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Theophanides

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[54] **HYDRAULIC POWER SYSTEM FOR A BOAT**

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[51] **Int. Cl.**[6] **B63H 21/12**

[52] **U.S. Cl.** **440/5**

[58] **Field of Search** 60/433; 180/242, 180/305–308; 440/5, 75, 900, 53, 61, 84–87

[56] **References Cited**

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3,847,107	11/1974	Buddrus	440/5
3,915,111	10/1975	Buddrus	440/5
4,143,614	3/1979	Jeanson et al.	115/41 HT
4,358,280	9/1982	Jeanson et al.	440/61
4,878,864	11/1989	Van Bentem	440/5
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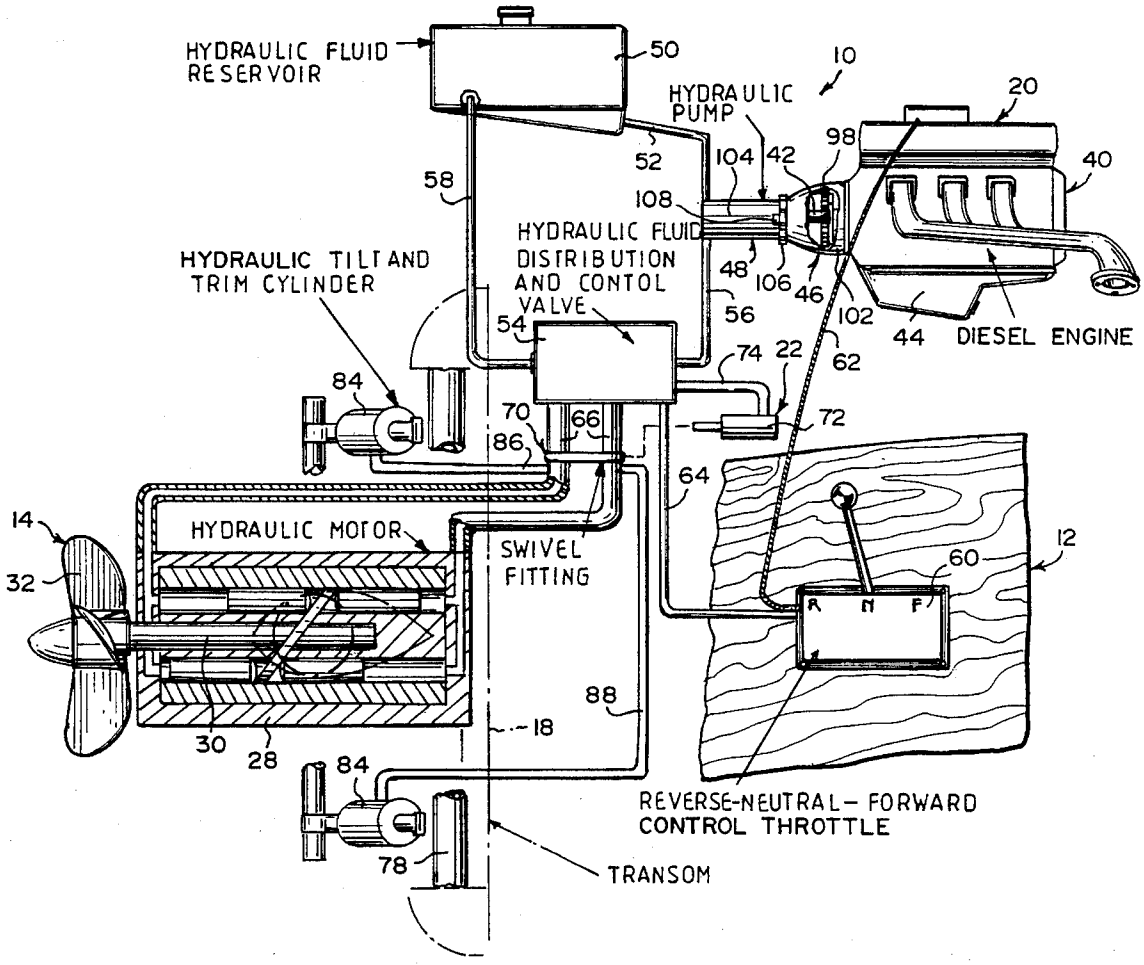
[57] **ABSTRACT**

An hydraulic power system for a boat comprising a marine thruster assembly. A structure is for mounting the marine thruster assembly to an exterior surface of a transom on the boat. A first hydraulic operative facility is for propelling the marine thruster assembly, so that the boat can travel in a body of water. A second hydraulic operative facility is for steering the marine thruster assembly, so that the boat can be directed on a course in the body of water. A third hydraulic operative facility is for lifting the marine thruster assembly out of the body of water for inspection and repair when needed.

7 Claims, 3 Drawing Sheets



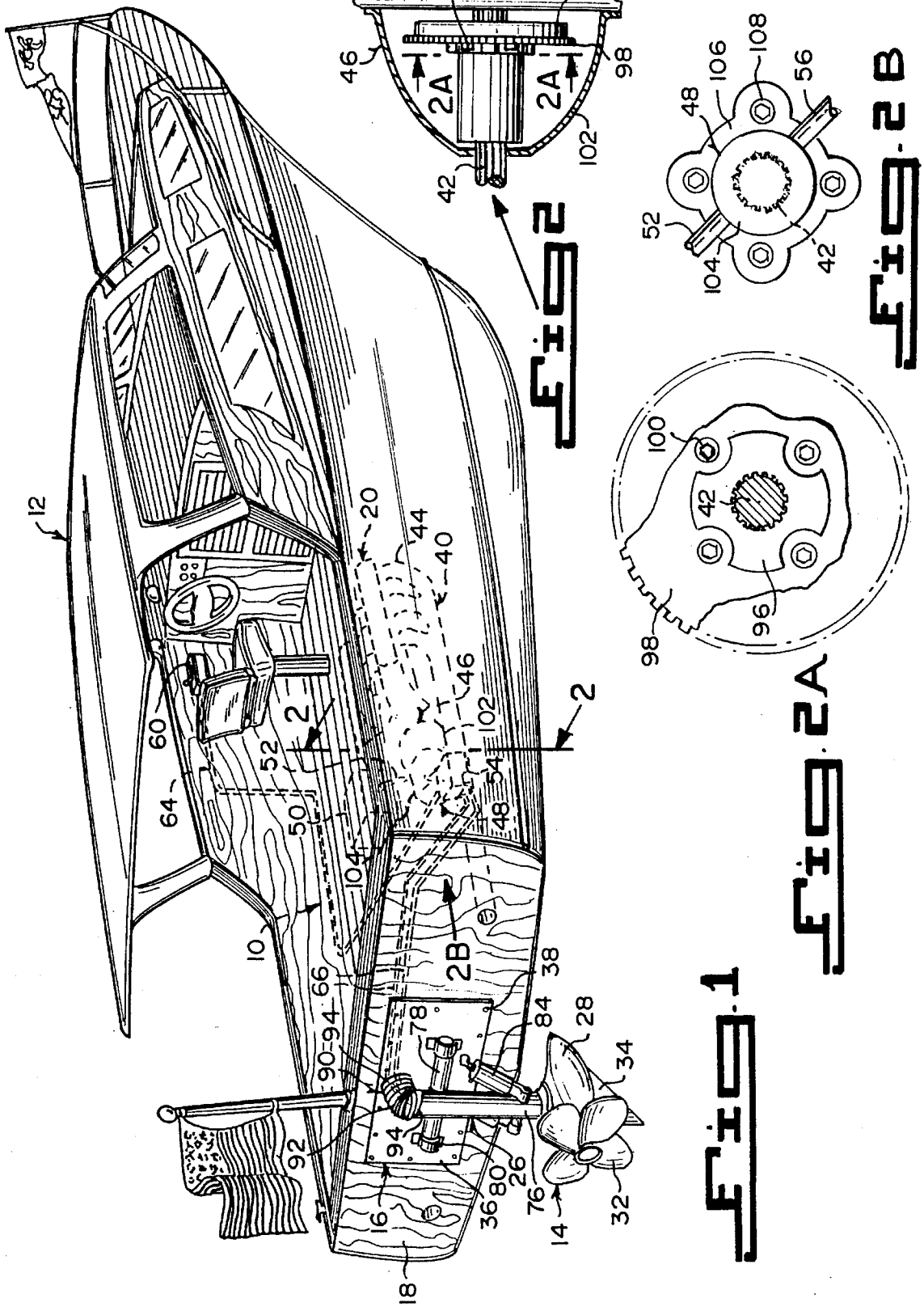


Fig. 1

Fig. 2

Fig. 2A

Fig. 2B

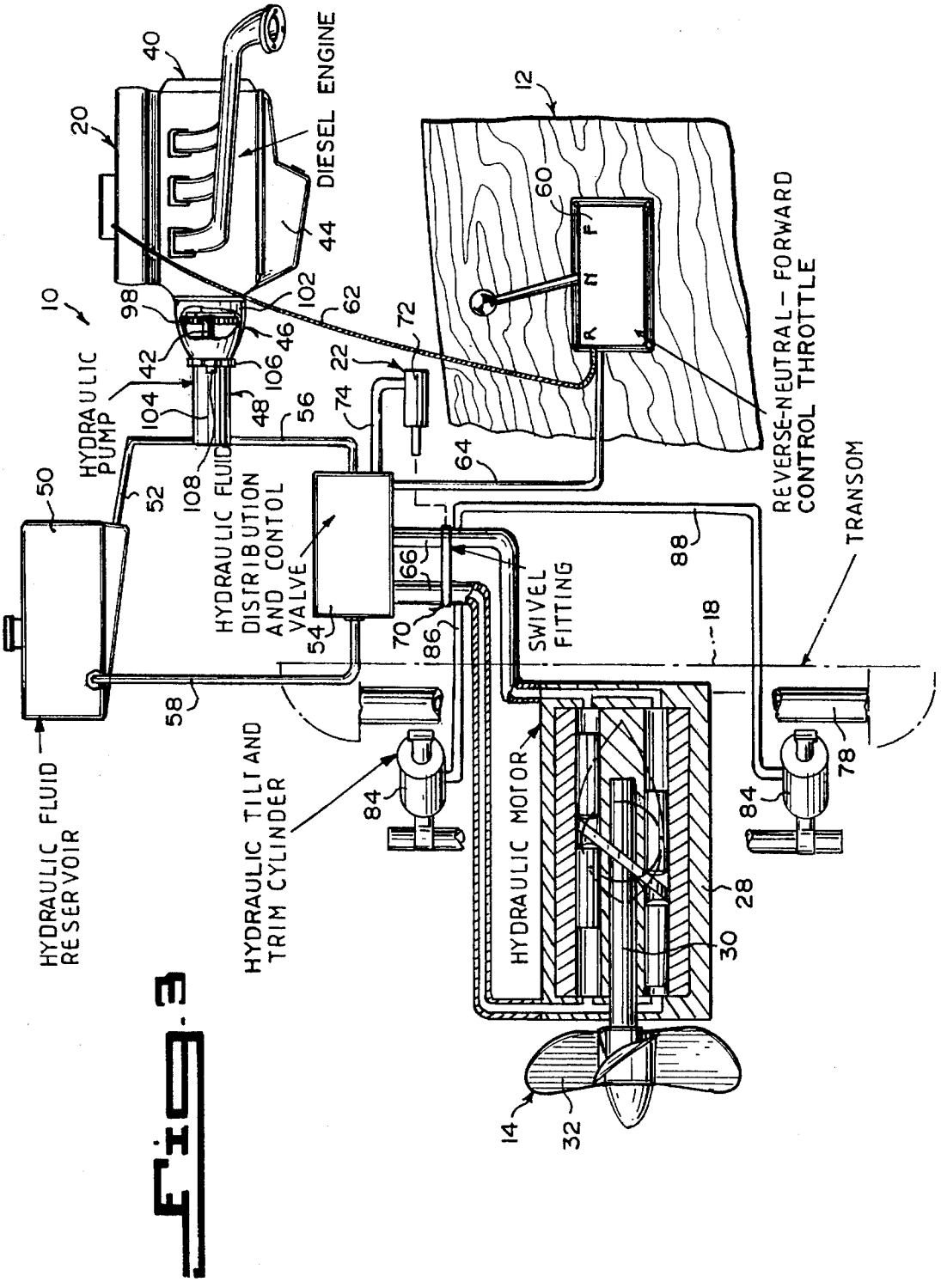

DIESEL ENGINE
REVERSE-NEUTRAL-FORWARD CONTROL THROTTLE
HYDRAULIC PUMP
HYDRAULIC FLUID DISTRIBUTION AND CONTOL VALVE
SWIVEL FITTING
TRANSOM
HYDRAULIC FLUID RESERVOIR
HYDRAULIC TILT AND TRIM CYLINDER
HYDRAULIC MOTOR
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Fig. 3

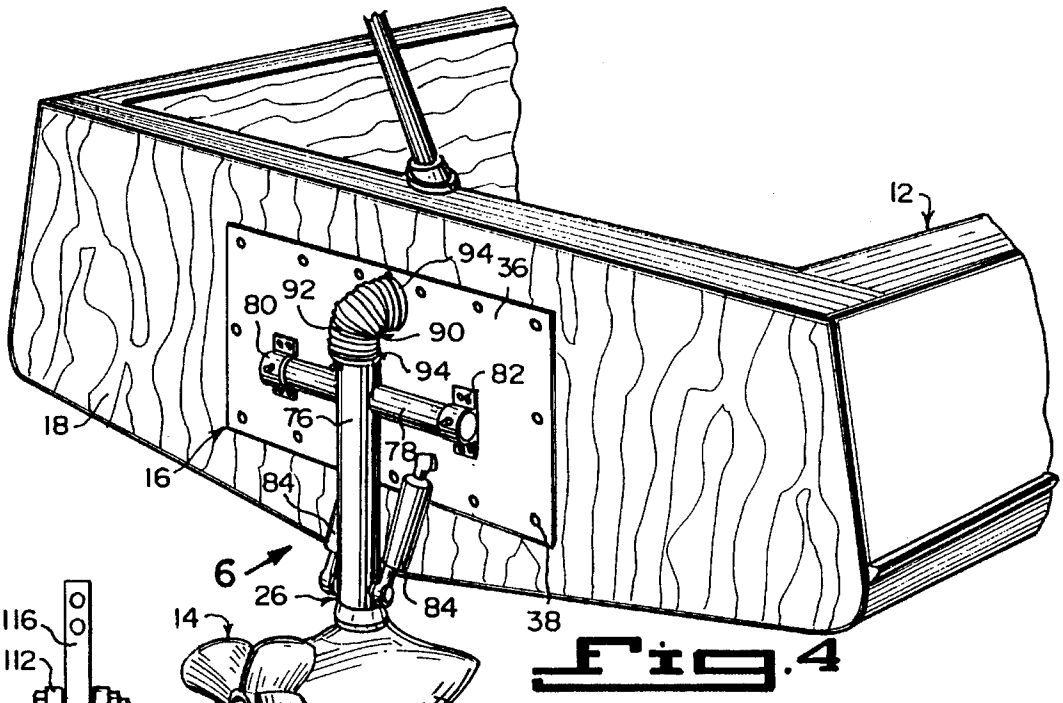

Fig. 4

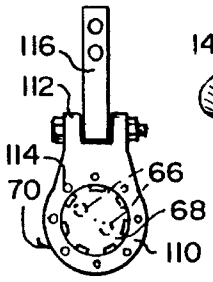

Fig. 5

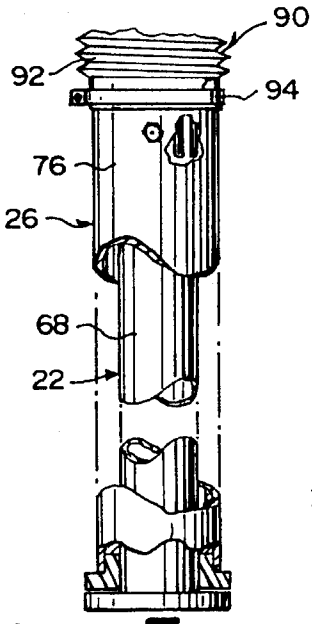

Fig. 6

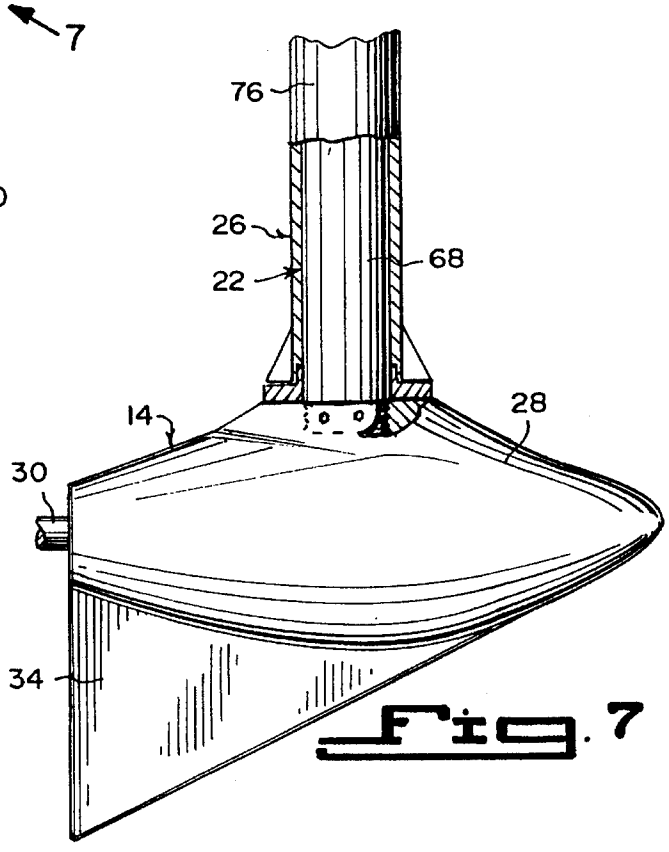

Fig. 7

HYDRAULIC POWER SYSTEM FOR A BOAT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The instant invention relates generally to propulsion units for marine vessels and more specifically it relates to an hydraulic power system for a boat.

2. Description of the Prior Art

Numerous propulsion units for marine vessels have been provided in prior art. For example, U.S. Pat. Nos. 4,143,614 to Jeanson et al.; 4,358,280 to Jeanson et al. and 4,878,864 to Van Bentem all are illustrative of such prior art. While these units may be suitable for the particular purpose to which they address, they would not be as suitable for the purposes of the present invention as heretofore described.

The screw of a screw-rudder propulsion assembly for a floating vehicle is suspended on the end of a steering shaft which is housed in a tubular casing which is supported on the vehicle. The shaft is rotated to steer the vehicle and the screw is driven by a hydrostatic receiver unit housed in the screw-rudder assembly. A pair of rotating joints through which oil is circulated to the hydrostatic receiver unit, a trust bearing, and the steering drive for rotating the steering shaft are grouped together at the top of the shaft.

A screw-rudder assembly is mounted at the bottom of a steering shaft which rotates in a tubular casing which is mounted on slide shoes which slide in vertical slide guides fixed to a support which is mounted on a floating vehicle. A power cylinder connects the tubular casing to the support and slides the casing upwardly to regulate the depth of immersion of the screw and pivots the casing upwardly about upper slide shoes when bottom slide shoes are released through passages in the slide guides, to lift the screw-rudder out of the water.

A new and improved compass-type retractable marine thruster apparatus comprises a housing pivotally mounted on a base that can be attached to the stern of a vessel. A tubular member has an upper section extending into the housing. A hub is attached to the lower end of the tubular member. A cross-vane hydraulic motor is in the hub and has a propeller mounted directly on its output shaft. A swivel assembly at the top of the tubular member is arranged so that oil under pressure can be fed to a plurality of lines that are connected to the motor. A steering motor is for rotating the tubular member about its longitudinal axis. An hydraulic cylinder can be extended to pivot the tubular member, hub and propeller out of the water.

SUMMARY OF THE INVENTION

A primary object of the present invention is to provide an hydraulic power system for a boat that will overcome the shortcomings of the prior art devices.

Another object is to provide an hydraulic power system for a boat, in which an hydraulic circuit is connected to and operated by an engine to drive a marine thruster assembly, so as to propel and steer the boat within a body of water.

An additional object is to provide an hydraulic power system for a boat, in which the hydraulic power system can also operate a pair of hydraulic cylinders to lift the marine thruster assembly out of the body of water for inspection and repair when needed.

A further object is to provide an hydraulic power system for a boat that is simple and easy to use.

A still further object is to provide an hydraulic power system for a boat that is economical in cost to manufacture.

Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above and related objects, this invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that changes may be made in the specific construction illustrated and described within the scope of the appended claims.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

Various other objects, features and attendant advantages of the present invention will become more fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views, and wherein:

FIG. **1** is a rear perspective view of a boat with the instant invention installed therein.

FIG. **2** is a diagrammatic cross sectional view taken generally along line **2**—**2** in FIG. **1**, showing the flywheel unit in greater detail.

FIG. **2A** is a diagrammatic cross sectional view taken generally along line **2A**—**2A** in FIG. **2**, with parts broken away.

FIG. **2B** is a diagrammatic end view of the hydraulic pump taken generally in the direction of arrow **2B** in FIG. **1**.

FIG. **3** is a diagrammatic view partly in section, showing the various components of the instant invention connected together in their relative positions.

FIG. **4** is an enlarged rear perspective view of a portion of the boat showing the marine thruster assembly connected to the transom in greater detail.

FIG. **5** is a diagrammatic top plan view of the swivel fitting.

FIG. **6** is a rear elevational view taken in the direction of arrow **6** in FIG. **4** with parts broken away, showing the inner steering column and the outer tilting column of the marine thruster assembly in greater detail.

FIG. **7** is a side elevational view taken in the direction of arrow **7** in FIG. **4** with parts broken away, showing the hydraulic motor connected to the inner steering column of the marine thruster assembly.

Similar reference characters denote corresponding features consistently throughout the attached drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, FIGS. **1** through **7** illustrate an hydraulic power system **10** for a boat **12** comprising a marine thruster assembly **14**. A structure **16** is for mounting the marine thruster assembly **14** to an exterior surface of a transom **18** on the boat **12**. A first hydraulic operative facility **20** is for propelling the marine thruster assembly **14**, so that the boat **12** can travel in a body of water. A second hydraulic operative facility **22** is for steering the marine thruster assembly **14**, so that the boat **12** can be directed on a course in the body of water. A third hydraulic operative facility **24**

is for lifting the marine thruster assembly **14** out of the body of water for inspection and repair when needed.

The marine thruster assembly **14** includes a generally upright stanchion unit **26**. An hydraulic motor **28** is at a lower end of the stanchion unit **26**. An output shaft **30** is on the hydraulic motor **28**. A propeller **32** is affixed to the output shaft **30**. A skeg **34** extends downwardly from the hydraulic motor **28**.

The mounting structure **16** consists of a plate **36** for supporting the stanchion unit **26**. A plurality of fasteners **38** are for securing the plate **36** to the exterior surface of the transom **18** on the boat **12**.

The first hydraulic operative facility **20** comprises an engine **40**, having a drive shaft **42** extending from a housing **44**. A flywheel unit **46** is connected to the housing **44** and is coupled to the drive shaft **42** of the engine **40**. An hydraulic pump **48** is connected to the flywheel unit **46** and is coupled to the drive shaft **42** extending through the flywheel unit **46**. An hydraulic fluid reservoir **50** is fluidly connected via an hydraulic line **52** to the hydraulic pump **48**. An hydraulic fluid distribution and control valve **54** is fluidly connected via hydraulic lines **56, 58** between the hydraulic pump **48** and the hydraulic fluid reservoir **50**. A reverse-neutral-forward control throttle **60** is electrically connected via cables **62, 64** between the engine **40** and the hydraulic fluid distribution and control valve **54**. A pair of hydraulic hoses **66** are fluidly connected between the hydraulic fluid distribution and control valve **54** and the hydraulic motor **28** in the marine thruster assembly **14**. The hydraulic hoses **66** extend through an aperture in the transom **18** on the boat **12**, an aperture in the plate **36** and down through the stanchion unit **26**.

The second hydraulic operative facility **22** includes the stanchion unit **26** having a hollow inner steering column **68** connected at a lower end to the hydraulic motor **28**. The inner steering column **68** will carry the hydraulic hoses **66** to the hydraulic motor **28**. A swivel fitting **70** is connected to an upper end of the inner steering column **68**. An hydraulic cylinder **72** is fluidly connected via an hydraulic line **74** to the hydraulic fluid distribution and control valve **54**. The hydraulic cylinder **72** is mechanically connected to the swivel fitting **70** through the aperture in the transom **18** on the boat **12** and the aperture in the plate **36**, so as to move the swivel fitting **70** to turn the inner steering column **68** left and right.

The third hydraulic operative facility **24** consists of the stanchion unit **26** having a hollow outer tilting column **76** over the inner steering column **68**. A pivot shaft **78** divided into two segments are transversely affixed to opposite sides of the outer tilting column **76** near an upper end thereof. A pair of connector caps **80** are provided. A plurality of fasteners **82** are for attaching the connector caps **80** to the plate **36**, to allow the ends of the pivot shaft **78** to rotate thereabout. A pair of hydraulic tilt and trim cylinders **84** are mechanically connected between a lower end of the outer tilting column **76** and the plate **36** and are fluidly connected via hydraulic lines **86, 88** to the hydraulic fluid distribution and control valve **54**. The hydraulic tilt and trim cylinders **84** can lift the outer tilting column **76** with the inner steering column **68** up and down.

Paraphernalia **90** at the upper end of the outer tilting column **76** is for covering in a waterproof manner the hydraulic hoses **66** and the swivel fitting **70**, The covering paraphernalia **90** includes a flexible bellow-like rubber boot **92**. A pair of clamps **94** are to secure the boot **92** to the upper end of the outer tilting column **76** and at the aperture in the plate **36**.

The flywheel unit **46**, as best seen in FIGS. **2** and **2A**, contains a coupler disc member **96** internally splined onto a splined portion of the drive shaft **42** of the engine **40**. A flywheel **98**, fits onto the coupler disc member **96**. A plurality of fasteners **100** are for securing the flywheel **98** to the coupler disc member **96**. A bell **102** is a casing for covering the coupler disc member **96** and the flywheel **98**. The bell casing **102** is affixed to the housing **44** of the engine **40**.

The hydraulic pump **48**, as best seen in FIG. **2B**, includes an outer cover **104** with a mounting flange **106**. A plurality of fasteners **108** are for securing the mounting flange **106** of the outer cover **104** to the bell casing **102**.

The swivel fitting **70**, as shown in FIG. **5**, contains a collar member **110** internally splined onto a splined portion of the upper end of the inner steering column **68**. The collar member **110** has a forked segment **112** extending rearwardly. A plurality of fasteners **114** are radially positioned about and through the collar member **110**, to permanently secure the collar member **110** to the upper end of the inner steering column **68**. A link arm **116** is mechanically connected between the forked segment **112** of the collar member **110** and the hydraulic cylinder **72**.

LIST OF REFERENCE NUMBERS

10 hydraulic power system
12 boat
14 marine thruster assembly
16 mounting structure
18 transom on 12
20 first hydraulic operative facility
22 second hydraulic operative facility
24 third hydraulic operative facility
26 stanchion unit of 14
28 hydraulic motor of 14
30 output shaft on 28
32 propeller on 30
34 skeg on 28
36 plate of 16
38 fasteners of 16
40 engine
42 drive shaft of 40
44 housing of 40
46 flywheel unit on 44
48 hydraulic pump on 46
50 hydraulic fluid reservoir
52 hydraulic line between 48 and 50
54 hydraulic fluid distribution and control valve
56 hydraulic line between 48 and 54
58 hydraulic line between 50 and 54
60 reverse-neutral-forward control throttle
62 cable between 40 and 60
64 cable between 54 and 60
66 hydraulic hose between 28 and 54
68 inner steering column of 26
70 swivel fitting on 68
72 hydraulic cylinder
74 hydraulic line between 54 and 72
76 outer tilting column of 26
78 pivot shaft
80 connector cap
82 fastener of 80
84 hydraulic tilt and trim cylinder
86 hydraulic line between 54 and 84
88 hydraulic line between 54 and 84
90 covering paraphernalia
92 flexible bellows-like rubber boot
94 clamp for 92
96 coupler disc member on 42
98 flywheel on 96

-continued

100	fastener for 96 and 98
102	bell casing
104	outer cover of 48
106	mounting flange on 104
108	fastener for 102 and 106
110	collar member of 70
112	forked segment of 110
114	fasteners for 68 and 110
116	link arm between 72 and 112

It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

While certain novel features of this invention have been shown and described and are pointed out in the annexed claims, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed is new and desired to be protected by Letters Patent is set forth in the appended claims:

1. An hydraulic power system for a boat comprising:

a) a marine thruster assembly, said marine thruster assembly including a generally upright stanchion unit, an hydraulic motor at a lower end of said stanchion unit, an output shaft on said hydraulic motor, a propeller affixed to said output shaft, and a skeg extending downwardly from said hydraulic motor;

b) means for mounting said marine thruster assembly to an exterior surface of a transom on the boat, said mounting means including a plate for supporting said stanchion unit, and a plurality of fasteners for securing said plate to the exterior surface of the transom on the boat;

c) a first hydraulic operative means for propelling said marine thruster assembly, so that the boat can travel in a body of water, said first hydraulic operative means including an engine having a drive shaft extending from a housing; a flywheel unit connected to said housing and coupled to said drive shaft of said engine, an hydraulic pump connected to said flywheel unit and coupled to said drive shaft extending through said flywheel unit, an hydraulic fluid reservoir fluidly connected via an hydraulic line to said hydraulic pump, an hydraulic fluid distribution and control valve fluidly connected via hydraulic lines between said hydraulic pump and said hydraulic fluid reservoir, a reverse-neutral-forward control throttle electrically connected via cables between said engine and said hydraulic fluid distribution and control valve, and a pair of hydraulic hoses fluidly connected between said hydraulic fluid distribution and control valve and said hydraulic motor in said marine thruster assembly, whereby said hydraulic hoses extend through an aperture in the transom on the boat, an aperture in said plate and down through said stanchion unit;

d) a second hydraulic operative means for steering said marine thruster assembly, so that the boat can be directed on a course in the body of water, said second hydraulic operative means including said stanchion unit having a hollow inner steering column connected at a lower end to said hydraulic motor, whereby said inner steering column will carry said hydraulic hoses to said hydraulic motor, a swivel fitting connected to an upper end of said inner steering column, and an hydraulic cylinder fluidly connected via an hydraulic line to said hydraulic fluid distribution and control valve, whereby said hydraulic cylinder is mechanically connected to said swivel fitting through the aperture in the transom on the boat and the aperture in said plate, so as to move said swivel fitting to turn said inner steering column left and right; and

e) a third hydraulic operative means for lifting said marine thruster assembly out of the body of water for inspection and repair when needed.

2. An hydraulic power system for a boat as recited in claim **1**, wherein said third hydraulic operative means includes:

a) said stanchion unit having a hollow outer tilting column over said inner steering column;

b) a pivot shaft divided into two segments that are transversely affixed to opposite sides of said outer tilting column near an upper end thereof;

c) a pair of connector caps;

d) a plurality of fasteners for attaching said connector caps to said plate to allow the ends of said pivot shaft to rotate thereabout; and

e) a pair of hydraulic tilt and trim cylinders mechanically connected between a lower end of said outer tilting column and said plate and are fluidly connected via hydraulic lines to said hydraulic fluid distribution and control valve, whereby said hydraulic tilt and trim cylinders can lift said outer tilting column with said inner steering column up and down.

3. An hydraulic power system for a boat as recited in claim **2**, further including means at the upper end of said outer tilting column for covering in a waterproof manner said hydraulic hoses and said swivel fitting.

4. An hydraulic power system for a boat as recited in claim **3**, wherein said covering means includes:

a) a flexible bellows shaped rubber boot; and

b) a pair of clamps to secure said boot to the upper end of said outer tilting column and at the aperture in said plate.

5. An hydraulic power system for a boat as recited in claim **4**, wherein said flywheel unit includes:

a) a coupler disc member internally splined onto a splined portion of said drive shaft of said engine;

b) a flywheel which fits onto said coupler disc member;

c) a plurality of fasteners for securing said flywheel to said coupler disc member; and

d) a bell casing for covering said coupler disc member and said flywheel, whereby said bell casing is affixed to said housing of said engine.

6. An hydraulic power system for a boat as recited in claim **5**, wherein said hydraulic pump includes:

a) an outer cover with a mounting flange; and

b) a plurality of fasteners for securing said mounting flange of said outer cover to said bell casing.

7. An hydraulic power system as recited in claim **6**, wherein said swivel fitting includes:

a) a collar member internally splined onto a splined portion of the upper end of said inner steering column, said collar member having a forked segment extending rearwardly;

b) a plurality of fasteners radially positioned about and through said collar member to permanently secure said collar member to the upper end of said inner steering column; and

c) a link arm mechanically connected between the forked segment of said collar member and said hydraulic cylinder.

* * * * *