A pedal-powered kayak, the present invention offers a more rounded keel and stem which operates in the water leaving no or little wake in the front or the rear of the boat. Since little water passes into the boat there is no rough ride. The hull farther provides a pair of fillers integrally formed on hull and extending along each side of the hull from said keel to said stem to provide a greater wetting surface for the hull as kayak moves over a body of water. The hull also provides a pair of strakes for lifting the hull as the kayak increases speed over the water.
PEDAL POWERED KAYAK

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates to watercraft, and more particularly to occupant-powered watercraft.

[0003] 2. Description of the Related Art

[0004] Pedal-type watercraft have never been popular due the weight and maintenance of the gearing assembly. However, in recent years, popularity has increased due at least in part to participants active in biking, swimming, canoeing and other types of water sports for individuals who are the health-conscious. With new recent legislation restricting the use of motorized watercraft such as jet skis due to safety concerns, water bike have increased in popularity. In addition, the pedal powered water vehicles have great advantages for use in hunting and fishing as they run silent and can be taken into rocky hazardous areas with the fear of damaging the motor. Pedal powered watercraft can travel greater distances faster than our powered craft and can be quickly stabilized without dropping a rod or a gun to pick up an oar to maintain stability of the boat.

[0005] One type of pedal-powered watercraft is disclosed in U.S. Pat. No. 4,795,381 issued to Willems on Jan. 3, 1989. The watercraft disclosed by Willems includes a floating body upon which a pedal assembly and recumbent seat are mounted. The seat can be adjusted toward or away from the pedal assembly to accommodate different sizes of users. An endless drive chain, reduction gearing, and a drive shaft connect the pedal assembly to a propeller. In one embodiment of this patent, the propeller and drive shaft extend downwardly and rearwardly from the floating body. A tandem seating arrangement is also shown.

[0006] Beres U.S. Pat. No. 5,460,551 discloses a pedal-powered watercraft shaped as a kayak with an integrally molded seat. A pedal assembly is connected to a propeller through a transmission and drive shaft arrangement. A front storage compartment as well as a rear storage compartment are provided.

[0007] U.S. Pat. No. 6,210,242 further discloses a pedal powered watercraft made with a unitary hull. The hull is made of a pair of spaced sponsons located on each side of the hull. Each sponson has a front wall that meets the water head on but becomes unstable as the water enters the keel at the tip of the boat causing a rocking motion. The rocking is caused during movement of the watercraft when water enters into the tunnel at the bow portion and exit the tunnel at the stem portion. Although the propeller is retractable, a large portion remains in the water during storage in the tunnel area.

[0008] Pedal-powered watercraft of the past also fail to present a hull design for traveling in rough water. Most hulls for these types of watercraft are designed for a one time user to get on and off the boat without falling into the water from the boat tipping. Such uses are in marinas or small ponds where the water is generally calm and the boat does not have to generate speed for long distance travel. There is a need in the recreational sports field for a pedal powered watercraft which is designed for high speed but stable enough for maneuvering in water around rocks and debris in the water. There is a greater need for a pedal powered kayak with a drive assembly and hull which is simple to operate and designed for speed.

SUMMARY OF THE INVENTION

[0009] An object of the present invention is to provide a watercraft with an aerodynamic hull designed to cut through water at high speed.

[0010] Another object of the present invention is to provide a high speed watercraft for outdoor sports.

[0011] Another object of the present invention is to provide a watercraft with a novel seating arrangement.

[0012] It is still another object of the present invention to provide a pedal-powered watercraft having a retractable rudder assembly.

[0013] It is a further object of the invention to provide a pedal-powered watercraft which has a retractable drive assembly with a novel bracket and pivot mechanism.

[0014] It is an even further object of the invention to provide a pedal-powered watercraft with a means for lifting the hull during movement in the water.

[0015] According to the invention, a pedal powered kayak is presented which has a deck and a hull with a stem and a keel connected by a central body portion formed with a central concave recess extending the length of the central body between said keel and said stem. The keel has a substantially round body portion ending in a pointed tip for a smooth frictionless motion through the water. The drive assembly is connected to a propeller for driving said kayak over a body of water with little resistance. The drive assembly is positioned over said centrally formed concave recess and extends through the bottom surface into and below said centrally formed concave recess.

[0016] The hull further provides a pair of fullers integrally formed on hull and extending along each side of the hull from said keel to said stem to provide a greater wetting surface for the hull as kayak moves over a body of water. The hull also provides a pair of strakes for lifting the hull as the kayak increases speed over the water.

[0017] A novel handle is provided for retracting the drive assembly into storage for nonuse.

[0018] Other objects and advantages of the invention will become apparent upon reading the following detailed description and appended claims, and upon reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The preferred embodiments of the present invention will hereinafter be described in conjunction with the appended drawings, wherein like designations denote like elements, and wherein:

[0020] FIG. 1 is a perspective view of a pedal powered kayak according to the invention;

[0021] FIG. 2 is a left side perspective view of the pedal powered kayak.

[0022] FIG. 3 is a bottom view of the pedal powered kayak of the present invention.
FIG. 4 is a right side view of the pedal powered kayak of the present invention.

FIG. 5 is a front bottom view of the pedal powered kayak of the present invention.

FIG. 6 is a rear bottom view of the pedal powered kayak of the present invention.

FIG. 7 is a front end—bottom view of the pedal powered kayak of the present invention.

FIG. 8 is a top perspective view of a pedal powered tandem kayak of the present invention.

FIG. 9 is a front end view of the pedal powered kayak of the present invention.

FIG. 10 is a right side perspective view of the pedal powered kayak of the present invention.

FIG. 11 is a rear view of a seat assembly for the pedal powered kayak of the present invention.

FIG. 12 is an exploded rear view of a seat assembly for the pedal powered kayak of the present invention.

FIG. 13 is a rear view of a seat assembly for the pedal powered kayak of the present invention.

FIG. 14 is a perspective view of a retraction and rudder assembly of the pedal powered kayak of the present invention.

FIG. 15 is a perspective view of a retraction and rudder assembly of the pedal powered kayak of the present invention.

FIG. 16 is a perspective view of a retraction and rudder assembly of the pedal powered kayak of the present invention.

FIG. 17 is a perspective view of a retraction assembly of the pedal powered kayak of the present invention.

FIG. 18 is an exploded view of a retraction and rudder assembly of the pedal powered kayak of the present invention.

FIG. 19 is a perspective view of a retraction and rudder assembly of the pedal powered kayak of the present invention.

FIG. 20 is a perspective view of a retraction handle of the pedal powered kayak of the present invention.

FIG. 21 is a perspective view of a retraction handle for the pedal powered kayak of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is directed to an improvement over U.S. Pat. No. 6,210,242 which is hereby incorporated by reference.

With reference to FIGS. 1, a pedal-powered watercraft or kayak 10 according to the invention is illustrated. The watercraft 10 includes a hull 12, a pedal drive assembly 13, a deck 14, a keel 15, a stem 16 and a retractable rear rudder 17. The keel 15 is closed within the hull 12 to move within the water without allowing the water to pass through the watercraft from keel 15 to stem 16. Unlike the watercraft described in U.S. Pat. No. 6,210,242, the water is forced out of the way of the watercraft during travel. The hull further includes a central body portion 18 having a bottom surface 19 with a centrally formed concave recess 20 extending the length of the central body portion 18 between the keel 15 and the stem 16. The retractable rear rudder 17 is attached to the rear of the stem 16 and is used for guiding the watercraft 10.

Turning to FIGS. 2-7, the watercraft 10 is illustrated without the moving mechanical parts shown in FIG. 1. The watercraft is less than 15 feet in length and less than two feet in width. The hull 12 offers straight tracking due to the shape of the pointed keel 15 and stem 16. As shown in FIG. 2, the keel 15 has a pointed end 21 provided with an integrally formed blade 22 which extends into the water to prevent rocking of the watercraft during movement through the water. Likewise, the stem 16 also has a pointed tip 23 with a blade 24 which extends into the water to prevent rocking of the watercraft during movement through the water. As the user pedals the boat through the water wetting action is produced on each bottom surface of the keel and stem to refine stability of the watercraft during movement.

Extra stability and efficiency are further achieved by recessing a center tunnel 30 in the central body portion 18. This creates a hull 12 that has the stability of a wide v-type hull with the efficiency of a longer narrower hull because the tunnel 30 formed in the central body portion 18 of the hull 12 reduces the effective wetted area, and provides access to the water for the pedal drive assembly 13. Unlike prior art kayaks, the present invention offers a more rounded keel and stem which operates in the water leaving no or little wake in the front or the rear of the boat. Instead of the water passing through the boat the water follows the outline of the hull with a frictionless glide through the water. Since little water passes into the boat there no rough ride. An elongated opening 30a is provided through the bottom surface for positioning the drive assembly 13 over the central body portion 18 through the concave recess 20 and into a body of water below the hull 12. The elongated aperture 30a further permits a user to remove debris from the drive assembly 13 positioned below the hull 12. The width of the hull 12 from the opening 30a to each side of the watercraft 12 is approximately 4½ feet.

Provided on each side of the hull are lifting strakes or ribs 31 and 32. The right side strake 31 is integrally formed on hull 12 and extends along the hull 12 from just inside the keel 15 to just inside the stem 16. The left side strake 32 is integrally formed on the hull 12 and extends along the hull 12 from the keel 15 to the stem 16. The strakes help the hull plane slightly under increased power.

The hull 12 is further provided with hydrodynamic fullers 33 and 34. Fullers are recesses or grooves in the hull 12. The right side fuller 33 is integrally formed on hull 12 and extends along the hull 12 from the keel 15 to the stem 16. The left side fuller 32 is integrally formed on the hull 12 and extends along the hull 12 from the keel 15 to the stem 16. The fullers are designed to channel air fore and aft, decreasing hull surface tension and drag.

In operation, a user sits in a chair 50 mounted in the hull of the boat and pedals the drive assembly which turns propeller 51 causing the watercraft 10 to move through the water. The drive assembly 13 when fully extended, besides
providing propulsion, also acts as a center board in the water. The center mounted drive assembly 13 creates a stable hull 12 that resists the side to side rocking motion created when raising and lowering the legs during pedaling. The center position of the drive assembly 13 also gives the watercraft 10 a sharp turning radius by providing a center pivot point which the rear mounted rudder 17 can easily turn the watercraft 10 around. Finally, the drive assembly 13, extended 22" into the water provides a fulcrum that lowers the tipping moment of the hull 12, dramatically increases the kayak’s stability over waves and in rough water.

0048 The drive assembly 13 rests in two lower drive collars 60 that are firmly attached to the hull 12 at the trunk 110. The drive assembly 83 is clamped in place with two upper drive collars 3 held with four spacers 6 and bolts 7 and friction o-rings 9. The drive assembly is centered and held firmly from side to side motion within its' mounting by a lower drive mount 106 mounted in a recess on the bottom of the hull & held with three machine screws 107.

0049 The drive trunk 110 is surrounded by a cockpit 117. The cockpit has a seat assy. 115 mounted on fore & aft moving seat slides 163, 164 and a steering handle assy 114 controlling a rudder assembly 113 which steers the boat. The deck has a hatch cover 112 providing access to the front cargo area and a rear storage deck 116. Also shown is a tandem version of the hull with two cockpits 118, 119 and two drive assemblies 83. All mechanical systems as well as the hull’s operate the same for the single and tandem boat. In the tandem steering is controlled from rear cockpit 119 as a steering handle 114 is located there.

0050 Illustrated in FIGS. 11-13, and positioning the rider in the optimum recumbent position for power and comfort is accomplished through the use of a 2 way adjustment seat assembly 115. Fore and aft adjustment is achieved through seat slides 163, 164 attached to the seat bottom with screws 163 fitted into inserts 168 molded into the seat bottom 155. The right seat slide 163 has a handle operating a locking mechanism 163a. Upper and lower seat hinges 158, 157, 156 are attached to seat back and bottom 154, 155 with machine screws 171 fitted into inserts 169, 170 molded into the seat back and bottom 154, 155. The seat back 154 hinges fore/aft and lays flat for transporting. The seat adjustment assembly 172 controls a seat back adjustment 174. Adjustment rams 162 provide four different stops for the upper seat hinge edges 177 to rest on. Adjustment is made by rotating seat adjustment knobs 159 on either side of the seat assembly 115. The knobs 159 and seat adjustment rams 162 rotate on metal collars 177a turning in corresponding holes 178 in the lower seat hinges 158. The knobs 159 slip onto the seat adjustment rod 166 with stops formed by roll pins 167 inserted in the seat adjustment rod 166. This square seat adjustment rod 166 keeps the adjacent rams 162 timed together to provide equal adjustment on both sides. The knobs 159 and rams 162 are held in place against the roll pins 167 by screws threaded into the seat adjacent rod 166 and through the knobs 159. Small caps 160 fit into the knobs 159 and cover the screws 165.

0051 With regards to FIGS. 14-21, the retractable rudder assembly 113 is connected to a steering handle assy 114 by a push-pull teleflex cable, provides simple and precise steering for the hull. The rudder assy 113 is attached to the hull by the rudder bracket assy 138 which includes a rudder bracket hinge 128 and a rudder bracket strap 129.

0052 An alternative embodiment is shown in FIG. 8 in the form of a pedal powered tandem kayak 90 which has two seats 91,92 and two drive assemblies 93,94 along with a body 95 a keel 96 and a stern 97. The pedal powered tandem kayak shown in the drawing is identical to the single drive boat except it is designed for two passengers.

0053 The rudder assy 113 has positive stops 152 as a part of the rudder housing 140 which limits the side to side rotation by only rotating until the stops 152 reach the sides of the rudder bracket 153. This limits the rudder assembly 113 from over rotating to the point of damage or past being effective as a rudder. The rudder assy 113 rotates on a clevis pin 137 and washer 132 held in place by a lock ring 131. The rudder housing 140 consists of a hinge tube 181, right side housing 182, left side housing 183 and a steering bracket 180 all welded together and bolted with screw posts 133 machine screws 179 & spacers 134. The rudder blade 139 rotates on and is held in the rudder housing 140 by a tension knob 142 passing through holes 184 in the rudder housings 182,183 and a hole 186 in the rudder blade 139. The rudder blade 139 is spring loaded to remain down, as well as kick-up and return when striking an object, by a torsion spring attached to the rudder blade 139. This spring 141 is engaged by the tension knob 142. The knob 142 can be rotated until the correct tension is achieved. The knob 142 is then pushed in to engage in holes 185 located in the left rudder housing 183. The tension knob 142 is then held in the position by a hitch pin 143.

0054 The rudder blade 139 is retracted out of the water by rotating it 140 degrees on the tension knob 142. The blade is rotated remotely from the cockpit by a rudder retract cord 123 passing through a housing 124 and locked in the up position by a jam cleat 122 mounted on the steering handle cover 187. The retract cord 123 is able to pull the spring loaded rudder blade upward by extending the cord outward past the pivot point by the lift rod 136 which hinges on a roll pin 135. The lift rod follows the cord 123 to the up position with the cord 123 threaded through the retract cord eye 130 into the cord housing 124. When the cord 123 is released from the jam cleat 122, the spring loaded rudder blade 139 returns to the down position pulling the retract cord 123 and lift rod 136 back into its extended position.

0055 The steering handle 188 with non-slip grip 144 has a plastic bearing 150 which rotates on a shoulder bolt 146. A tension spring 149 rests against the steering handle cover 187 and plastic washer 145 to hold the steering handle 188 in place. The shoulder bolt 146 is threaded into an insert molded into the hull. The head of the shoulder bolt passes through a hole 191 in the steering cover 187 providing a shoulder bolt 146 firmly mounted at both ends for the steering handle and bearing 188, 150 to rotate about.

0056 The hull and deck are preferably constructed of a strong, light-weight and waterproof material, such as fiberglass, aluminum, composites, laminates, and the like. A multi-layer laminate known as rotomolded polyethylene or vacuum formed polyethylene. The latter is better known as twin sheet technology and is especially suitable for the hull and deck.

0057 It is to be understood that the terms inner, outer, upper, lower, horizontal, vertical, and their respective derivatives, as used throughout the specification refer to relative, rather than absolute orientations and/or positions.
Thus, the described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

1. A pedal powered kayak, said pedaled powered kayak comprising,
   a hull, said hull having a stem, a keel and a central body portion, said keel having a pointed end and a rounded body area with a blade for guiding said kayak, said stem having a bottom blade and
   a drive assembly connected to a propeller for driving said kayak over a body of water.

2. The pedal powered kayak as recited into claim 1, said hull further comprising a right side fuller and a left side fuller, said right side fuller integrally formed on said hull and extending along said hull from said keel to said stem said left side fuller integrally formed on said hull and extending along said hull from said keel to said stem, said fullers extending the wetting surface of said hull as said kayak moves over a body of water.

3. The pedal powered kayak as recited into claim 1, said hull further comprising a right side stake and a left side stake, said right side stake integrally formed on said hull and extending along said hull from said keel to said stem said left side stake integrally formed on said hull and extending along said hull from said keel to said stem, said stakes causing a lifting of said hull as said kayak moves over a body of water.

4. The pedal powered kayak as recited into claim 1, said kayak further comprising means for retracting said drive assembly.

5. The pedal powered kayak as recited into claim 1, said kayak further comprising a retractable rudder assembly.

6. The pedal powered kayak as recited into claim 1, said kayak further comprising a trunk, said trunk formed in said central body portion, said trunk housing said drive assembly in retracted position.

7. A pedal powered kayak, said pedaled powered kayak comprising,
   a hull, said hull having a stem, a keel and a central body portion, said keel having a substantially round body portion ending in a pointed tip and,
   a retractable drive assembly connected to a propeller for driving said kayak over a body of water, said drive assembly positioned over said central body portion and extending through said bottom surface into and below said centrally formed concave recess.

8. The pedal powered kayak as recited into claim 1, said hull further comprising a right side fuller and a left side fuller, said right side fuller integrally formed on said hull and extending along said hull from said keel to said stem said left side fuller integrally formed on said hull and extending along said hull from said keel to said stem, said fullers extending the wetting surface of said hull as said kayak moves over a body of water.

9. The pedal powered kayak as recited into claim 1, said hull further comprising a right side stake and a left side stake, said right side stake integrally formed on said hull and extending along said hull from said keel to said stem said left side stake integrally formed on said hull and extending along said hull from said keel to said stem, said stakes causing a lifting of said hull as said kayak moves over a body of water.

10. The pedal powered kayak as recited into claim 1, said kayak further comprising cable means for retracting said drive assembly.

11. The pedal powered kayak as recited into claim 1, said kayak further comprising a retractable rudder assembly.

12. The pedal powered kayak as recited into claim 1, said kayak further comprising a trunk, said trunk formed in said central body portion, said trunk housing said drive assembly in retracted position.

13. A pedal powered kayak, said pedaled powered kayak comprising,
   a hull, said hull having a stem, a keel and a central body portion, said keel having a substantially round body portion ending in a pointed tip and
   a retractable drive assembly connected to a propeller for driving said kayak over a body of water, said drive assembly positioned over said central body portion and extending through said bottom surface into and below said centrally formed concave recess.

14. The pedal powered kayak as recited into claim 13, said hull further comprising a right side stake and a left side stake, said right side stake integrally formed on said hull and extending along said hull from said keel to said stem said left side stake integrally formed on said hull and extending along said hull from said keel to said stem, said stakes causing a lifting of said hull as said kayak moves over a body of water.

15. The pedal powered kayak as recited into claim 13, said hull further comprising a right side stake and a left side stake, said right side stake integrally formed on said hull and extending along said hull from said keel to said stem said left side stake integrally formed on said hull and extending along said hull from said keel to said stem, said stakes causing a lifting of said hull as said kayak moves over a body of water.

16. The pedal powered kayak as recited into claim 13, said kayak further comprising cable means for retracting said drive assembly.

17. The pedal powered kayak as recited into claim 13, said kayak further comprising a retractable rudder assembly.

18. The pedal powered kayak as recited into claim 13, said kayak further comprising a trunk, said trunk formed in said central body portion, said trunk housing said drive assembly in retracted position.

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