June 15, 1965 H. J. BARTEN 3,188,995

AIR PROPELLER ATTACHMENT FOR MARINE ENGINES

Filed Aug. 23, 1963 2 Sheets-Sheet 1

Fig. 1

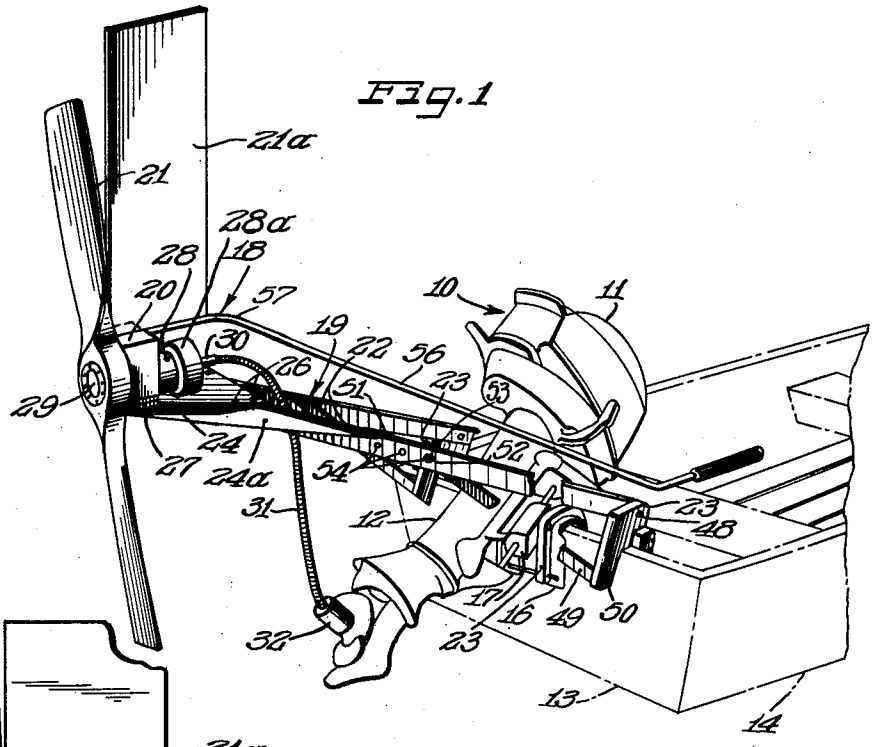


Fig. 2

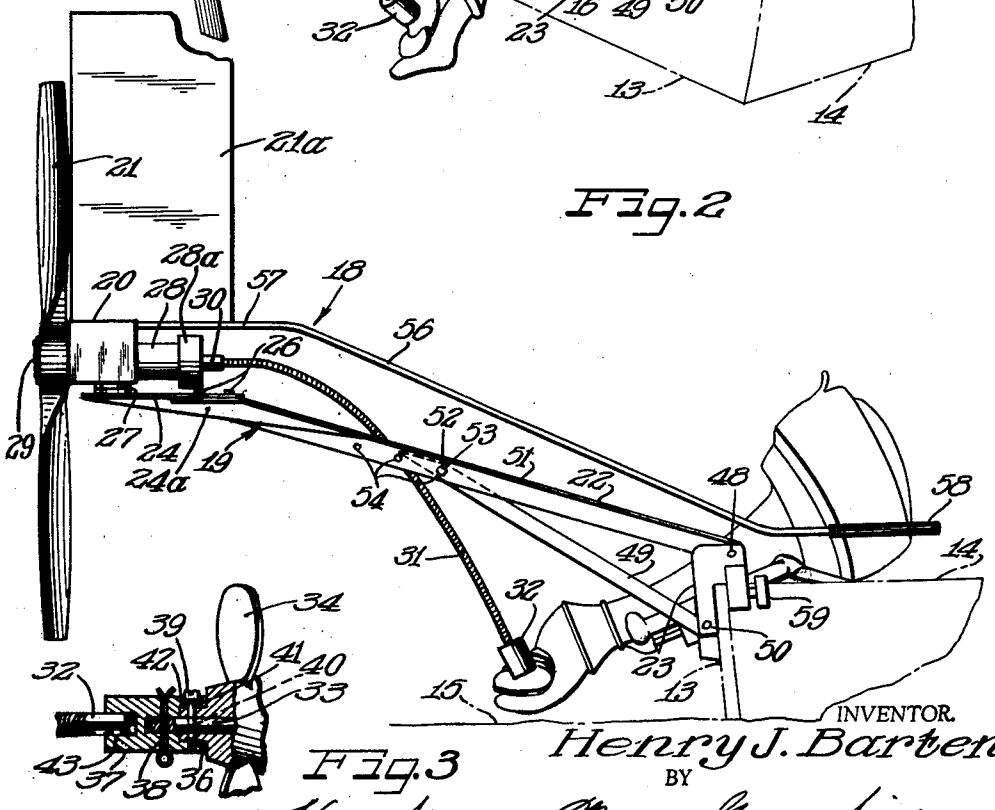


Fig. 3

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Filed Aug. 23, 1963 2 Sheets-Sheet 2

Fig. 4

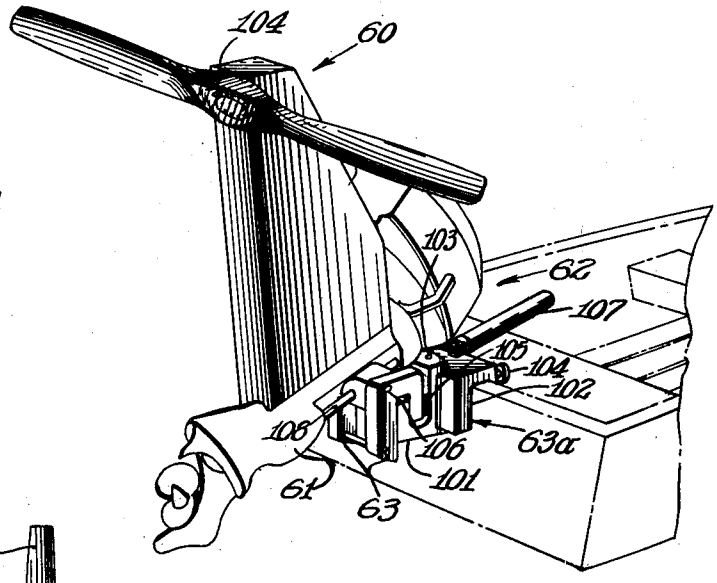
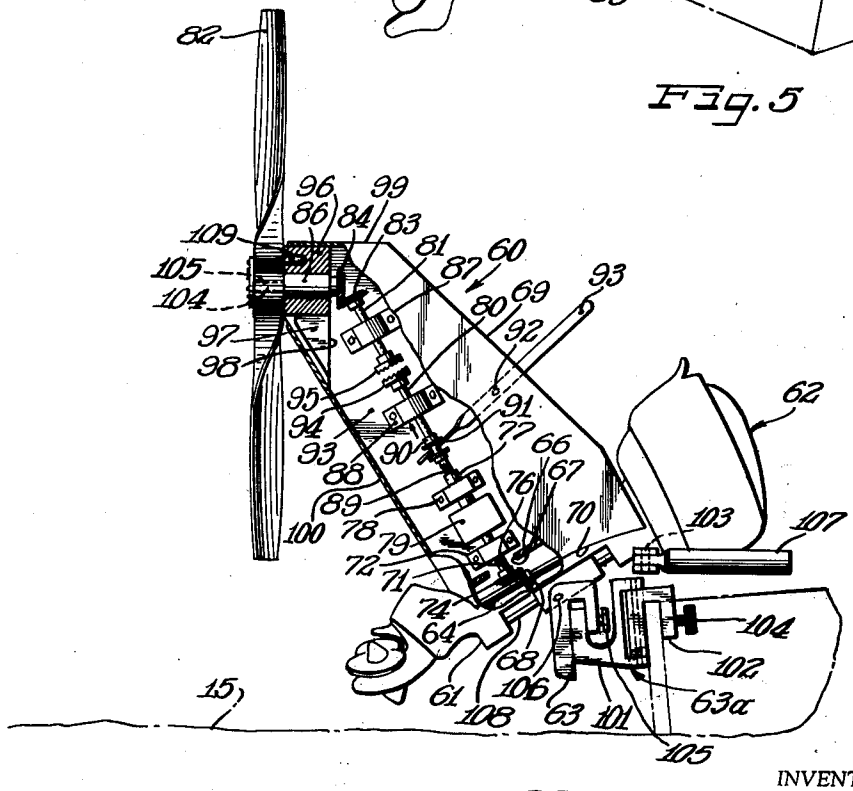


Fig. 5



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AIR PROPELLER ATTACHMENT FOR MARINE ENGINES

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This invention relates generally to an air propeller attachment for marine engines and more particularly relates to an attachment adapted to be connected to a marine engine of the type generally classified as "outboard" for propelling a boat by means of an air propeller instead of the usual water propeller. The attachment of the present invention permits alternate use of a water propeller and an air propeller, provides an air propeller operable within the r.p.m. range of the usual water propeller, can be constructed for integral or non-integral assembly with an outboard motor, is simple in design and construction and is easy to connect and to operate.

Air propeller driven boats are known wherein a gasoline powered marine engine is connected by suitable drive means to an air propeller mounted on the boat above the water line for propelling the boat by means of air propulsion rather than by means of the usual water propulsion. This type of propulsion has particular utility when navigating waters wherein vegetation, debris or other undesirable matter is situated at or closely below the water line and is capable of fouling a water propeller. As an example, air propeller driven boats are used extensively in certain marsh or swamp lands situated in the State of Florida.

The marine engines used to power the air propeller of known air propeller driven boats are of the so-called "inboard" variety as contrasted with the "outboard" variety. Generally, the air propeller is rotatably mounted at the stern of the boat, and is connected by suitable drive means, such as a chain linkage or V-belt drive, to an inboard marine engine. A water propeller is not usually connected to the engine since the normal inboard marine engine drives a water propeller from a drive shaft connected directly to the crankshaft of the engine and extending downwardly and rearwardly through the bottom of the boat into the water. Since it is impractical to retract or disconnect such a water propeller drive shaft from a boat for use over marsh or swamp areas wherein such shaft would become entangled with vegetation, air propeller driven boats are generally not equipped for water propeller operation and generally do not include a water propeller drive shaft extending from the bottom thereof.

As a result, air propeller driven boats of the prior art are not particularly suited for alternate water and air propulsion.

Further, inboard type marine engines have certain disadvantages as contrasted with the "outboard" variety. Inboard engines are permanently mounted within a boat and cannot be readily removed for servicing operations. Inboard engines cannot be easily utilized successively on a number of boats by simply unclamping the engine from one boat and clamping it on another, as is generally the case with the outboard type. Further, engines of the outboard variety incorporate a pivotal propeller drive shaft which can be easily and quickly tilted for raising the water propeller above the water line, a feature particularly useful in connection with air propeller driven boats as will be described hereinafter and such feature is not available in engines of the inboard type.

As used in this application, the term "outboard engine" is not meant to be restrictive to engines of the two-cycle type, but is meant to include all marine engines having a lower housing or drive shaft capable of being tilted so as

to completely remove the drive shaft and the water propeller from the water without disconnecting the lower housing or drive shaft from the engine.

In view of the above, it is a primary object of the present invention to overcome many of the deficiencies of the prior art by providing an air propeller attachment for a boat utilizing an "outboard" engine such that air propulsion and water propulsion are alternatively available without extensive removal, modification or disengagement of parts.

Another object of the present invention is to provide an attachment for a boat wherein an air propeller can be conveniently driven from an "outboard" engine.

Another object of the present invention is to provide a boat utilizing an engine of the pivotal drive shaft type with an air propeller attachment to render such boat capable of dealing with or negotiating clear water and marsh areas with facility.

Another object of the present invention is to provide an air propeller attachment adapted for operating in conjunction with an outboard marine engine.

Many other features, advantages and additional objects will become manifest to those versed in the art from the detailed description of the invention which follows and the accompanying sheets of drawings in which preferred embodiments of an outboard marine engine and an air propeller attachment incorporating the principles of the present invention are shown by way of illustrative example.

On the drawings:

FIGURE 1 is a fragmentary perspective view of a boat assembly including an outboard engine and one embodiment of an air propeller attachment incorporating the principles of the present invention, with certain portions shown in phantom;

FIGURE 2 is a side elevational view of the boat assembly of FIGURE 1;

FIGURE 3 is a fragmentary sectional view of the outboard engine of FIGURE 1 showing a power shaft thereof with a flexible power transmitting member attached thereto;

FIGURE 4 is a fragmentary perspective view of a boat assembly including an outboard engine and another embodiment of an air-propeller attachment of the present invention; and

FIGURE 5 is a side elevational view of the boat assembly of FIGURE 4 showing portions cut away.

As shown on the drawings:

Although the principles of the present invention are of utility in association with any marine engine of the type incorporating pivotal mounting for the drive shaft or lower housing, a particularly useful application is made to engines of the type normally carried by the transom of the boat at the stern thereof, and an illustrative embodiment herein shown consists of a multi-cylinder two-cycle gasoline operated "outboard" marine engine shown generally at **10** in FIGURE 1 wherein is illustrated an engine housing **11** having a lower housing or drive shaft housing **12** rigidly connected thereto and depending therefrom. The engine **10** is shown mounted on a transom board **13** of a boat **14** and is fixedly clamped thereto above a water line **15** by means of a clamp bracket **16**. The lower housing **12**, and accordingly the entire engine **10**, is mounted for pivotal movement on the clamp bracket **16** by means of a pivot bar **17**, and such movement is in a plane transverse to the plane of the transom **13**. The pivot bar **17** also permits rotation of the engine **10** about an axis parallel to the longitudinal axis of the lower housing **12**.

One embodiment of an air propeller attachment incorporating the principles of the present invention is shown

generally at 18 in FIGURES 1 and 2 and comprises a main frame 19, a propeller shaft mounting block 20 and an air propeller 21. The main frame 19 is constructed for easy and removable mounting on the boat 14 and to this end a pair of angularly upwardly extending converging V-members 22, 22 are pivotally connected to a pair of mounting brackets 23, 23 which are clamped to the transom 13 on either side of the engine clamp bracket 16. To provide for alternate or supplemental steering effect, an air rudder 21*a* is mounted on the mounting block 20 adjacent the air propeller 21.

At the converging ends of the V-members 22, 22 a mounting plate 24 is fixedly connected thereto by means of bolt 26 and for additional rigidity a pair of gusset plates 24*a* are secured by suitable means, such as a welded connection, to the V-members 22, 22 and the mounting plate 24. The mounting block 20 is mounted for horizontal rotation on the mounting plate 24 by means of a bearing assembly as at 27. A propeller shaft journal member 28 and a centrifugal clutch member 28*a* are connected in fixed assembly to the mounting block 20 and a propeller shaft 29 on which the air propeller 21 is mounted, is carried for rotation in the mounting block 20 and the journal member 28. Fixedly connected at one end to the centrifugal clutch 28*a* is a flexible force transmitting cable 31 of a type well known in the art. At the opposite end of the cable 31 a power take-off portion or assembly 32 is formed thereon and is adapted to connect to a power shaft for transmitting rotative movement to the air propeller 21.

FIGURE 3 illustrates a water propeller power shaft 33 extending from the lower housing 12 of the engine 10 and through the usual water propeller 34. It will be understood that the shaft 33 is operatively connected to the main drive shaft (not shown) of the engine 10 which is journalled for rotation within the lower housing 12.

Mounted on the shaft 33 adjacent an extension 36 of the propeller 34 is a connector collar member 37 maintained in fixed assembly on the shaft 33 by means of a retainer pin 38. A bolt-type shear pin 39 is inserted through aligned threaded apertures 40 and 41 formed respectively in the shaft 33 and in a portion 42 of the collar 37 which overlies the propeller extension 36.

The power take-off assembly 32 of the cable 31 comprises an inflexible squared solid end portion which is received in friction-locking relation with a complementarily shaped opening 43 formed in the collar member 37. In operation, the connector collar 37 can be continuously connected to the shaft 33, even during periods of conventional water propeller operation. When air propeller operation is desired, the cable 31 can be connected to the connector collar 37 without disturbing the shaft 33 or the water propeller 34. Operation of the air propeller 21 requires, therefore, only that the cable power take-off assembly 32 be connected to the connector collar member 37. Preferably, the lower housing 12 of the engine 10 is tilted or pivoted out of the water to a position as illustrated in FIGURES 1 and 2 during air propulsion operation to avoid entanglement with vegetation and other debris that might be located at or near the surface of the water. Converting back to water propulsion requires only that the power take-off assembly 32 be disconnected from the collar member 37 and then the lower housing 12 be pivoted to its normal position, wherein its longitudinal axis is substantially parallel to and outboard of the transom 13.

In order to vary the plane of rotation of the air propeller 21 relative to the boat 14, which in turn effects the plane or lift of the boat as it moves through the water, the V-members 22, 22 of the main frame 19 are pivotally connected to the mounting brackets 23, 23 by means of mounting pins as at 48. The position of the main frame 19 relative to the water line may be selectively adjustably varied by means of lift bars 49, 49 which are pivotally mounted at one end thereof to a respective mounting

bracket 23 by means of mounting pins as at 50. The other end of each of the lift bars 49, 49 is pivotally connected to an intermediate portion 51 of a respective V-member 22 by means of an adjusting bolt as at 52, which is inserted through a bolt hole 53 formed in each of the lift bars 49, 49 and one of a number of axially spaced holes as at 54 formed in the intermediate portions 51. Accordingly, the angle of the main frame 19 and consequently the plane of rotation of the air propeller 21, relative to the bolt 14, is selectively adjustable in accordance with which the holes 54 in the V-members 22, 22 are selected to receive the adjusting bolts 52.

In order to control steering of the boat 14 under air propulsion operation, a steering handle 56 is fixedly connected at one end 57 to the mounting block 20 and extends at its opposite end 58 to a position providing easy access thereto by a person who may be seated at the stern of the boat. Lateral movement of the handle 56 will pivot the plane of rotation of the air propeller 21 as well as the air rudder 21*a* substantially about the bearing assembly 27, which will in turn tend to steer the direction of movement of the boat accordingly.

The embodiment of the invention illustrated in FIGURES 1 and 2 is defined as being a non-integral unit, that is, the air propeller attachment 19 is not mounted directly on the engine 10 but is instead mounted on the transom 13 and fixedly connected thereto by tightening knobs as at 59. The only connection between the attachment 19 and the engine 10 is through the flexible cable 31.

In FIGURES 4 and 5 another embodiment of the invention is illustrated, which is defined as being an integral unit, wherein an air propeller attachment indicated generally at 60 is mounted directly on a lower housing 61 of an outboard engine indicated generally at 62. The engine 62 is clamped by means of mounting brackets 63, 63 to a mounting device 63*a* which is, in turn, clamped to the transom 13 of the boat 14.

A drive shaft 64 is illustrated as extending longitudinally within the lower housing 61 and is connected at its upper end in the usual manner to a crankshaft (not shown) of the engine 62. A back portion 66 of the lower housing 61 has been cut away as at 67 and a bevel gear 68 is mounted for corotation on the drive shaft 64 and comprises a power take-off from the shaft 64.

An attachment housing 69 is fixedly mounted on the lower housing 61 by suitable means such as a welded joint as at 70. A shaft 71 is mounted for rotation within the housing 69 at right angles to the drive shaft 64 and is supported by means of a bearing member as at 72. A bevel gear 74 is mounted on the lower end 76 of the shaft 71 for meshing engagement with the bevel gear 68.

Another shaft 77 is axially aligned with the shaft 71 and is supported for rotation by means of a bearing member 78. In order to reduce inertia forces during starting of the engine 62 a known centrifugal clutch 79 connects the shafts 71 and 77 and engages to transmit rotation from the shaft 71 to the shaft 77 only when the shaft 71 has attained a predetermined minimum r.p.m. Shafts 80 and 81 are also axially aligned with shafts 71 and 77 and are adapted for selectively transmitting rotation to an air propeller 82. A bevel gear 83 mounted at the upper end of the shaft 81 is maintained in constant meshing engagement with a gear 84 on a propeller shaft 86 by means of a bearing member 87. Shaft 80 is supported for both axial and rotative movement by a bearing member 88 and is splined at one end as at 89 for corotation with the shaft 77. A collar member 90 is fixedly mounted for rotation on the shaft 80 and receives a bifurcated member 91 which is pivoted as at 92 and extends from the housing 69 at one end thereof to form a handle portion 93. Pivotal movement of the handle portion 93 causes the member 91 to engage the collar 90 for moving the shaft 80 axially telescopically relative to the shaft 77.

At interfacing ends of shafts **80** and **81** engaging portions **94** and **95** of a dog clutch are mounted respectively thereon and are adapted to engage shafts **80** and **81** in response to movement of the handle **93**. Accordingly, the air propeller can be engaged or disengaged from the engine **62** as desired.

The propeller shaft **86** is journalled in a bearing **96** which is supported by a web **97** attached to a flange plate **98** which is connected in fixed assembly to a top face **99** and an end plate **100** of the housing **69** by suitable means such as a weld joint.

In order to permit steering rotation of the engine **62** about an axis perpendicular to the surface of the water, the clamping device **63***a* comprises a generally U-shaped bracket **101** and a transom mounting support **102**. The engine mounting brackets **63**, **63** are securely fastened to the bracket **101** by means of tightening knobs **102**. The U-shaped bracket **101** is pivotally connected to the mounting support **102** by means of a vertical pivot pin **103**, and the support **102** is clamped to the transom board **13** by means of tightening knobs **104**.

During periods of air propulsion operation, the lower housing **61** of the engine **62** is pivoted downwardly about a pin **106** carried by the mounting brackets **63**, **63** to a raised position as illustrated in FIGURES 4 and 5, wherein the lower housing **61** is situated above the water line **15** and the plane of rotation of the air propeller **82** is substantially at right angles to the water line **15**. The lower housing **61** may be locked in this raised position by the usual locking means (not shown) normally included in outboard engines. Steering of the boat under air propulsion operation may be accomplished by providing lateral movement to a steering handle **107** connected to the engine **62** which provides rotative movement to the lower housing **61** about a steering shaft **108**. In this manner, the propelling effect of the propeller **82** can be situated at either side of the longitudinal axis of the boat **14**, thereby controlling the direction of movement thereof.

When it is desired to use water propulsion, the lower housing **61** is pivoted about the pin **106** to a position wherein the lower housing **61** assumes a position substantially parallel to the transom board **13** and at right angles to the water line **15**. The attachment housing **69** would thereby extend substantially horizontally from the lower housing **61** and the handle **93** would be pivoted for disengaging the air propeller **82** from the drive shaft **64**.

In order to prevent the air propeller **82** from dipping into the water during periods of water propulsion operation, a bore **105** is formed to extend transversely through the air propeller **82** adjacent the propeller shaft **86**, and a complementarily shaped bore **109** is formed in the bearing **96**. A rod or pin (not shown) may be inserted into bores **105** and **109** to maintain the air propeller in a position substantially parallel to the water line when the engine **62** has been pivoted downwardly for water propulsion operation.

Accordingly, there has been provided an integral and non-integral air propeller attachment for a marine engine of the outboard type whereby a single engine can be used for both water and air propulsion. From the standpoint of engine modification, the non-integral arrangement requires only that a flexible cable be connected to the water propeller of the engine for power take-off. The integral arrangement requires some modification to the engine but has the added advantages of greater support for the air propeller, greater balance to the entire boat assembly as it rides in the water and provides for clutch means for easy engagement and disengagement of the air propeller.

Although various modifications might be suggested by those versed in the art, I wish to embody within the scope of the patent warranted herein all such modifications as come within the scope of my contribution to the art.

I claim as my invention:

1. In combination, for use on a boat,
a marine engine of the outboard type adapted to be mounted on the boat and having a water propeller drive shaft pivotally connected thereto for movement into and out of the water,
a rotatable air propeller drive shaft having an air propeller mounted thereon and adapted for mounting on the boat, and flexible power transmitting means for operatively connecting said water propeller drive shaft to said air propeller drive shaft for driving said air propeller,
whereby said engine is adapted to provide power for both water and air propulsion and whereby said water propeller drive shaft can be pivotally moved out of the water during air propulsion operation and can be moved into the water during water propulsion operation while said force transmitting means is connected between said drive shafts.

2. In combination with a boat having a transom board,
a marine engine of the outboard type having a water propeller drive shaft pivotally mounted thereon for movement alternatively into and out of the water and adapted to be mounted on the boat,
a frame adapted for mounting on the transom board and for extending from the stern of the boat,
a horizontally disposed air-propeller shaft having an air propeller mounted thereon for propelling said boat by air propulsion,
mounting means for mounting said air propeller shaft on said frame for rotation about its longitudinal axis and for rotation about a vertical axis transverse to said longitudinal axis,
flexible force transmitting means connected to said water propeller shaft and to said air propeller shaft for driving said air propeller, and
steering means connected to said mounting means and adapted to be operable from said boat for rotating said air propeller shaft about said vertical axis and independently of said water propeller drive shaft for steering said boat when under air propulsion.

3. In combination,
a boat having a transom board at the stern thereof,
a marine engine mounted on the boat,
said engine having a lower housing including a drive shaft situated astern of the transom board and pivotally movable relative to the transom board,
an attachment housing fixedly mounted on said lower housing,
an air propeller journalled for rotation on said attachment housing,
drive means rotatably carried by said attachment housing and operatively connected to said air propeller, and
power take-off means on said drive shaft connected to said drive means for driving said air propeller from said engine.

4. In combination, for use on a boat having a transom board,
a marine engine adapted for mounting on the boat and of the type having a lower housing including a drive shaft adapted to be situated astern of the transom board and to be pivotally movable relative to the transom board,
an attachment housing fixedly mounted on said lower housing,
an air propeller journalled for rotation on said attachment housing,
drive means rotatably carried by said attachment housing and operatively connected to said air propeller, and

power take-off means on said drive shaft connected to said drive means for driving said air propeller from said engine.

5. In combination, for use on a boat having a transom board,

a marine engine adapted to be mounted on the transom board and having a lower housing including a drive shaft pivotally movable relative to the transom board,

an attachment having an air propeller rotatably mounted thereon,

said attachment being fixedly connected to said lower housing,

drive means carried by said attachment and operatively connected to said air propeller, and

power take-off means on said drive shaft and connected to said drive means for driving said air propeller from said engine.

6. An attachment for use with an out-board marine engine having a pivotal lower housing including a drive shaft and a power take-off means on said drive shaft compressing,

a housing adapted to be mounted on said lower housing,

an air propeller journalled for rotation on said housing, and

drive means including clutch means rotatably mounted on said housing and operatively connected to said air propeller,

said drive means adapted to engage in driving relation the power take-off means for driving said air propeller from said engine.

7. An attachment for use with an outboard marine engine having a pivotal lower housing including a drive shaft and a power take-off gear means on said drive shaft comprising,

a housing adapted to be fixedly connected to said lower housing,

an air propeller journalled for rotation on said housing,

drive means including a manually operable clutch means rotatably mounted on said housing and operatively connected to said air propeller, and

gear means on said drive means adapted to engage in driving relation the power take-off gear means for driving said air propeller from said engine.

8. Apparatus for driving a boat by means of air propulsion and water propulsion comprising,

a marine engine having an elongated lower housing,

a water propeller drive shaft mounted at a lower end of said housing for receiving a water propeller,

means carried on said lower housing for attaching said housing to the boat to provide pivotal movement of said housing in a vertical plane to alternatively swing the water propeller into the water to drive the boat by means of water propulsion and to swing the water propeller out of the water and also to provide rotatable movement of said lower housing about the longitudinal axis thereof to steering the boat when driven by water propulsion,

an air propeller mounting frame including means for securely attaching said frame to the boat,

an air propeller power shaft having an air propeller mounted thereon for driving the boat by means of air propulsion,

mounting means mounting said air propeller drive shaft and said air propeller on said frame to provide pivotal movement of said air propeller to steer the boat when driven by air propulsion, and

a flexible force transmitting member interconnecting said water propeller drive shaft and said air propeller drive shaft.

9. In combination, for driving a boat through water by means of water propulsion and air propulsion,

a marine engine of the outboard type comprising an elongated lower housing having a water propeller power shaft for driving a water propeller,

clamping means including a clamp bracket mounted on said lower housing and adapted to be securely attached to a transom board of the boat to accommodate pivotal movement of said lower housing between a lower position whereby the water propeller is submerged beneath the water to drive the boat by means of water propulsion and an upper position whereby the water propeller is positioned out of the water,

a frame having an air propeller drive shaft rotatably mounted thereon,

an air propeller mounted on said air propeller drive shaft to drive the boat by means of air propulsion,

mounting means including mounting brackets connected to said frame and adapted to be securely attached to the transom board to mount said frame thereon independently of said engine,

said frame being arranged so that in the mounted position thereof on the transom board said frame and said air propeller are positioned out of the water, and

flexible force transmitting means interconnecting said drive shaft of said water propeller and said air propeller.

References Cited by the Examiner

UNITED STATES PATENTS

1,180,430	4/16	Riedel	115—18
1,443,368	1/23	Lamblin	115—0.5
1,450,197	4/23	Zwickey	115—3
1,823,109	9/31	Louvier	115—3
1,834,068	12/31	Merickle	115—18
2,839,696	6/58	Dunham	74—16 X

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