ABSTRACT

A shallow draft boat hull for use with a water-jet propulsion unit has an elongate step extending longitudinally of the bottom along the keel forwardly from the transom so that the step extends forwardly of the transom at least about two-thirds the length of the hull.

6 Claims, 4 Drawing Figures
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STEPPED HULL FOR JET-POWERED BOAT
This is a continuation of application Ser. No. 68,941, filed Sept. 2, 1970, now abandoned.

BACKGROUND OF THE INVENTION

Field:
This invention relates to boat hulls, and more particularly to hulls adapted for use with water-jet propulsion units on shallow rivers.

State-of-the-Art
In many regions of the world there are fast-running, shallow rivers and streams which must be traversed with speed and safety by boats carrying passenger and cargo loads. Often these rivers contain large boulders and other hidden obstructions which endanger boats, especially when traveling at high rates of speed. Attempts have been made to use boats having shallow draft or even flat bottoms to avoid obstacles and permit travel over shallow river beds. However, a problem inherent in most shallow-bottomed boats is the difficulty of maintaining a course and remaining upright at high speeds over rapidly moving rivers. Moreover, at higher speeds a boat tends to raise its bow a considerable distance into the air, so that only the rear portion of the boat bottom remains in the water at all times, making the use of high powered, water-jet propulsion systems quite inefficient. These major obstacles have discouraged boat builders from constructing jet-powered boats having shallow draft so as to be capable of high speeds over shallow and rapidly flowing rivers.

Object
It was an object therefore in the development of this invention to provide an easily maneuverable boat hull for high speed, water jet propulsion that will insure submergence of the water intake aperture at all times, so that the propulsion unit can continually draw water during travel, particularly in shallow and rapidly flowing river water.

SUMMARY OF THE INVENTION
The boat hull is of the type adapted to be powered by a water-jet propulsion unit which draws water from the surrounding river and thrusts it rearwardly from the boat to provide forward propulsion. The hull has a step or downwardly projecting member extending longitudinally along the center or keel of the hull bottom. The step extends from the transom of the hull forwardly, preferably at least about two-thirds the length of the hull. In cross-section, the bottom of the step is preferably V-shaped with the sides of the step extending vertically downward from the hull bottom. Adjacent the transom an aperture is located in the step to provide a water intake for the jet propulsion unit which is preferably located within the hull as close to the transom as is convenient. The aperture in the step thereby extends below the bottom of the hull and remains in the water at all times when the boat is in motion to provide for continuous inflow of water to the jet unit. The step can extend forwardly along the bottom of the hull as far as desired to provide additional stability to the boat. The hull preferably has a shallow, generally V-shaped bottom in cross-section with a small, unstepped slope from each side of the hull to the step or keel. In one embodiment, the slope of the bottom on each side of the step is slightly concave. The hull can be equipped with a windscreen, seats, appropriate steering mechanism, running lights and other equipment necessary or desirable in a boat.

THE DRAWING
The best mode presently contemplated of carrying out the invention is illustrated in the accompanying drawing, in which:

FIG. 1 is an elevational view of the boat hull showing a jet propulsion unit in the cut-away position;
FIG. 2, a plan view of the bottom of the boat hull showing the location of the water intake aperture;
FIG. 3, a rear elevation of the hull illustrating the jet exhaust and the small, straight slope of the hull bottom from the hull sides to the step; and
FIG. 3A, a rear elevation similar to FIG. 3, but depicting the slightly concave slope of the hull bottom on both sides of the step.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT
In a preferred embodiment of the boat hull of the invention, as shown in FIGS. 1-3, the hull 10 has two mutually opposing longitudinal sides 11, 12. Sides 11, 12 can be slightly inclined toward the bottom 13 of the hull, as shown in FIGS. 3 and 3A, or they can be perpendicular if desired. Attached to the rearward end of sides 11, 12 is the transom 14 forming the stern of hull 10. At the forward end, sides 11, 12 curve laterally inwardly toward a bow 15. A structural projection or lip 16 projecting outwardly over, and extending around, the upper edge of sides 11, 12 and transom 14 prevents water from splashing into the interior of the hull as the boat is in motion. A wind screen 17 and deck covering 18 are attached to the top of hull 10 for the protection of the occupants.

Disposed longitudinally along the center or keel 19 of bottom 13 is a step 20 which extends from transom 14 forward along keel 19. In the embodiment illustrated in FIGS. 1 and 2, step 20 extends forward and downward to a point 21 about two-thirds the length of the hull from transom 14. From point 21, step 20 gradually rises and recedes in depth until it merges with bottom 13 at a point 21a which is about three-fourths the length of the hull from transom 14. As illustrated in FIGS. 3 and 3A, step 20 preferably has two mutually opposing sides 22, 23 projecting downwardly from bottom 13. From sides 22, 23 the two surfaces of bottom 24 of step 20 slope inwardly to form a V in cross-section. The configuration of step 20 provides stability to hull 10 when the boat is in the water, particularly traveling at high speeds.

An additional feature of step 20 is the water intake aperture 25 disposed adjacent transom 14. Water is drawn through aperture 25, which may have a grill 26 or other protective screen covering it, into a jet unit 27 located in the boat preferably adjacent transom 14. As the water is ejected from the jet unit through water-jet exhaust pipe 28, the boat is propelled forward. A disc 28a is advantageously disposed around exhaust pipe 28 at transom 19 to secure such pipe to the transom. The placement of intake aperture 25 is important in that the aperture will be submerged in water even when the bow of the boat rises out of the water during high speed travel. Under normal, high speed conditions, the boat skims along the surface of the water on a mixture of air and water. The aperture 25 in step 20 remains sub-
merged below the surface of the water so that only water is drawn into the jet unit. It is recognized that sufficient space between transom 14 and aperture 25 must be provided to permit jet unit 27 to be accommodated in the boat. However, the farther forward the aperture is placed, the greater is the likelihood that so-called "white water" or water containing great amounts of encapsulated air can surround the aperture and diminish the effectiveness of the jet unit.

The two longitudinal surfaces 29, 30 of hull bottom 13 preferably slope slightly downwardly and inwardly respectively from sides 11, 12 toward step 20 and keel 19 to form a shallow V in cross-section, as shown in FIG. 3. An alternative embodiment shown in FIG. 3A has each surface 31, 32 of bottom 13 in a slightly concave configuration. Both embodiments shown in FIGS. 3 and 3A provide the hull with a shallow draft or water displacement to allow rapid travel over the surfaces of shallow, obstacle-laden rivers and streams, on a cushion of air and water. The concave bottom surfaces 31, 32 permit more air to be present in the air-water mixture under the boat, thereby providing an even more friction-free passage over the water.

An additional feature of the illustrated embodiment is found in two extensions 33, 34 of bottom surfaces 29, 30 at the forward end of the hull. Extensions 33, 34 extend upwardly and forwardly along respective sides of keel 19 and bow 15, and are bounded on each lateral side thereof by hull sides 11, 12. The shallow bottom 13 is thereby extended forward to the bow to provide less resistance to shallow river water and hidden obstructions in the river. The broad, sled-like bow provides a wide, gradual rise which enables the boat to negotiate river rapids and white water by rising above the turbulent water instead of cutting through the rapids.

The dimensions of an embodiment of the invention, which has been found to be well adapted to navigating rapid Idaho rivers as shallow as 8 inches, are as follows:

Length of hull: 26 feet
Width at top of transom: 7 feet
Width at bottom of transom: 6 feet, 4 inches
Height of sides at transom: 32 inches
Distance from transom to merger of step with keel: 20 feet
Width of step: 16 inches
Distance from lower edge of hull sides to top of step sides: 1½ inches
Height of step sides: 1 inch
Distance from lower edge of hull sides to bottom of step: 5 inches

Width of bow: 3 feet
From the above and as illustrated, it is seen that the width of the step is approximately one-quarter the width of the bottom of the hull.

Whereas this invention is illustrated and described herein with respect to certain preferred forms, it is to be understood that many variations are possible without departing from the inventive concepts particularly pointed out in the claims.

1. A shallow draft, boat hull constructed for water-jet propulsion and having wall means which together define a broad and open interior for carrying passengers and cargo on shallow rivers, said wall means defining a bow for the boat; a transom; mutually opposing, longitudinal side walls interconnecting the bow and transom; a boat bottom connected to the bow, transom, and side walls; an elongate step having substantially vertical sides and V-shaped bottom and extending longitudinally of said bottom of the hull centrally thereof and forwardly from the transom at least about two-thirds the length of the hull, the width of said step being approximately one-quarter the width of said bottom and the entire assembly being of shallow draft, the said bottom extending in slightly upwardly sloping, unstepped formation from the sides of said step to the said longitudinal side walls; a water-intake aperture in said step adjacent to the transom for receiving the water-intake means of a water-jet propulsion unit; and an outlet aperture in the transom above the step for receiving the water-jet propulsion unit.

2. A boat hull as set forth in claim 1, wherein the surfaces of the bottom of the hull extending outwardly from the step are concave.

3. A boat hull as set forth in claim 1 wherein the bow is broadly tapered and slopes gradually upwardly from the bottom of the hull.

4. A boat hull as set forth in claim 1, including a water-jet propulsion unit having water-intake means installed in said water-intake aperture and water-jet exhaust means installed in said outlet aperture.

5. A boat hull as set forth in claim 1 wherein said step extends downwardly a distance of about 5 inches below the lower edge of the hull sides, said step being about 16 inches wide.

6. A boat hull as set forth in claim 1, wherein said hull is about 26 feet long and about seven feet wide at the transom.