of various cowling components, which will be further described herein below. The components can be installed during latter stages of the assembly process.

(49) Referring back to FIGS. **1** and **2**, a cowling **90** is mounted on the supporting frame **82**. The cowling **90** encloses the frame interior **86** and covers various components mounted to the trusswork. The cowling **90** also encloses the battery **400** located in the frame interior **86**. The monolithic body **84** of the supporting frame **82** is itself is located inside of a cowling interior **300** defined by the cowling **90**, as will be further described herein below with reference to FIGS. **29-36**. The type and configuration of the cowling **90** can vary from what is shown and described, and for example can include one or more portions that are mounted to the supporting frame **82**. In general, the cowling **90** includes a first cowl portion consisting of a cowl body **92** on the supporting frame **82** and a second cowl portion consisting of a lid **94** located on the top of the cowl body **92**. The second cowl portion or lid **94** is movable relative to the first cowl portion or cowl body **92** into and between the closed position illustrated in FIG. **1**, and an open position (illustrated in FIG. **28**) exposing and providing access to the frame interior **86** and the cowling interior **300**, as will be further described herein below. In the illustrated embodiment, the cowl body **92** is located on the front, the back, the port side and the starboard side of the supporting frame **82**, and the lid **94** is located on the top of the supporting frame **82**.
(50) Referring to FIGS. **2** and **5-7**, the cowl body **92** includes a plurality of cowl panels, including a port side cowl panel **100** (FIG. **5**), a starboard side cowl panel **102** (FIG. **6**), a rear cowl panel **104** (FIG. **7**), an upper front cowl panel **106** (FIG. **8**), and a lower front cowl panel **108** (FIG. **9**). In other examples, instead of comprising multiple panels, the cowl body **92** could wrap around the supporting frame **82**.
(51) Referring to FIG. **7**, the rear cowl panel **104** is a generally angular, plate-like member having an outer perimeter **110**. Mounting bosses protrude from the interior surface of the rear cowl panel **104**. In particular, port and starboard mounting bosses **112** are located along the top of the rear cowl panel **104** and a center mounting boss **114** is located along the bottom of the rear cowl panel **104**. Each of the mounting bosses **112**, **114** has a through-bore formed therethrough for retaining a fastener inserted from outside of the rear cowl panel **104**, as will be further described herein below. The rear cowl panel **104** also has a locating device **116**, which as will be further explained herein below is for initially locating the rear cowl panel **104** on the supporting frame **82** during installation thereof. The locating device **116** includes a dowel pin **120**, which in the illustrated example is an elongated cross-pin located adjacent the starboard-side mounting boss **112**, along the top side of the rear cowl panel **104**, and protruding outwardly from the interior surface of the rear cowl panel **104**. The rear cowl panel **104** also has an orienting device **118** for subsequently rotationally orienting the rear cowl panel **104** relative to the supporting frame **82** during installation. The orienting device **118** includes an annular protrusion **122** extending around the through-bore in the center mounting boss **114**.
(52) The rear cowl panel **104** is the first of the plurality of cowl panels to be installed on the supporting frame **82**. The locating device **116** and orienting device **118** advantageously facilitate efficient and accurate installation of the rear cowl panel **104** onto the rear of the supporting frame **82**, as follows. Referring to FIGS. **2**, **4**, **7** and **12**, a technician and/or other person brings the rear cowl panel **104** to the rear of the supporting frame **82** (see dash-and-dot lines in FIG. **2**) such that the dowel pin **120** is partially inserted into a dowel hole **124** (which is shown in FIG. **4**) on the rear of the supporting frame **82**. The dowel pin **120** is freely rotatable in the dowel hole **124**, which allows the technician to subsequently rotate the rear cowl panel **104** about the axis defined by the dowel pin **120** until the annular protrusion **122** is aligned with a corresponding countersunk threaded bore **126** (which is shown in FIG. **4**) on the rear of the supporting frame **82**. Once properly aligned, (see FIG. **12**) the technician is able to move the rear cowl panel **104** further towards the rear of the supporting frame **82** such that the dowel pin **120** is fully inserted into the dowel hole **124** and the annular protrusion **122** is fully engaged with the corresponding countersunk threaded bore **126**. This automatically aligns each of the port and starboard mounting bosses **112** with corresponding threaded holes **128** (shown in FIG. **4**) on along the top of the rear of

the supporting frame **82**. Thereafter, fasteners **130** (shown in FIG. **2**) are inserted through the rear cowl panel **104**, via the mounting bosses **112**, **114** and into threaded engagement with the rear of the supporting frame **82**.

(53) Referring now to FIGS. **5** and **6**, the port side cowl panel **100** and the starboard side cowl panels **102** are the next of the plurality of cowl panels to be installed on the supporting frame **82**. The port side cowl panel **100** and the starboard side cowl panel **102** are nearly mirror images of each other with only a few differences. Thus the following description of the nature of an installation of the port side cowl panel **100** for the most part applies to the starboard side cowl panel **102**. Like reference numbers are illustrated in the drawings. The port side cowl panel **100** is a generally flat member having a perimeter **132** extending entirely around the port side cowl panel **100**. An arc-shaped split contour line **134** extends from the top to the bottom through the middle of the port side cowl panel **100**. Various contoured panel sections are located on either side of the arc-shaped split contour line **134**. A plurality of mounting bosses **136** protrude from the upper portion of the interior surface of the port side cowl panel **100**, each having threaded bores formed therein for engagement by a hidden fastener that couples the port side cowl panel **100** to the supporting frame **82**, as will be further described herein below. The port side cowl panel **100** also has a locating device **140**, which as will be further explained herein below is for initially locating the port side cowl panel **100** on side of the supporting frame **82** during installation thereof. The locating device **140** includes a dowel pin **144**, which in the illustrated example is an elongated cross-pin located at the front side of the port side cowl, alongside the perimeter **132** and alongside one of the mounting bosses **136**. The port side cowl panel **100** also has an orienting device **146** for subsequently rotationally orienting the port side cowl panel **100** relative to the supporting frame **82** during installation. The orienting device **146** is a slotted boss **148** which is cylindrically shaped and has an axially-oriented slot **149** formed in its end face. The slotted boss **148** has a bore for receiving a fastener, as will be explained herein below. The slotted boss **148** is located along the lower front of the port side cowl panel **100**, alongside the perimeter **132**.

(54) The locating device **140** and orienting device **146** advantageously facilitate efficient and accurate installation of the port side cowl panel **100** and the starboard side cowl panel **102** onto the port and starboard sides of the supporting frame **82**, as follows. Referring now to FIGS. **15-18**, the technician brings the port side cowl panel **100** to the port side of the supporting frame **82** and partially inserts the dowel pin **144** into a dowel hole **150** on the top of the port side of the supporting frame **82** (see FIGS. **17-18**). The dowel pin **144** is freely rotatable within the dowel hole **150**, which allows the technician to rotate the port side cowl panel **100** relative to the port side of the supporting frame **82** until the slotted boss **148** is aligned with opposed flats **152** on opposite side of a mounting boss **154** located on the lower end of the support leg **88** (see FIGS. **15-16**). An elbow flange **153** (see FIG. **5**) on the forward side of the perimeter **132** facilitates easy alignment via engagement with the front of the supporting frame **82**. Next the technician presses the port side cowl panel **100** further onto the port side of the supporting frame **82** so as to fully insert the dowel pin **144** into the dowel hole **150** and so as to fully engage the slotted boss **148** with the opposed flats **152** on the mounting boss **154**. (See FIG. **15**). This advantageously automatically aligns the various mounting bosses **136** with bores on the supporting frame **82**. Thereafter, referring to FIG. **18**, the technician reaches into the frame interior **86** from the top of the supporting frame **82** and installs fasteners **158** through the bores and into threaded engagement with the mounting bosses **136**. The fasteners **158** are thus advantageously hidden from view exterior of the marine drive **50** and thus are referred to herein as “hidden fasteners”. Next, with continued reference to FIG. **18**, the technician brings the starboard side cowl panel **102** to the starboard side of the supporting frame **82** and partially inserts the dowel pin **144** into a dowel hole **150** on the top of the port side of the supporting frame **82**, and continues installing the starboard side cowl panel **102** by repeating the steps described herein above regarding the port side cowl panel **100**.

(55) Referring to FIGS. **16** and **18**, once the port side cowl panel **100** and the starboard side cowl

panel **102** are fastened to the supporting frame **82** via the hidden fasteners **158**, the technician inserts fasteners **160** through mounting bosses **162** and into engagement with corresponding opposed threaded bores on the upper portion of the support leg **88** and through the slotted boss **148** and into engagement with corresponding opposed threaded bores on the lower portion of the support leg **88**. Referring to FIG. **18**, the technician also inserts two externally visible fasteners **168** through bosses **171** located along the rear of the starboard side cowl panel **102** and into threaded engagement with threaded bores formed in mounting bosses **172** extending from the interior surface of the port side cowl panel **100**, along the rear thereof. Thus, the port side cowl panel **100** and the starboard side cowl panel **102** are fastened together along their rear sides via fasteners **168**.

(56) Referring now to FIGS. **5** and **15**, along the rear side of the cowl body **92**, particularly along the lower portion thereof, the port side cowl panel **100** has a lip **176**, which as illustrated in FIG. **15** overlaps the outer perimeter **110** on the bottom of the rear cowl panel **104** when the port side cowl panel **100** is installed. Installation of the starboard side cowl panel **102** causes its perimeter **132** to overlap the outer perimeter **110** on the bottom of the rear cowl panel **104** and the lip **176** on the port side cowl panel **100**. The perimeter **132** of the port side cowl panel **100** and the starboard side cowl panel **102**, particularly along the upper rear portions thereof, overlap the perimeter edges of the rear cowl panel **104**, particularly along the port and starboard sides thereof. Thus, the rear cowl panel **104** is effectively sandwiched between the perimeter edges of the port and starboard side cowl panels **100**, **102**, along the rear edges thereof. The bottom of the port side cowl panel **100** and the starboard side cowl panel **102** have an inwardly turned lip **180** which is turned inwardly towards the strut **72**.

(57) Next, the upper front cowl panel **106** (see FIG. **8**) and the lower front cowl panel **108** see (FIG. **9**) are installed.

(58) Referring first to FIG. **9**, the lower front cowl panel **108** is an elongated plate-like member having a U-shaped cross section. The lower front cowl panel **108** has an outer perimeter consisting of opposing straight side edges **182**, a U-shaped top edge **184** which defines a space through which the lower half of the steering arm **76** extends when the lower front cowl panel **108** is installed on the supporting frame **82** (see FIG. **22**), and a bottom edge **188** having an inwardly turned lip **190**, which together with the inwardly turned lips **180** on the lower rear sides of the port side cowl panel **100** and the starboard side cowl panel **102** surrounds the strut **71** when these components are fully installed (see FIG. **22**). Referring to FIG. **9**, the lower front cowl panel **108** has four mounting bosses **192**, including port and starboard upper mounting bosses and port and starboard lower mounting bosses. The lower front cowl panel **108** also has a locating device **194**, which as will be further explained herein below is for initially locating the lower front cowl panel **108** on rear of the supporting frame **82** during installation thereof. The locating device **194** includes a dowel pin **196**, which in the illustrated example is an elongated cross-pin located at the top of the lower front cowl panel **108**, adjacent the upper port-side mounting boss, and protruding outwardly from the interior surface of the lower front cowl panel **108**. The lower front cowl panel **108** also has an orienting device **198** for orienting the lower front cowl panel **108** relative to the supporting frame **82** during installation. The orienting device **198** includes another dowel pin **200**, which in the illustrated example is an elongated cross-pin located at the bottom of the lower front cowl panel **108**, between the lower port and starboard mounting bosses and protruding outwardly from the interior surface of the lower front cowl panel **108**.

(59) The locating device **194** and orienting device **198** advantageously facilitate efficient and accurate installation of the lower front cowl panel **108** onto the lower front side of the supporting frame **82**, as follows. Referring to FIGS. **9** and **21**, initially the technician brings the lower front cowl panel **108** to the lower front side of the supporting frame **82** and partially inserts the dowel pin **196** into a dowel hole **202** (shown in FIG. **18**) on the supporting frame **82**. The dowel pin **196** is freely rotatable within the dowel hole **202**, which allows the technician to rotate the lower front cowl panel **108** relative to the lower front side of the supporting frame **82** until the dowel pin **200** is

aligned with an elongated dowel slot **204** (shown in FIG. **18**) on the lower end of the support leg **88**. The elongated nature of the dowel slot **204** provides freedom of movement during this process. Next the technician presses the lower front cowl panel **108** onto the lower front side of the supporting frame **82**, in the direction of the dash-and-dot lines in FIG. **21**, which fully inserts the dowels pins **196**, **200** into the dowel hole **150** and dowel slot **204**, respectively. This advantageously automatically aligns the various mounting bosses **192** with corresponding threaded bores on the supporting frame **82**. Thereafter, the technician installs externally visible fasteners **205** through bores extending through the mounting bosses **192** and into engagement with the respective threaded bores on the supporting frame **82** so as to fixedly mount the lower front cowl panel **108** onto the supporting frame **82**. In the mounted position, the opposing straight side edges **182** overlap the perimeter **132** of the port and starboard side cowl panels **100**, **102**, along the lower forward sides thereof, advantageously covering the fasteners **160**, hiding them from view and thus rendering the fasteners **160** “hidden fasteners”.

(60) Now referring to FIGS. **8** and **21**, installation of the upper front cowl panel **106** will be described. The upper front cowl panel **106** is an angular, plate-like member having a perimeter edge **210** that is inwardly turned so that the perimeter edge **201** overlaps the perimeter **132** on the upper forward sides of the port and starboard side cowl panels **100**, **102** when the upper front cowl panel **106** is installed, thus hiding fasteners **160**. Upper front cowl panel **108** has a U-shaped bottom edge **214** which defines a space through which the upper half of the steering arm **76** extends when the upper front cowl panel **106** is installed on the supporting frame **82** (see FIG. **22**). Referring to FIG. **8**, the upper front cowl panel **106** has four mounting bosses **216** including port and starboard upper mounting bosses and port and starboard lower mounting bosses, each having a through-bore for receiving a fastener. The upper front cowl panel **106** also has a locating device **218**, which as will be further explained herein below is for initially locating the upper front cowl panel **106** on front of the supporting frame **82** during installation thereof. The locating device **218** includes a dowel pin **220**, which in the illustrated example is an elongated cylindrical pin located below the upper starboard-side mounting boss, and protruding outwardly from the interior surface of the upper front cowl panel **106**. The upper front cowl panel **106** also has an orienting device **222** for orienting the upper front cowl panel **106** relative to the supporting frame **82** during installation. The orienting device **222** includes an annular protrusion **224** extending around the through-bore in the port-side lower mounting boss **216**.

(61) The locating device **218** and the orienting device **222** advantageously facilitate efficient and accurate installation of the upper front cowl panel **106** onto the upper front side of the supporting frame **82**, as follows. Referring to FIG. **21**, the technician brings the upper front cowl panel **106** to the upper front side of the supporting frame **82** and partially inserts the dowel pin **220** into a dowel hole **226** (shown in FIG. **15**) on the front of the supporting frame **82**. The dowel pin **220** is freely rotatable within the dowel hole **226**, which allows the technician to rotate the upper front cowl panel **106** relative to the upper front side of the supporting frame **82** until the annular protrusion **224** is aligned with a countersunk bore **228** (shown in FIG. **15**) on the supporting frame **82**. Next, referring to FIG. **21**, the technician presses the upper front cowl panel **106** onto the upper front side of the supporting frame **82**, in the direction of the dash-and-dot lines in FIG. **21**, which fully inserts the dowels pin **220** into the dowel hole **226** and the annular protrusion **224** into the countersunk bore **228**. This advantageously automatically aligns the various mounting bosses **216** with threaded bores on the supporting frame **82**. Thereafter, the technician installs externally visible fasteners **232** through the bores extending through the mounting bosses **216** and into engagement with the respective threaded bores so as to fixedly mount the upper front cowl panel **106** onto the supporting frame **82**.

(62) Referring to FIGS. **19** and **20**, prior to installation of the upper front cowl panel **106** onto the supporting frame **82**, a display screen device **240** is installed on the upper front cowl panel **106**. The display screen device **240** has a planar display screen **242** that is set at an angular orientation

so that the it is easily visible from in front of and above the marine drive **50**, for example by a person sitting or standing in the marine vessel, proximate to the transom. The upper front cowl panel **106** has an opening **244** in which the display screen device **240** is disposed. Mounting edges **243** frame the opening **244**. The display screen device **240** is mounted to the upper front cowl panel **106**, as illustrated in dashed lines in FIG. **19**. In particular, a backing bracket **246** is installed into the rear of the rear of the opening **244** and the planar display screen **242** is installed into the front of the opening **244**. The backing bracket **246** is affixed to the planar display screen by fasteners **250** **242**, sandwiching the mounting edges **243** therebetween. Bracket arms **252** on the backing bracket **246** help retain the planar display screen **242** in place.

(63) The upper portion of the opening **244** is defined by the top of the upper cowl panel **106**, which is supported on arms **103**, **105** that laterally inwardly extend from the upper forward edges of the port and starboard side cowl panels **100**, **102**. The top of the upper cowl panel **106** and the arms **103**, **105** together define a top portion of the opening **244** which longitudinally overhangs the top of the planar display screen **242**. Thus the top of the opening **244** provides sunshade to the planar display screen **242**, facilitating easier viewing. Optionally the display screen device **240** contains a conventional Global Positioning System sensor or "GPS puck **248**", which is aligned with a corresponding hole **254** in the backing bracket **246**. This ensures that the backing bracket **246**, which is made of metal, does not interfere with wireless signals to and from the GPS puck **248**.

(64) Now referring to FIGS. **27** and **28**, the second cowl portion or lid **94** is movable relative to the first cowl portion or cowl body **92** into and between a closed position (see FIG. **27**) enclosing the frame interior **86** and surrounding cowling interior **300**, and an open position (see FIG. **28**) exposing and providing access to the frame interior **86** and surrounding cowling interior **300**. The lid **94** is a generally trapezoidal, plate-like member having downwardly turned side edges **301** which overlap the upper edges of the port and starboard side cowl panels **100**, **102** when the lid **94** is in the closed position. The lid **94** has a front end which is latched to the supporting frame **82** by a latch **302**, and a rear end which is pivotally coupled to the supporting frame **82** by a hinge **304**.

(65) Referring to FIGS. **2**, **13**, **27** and **28**, the hinge **304** includes a stationary frame **306** (which is best shown in FIGS. **2** and **13**) which is fixed to the supporting frame **82** and opposing hinge arms **308** (which are best shown in FIGS. **2**, **27** and **28**) which pivotally couple the lid **94** to the stationary frame **306** along a pivot axis. The stationary frame **306** is affixed to the supporting frame **82** during assembly of the rear cowl panel **104** onto the supporting frame **82**. The stationary frame **306** includes a generally U-shaped plate member having a stationary body **310** and opposing stationary arms **312** that extend transversely from the stationary body **310**. Holes are formed through opposing ends of the stationary body **310** for receiving fasteners **130**, as illustrated by dash-and-dot lines in FIG. **2**, during assembly of the rear cowl panel **104**, as described herein above. The fasteners **130** fasten the stationary frame **306** in a position between the top of the rear cowl panel **104** and the top of the rear of the supporting frame **82**. Referring to FIGS. **27** and **28**, the opposing hinge arms **308** are generally L-shaped plate members having a first end pivotally coupled to the opposing stationary arms **312** along the pivot axis by a fastener such that the hinge arms **308** are pivotable with respect to the opposing stationary arms **312** into and between the illustrated positions. The hinge arms **308** have a second end fastened mounting flanges **314** fixed to and extending downwardly from the interior surface of the lid **94**, proximate to the rear of the lid **94**. A stop finger **316** transversely extends transversely inwardly from the first end of each hinge arm **308**. The stop fingers **316** engage a lower stop surface **318** on the supporting frame **82** to as to stop pivoting motion of the lid **94** in the open position illustrated in FIG. **22**.

(66) Referring to FIGS. **13** and **28**, a detent mechanism **320** is specially configured to retain the hinge arms **308** in the open position. The detent mechanism **320** includes a ball **322** retained within a cylinder **324** in the stationary arm **312**. The ball **322** is retained in the cylinder **324** but is biased outwardly therefrom by a compression spring in the cylinder **324** such that the ball **322** protrudes partially outwardly from the cylinder **324** into abutting engagement with the interior surface of the

hinge arm **308**. A corresponding inwardly oriented spherical indentation or recess **326** is formed in the hinge arm **308**. The recess **326** becomes aligned with the ball **322** when the lid **94** is pivoted into the open position illustrated in FIG. **22**, the stop fingers **316** engage the lower stop surface **318**, in which position the noted spring biases the ball **322** into the recess **326**, so as to pop into the recess and retain the lid **94** in the open position. When it is desired to move the lid **94** out of the open position in the direction of arrow **321**, the user pushes on the lid **94**, which overcomes the spring bias to push the ball **322** out of the recess **326** as the hinge arms **308** are pivoted relative to the stationary frame **306**.

(67) Referring to FIGS. **23-26**, the latch **302** includes a latch engagement arm **330** which in the illustrated example is a hook-shaped plate member that is fixed to the interior surface of the lid **94**, at the front thereof, in particular by fasteners **332** fixed to a mounting flange **334**, configured such that the latch engagement arm **330** protrudes downwardly from the interior surface of the lid **94**. Referring to FIGS. **23** and **25**, the latch **302** also includes a latch retainer **336** mounted on the supporting frame **82**, particularly along the top front portion thereof within the opening **244** in the upper cowl panel **106**. As further described herein below, the latch **302** is configured such that pivoting the lid **94** into the closed position illustrated in FIG. **27** causes the latch retainer **336** to automatically retain the latch engagement arm **330** and thereby retain the lid **94** in the closed position.

(68) Referring to FIG. **23**, the latch retainer **336** includes a latch lever **338**, which is a generally L-shaped member having a first lever end **340** protruding outwardly from the cowling **90**, particularly into the opening **244** in the upper front cowl panel **106**, above the display screen device **240**. A finger grip **335** is disposed on the first lever end **340**, facilitating actuation of the latch lever **338**. The latch lever **338** has an opposite, second lever end **342** which is located in the cowling interior **300** and extends transversely to the first lever end **340**. A lever body **344** connects the first and second lever ends **340**, **342**. A pivot pin **346** axially extends through the lever body **344** and into engagement with the upper front cowl panel **106**, alongside the upper front portion of the supporting frame **82** and defines a latch pivot axis. The latch lever **338** is pivotable about the latch pivot axis and relative to the upper front cowl panel **106** and the upper front portion of the supporting frame **82**. A compression spring **348** is contained in a cylindrical spring cavity **350** formed in the upper front cowl panel **106**. An end cap **352** retains the spring **348** in the spring cavity **350** and the bias of the spring **348** tends to move the end cap **352** outwardly to the outer end of the spring cavity **350**. The second lever end **342** abuts the end cap **352**, opposite the spring **348**. As such, the spring **348** tends to pivot the latch lever **338** about the pivot axis into the position illustrated in FIG. **23**.

(69) FIGS. **23-24** illustrate the latch retainer **336** in an engaged position. The spring **348** tends to expand, which moves the end cap **352** to the outer end of the spring cavity **350**, as illustrated, which thus pivots the latch lever **338** about the latch pivot axis, clockwise when viewed from the top. As illustrated in FIG. **24**, the latch engagement arm **330** has an angled engagement surface **354** and the latch lever **338**, along the outside of the lever body **344**, has a beveled engagement surface **356**. As the lid **94** is pivoted into the closed position, the latch engagement arm **330** is brought down onto the latch lever **338** and the angled engagement surface **354** engages and slides along the beveled engagement surface **356**. Thus causes the latch lever **338** to pivot about the latch pivot axis, counterclockwise when viewed from above, forcing the end cap **352** into the spring cavity **350** and compressing the spring **348**. Once the angled engagement surface **354** passes by the beveled engagement surface **356**, the resiliency of the spring **348** moves the end cap **352** back outwardly in the spring cavity **350**, which pivots the latch lever **338** back clockwise about the latch pivot axis and causes the lever body **344** to engage with an engagement recess **358** in the latch engagement arm **330**. Engagement of the lever body **344** in the engagement recess **358** retains the lid **94** in the closed position.

(70) Referring to FIGS. **25-26**, when it is desired to move the lid **94** out of the closed position, the

user engages the finger grip **325** and pivots the latch lever **338** counterclockwise when viewed from above into the position illustrated. This forces the end cap **352** further into the spring cavity **350** and compresses the spring **348** and moves the lever body **344** out of the engagement recess **358** and thus out of engagement with the latch engagement arm **330**, freeing the lid **94** for movement in the direction of arrow **360** in FIG. **26**. Once the user releases the finger grip **325**, the natural resiliency of the spring **348** pushes the end cap **352** back towards the outer end of the spring cavity **350** and pivots the latch lever **338** clockwise when viewed from above into the position illustrated in FIG. **23**.

(71) Referring to FIGS. **27** and **28**, optionally, port and starboard opening assist mechanisms **362** are located along the upper edges of the port and starboard side cowl panels **100**, **102**. The port and starboard opening assist mechanisms **362** are configured to engage the interior surface of the lid **94**, alongside the downwardly turned side edges **301** when the lid **94** is in the closed position. Each opening assist mechanism **362** includes a spring retainer **364** which is fastened to one of the respective port and starboard side cowl panels **100**, **102** by fasteners **367**. The spring retainer **364** has an elongated spring cavity **366** which retains a compression spring **368**. A scratch-resisting spring cap **372** is disposed on the outer end of the spring **368** and has an annular retainer flange **370** contained in a widened portion of the spring cavity **366**. The opening assist mechanisms **362** are configured to bias the lid **94** out of the closed position illustrated in FIG. **27** when the latch **302** is unlatched. In particular, the spring **368** biases the lid **94** into a slightly opened position by tending to extend outwardly of the spring retainer **364**, thus causing the spring cap **372** to push upwardly on the interior surface of the lid **94** and thereby pivot the lid **94** away from the closed position. Containment of the annular retainer flange **370** in the widened portion of the spring cavity **366** limits the travel of the spring **368**. Thus when the latch **302** is unlatched, the port and starboard opening assist mechanisms **362** automatically pivot the lid **94** slightly out of the closed position, which enables the user to use their fingers to grasp the underside of the perimeter of the lid **94** and further pivot the lid **94** toward the open position illustrated in FIG. **28**.

(72) Referring now to FIGS. **13-14**, a fuse carrier bracket **374** is mounted to the supporting frame **82**, particularly at the upper rear portion of the supporting frame **82** inside the frame interior **86**. In the installed position, the fuse carrier bracket **374** is located between the rear of the supporting frame **82** and a battery **400** contained in the frame interior **86**, as will be further described herein below. The fuse carrier bracket **374** is specially configured such that it is easily accessible, particularly for removal and installation from above the marine drive **50** without the use of tools when the lid **94** is in the open position. The fuse carrier bracket **374** is a plate-like member having a bracket body **376** that retains fuse components **379** for the marine drive **50**. Opposing shoulders **378** laterally extend from opposite sides of the bracket body **376**. Each shoulder **378** forms a downwardly oriented recess **380** that receives a mounting post **382** in the frame interior **86**, which is formed by a fastener engaged in a threaded bore **384** in supporting frame **82**. Each opposing shoulder **378** has inwardly oriented fingers **383** that are spaced apart such that they snap over the mounting posts **382** when the fuse carrier bracket **374** is installed and when the fuse carrier bracket **374** is removed. During installation, the fuse carrier bracket **374** is lowered in the direction illustrated by dash-and-dot lines in FIG. **13** until the mounting posts **382** snap fit into the downwardly oriented recesses **380**, over the fingers **383**. The opposing shoulders **378** are pliable such that grasping the bracket body **376** and pulling upwardly, generally in the axial direction, overcomes the normal rigidity of the shoulders **378** and thereby separates the fingers **383** apart as the fingers **383** travel along and past the widest part of the mounting posts **382**. This frees the fuse carrier bracket **374** for removal from the frame interior **86**. In the illustrated embodiment, the fuse carrier bracket **374** is configured for servicing of the fuses, as well as for supporting a diagnostic harness connector.

(73) Referring to FIGS. **29-30**, the marine drive **50** includes a rechargeable battery **400**, which is removably retained in the frame interior **86** and configured to provide electrical (battery) power to

the electric motor **64** for powering the propulsor **58**. The type and configuration of the battery **400** can vary from what is illustrated and described, and for example can include a lithium battery and/or any other type of rechargeable battery. In the illustrated example, the battery **400** has a box-shaped battery body **402** having opposing side surfaces **404** and opposing front and rear surfaces **406**, **408**. A ledge portion **410** (best shown in FIG. **33**) extends forwardly from the top of the front surface **406** and as further explained herein below has a battery port **426** for connecting the battery **400** to a corresponding motor port **428** for the electric motor **64**. The battery **400** also has a top cap **412** located on top of the battery body **402** and ledge portion **410**. The top cap **412** has a handle **416**, which conveniently enables grasping and lifting of the battery **400** during insertion and removal relative to the frame interior **86**. Elongated slots **417** extend along the battery body **402**, in particular along the opposing side surfaces **404** adjacent the front surface **406**.

(74) The battery **400** is conveniently accessible for removal and replacement by opening the lid **94**. Referring to FIG. **2**, a guide sleeve **418** is located in the frame interior **86** for guiding the battery **400** into the frame interior **86**. The guide sleeve **418** has a generally U-shaped cross-section defined by a U-shaped guide body **420** and opposing guide arms **422** that extend downwardly away from the outer ends of the guide body **420**. The guide arms **422** have elongated tracks **424** which are configured to engage with the elongated slots **417** and thereby guide the battery **400** into the frame interior **86** as the slots **417** slide along the tracks **424**. The configuration of the guide sleeve **418** can vary from what is illustrated and described. In the illustrated example, the guide sleeve **418** is fastened to the supporting frame **82** by fasteners **425** extending through the sides of the supporting frame **82** and into threaded engagement with threaded bores in the opposing guide arms **422**.

(75) Referring to FIGS. **29-30** and **35-36**, the battery port **426** is located on the bottom of the ledge portion **410** of the battery **400** and is configured to output battery power from the battery **400**. The corresponding motor port **428** is located in the frame interior **86**, on an internal ledge portion **431** of the supporting frame **82**. The battery **400**, supporting frame, **82** and guide sleeve **418** are configured such that inserting the battery **400** into the frame interior **86** automatically engages the battery port **426** with the motor port **428** so that the battery **400** is able to provide electrical power to the electric motor **64**. With the lid **94** in the open position, the user grasps the battery handle **416** and lowers the battery **400** into the frame interior **86** while aligning the elongated slots **417** on the battery body **402** with the elongated tracks **424** on the guide sleeve **418**. As the battery **400** is lowered into the frame interior **86**, the slots **417** slide downwardly along the tracks **424** as the bottom of the ledge portion **410** is brought closer to the internal ledge portion **431** and until the battery port **426** is automatically brought into alignment with and then electrical mating contact with the motor port **428**. As will be understood by one having ordinary skill in the art, the battery port **426** and motor port **428** have profiles that correspond to each other such that these components mate together and electrical contacts within each port contact each other when the battery and motor ports **426**, **428** are physically joined, thus enabling electricity from the battery **400** to be provided to the electric motor **64**. Electrical wires **70** (see FIG. **1**) connect the motor port **428** to the electric motor **64**, optionally via other electrical auxiliary components, as would be known to one having ordinary skill in the art. The electrical wires extend downwardly through the support leg **88** of the supporting frame **82** and then through the strut **72** and into the lower unit **62** for connection to the electric motor **64** via, for example, a conventional electrical input which may include a printed circuit board.

(76) Referring to FIGS. **29-33**, a battery latch **430** engages the battery **400** with the supporting frame **82** as the battery **400** is inserted into the frame interior **86**. The battery latch **430** includes a pair of latch fingers **432** on the forward side of the top cap **412** of the battery **400**. The latch fingers **432** are spring-biased outwardly from the battery **400** into the position illustrated in FIG. **29**. The battery latch **430** also includes a pair of engagement recesses **434** in the supporting frame **82**, in particular in an upper front sidewall thereof. The engagement recesses **434** are engaged by the latch fingers **432** when the battery **400** is fully inserted into the frame interior **86**. As the battery **400** is

slid into the frame interior **86**, a ramp **436** on the supporting frame **82** is engaged by the latch fingers **432**, which pushes the latch fingers into the battery **400** against the spring-bias. As the battery **400** is fully inserted into the frame interior **48**, the latch fingers **432** become aligned with the engagement recesses **434** (see FIG. **30**), which permits the spring-bias to force the latch fingers **432** back outwardly and into engagement with the engagement recesses **434**. This retains (latches) the battery **400** in the frame interior **86**.

(77) Referring to FIGS. **31** and **32**, the user can remove the battery **400** from the frame interior **86** by pressing a latch actuator **438** on top of the top cap **412**. The latch actuator **438** is coupled to the pair of latch fingers **432** by a linkage **440** such that pressing the latch actuator **438** moves the linkage **440** and the latch fingers **432** in the direction of the arrow illustrated in FIG. **31**, removing the latch fingers **432** out of engagement with the engagement recesses **434**, withdrawing the latch fingers **432** into the top cap **412** of the battery **400**. This frees the battery **400** for removal from the frame interior **86** in the direction of the arrows in FIG. **32**, as illustrated in dash-and-dot line. Thereafter when the user releases the latch actuator **438**, the latch fingers **432** are again spring-biased back to the position illustrated in FIG. **29**. It will thus be understood that the battery **400** can be efficiently removed by using only one hand. The user can grasp the battery handle **416** and use their thumb to press the latch actuator **438**, thus enabling the user to lift the battery **400** out of the frame interior **86**.

(78) Referring to FIGS. **33** and **34**, a battery removal assist mechanism **450** is located in the frame interior **86**, in particular in the floor of the monolithic body **84**, rearwardly of the support leg **88**. The battery removal assist mechanism **450** includes a compression spring **452** disposed on a spring pedestal **454** in a cylindrical spring holder **456** having an annular mounting flange **460** coupled to the floor of the monolithic body **84**. A spring cap **458** is located on the spring **452** and coupled to the spring holder **456** such that the spring **452** is compressed between the inside of the spring cap **458** and the floor of the spring holder **456**. The spring cap **458** is reciprocal relative to the spring holder **456**. Pressing the spring cap **458** further into the spring holder **456** compresses the spring **452**. The spring **452** biases the spring cap **458** further out of the spring holder **456**.

(79) FIG. **30** illustrates the battery **400** fully installed into the frame interior **86** and latched in place by the battery latch **430**. In this position, the bottom of the battery **400** forces the spring cap **458** into the spring holder **456**, compressing the spring **452**. As illustrated in FIG. **33**, when the battery latch **430** is unlatched, the force of the spring **452** biases the battery **400** upwardly in the direction of the arrows in FIG. **33**. This moves the battery port **426** out of engagement with the motor port **428**, as illustrated, and permits easier removal of the battery **400** from the frame interior **86**. The battery **400** moves upwardly a small amount under the force of the spring **452**, as illustrated by the solid lines and the dash-and-dot lines in FIG. **33**. This also further helps the user by automatically moving the battery **400** upwardly out of the frame interior **86** an amount that facilitates easier grasping of the battery handle **416** and removal from the frame interior **86**.

(80) It will thus be understood that moving the lid **94** from the closed position enclosing the frame interior **86** in the cowling interior **300** to the open position provides access to the cowling interior **300** for insertion and removal of the battery **400** from the frame interior **86**, for example for recharging and/or service, and replacement of the battery **400** into the frame interior **86** for providing power to the electric motor **64**.

(81) FIGS. **36-37** illustrate the motor port **428** and a motor port cover **500** for preventing environmental wear or damage of the motor port **428** when the battery **400** is not installed, for example during servicing and/or storage of the marine drive **50**. In the illustrated example, the motor port cover **500** has a cover body **502** having sidewalls **508** that form a generally rectangular box shape that is sized just slightly larger than the outer perimeter of the sidewalls **506** of the motor port **428**, such that the cover body **502** fits over the motor port **428** in a friction fit arrangement, as illustrated in FIG. **37**. Optionally, seals **504** are disposed around the sidewalls **506** of the motor port **428** and form a seal with the interior surfaces of the sidewalls **508** of the generally rectangular

shaped cover body **502**, forming a friction fit when the cover body **502** is slid onto the motor port **428**. In other examples, the cover body **502** can be configured to engage with the motor port **428** via a snap-fit arrangement and/or the like. The cover body **502** has a top wall with a handle **507** which protrudes upwardly from the top wall, facilitating grasping by the user for placement on the motor port **428** during servicing and/or storage of the marine drive **50** and for removal from the motor port **428** when the battery **400** is to be installed.

(82) Referring to FIGS. **24** and **26**, a pedestal **510** is located on the interior surface of the lid **94** is configured to retain the motor port cover **500** in a storage position, for example when the battery **400** is installed in the frame interior **86**. Just like the motor port **428**, the pedestal **510** has sidewalls **512** that form a generally rectangular box shape that is sized just slightly smaller than the inner perimeter of the sidewalls **508** of the cover body **502**. Also just like the motor port **428**, the pedestal **510** has seals **514** disposed around the sidewalls **512** that form a seal with the interior surfaces of the sidewalls **508** of the cover body **502**. Preferably, the motor port **428** and the pedestal **510** have an identical outer perimeter shape and size. Ideally, the pedestal **510** and the motor port **428** have an identical outer perimeter shape and size. As illustrated in FIGS. **27-28**, the pedestal **510** provides a secure and sealed location for storing the motor port cover **500** when it is not in use on the motor port **428**, thus preventing environmental wear or damage of the motor port cover **500** and thus preventing subsequent transfer of environmental contaminants such as salt and water from the motor port cover **500** to the motor port **428**. A tether **516** connects the motor port cover **500** to the supporting frame **82**, thus preventing loss of the motor port cover **500**, for example by accidentally dropping the motor port cover **500** in the water.

(83) FIG. **38** illustrates a second embodiment of a motor port cover **600** for preventing environmental wear or damage of the motor port **428** when the battery **400** is not installed, for example during servicing and/or storage of the marine drive **50**. The motor port cover **600** is illustrated in solid lines in a use position and in dashed lines in a storage position. In the use position, the motor port cover **600** has sidewalls **602** that surround and abut the sidewalls **506** of the motor port **428** in a friction fit. The motor port cover **600** has an inner end that is pivotally connected to the supporting frame **82** by a hinge **604**. Optionally, seals **504** are disposed around the sidewalls **506**, similar to the first embodiment, for sealing between the motor port **428** and the interior of the sidewall **602**. When it is desired to move the motor port cover **600** into a storage position, for example when the battery **400** is to be installed, the user grasps a lip **608** on the front of the motor port cover **600** and pivots the motor port cover **600** upwardly about the pivot axis defined by the hinge **604**. A recess **612** in the sidewall of the supporting frame **82** provides a storage space for the motor port cover **600** in the storage position.

(84) FIGS. **39** and **40** illustrate a third embodiment of a motor port cover **700** for preventing environmental wear or damage of the motor port **428** when the battery **400** is not installed. Just like the first and second embodiments, the motor port cover **700** is movable into a use position (FIG. **39**) in which the motor port cover **700** prevents environmental wear or damage of the motor port **428** and a non-use or storage position (FIG. **40**) in which the battery port **426** is connectable to the motor port **428**. Unlike the first and second embodiments, the third embodiment is configured such that inserting the battery **400** into the frame interior **86** automatically causes the motor port cover **700** to move from the use position to the non-use or storage position. More specifically, a lever assembly **702** is configured to move the motor port cover **700** into the non-use position. The lever assembly **702** includes a lever arm **704** which is an L-shaped member having a first end **706** that protrudes into the frame interior **86**, a second end **708**, and a lever body **710** that extends between the first end **706** and the second end **708**. The lever body **710** is pivotably coupled to the supporting frame **82** at a lever pivot axis **712**. The second end **708** is pivotably coupled to the first end of an elongated linkage bar **714** at a first linkage pivot axis **716**. The elongated linkage bar **714** has an opposite, second end that is pivotally coupled to a first end of a crank arm **718** at a second linkage pivot axis **720**. The opposite second end of the crank arm **718** is pivotably coupled to the

supporting frame **82** at a cover axis **722**. A torsion spring **724** on the crank arm axis **722** has a first end coupled to the supporting frame **82** and an opposite, second end coupled to the motor port cover **700**.
(85) The motor port cover **700** is normally biased by the torsion spring **724** into the use position illustrated in FIG. **39**. The torsion spring **724** has a natural spring bias that acts between the supporting frame and the motor port cover **700** so as to pivot the motor port cover **700** about the cover axis **722** into position over the top of the motor port **428**. When the user installs the battery **400** in the manner explained herein above, the battery body **402** slides downwardly in the direction of arrow **730** and as it does so it engages the lever arm **704** and causes the lever arm **704** to pivot about the lever pivot axis **712** in the direction of arrow **732**. This moves the elongated linkage bar **714** upwardly and pivots the crank arm **718** in the direction of arrow **734**. Such movement of the crank arm **718** moves the motor port cover **700** into the non-use position illustrated in FIG. **40**, wherein the motor port cover **700** is out of the way of the battery port **726** and as such permits connection of the battery port **726** to the motor port **728** during continued insertion of the battery **400** in the direction of arrow **730**, and as further described herein above. Subsequent removal of the battery **400** from the frame interior **86** allows the torsion spring **724** to again pivot the motor port cover **700** into the use position illustrated in FIG. **39**. Thus, it will be understood that moving the battery **400** into the frame interior **86** engages the lever assembly **702** via the lever arm **704** so as to automatically move the motor port cover **700** from the use position illustrated in FIG. **39** to the non-use position illustrated in FIG. **40**. Removing the battery **400** from the frame interior **86** permits the bias of the torsion spring **724** to move the motor port cover **700** back into the non-use position illustrated in FIG. **40**.

Claims

1. A marine drive for propelling a marine vessel, the marine drive comprising: a propulsor configured to generate a thrust force in a body of water, a battery that powers the propulsor, and a supporting frame that supports the marine drive relative to marine vessel, the supporting frame extending from a front to a rear in a longitudinal direction, from a port side to a starboard side that is opposite the port side in a lateral direction that is perpendicular to the longitudinal direction, and from a top to a bottom in an axial direction that is perpendicular to the longitudinal direction and perpendicular to the lateral direction, wherein the supporting frame comprises a monolithic body defining a frame interior, a support leg extending downwardly from the monolithic body, and a steering arm extending forwardly from monolithic body.
2. The marine drive according to claim 1, wherein the battery is disposed in the frame interior, the battery being configured to provide electrical power to an electric motor for powering the propulsor.
3. The marine drive according to claim 1, further comprising a cowling mounted on the supporting frame.
4. The marine drive according to claim 1, further comprising a lower unit mounted on the support leg and containing an electric motor for powering the propulsor.
5. A marine drive for propelling a marine vessel, the marine drive comprising: a propulsor configured to generate a thrust force in a body of water; a battery that powers the propulsor; a supporting frame that supports the marine drive relative to marine vessel, the supporting frame having a frame interior, wherein the supporting frame extends from a front to a rear in a longitudinal direction, from a port side to a starboard side that is opposite the port side in a lateral direction that is perpendicular to the longitudinal direction, and from a top to a bottom in an axial direction that is perpendicular to the longitudinal direction and perpendicular to the lateral direction, and a cowling on the supporting frame, the cowling having a first cowl portion and a second cowl portion that is movable relative to the first cowl portion into a closed position

enclosing the frame interior and alternately into an open position providing access to the frame interior, wherein the first cowl portion comprises a cowl body disposed on the front, the bae-rear, the port side and the starboard side, and further wherein the second cowl portion comprises a lid located on the top of the supporting frame, and further wherein the cowl body is fixed to the supporting frame via at least one hidden fastener that extends from the frame interior, through the supporting frame, and into engagement with the cowl body, said hidden fastener being accessible when the lid is in the open position.

6. The marine drive according to claim 5, wherein the supporting frame comprises a monolithic body defining the frame interior, a support leg extending downwardly from the monolithic body, and a steering arm extending forwardly from monolithic body, and further wherein the battery is disposed in the frame interior, the battery being configured to provide electrical power the propulsor.

7. The marine drive according to claim 5, wherein the first cowl portion comprises a plurality of cowl panels, each cowl panel in the plurality of cowl panels comprising a locating device for initially locating the cowl panel on the supporting frame during installation, an orienting device for subsequently rotationally orienting the cowl panel relative to the supporting frame during installation, and a bore for engagement with the hidden fastener once the cowl panel is oriented relative to the supporting frame.

8. The marine drive according to claim 7, wherein the locating device comprises a dowel pin that engages in a corresponding dowel hole on the supporting frame.

9. The marine drive according to claim 7, wherein the orienting device comprises a slotted boss that engages with opposed flats on the supporting frame.

10. The marine drive according to claim 7, wherein the orienting device comprises a dowel pin that engages in a corresponding dowel slot on the supporting frame.

11. The marine drive according to claim 7, wherein the orienting device comprises a boss having an annular protrusion that engages in a countersunk bore on the supporting frame.

12. The marine drive according to claim 7, wherein the plurality of cowl panels comprises a port side cowl panel and a starboard side cowl panel, wherein the locating device on each of the port side cowl panel and the rear-starboard side cowl panel comprises a dowel pin, and wherein the orienting device on each of the port side cowl panel and the starboard side cowl panel comprises a slotted boss that engages with flats on the supporting frame.

13. The marine drive according to claim 7, wherein the plurality of cowl panels comprises a rear cowl panel, wherein the locating device comprises a dowel pin that engages in a corresponding dowel hole on the supporting frame, and wherein the orienting device comprises a boss having an annular protrusion that engages in a countersunk threaded bore on the supporting frame.

14. The marine drive according to claim 7, wherein the plurality of cowl panels comprises a lower front cowl panel, wherein the locating device comprises a dowel pin that engages in a corresponding dowel hole on the supporting frame, and wherein the orienting device comprises a dowel pin that engages in a corresponding dowel slot on the supporting frame.

15. The marine drive according to claim 7, wherein the plurality of cowl panels comprises an upper front cowl panel, wherein the locating device comprises a dowel pin that engages in a corresponding dowel hole on the supporting frame, and wherein the orienting device comprises a boss having an annular protrusion that engages in a countersunk threaded bore on the supporting frame.

16. The marine drive according to claim 7, wherein the plurality of cowl panels comprises a rear cowl panel, a port side cowl panel, a starboard side cowl panel, and a front cowl panel.

17. The marine drive according to claim 16, wherein the rear cowl panel comprises an outer perimeter that is sandwiched between rear perimeter edges of the port side cowl panel and the starboard side cowl panel.

18. The marine drive according to claim 17, wherein rear perimeter edges of the port side cowl

panel and cowl panel are fastened together.

19. The marine drive according to claim 16, wherein the front cowl panel overlaps the port side cowl panel and the starboard side cowl panel, respectively, covering fasteners for the port side cowl panel and the starboard side cowl panel.

20. The marine drive according to claim 15, further comprising a display screen device, wherein the cowling defines an opening for the display screen device.

21. The marine drive according to claim 20, wherein the display screen device is located on the cowling and angularly oriented relative to the cowling so that the display screen device is visible from in front of and above the marine drive.

22. The marine drive according to claim 21, wherein the cowling, along the top of the opening, overhangs the display screen device so as to provide sunshade to the display screen device.

23. The marine drive according to claim 20, wherein the lid is movable relative to the cowl body into and between a closed position and an open position, and wherein a latch for opening the lid is accessible via the opening.