March 31, 1959 L. A. CULBERTSON 2,879,738

SECTIONAL COMBINED OUTBOARD MOTOR AND GENERATING PLANT

Filed April 28, 1958

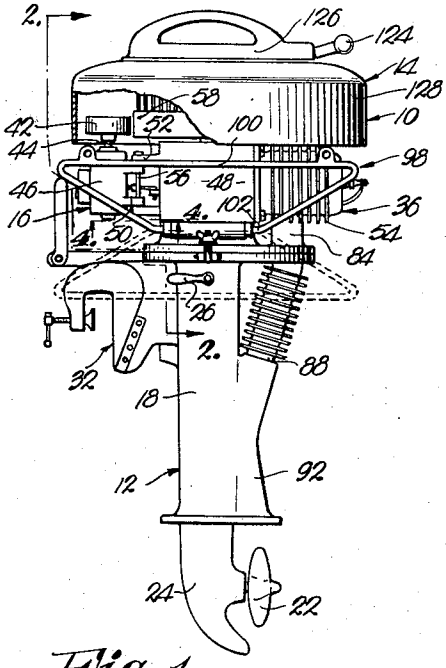


Fig. 1.

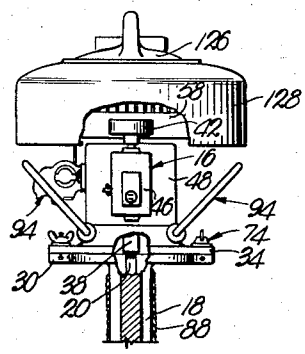


Fig. 2.

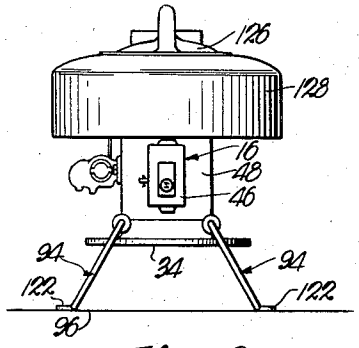


Fig. 3.

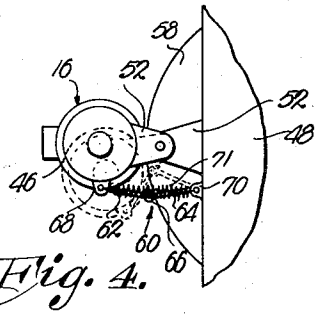


Fig. 4.

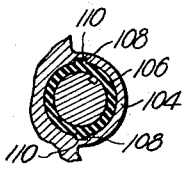


Fig. 7.

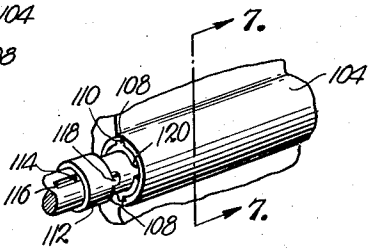


Fig. 6.

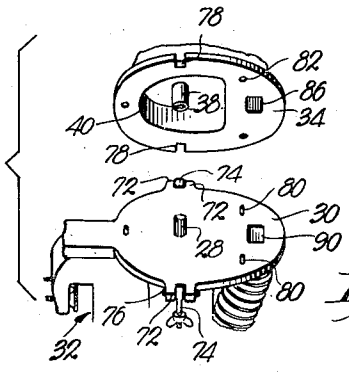


Fig. 5.

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SECTIONAL COMBINED OUTBOARD MOTOR AND GENERATING PLANT

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17 Claims. (Cl. 115—17)

This invention relates to outboard motors for use in propelling small boats and more particularly, to a combined outboard motor and generating plant constructed of interconnected, separable units so that the utility of the assembly is greatly increased.

It is the primary object of this invention to provide an outboard motor adapted to be positioned on the rear transom of a small boat in order to propel the same and which has incorporated therewith, generating mechanism constructed so that the engine of the assembly may be utilized to produce electrical energy when desired, and wherein the engine and associated generator are separable from the drive unit of the outboard motor assembly when desired so that the generating plant may be employed in various capacities independently of the lower propeller unit forming a part of the overall assembly.

A further important object of the instant invention is to provide a combined outboard motor and generating plant as described, wherein the lower drive unit which includes clamp means for securing the assembly to a boat, as well as the power shaft and propeller operably coupled thereto, is releasably connected to the engine forming the upper unit of the assembly so that the engine and associated parts may be completely separated from the lower drive unit when desired and operated completely independent of the lower unit.

A further important object in this connection is to provide an assembly as referred to above, wherein the generator mechanism is carried by the upper engine unit in a position to be actuated by the flywheel of the engine, to the end that the engine may be used as a generating plant either when the upper unit is mounted on the drive unit and the entire assembly is attached to a boat or, in the alternative, when the upper power unit has been removed from the drive assembly and positioned upon a supporting surface.

Also an important aim of the invention is to provide an assembly wherein the upper engine unit has leg components thereon adapted to support the upper unit in vertically spaced relationship to a supporting surface, whereby the engine may be used in various desired places such as at camp sites, in cabins, and similar locations where electrical energy is not available and it is desired to supply power to electrically operated devices.

A further important aim of the invention is to provide a combined outboard motor and generating plant assembly wherein the generator mechanism is shiftably mounted on the upper engine unit by suitable toggle structure so that the drive wheel of the generator mechanism may be selectively moved into operable engagement with the flywheel of the engine as desired, to thereby permit optional generation of electrical energy as desired or needed.

Other important objects of this invention relate to the provision of a sectional combined outboard motor and generating plant assembly wherein the lower drive unit and the upper engine unit are provided with interengageable plate portions which assure that the engine is firmly

attached to the lower drive unit; to bolt and nut means on one of the plates adapted to be secured in corresponding slots in the other plate which serve to rigidly secure the upper engine unit to the lower drive unit, while permitting the units to be separated in a relatively short period of time; to the utilization of an air cooled, gasoline type engine in the power unit of the assembly so that the engine may be operated under any conditions and separate from the drive unit; to the provision of unique exhaust structure on the assembly for directing exhaust gases from the power plant, either away from the engine when the latter is removed from the lower drive unit or, in the alternative, into the water when the units are interconnected and the assembly is positioned on a boat; to simple and efficient supporting legs for maintaining the engine in vertical, spaced relationship to a supporting surface when the engine is removed from the lower drive unit and which include releasable means for maintaining the legs in their extended positions despite vibration of the engine during operation of the same; and to other important objects and salient features of the instant invention which will become obvious or be explained more fully as the following specification progresses.

In the drawing:

Figure 1 is a side elevational view of a sectional combined outboard motor and generating plant assembly constructed in accordance with the preferred concepts of the instant invention, certain parts being broken away and in section to reveal details of construction;

Fig. 2 is a vertical, cross-sectional view taken on the broken line 2—2 of Fig. 1 and looking in the direction of the arrows;

Fig. 3 is an end elevational view of the upper engine unit of the present assembly illustrating the same removed from the lower drive unit and positioned on a suitable supporting surface;

Fig. 4 is a horizontal, cross-sectional view illustrating a portion of the instant assembly fragmentarily and taken substantially on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary, exploded, perspective view of portions of the upper engine unit and the lower drive unit showing the manner in which the drive shaft of the engine is operably coupled with the driven shaft of the lower drive unit;

Fig. 6 is an enlarged, fragmentary, perspective view illustrating the novel structure for maintaining the leg components in their extended, engine unit supporting positions; and

Fig. 7 is a vertical, cross-sectional view taken on the line 7—7 of Fig. 6.

Briefly, the instant invention comprises a sectional combined outboard motor and generating plant assembly including a lower drive unit having means thereon adapting the lower unit to be mounted on a small boat, as well as a propeller at the lower extremity thereof and a driven shaft operably coupled with the propeller and extending to a point adjacent the upper end of the drive unit. An upper power unit is releasably mounted on the lower drive unit and includes a prime mover in the nature of an air cooled, gasoline engine provided with a drive shaft operably engageable with the driven shaft of the lower unit only when the units are interconnected, as well as generator mechanism shiftably mounted on the upper power unit and selectively actuatable by the engine. Foldable leg components are mounted on the upper power unit for supporting the latter in vertically spaced relationship to a supporting structure when the upper power unit is removed from the lower drive unit and disposed on such surface. It thus can be appreciated that the present assembly may be used as a power plant for propelling a small boat, the generator may be operably connected with the engine to produce electrical

energy during the time that the engine is utilized to propel the boat and, as another option, the entire engine unit may be removed from the lower drive unit and utilized separately therefrom to produce electrical energy as needed.

A sectional combined outboard motor and generating plant assembly broadly designated by the numeral **10** is illustrated in its preferred form in the drawing, and includes as basic components a lower drive unit **12**, an upper power plant unit **14**, releasably connected to unit **12**, and generator mechanism **16** carried by unit **14** for production of electrical energy when needed.

Lower drive unit **12** has a tubular, driven shaft housing **18** rotatably carrying a driven shaft **20** which is operably coupled with a propeller **22** rotatably mounted on the lower gear case **24** of housing **18** through suitable reverse and forward gears within case **24**. In this connection it is to be pointed out that control handle **26** pivotally mounted on housing **18** adjacent the upper extremity thereof controls the gears within case **24** and permits the operator of assembly **10** to engage driven shaft **20** with propeller **22** for reverse or forward operation or, in the alternative, to shift the gears into neutral so that propeller **22** is not rotated during operation of driven shaft **20**. The uppermost end of driven shaft **20** is splined as at **28**, and it is to be noted that end **28** of shaft **20** extends upwardly above the elliptical mounting plate **30** integral with the upper extremity of housing **18**.

A clamp assembly **32** joined to and preferably forming a part of housing **18** adapts lower unit **12** and thereby, unit **14** when the same is mounted on unit **12**, to be mounted on the rear transom or the like of a small boat so that assembly **10** may propel such boat. It is to be pointed out that clamp assembly **32** is conventional in nature and extends away from housing **18** in a direction opposite to the disposition of propeller **22**.

Power plant unit **14** which is removably mounted on unit **12** includes an elliptical base plate **34** identical in configuration with upper mounting plate **30** of unit **12**, and plate **34** serves as a mount for an air cooled, gasoline powered engine broadly numerated **36**. The vertically disposed drive shaft (not shown) of engine **36** has an internally splined connector secured to the lower end thereof and extends downwardly into a cup-shaped depression **40** formed in the lower face of base plate **34**. Connector **38** and splined end **28** of driven shaft **20** are disposed so that connector **38** complementally receives end **28** when unit **14** is mounted on unit **12**, with plates **30** and **34** thereof in correct alignment.

Generator mechanism **16** is preferably of the rotating armature type and therefore has a drive wheel **42** connected to armature shaft **44** for rotation therewith. Cylindrical housing **46** of mechanism **16** is pivotally mounted on crank housing **48** of engine **36** by virtue of spaced bracket ears **50** integral with housing **46**, being disposed between vertically spaced brackets **52** integral with the face of crank housing **48** opposed to finned cylinders **54**. A pin **56** passing through all of the bracket ears **50** and brackets **52** permits cylindrical housing **46** of mechanism **16** to be swung in an arc about the axis of pin **56**.

The vertical disposition of cylindrical housing **46** is fixed at a predetermined point so that drive wheel **42** of mechanism **16** frictionally engages the outer peripheral edge of flywheel **58** connected to the upper end of the drive shaft of engine **36** above crank housing **48**.

Toggle structure broadly designated **60** is provided for maintaining drive wheel **42** of mechanism **16** either in or out of engagement with flywheel **58** and thereby includes a pair of elements **62** and **64** pivotally interconnected at proximal, overlapped ends thereof by pin means **66**. Opposed, outermost ends of elements **62** and **64** are pivotally connected to an ear **68** on housing **46** and an ear **70** on crank housing **48** respectively. A coil spring **71** interconnecting opposed ends of elements **62** and **64** at the points where the same are pivotally coupled with housing **46** and crank housing **48** respectively normally biases elements **62** and **64** into a folded position. Means is provided on one of the elements **62** or **64** (not detailed) for preventing relative folding movement of elements **62** and **64** away from bracket ears **50** and brackets **52**, while elements **62** and **64** are unrestricted in folding movement in the opposite direction so that wheel **42** is automatically moved into and maintained in engagement with flywheel **58** when toggle structure **60** is collapsed.

Two pair of opposed projections **72** integral with the outer, peripheral edge of mounting plate **30** of lower drive unit **12** serve as means for mounting a bolt and wing nut assembly **74**, which is pivotal about a normally horizontal pin **76**. Opposed slots **78** formed in the outer, peripheral margin of base plate **34** of unit **14** are aligned with the space between projections **72** to thereby permit bolt and wing nut assembly **74** to be moved into the same. With the wing nuts of assemblies **74** engaging the upper surface of base plate **34**, unit **14** is securely mounted on unit **12** for operation of assembly **10** as a combined power plant.

In order to assure that plate **34** of unit **14** is properly aligned with plate **30** of unit **12**, a plurality of upwardly projecting dowels **80** are provided on the upper surface of plate **30** and which are complementally received within respective apertures **82** in plate **34** of unit **14**.

Exhaust header **84** intercommunicates cylinders **54** with an opening **86** in plate **34**, while a finned exhaust pipe **88** intercommunicates opening **90** in plate **30** with underwater exhaust conduit **92** forming a part of housing **18**. It is to be noted that openings **86** and **90** in plates **34** and **30** respectively are in alignment when apertures **82** receive respective dowels **80** and when end **28** of driven shaft **20** is complementally threaded into connector **38**, so that exhaust gases from engine **36** are directed out of conduit **92** into the water.

In order to permit unit **14** to be used separate from unit **12**, leg components broadly designated **94** are provided on unit **14** for maintaining the latter in vertically spaced relationship to a supporting surface **96**. Each of the leg components **94** includes a substantially trapezoidally-shaped rod **98** having a pair of parallel lengths **100** and **102**, lengths **102** being substantially shorter than lengths **100**. Opposed, parallel, normally horizontal sleeves **104** joined to crank housing **48** on opposite sides thereof each have a tubular lining **106** of rubber or similar material and which linings in turn rotatably receive respective lengths **102** of rods **98**. As indicated in Fig. 7 of the drawing, linings **106** are provided with key portions **108** received within corresponding, opposed slots **110** in sleeves **104** to thereby prevent rotation of linings **106** relative to sleeves **104**.

Means for releasably locking rods **98** in their extended positions as illustrated in Fig. 3 preferably comprises a collar **112** slidably mounted on each of the lengths **102** of rods **98** and having inwardly extending keys **114** slidably disposed in elongated slots **116** extending longitudinally of lengths **102**. Lugs **118** integral with collars **112** and extending toward respective sleeves **104** are adapted to be complementally received within corresponding slots **120** within linings **106** and sleeves **104**.

Perforated ears **122** welded to lengths **100** of rods **98** are disposed at angles so as to lie flat on supporting surface **96** when legs **94** are in their extended positions, as illustrated in Fig. 3.

In describing the operation and utility of combined outboard motor and generating plant assembly **10**, it will initially be assumed that it is desired to use assembly **10** in propelling a small boat by positioning the same on the rear transom of such boat. Unit **14** is securely mounted on unit **12**, as illustrated in Fig. 1, and leg components

94 are folded to their normally inoperative positions against or adjacent to crank housing 48 of engine 36, with collars 112 shifted into a position with the lugs 118 thereof received within corresponding slots 120 in linings 106 and sleeves 104 to thereby maintain rods 98 in out-of-the-way positions. Clamp assembly 32 is secured to the transom of the boat and engine 36 may be started by pulling on the recoil starter handle 124 connected to starter 126, in turn mounted on hood 128. Control handle 124 is moved to the desired location with the gears within casing 24 being shifted to forward, reverse or neutral, as desired. Thus, if the gears are in forward position, propeller 22 is rotated as driven shaft 20 is operated by the drive shaft of engine 36.

Assuming that it is desired to generate electricity during operation of engine 36 and consequent rotation of propeller 22, the pivotally interconnected ends of elements 62 and 64 are shifted toward bracket ears 50 and brackets 52 to thereby cause toggle structure 60 to collapse and move drive wheel 42 of the armature of generator mechanism 16 into operable engagement with the outer, peripheral edge of flywheel 58. In this manner, as flywheel 58 rotates during operation of engine 36, generator mechanism 16 supplies electrical energy to a desired point of use. It can now be perceived that power unit 14 may be utilized to simultaneously propel the boat and also generate electrical energy or, in the alternative, the boat may be propelled by assembly 10 without mechanism 16 being driven by flywheel 58 or, as a third alternative, control handle 26 of unit 12 may be shifted to a neutral position so that engine 36 continues to operate while propeller 22 remains stationary and drive wheel 42 is shifted into engagement with flywheel 58 to cause mechanism 16 to generate electricity while movement of the boat is discontinued.

If it is desired to use power plant or unit 14 at another location such as a camp site, in a cabin or other place where electric current is needed, unit 14 may be readily removed from unit 12 by merely unscrewing the nuts of bolt and wing nut assemblies 74, whereupon the latter may be swung downwardly out of slots 78 to thereby permit plate 34 of unit 14 to be moved upwardly until connector 38 clears the upper end 28 of driven shaft 20. Unit 14 may be easily carried to a desired point through the handle provided by starter 126 and then leg components 94 may be swung downwardly to their extended positions in Fig. 3 to support engine 36 in vertically spaced relationship to surface 96. In order that rods 98 may be swung downwardly about the axes of lengths 102, collars 112 are shifted away from sleeves 104 to move lugs 118 out of slots 120, whereupon when rods 98 have been moved to their extended positions, collars 112 are reshifted toward sleeves 104 to cause lugs 118 to again reengage linings 106 and sleeves 104 within corresponding slots 120. If desired, stakes or other securing means may be driven through perforated ears 122 to secure unit 14 to surface 96 and prevent movement of the same caused by vibration of engine 36 as the latter operates. In this connection, it is to be noted that spring means may be provided in collars 112 to assure that the same remain in firm engagement with linings 106 and sleeves 104.

It is particularly contemplated that assembly 10 utilize a relatively lightweight engine 36 which is normally termed a "trolling" type of power plant so that the overall weight of the assembly is kept to a minimum. Thus, the fisherman or sportsman may easily transport assembly 10 to a desired location and one person may remove unit 14 from unit 12 for subsequent use at another site. Another important feature is the utilization of an air cooled type of power plant so that it in not necessary to provide means for cooling engine 36 and the same may be used at any location, even remote from the water.

Although a governor has not been illustrated in the assembly described, it is to be pointed out that in certain

instances it may be desirable or necessary to provide such a governor in order to limit the r.p.m.'s of engine 36 as the load thereon fluctuates, but it can be appreciated that many types of governors or similar devices can be utilized in the instant invention. It is contemplated that other modifications and changes such as this may be made in the present assembly without departing from the scope of the invention and therefore, it is intended to be limited only by the scope of the appended claims.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A combined outboard motor and generating plant comprising a lower drive unit provided with a propeller and a driven shaft operably connected thereto; an upper power unit releasably connected to the lower unit and having a prime mover provided with a drive shaft operably coupled with said driven shaft only when the units are interconnected, the upper unit being completely separable from the lower unit; and generator mechanism carried by the upper unit and actuatable by the drive shaft of the prime mover whereby the mechanism produces electrical energy during operation of the prime mover irrespective of the relative relationship of the units.

2. A combined outboard motor and generating plant comprising a lower drive unit provided with a propeller and a driven shaft operably connected thereto; an upper power unit releasably connected to the lower unit and having a prime mover provided with a drive shaft operably coupled with said driven shaft only when the units are interconnected, the upper unit being completely separable from the lower unit; and generator mechanism carried by the upper unit and selectively actuatable by the drive shaft of the prime mover whereby the mechanism may optionally be used to produce electrical energy during operation of the prime mover irrespective of the relative relationship of the units.

3. A combined outboard motor and generating plant comprising a lower drive unit provided with a propeller and a driven shaft operably connected thereto; an upper power unit releasably connected to the lower unit and having a prime mover provided with a drive shaft operably coupled with said driven shaft only when the units are interconnected, the upper unit being completely separable from the lower unit; and generator mechanism shiftably carried by the upper unit and movable to and from a position where the same is actuated during rotation of the drive shaft whereby the mechanism may optionally be used to produce electrical energy during operation of the prime mover irrespective of the relative relationship of the units.

4. A combined outboard motor and generating plant comprising a lower drive unit provided with a propeller and a driven shaft operably connected thereto; an upper power unit releasably connected to the lower unit and having a prime mover provided with a drive shaft and a flywheel thereon, said drive shaft being operably coupled with said driven shaft only when the units are interconnected and the upper unit being completely separable from the lower unit; and generator mechanism shiftably carried by the upper unit and having a drive wheel, said mechanism being movable to and from a position with said drive wheel thereof operably engaging the flywheel whereby the mechanism may optionally be used to produce electrical energy during operation of the prime mover irrespective of the relative relationship of the units.

5. A combined outboard motor and generating plant comprising a lower drive unit provided with a propeller and a driven shaft operably connected thereto; an upper unit releasably connected to the lower unit and having a prime mover provided with a drive shaft and a flywheel thereon, said drive shaft being operably coupled with said driven shaft only when the units are interconnected and the upper unit being completely separable from the lower

unit; generator mechanism having a drive wheel; and toggle structure shiftably mounting the mechanism on the upper unit in a position to maintain the drive wheel in spaced relationship to the flywheel when the structure is in its extended position and to automatically shift the drive wheel into operable engagement with the flywheel when the structure is in its collapsed position whereby the mechanism may optionally be used to produce electrical energy during operation of the prime mover irrespective of the relative relationship of the units.

6. A combined outboard motor and generating plant as set forth in claim 5 wherein said structure includes a pair of pivotally interconnected elements, one of the elements being pivotally connected to the mechanism and the other element being pivotally coupled with the upper unit, and spring means interconnecting opposed ends of the elements adjacent said mechanism and the upper unit respectively.

7. A combined outboard motor and generating plant as set forth in claim 6 wherein said elements have means thereon limiting relative folding of the same in one direction to thereby maintain the drive wheel out of engagement with said flywheel.

8. A combined outboard motor and generating plant comprising a lower drive unit provided with a propeller and a driven shaft operably connected thereto; an upper power unit releasably connected to the lower unit and having a prime mover provided with a drive shaft operably coupled with said driven shaft only when the units are interconnected, the upper unit being completely separable from the lower unit; generator mechanism carried by the upper unit and actuatable by the drive shaft of the prime mover whereby the mechanism produces electrical energy during operation of the prime mover irrespective of the relative relationship of the units; and foldable leg components carried by the upper unit for maintaining the latter in spaced relationship above a supporting surface when the upper unit is separated from the lower unit.

9. A combined outboard motor and generating plant as set forth in claim 8 wherein said components include a pair of substantially trapezoidally-shaped rods pivotally mounted on opposed sides of the upper unit.

10. A combined outboard motor and generating plant as set forth in claim 9 wherein is provided parallel sleeves on opposed sides of the upper unit rotatably receiving corresponding, identical lengths of respective rods, there being releasable means on said rods engageable with respective sleeves for maintaining the rods in extended positions supporting the upper unit above said surface.

11. A combined outboard motor and generating plant as set forth in claim 10 wherein said releasable means includes slots in said sleeves and a collar slidably mounted on respective lengths of the rods, secured against rotation thereon and provided with laterally extending lugs movable into corresponding slots in the sleeves.

12. A combined outboard motor and generating plant comprising a lower drive unit having an upper, flat mounting plate, a propeller at the lower end thereof, a driven shaft operably coupled with the propeller, extending upwardly in the lower unit to a point adjacent the upper plate and externally splined at the upper end thereof; an upper power unit removably mounted on the lower unit and having a base plate releasably connected to said upper plate of the lower unit and a prime mover provided with a drive shaft having an internally splined connector at the lower end thereof complementally receiving the splined upper end of said driven shaft only when the units are interconnected; and generator mechanism carried by the upper unit and actuatable by the drive shaft of the prime mover whereby the mechanism produces electrical energy during operation of the prime mover irrespective of the relative relationship of the units.

13. A combined outboard motor and generating plant as set forth in claim 12 wherein said prime mover is an air cooled, hydrocarbon powered engine.

14. A combined outboard motor and generating plant as set forth in claim 13 wherein said plates are provided with aligned openings, said upper unit being provided with an exhaust header extending from the engine to the opening in the base plate and said lower unit having an exhaust pipe extending from the opening in said upper plate to a point adjacent the lower extremity of the drive unit.

15. A combined outboard motor and generating plant as set forth in claim 12 wherein one of the plates is provided with laterally extending dowels and the other plate has an aperture receiving a respective dowel to maintain the units in proper alignment when the same are interconnected.

16. A combined outboard motor and generating plant as set forth in claim 12 wherein one of the plates is provided with a pair of opposed slots in the outer peripheral edge thereof and the other plate has a bolt and nut assembly for each of said slots and disposed to be received in a respective slot for releasably interconnecting the units.

17. A combined outboard motor and generating plant comprising a lower drive unit provided with a propeller; an upper power unit mounted on said lower unit and having a prime mover provided with a drive shaft operably coupled with said propeller, there being gear means connected with said drive shaft for disengaging the latter from the propeller and permitting the prime mover and thereby the drive shaft to be operated completely independently of the propeller; and generator mechanism carried by the power unit and selectively actuatable by said drive shaft of the prime mover during operation of the latter irrespective of interconnection of the drive shaft and the propeller.

No references cited.