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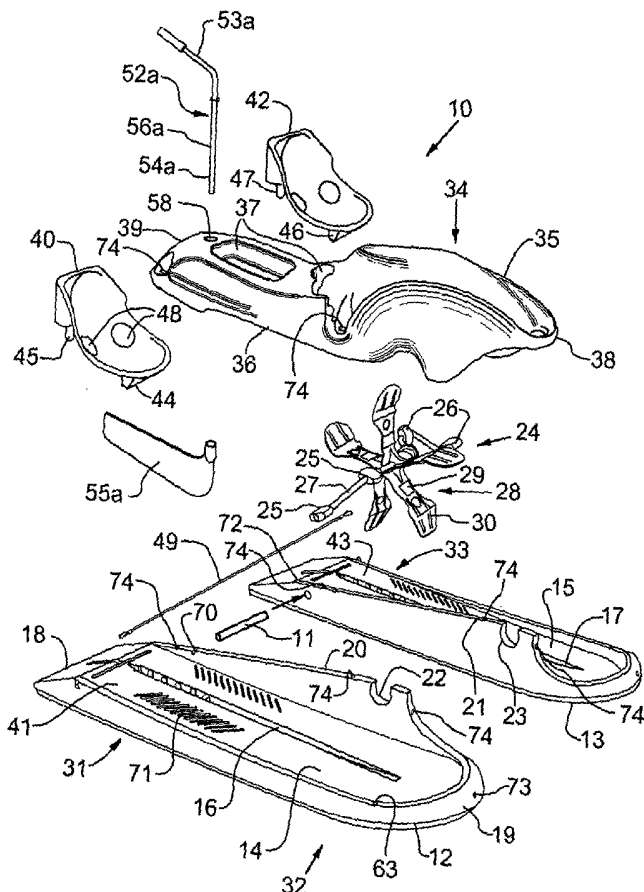
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[Continued on next page]

(54) Title: PORTABLE, COLLAPSIBLE WATERCRAFT



(57) Abstract: A collapsible portable watercraft may be easily assembled from modular unitary components using minimal hardware. The components comprise two or more pontoon floats (14, 15) connected by a bridge system. The bridge system comprises a transmission housing (35) and an optional propulsion system (24). Optionally, the watercraft may include a steering system (52a) and seats (40, 42). Each seat may include a fin (44, 46) for mounting to a groove (71) formed in a fore/aft direction along a top surface of each pontoon to provide adjustable comfort. The steering system may comprise a row tiller (53a) extending horizontally to a rear rudder (55a) for enhanced maneuverability. Additional accessories may be attached to the watercraft including a sun cover (65), sail, or motor.



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- 1 -

PORTABLE, COLLAPSIBLE WATERCRAFT**TECHNICAL FIELD**

The invention relates to personal watercraft and more particularly to collapsible watercraft including pedal
5 boats.

BACKGROUND OF THE INVENTION

Small personal watercraft such as human powered pedal boats, kayaks and other boats, sail boats and low- powered motor-aided boats are widely known and enjoyed, typically
10 for recreational use. Despite their relatively small size, such watercraft are usually too large to be conveniently transported within or upon a passenger vehicle or are too bulky to be conveniently stored on shelving or the like.

While some such watercrafts are collapsible for storage
15 and/or transportation, their component construction is complicated, as can be their assembly and disassembly. Alternatively, the maneuverability of such craft is restricted or the operator's seat position is not adjustable. See generally U.S. Patent Nos. 4,496,325,
20 4,648,846, 5,088,944, 5,349,918, 5,427,554, 5,651,706, 5,878,682, and 6,065,414.

SUMMARY OF THE INVENTION

It is an aim of the invention to provide a portable, collapsible watercraft that is uncomplicated in
25 construction and assembly/disassembly. It is a further aim of the invention to provide a collapsible watercraft that is highly maneuverable. It is also an aim of the invention

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to provide a collapsible watercraft in which the operator's seat position is adjustable.

Generally, there is provided a portable, collapsible watercraft that may be easily assembled from modular
5 unitary components using minimal hardware. The components comprise two or more pontoon floats connected by a bridge system. The bridge system comprises transmission housing and an optional propulsion system. Optionally, the watercraft may include a steering system and seats. Each
10 seat may include a fin for mounting to a groove formed in a fore/aft direction along a top surface of each pontoon to provide adjustable comfort. The steering system may comprise a row tiller extending horizontally to a rear rudder for enhanced maneuverability. Additional
15 accessories may be attached to the watercraft including a sun cover, sail, or motor.

In a first aspect of the invention, there is provided a watercraft for assembly and disassembly comprising. The watercraft comprises a plurality of pontoons for assembly
20 in spaced parallel relation and at least one propulsion system for assembly between pairs of the plurality of pontoons. A transmission housing is further provided for assembly to the pontoons and for covering the at least one propulsion system when assembled with fastening hardware
25 for releasably fastening the transmission housing over the at least one propulsion system and to the pontoons. Preferably, the watercraft further comprises at least one of a) at least one seat for releasable assembly to at least one of the pontoons and b) a steering system for
30 releasable assembly to the transmission housing.

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In a further aspect of the invention, there is provided a watercraft for assembly and disassembly comprising at least two rigid unitary pontoons for assembly in spaced parallel relation, each pontoon having a forward section and a rearward section where the forward section incorporates a propulsion system support. A unitary propulsion system pre-assembled for assembly between the forward sections of the pontoons and support by the propulsion system supports is also provided for the watercraft. The propulsion system includes a pedal operated drive means extending at least partially across the forward sections for operation by at least one user. A unitary transmission housing having a forward portion and an aft extending portion is provided for assembly to the pontoons where the forward portion covers the propulsion system when assembled. And fastening hardware is provided for releasably fastening the transmission housing over the propulsion system and to the pontoons. Preferably, the watercraft in accordance with this aspect further comprises at least one of a) at least one unitary seat for assembly to each pontoon to support the at least one user and b) a steering system for assembly to the aft extending portion of the transmission housing between the pontoons.

Further in accordance with the invention, it is preferred that each respective seat and pontoon cooperate to engage one another to releasably mount the seat to the pontoon. For example, each respective seat may form a support fin and each pontoon form a longitudinally extending seat support groove for receiving the seat support fin. At least one seat tether for additionally securing at least one seat to the watercraft to permit at least one seat to

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be disassembled from the pontoon while remaining attached to the watercraft may also be provided.

The steering system may comprise a tiller including a handle portion, a pivot portion for mounting through the transmission housing and a rudder end portion including a rudder. It is preferred that the pivot portion depend from the tiller and, when assembled to the watercraft, the rudder end portion extends downward and rearward over the aft extending portion of the transmission housing to enhance operational maneuverability.

The pontoon may comprise a unitary, hollow body contoured for self-bailing and a major portion of a top surface of each pontoon may form a sun deck for a user. Preferably, the transmission housing comprises a unitary body as well. The propulsion system may comprise a paddle wheel, particularly a hydrodynamic wheel.

A connector for releasable assembly between rearward sections of pairs of the pontoons to reduce relative movement of the pairs of pontoons may also be provided. Releasable accessories such as a sun cover and a sail may also be fitted to the watercraft.

In a third aspect, there is provided a modular watercraft collapsible for disassembly comprising at least two rigid pontoons arranged in spaced parallel relation, each pontoon having a forward section and a rearward section, where the forward section incorporates a propulsion system support. A propulsion system is mounted between the forward sections of the pontoons and supported by the propulsion system supports. The propulsion system includes a pedal operated drive means extending at least partially

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across the forward sections for operation by at least one user. A transmission housing has a forward portion and an aft extending portion bridging between the pontoons, where the forward portion covers the propulsion system. A steering system is releasably assembled for pivoting movement to the aft extending portion of the transmission housing and fastening hardware releasably fastens the transmission housing to the pontoons and secures the propulsion system therebetween. Also provided is at least one seat releasably assembled to each pontoon to support the at least one user.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the present invention will become apparent from the following detailed description, taken in combination with the appended drawings, in which:

Figure 1 is an exploded view of unassembled components of an exemplary collapsible pedal boat in accordance with a preferred embodiment of the invention;

Figure 2 is a side view of assembled components of the pedal boat of Figure 1 additionally including a sun cover;

Figure 3 is a side view of assembled components of the pedal boat of Figure 2 showing a preferred steering mechanism;

Figure 4 is a view of a partially assembled pedal boat of Figure 1;

Figure 5 is a view of a partially assembled pedal boat of Figure 4;

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Figure 6 is a cross-sectional side view of the pedal boat of Figure 1.

It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

5 DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 illustrates an exemplary collapsible watercraft in accordance with the invention, namely a pedal boat 10 in a state of disassembly. Fig. 2 illustrates pedal boat 10 of Fig. 1 in an assembled state additionally including Bimini
10 sun cover.

Pedal boat 10 comprises two unitary buoyant pontoon floats 12 and 13, a pedal operated paddle wheel propulsion system 24, a unitary transmission housing 34, a pair of unitary seats 40 and 42, a steering system 50 and fastening
15 hardware (not shown). Preferably, there is also included a connecting member 11 and at least one seat tether 49.

The pontoon floats 12 and 13 are dimensioned to provide stable hull support for the pedal boat 10. Each pontoon 12 and 13 comprises a respective top surface 14 and 15 in
20 which is formed a groove 16 and 17 extending along the longitudinal direction of each pontoon 12 and 13 from the stern 18 toward the fore end 19 for receiving and mounting a seat 40 and 42. Preferably a plurality of ribs are included that project into the grooves 16 and 17 from the
25 sides thereof as described further below.

Each pontoon 12 and 13 further forms a respective support flange 20 and 21 and indents 22 and 23 for supporting the propulsion system 24 transversely between each pontoon 12

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and 13. Preferably, additional indents 70 and 72 are formed in respective support flanges 20 and 21 in the area of the rearward sections 31 and 33 for receiving the seat tether 49. The grooves 16 and 17 together with other
5 contours of the pontoons 12 and 13, including small ridges 71 in the rearward section 31 direct water off of the top surfaces 14 and 15 to provide self-bailing functionality. Preferably, one or more drainage channels (not shown) may be formed through the pontoon in the bottom of the grooves
10 16 and 17 to drain water from the watercraft 10 particularly when it is stored out of the water, on a beach or dock, etc. Water may occasionally find its way into the interior of the hollow pontoons 12 and 13 such as through various mounting positions for the fastening
15 hardware as discussed below. A drainage hole and plug 73 may be provided.

As illustrated in Fig. 1, propulsion system 24 preferably comprises a drive means including pairs of journaled pedals 25 and 26 each connected to a crankshaft 27 for
20 driving hydrodynamic paddle wheel 28. Wheel 28 includes a plurality of radially extending arms 29, each arm 29 terminating in an articulating paddle flipper 30 with a rounded end portion canted from the radial axis of the arm 29 to scoop the water but flexible to bend back toward the
25 radial axis as the paddle moves through the water. The components of propulsion system 24 including crankshaft 27 and internal bearings (not shown) are non-corroding for long-life use. The bearings define large grooves that act to provide both consistent water lubrication and cleaning
30 action to flush out sand, salt and other materials that may cause contamination, rusting or other damage.

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Propulsion system 24 is preferably factory pre-assembled before delivery.

Preferred propulsion system 24 is further described in detail in US Patent 5,989,081 issued November 23, 1999 of
5 Lekhtman, the present inventor, and the entirety of which patent is incorporated herein by reference. Other paddle and propeller mechanisms may be adapted as a propulsion system 24 as is understood to persons skilled in the art.

Transmission housing 34 bridges the gap between the
10 pontoons 12 and 13 and comprises a rounded forward portion 35 and a flatter aft extending portion 36. The Forward portion 25 is dimensioned for covering the propulsion system 24 to prevent splashes while in operation. Transmission housing 34 may be formed with one or more
15 storage units such as recesses 37 for personal items such as beverages, sunscreen and the like and with an integral front handle 38 and rear handle 39 for carrying or tying off the boat 10 to a dock, for example. Transmission housing 34 further forms a mounting position 58 such as a
20 channel in the aft extending portion 36 for receiving steering system 50 as described further below.

As better illustrated by Fig. 3, steering system 50 preferably comprises a long tiller 52 having a handle end portion 53 and extending generally to the aft, when
25 mounted, to a rudder end portion 54 including a rudder. The rudder is preferably a flexible flipper-like fin, which aids with maneuverability and propulsion when turning. A pivot mount 56 depends from tiller 52 for engaging the mounting position of housing 34. To ensure
30 tiller 52 remains mounted, pivot mount 56 may extend

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through housing 34 to receive a clip (not shown) or other releasable stop means.

Though less preferred due to reduced maneuverability, steering system 50 might comprise a short tiller 52a configuration as illustrated in Figs. 1 and 2. Tiller 52a comprises a handle portion 53a, a pivot mount portion 56a, for extending through the mounting portion of housing 34, and a rudder end portion 54a including a rudder.

Unitary seats 40 and 42 each include mountings for coupling each seat to a respective pontoon. Mounts may comprise pairs of respective fins 44, 45 and 46, 47 for slidably and frictionally engaging the grooves 16 and 17 of the pontoons 12 and 13. The seats may also be formed in a comfortable bucket seat configuration with a pair of open areas 48 for drainage and to reduce material usage for cost and component weight considerations. Reclined bucket seats further ease the operation of the propulsion system as is well known to those skilled in the art. As previously noted, ribs may be provided within the grooves 16 and 17. The ribs aid with the coupling of the seats 40 and 42 with the pontoons 12 and 13.

Optionally and preferably, the grooves 16 and 17 may be dimensioned to provide a plurality of adjustable seat positions, it being understood by those skilled in the art that other integral mounting systems may be formed. For example, more than one groove may be provided for each pontoon to engage more than one fin in each seat. Though not preferred, the pontoons may be formed with fins that engage grooves in the seats. The seats may slide to various positions along the pontoon or fitted at a

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plurality of discrete mounting positions. As well, it is preferred that top surface 14 and 15 of the pontoons be generally flat (i.e. without projections) to provide a sun deck, permitting a user to remove a seat and lie
5 comfortably on the pontoon. The rear sections 41 and 43 behind the seats 40 and 42 provide a small seat platform for children as well. While separate releasable seats are preferred, the pontoons may form integral seat backs as is understood to those skilled in the art. Such integral seat
10 backs are not adjustable and may interfere with the easy storage of flatter pontoons. Further, integral seating may not provide enhanced positioning of a user's legs to operate the propulsion system.

Fastening hardware is provided for securely connecting
15 each side of transmission housing 34 to each pontoon 12 and 13. Fastening hardware may comprise, for example, a plurality of screws for fitting in mated holes 74 formed in spaced relation near the periphery of housing 34 and support flanges 20 and 21. In a preferred embodiment, a
20 pair of screws for each end of the housing 34 and a middle portion thereof are used with a socket wrench to secure the housing 34 to the pontoons 12 and 13.

Assembly of the boat 10 may be better understood with references to Figs. 4,5 and 6. To assemble pedal boat 10,
25 pontoons 12 and 13 are aligned in generally parallel spaced relation, about knee-width apart as illustrated in Fig. 4. Connecting member 11 is mounted in holes 58 formed in the opposing sides of the pontoons 12 and 13. The propulsion system 24 is positioned transversely between
30 the pontoons 12 and 13 in indents 22 and 23 with the drive means extending over at least a portion of each forward

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section. If used, the optional seat tether 49 is placed between the pontoons 12 and 13 in indents 70 and 72. Housing 34 is placed over propulsion system 24 and pontoon support flanges 20 (Fig. 5) and secured with the fastening hardware (not shown) at mounting positions 74. Fins 44 and 45 seat 40 (Fig. 6) are fitted into groove 16 the optional tether 49, if used, is secured to the seats. Seat 42 is similarly mounted to pontoon 13. To releasably fasten the tether 49 to the seats 40 and 42, tether 49 may be provided with a J-clip on each end for connecting to a D-clip fastened to the bottom of each seat 40 and 42. Preferably, tether 49 is an elastic-type cord and stretches sufficiently to securely clip to each seat 40 and 42.

Steering system 50 is mounted to housing 34 at the aft portion 36 (Figs. 2 and 3) through the mounting position 58 and may be pre-mounted to the housing 34 prior to connecting the housing 34 to the pontoons 12 and 13. In the long configuration (Fig. 3), tiller 52 is mounted by sliding pivot mount 56 through the mounting position 58. From behind and underneath housing 34, a c-clip, pin, or other removable fastener (all not shown) may be applied near the free end of the pivot mount 56 to prevent inadvertent release of the pivot mount 56. Similarly, short tiller 52a (Figs. 1 and 2) may be slid through the mounting position 58 and the rudder 55a fastened at the end thereof in a conventional manner.

Pedal boat 10 may be assembled on a dock or waterfront and easily set into the water. Users may mount the boat and position themselves in respective seats. The boat may be

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propelled in the water by turning the foot pedals as is well known.

Advantageously, the long steering tiller 52 is not attached to the rudder 54 vertically through housing 34. Instead, tiller 52 extends horizontally to the stern of pedal boat 10, and only then attaches to rudder 55 near the water level (when in use). Conventional pedal boats having a rudder connected vertically through the boat, similar to short tiller 52a, must be in motion to initiate a turn while pedal boat 10 can turn 90 degrees from a stationary position as configured in Fig. 3.

Operator seating is adjustable to accommodate operators of different leg lengths as seats 40 and 42 may be individually slid toward or away from respective pedals 25 and 26 for comfort (Fig. 6). As noted, they may be removed easily to permit a sunbather or user to lie on the pontoon.

While the preferred embodiment illustrates a pedal boat configuration, those skilled in the art will understand that additional configurations may be fashioned from the components of the invention. Additional configurations may be constructed with two or more pontoon floats connected by one or more transmission housings and/or propulsions systems. Many alternative constructions to the exemplary embodiment described herein in accordance with the invention will be apparent to those skilled in the art. For example a person skilled in the art understands that seats or a steering system are optional for a watercraft though highly preferred.

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Additionally, the collapsible watercraft may be accessorized with attachments such as a motor, sun cover, sail, and other accessories. For example, Figs. 2 and 3 illustrate pedal boat 10 with a Bimini sun cover 60 mounted via resilient flexible mounting poles 61 and 62 at first ends thereof to mounting positions (e.g. 63) in the pontoons 12 and 13. Bimini 60 may comprise a cover portion 64 including peripheral loops 65 or sleeves for receiving the pair of poles 61 and 62. A stabilizing rod 66 may connect second ends of the poles 61 and 62 adjacent the cover portion 64. A pair of tie down cords 67 may be fastened to the second ends of the poles 61 and 62 to anchor them to the pontoons 12 and 13. Preferably the pontoons are fitted with rings (e.g. 68) for receiving a clip 69 from a tie down cord 67.

The majority of the components of pedal boat 10, particularly pontoons 12 and 13, transmission housing 34, and seats 40 and 42, may be constructed of molded high-density plastic materials, such as polyethylene. These materials are preferably treated with UV stabilizers for color protection well known to those skilled in the art. Such material is resilient, resistant to water, even salt water, and of light weight relative to strength to ease portability. It is also easy to clean. In cold weather climates, disassembly and indoor storage for the winter months is preferred.

The invention provides a compact component system for packaging, shipping and storage. The collapsible watercraft may be conveniently transported inside or on top of most personal passenger vehicles. The ergonomic design provides a safe and comfortable, yet sporty, ride.

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The embodiment(s) of the invention described above is(are) intended to be exemplary only. It will be understood that the invention in its broad aspect includes mechanical and functional equivalents of the elements
5 described and illustrated.

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I claim:

1. A watercraft for assembly and disassembly comprising:
 - a plurality of pontoons for assembly in spaced
5 parallel relation;
 - at least one propulsion system for assembly between
pairs of the plurality of pontoons, each of said
propulsion systems including a drive means that
extends at least partially across a respective
10 pontoon for operation by at least one user when
assembled;
 - a transmission housing for assembly to the pontoons
and for covering the at least one propulsion
system when assembled; and
 - 15 fastening hardware for releaseably fastening the
transmission housing over the at least one
propulsion system and to the pontoons.
2. The watercraft in accordance with claim 2 further
comprising at least one of:
 - 20 at least one seat for releasable assembly to at
least one of the pontoons to support at least
one user; and
 - a steering system for releasable assembly to the
transmission housing.
- 25 3. A watercraft for assembly and disassembly
comprising:

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- at least two rigid unitary pontoons for assembly in spaced parallel relation, each pontoon having a forward section and a rearward section, said forward section incorporating a propulsion system support;
- 5
- a unitary propulsion system pre-assembled for assembly between the forward sections of the pontoons and support by the propulsion system supports, said propulsion system including a
- 10 pedal operated drive means extending at least partially across the forward sections for operation by at least one user;
- a unitary transmission housing having a forward portion and an aft extending portion for
- 15 assembly to the pontoons, said forward portion covering the propulsion system when assembled; and
- fastening hardware for releaseably fastening the transmission housing over the propulsion system
- 20 and to the pontoons.
4. The watercraft in accordance with claim 3 further comprising at least one of:
- at least one unitary seat for assembly to each pontoon; and
- 25 a steering system for assembly to the aft extending portion of the transmission housing between the pontoons.
5. The watercraft in accordance with claim 4 wherein each respective seat and pontoon cooperate to engage

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one another to releasably mount the seat to the pontoon.

6. The watercraft in accordance with claim 5 wherein each respective seat forms a support fin and each pontoon forms a longitudinally extending seat support groove for receiving the seat support fin.
7. The watercraft in accordance with claim 4 further comprising at least one seat tether for additionally securing at least one seat to the watercraft to permit at least one seat to be disassembled from the pontoon while remaining attached to the watercraft.
8. The watercraft in accordance with claim 4 wherein each respective seat comprises a unitary reclining bucket seat.
9. The watercraft in accordance with claim 4 wherein the steering system comprises a tiller including a handle portion, a pivot portion for mounting through the transmission housing and a rudder end portion including a rudder.
10. The watercraft in accordance with claim 9 wherein the pivot portion depends from the tiller and, when assembled to the watercraft, the rudder end portion extends downward and rearward over the aft extending portion of the transmission housing to enhance operational maneuverability.
11. The watercraft in accordance with claim 4 wherein the forward section of each pontoon forms a support

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flange and an indent to define the propulsion support.

12. The watercraft in accordance with claim 4 wherein the pontoon comprises a unitary, hollow body
5 contoured for self-bailing.
13. The watercraft in accordance with claim 4 wherein a major portion of a top surface of each pontoon is formed to provide a sun deck for a user.
14. The watercraft in accordance with claim 4 wherein
10 the transmission housing comprises a unitary body.
15. The watercraft in accordance with claim 13 wherein the unitary body of the transmission housing forms at least one of a carrying handle and one or more storage units.
- 15 16. The watercraft in accordance with claim 4 wherein the propulsion system comprises a pedal operated paddle wheel.
17. The watercraft in accordance with claim 16 wherein
20 the paddle wheel comprises at least one of hydrodynamic paddles, corrosion resistant self-cleaning bearings and a corrosion resistant crankshaft.
18. The watercraft in accordance with claim 4 further comprising a connector for releasable assembly
25 between rearward sections of pairs of the pontoons

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to reduce relative movement of the pairs of pontoons.

19. The watercraft in accordance with claim 4 further comprising one of a sun cover and a sail, each for
5 releasable assembly to the watercraft.

20. A modular watercraft collapsible for disassembly comprising:

at least two rigid pontoons arranged in spaced
parallel relation, each pontoon having a forward
10 section and a rearward section, said forward
section incorporating a propulsion system
support;

a propulsion system unit mounted between the forward
sections of the pontoons and supported by the
15 propulsion system supports, said propulsion
system including a pedal operated drive means
extending at least partially across the forward
sections for operation by at least one user;

a transmission housing having a forward portion and
20 an aft extending portion bridging between the
pontoons, said forward portion covering the
propulsion system;

a steering system releasably assembled for pivoting
movement to the aft extending portion of the
25 transmission housing;

fastening hardware releasably fastening the
transmission housing over the propulsion system
and to the pontoons; and

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at least one seat releasably assembled to each
pontoon.

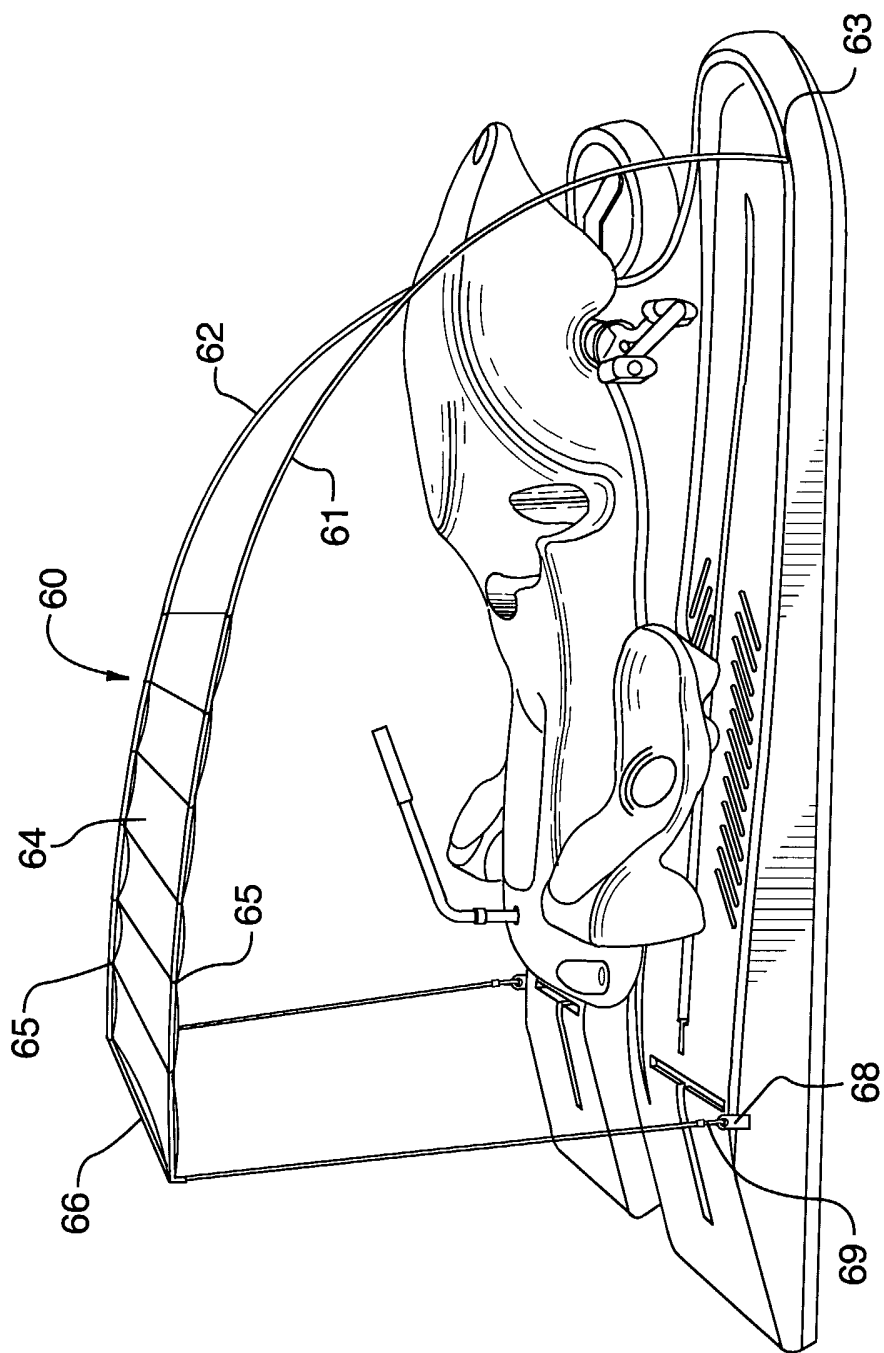


FIG.2

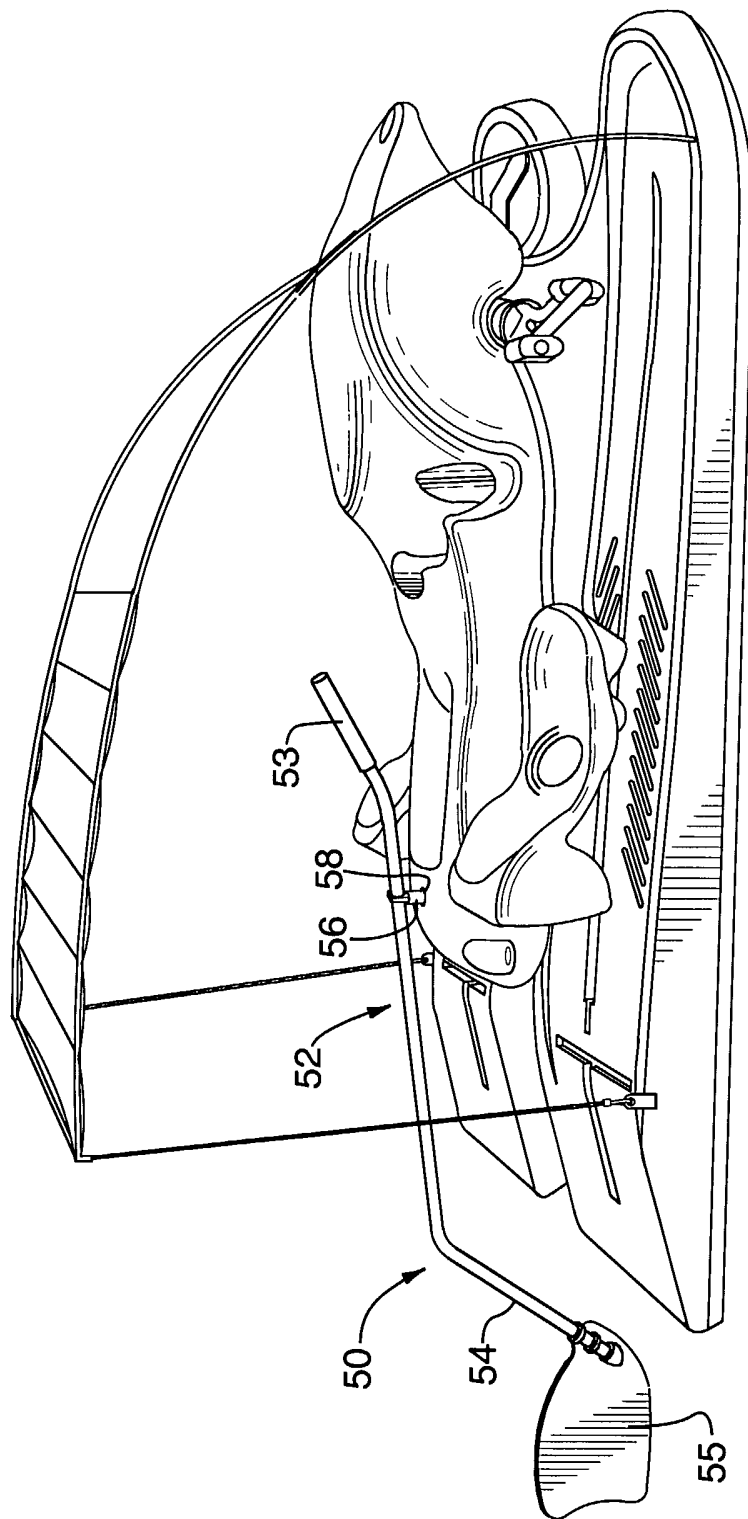


FIG.3

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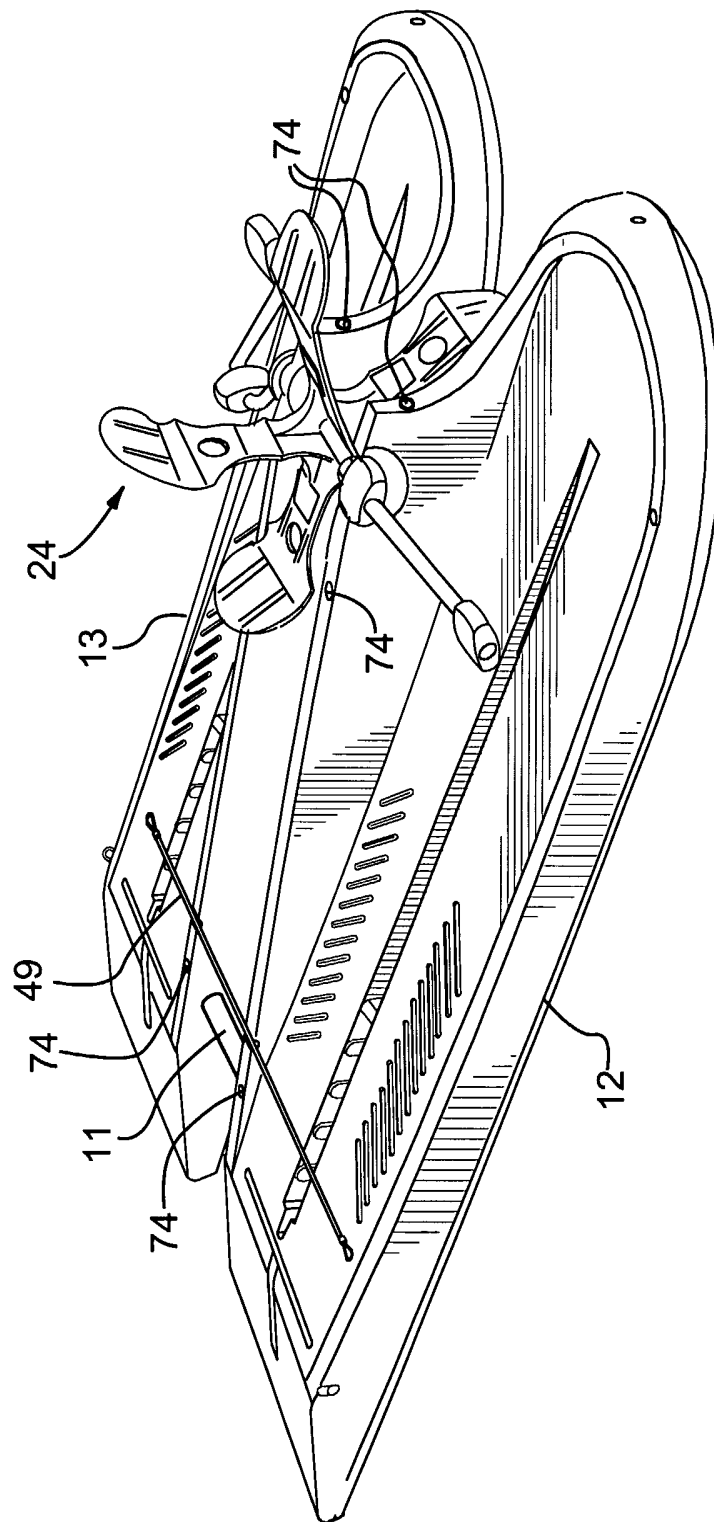


FIG.4

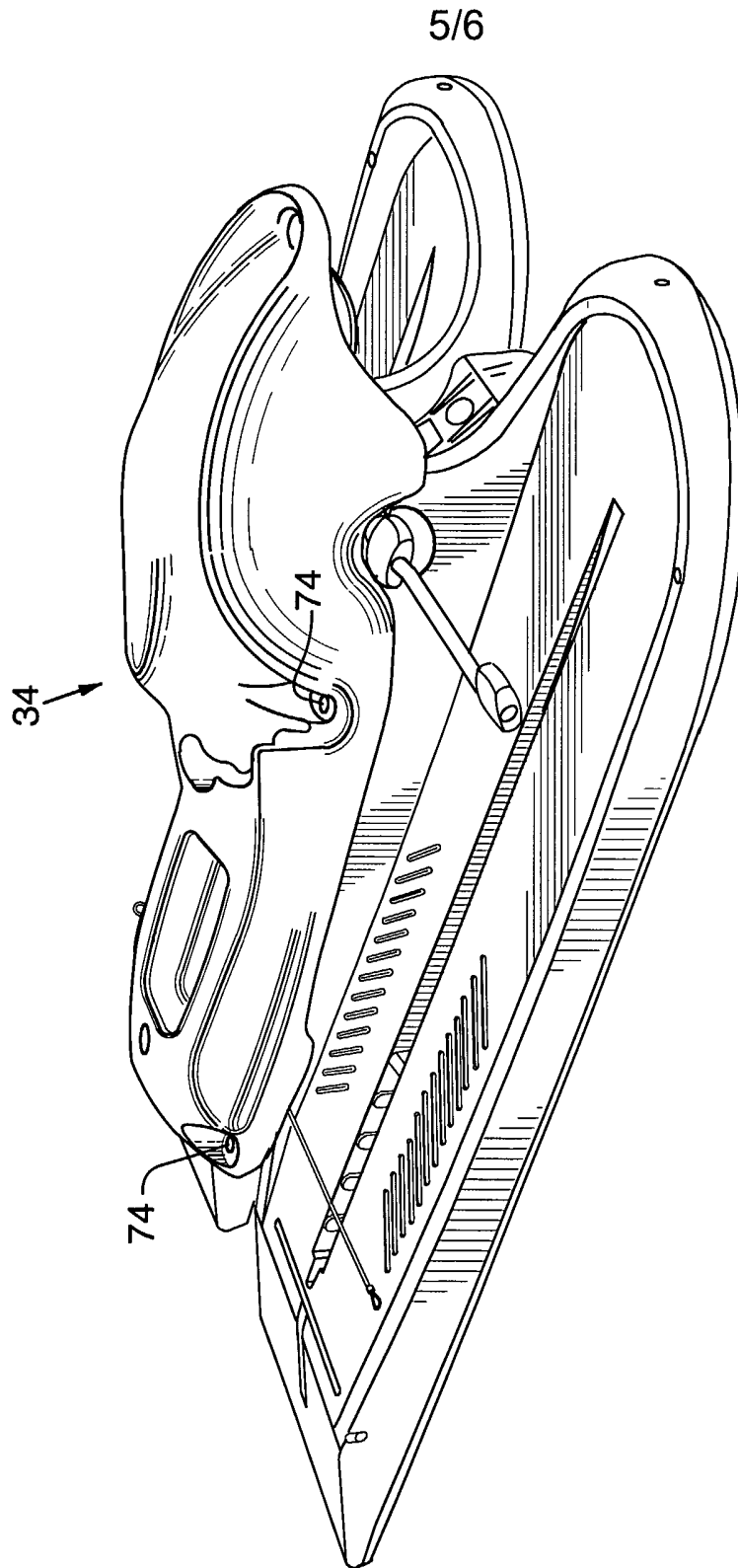


FIG.5

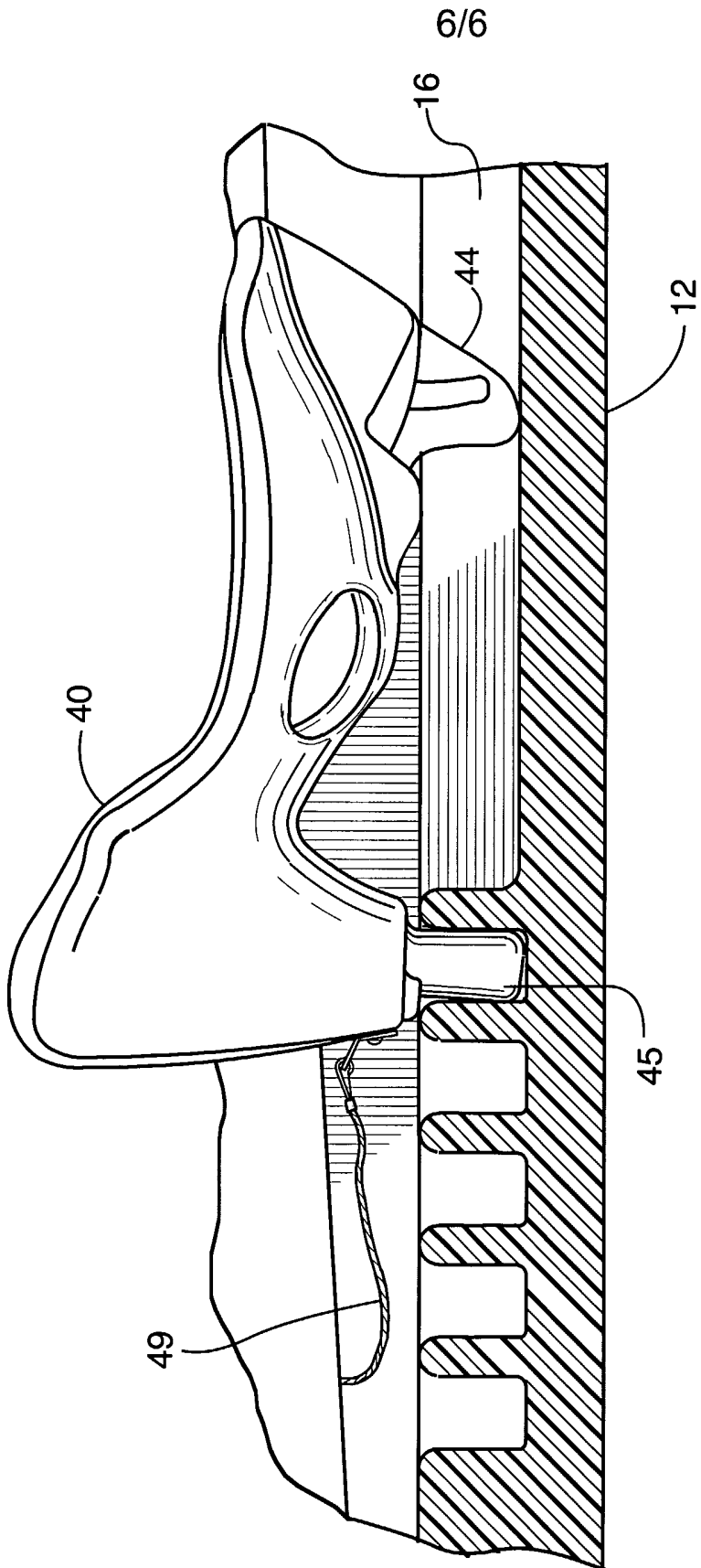


FIG.6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 02/01270

CORRECTED VERSION

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B63H16/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B63H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 674 211 A (PEDALO WATERCRAFT LTD) 18 June 1952 (1952-06-18)	1-4, 8-12,14, 16-18
Y	column 1, line 25 - line 31; figures	13,15, 19,20
Y	--- US 5 989 081 A (LEKHTMAN DAVID) 23 November 1999 (1999-11-23) cited in the application	13,15
A	column 7, line 65 - line 66; figure 3 column 9, line 17 - line 20; figure 1	3
Y	--- DE 43 41 781 A (WOELKY OTTO WERNER) 14 June 1995 (1995-06-14)	19
A	figures --- -/--	1

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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International Application No

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