Nov. 24, 1964 H. H. MAUER 3,158,129

AQUATIC VEHICLE

Filed May 22, 1962

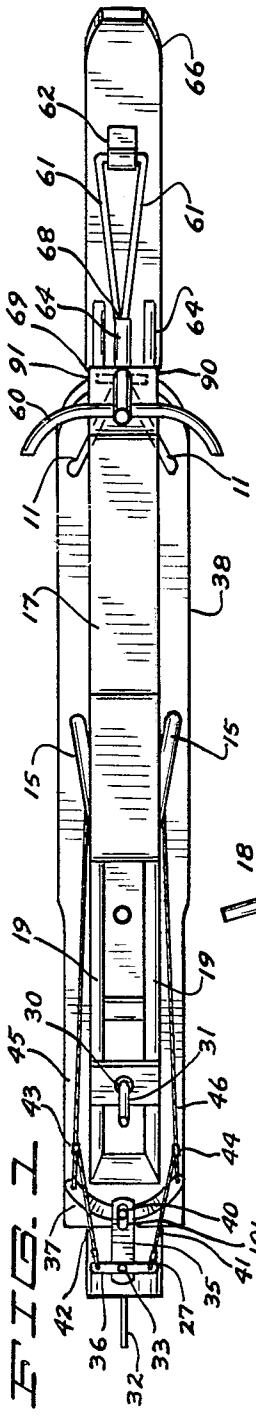

FIG. 1

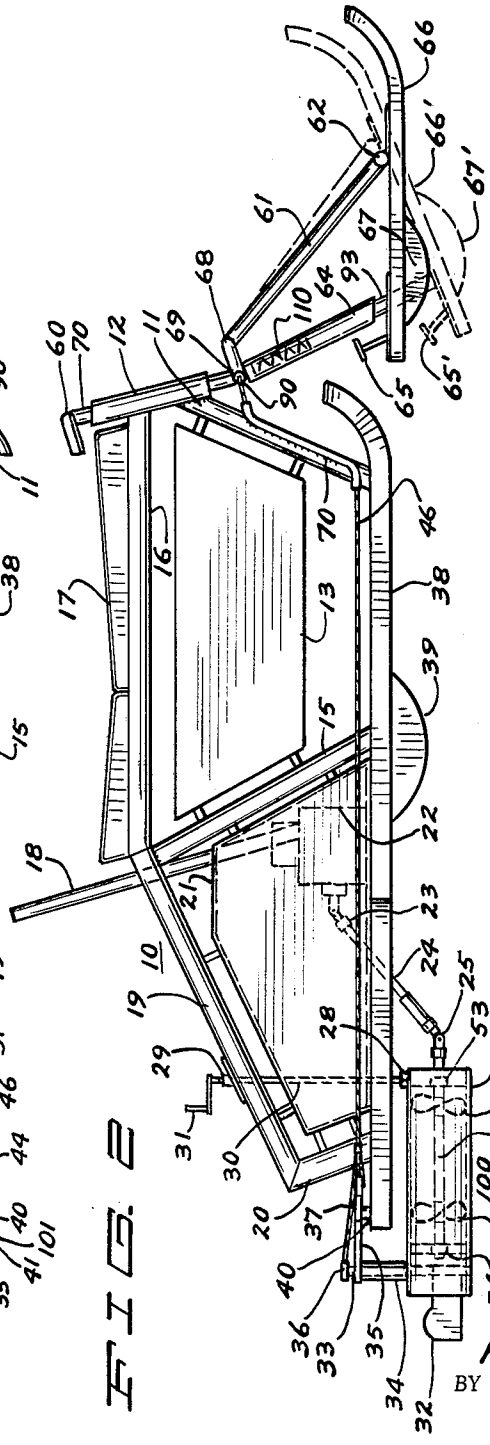

FIG. 2

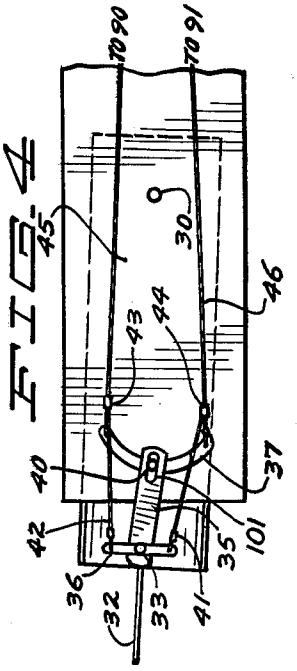

FIG. 4

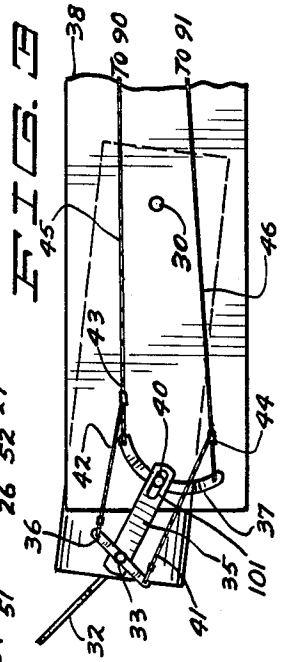

FIG. 3

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3,158,129

Patented Nov. 24, 1964

3,158,129

AQUATIC VEHICLE

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Filed May 22, 1962, Ser. No. 196,765
6 Claims. (Cl. 115—70)

The following invention relates to improvements in aquatic vehicles and is more particularly directed to aquatic vehicles of the steerable self-propelled type.

During the past decade or so, considerable effort has been directed toward the development of apparatus and devices for the enjoyment of recreation on aquatic bodies. One field of activity that has enjoyed considerable acceptance by the general public is the recreational sport of water skiing. Originally, this sport consisted of attaching a pair of skis, of suitable size, to the feet of a wearer and towing the user at a moderate to fast speed over the surface of a body of water through the intermediary of a tow-line. This arrangement, while ordinarily satisfactory, has become the subject of many regulations due to the apparent lack of safety and disregard for the rights of others using the same body of water for other recreational purposes.

A further step in the development of the general art of skiing is illustrated in the Ritter et al. patent, No. 2,814,811, issued December 3, 1957, on an application filed October 19, 1953, for Water Vehicle. In this patent, and many others, a towable vehicle was utilized as distinguished from having the skis actually attached to the feet of the user. Again, a tow-line was utilized to propel the vehicle through the water.

Further subsequent developments led to the self-propelled type of aquatic vehicle with which the present invention is concerned. An example of such a vehicle may be seen in the F. L. Chaffee patent, No. 2,940,409, issued June 14, 1960, filed August 27, 1956, for Water Craft. In this patent, a boat shaped hull has mounted within it an outboard engine assembly. The propeller housing extends below into the water and is positioned between a pair of ski members adapted to plane and support the body of the hull above the surface of the water. It may be noted that the entire control of the vehicle is at the discretion of the user or the operator.

In the present invention, improved stability and performance characteristics and above all, improved safety of operation is provided in combination with simplified construction which may be manufactured and constructed in a more economical manner.

It is therefore an object of the present invention to provide an improved self-propelled aquatic vehicle.

Another object of the present invention is to provide an improved arrangement for propelling and steering a self-propelled aquatic veticle.

Another object of the present invention is to provide an improved arrangement for steering an aquatic vehicle.

A still further object of the present invention is to provide a propulsion means for a self-propelled aquatic vehicle which is safer and more efficient in operation.

Another object of the present invention is to provide an adjustable propulsion unit for use with a self-propelled aquatic vehicle so as to allow for variations in weight of an operator.

These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawings, in which:

FIG. 1 is a top view of a self-propelled aquatic vehicle;

FIG. 2 is a side elevational view of the apparatus of FIG. 1; and

FIGS. 3 and 4 are detailed drawings of the rear portion of the vehicle of FIGS. 1 and 2 showing one embodiment of a steering mechanism.

Referring now to FIGS. 1 and 2, a frame made up of members 11, 12, 16, 15, 19 and 20 is shown attached to a stationary ski member 38. The frame may be made of suitable tubing, or the like, and is of rigid construction. Stationary ski member 38 is provided with a fin 39 depending downwardly therefrom for increasing the longitudinal stability and preventing skidding of the vehicle during turns. Frame member 12 has rotatably journalled therein, a shaft member 70 to which is attached a handle bar member 60 for manual operation by the operator of the vehicle. At the lower end of shaft 70 axle 69 is transversely rotatably journalled and has provided at either end connecting means 90 and 91 respectively for connection to steering cables, the purpose of which is to be explained below. A further member 68 extends forwardly of axle 69 and is connected to a pair of mounting members 61, connected at their lower ends through rotatable mounting means 62 to the forward portion of movable ski member 66. A shaft 93 is connected to the rear end of ski member 66 and extends in a telescoping arrangement within member 64 which is rotatably connected to axle 69. A spring biasing member 110 is utilized to urge shaft member 93 in a downward direction. The member 65 is positioned at the rear end of ski 66 for engagement by the foot of an operator so as to hold the rear end of ski 66 in the downward extended position. Corresponding reference characters 66', 67' and 65' applied to the dotted portion of FIG. 2 show the ski in its extended position.

A seat member 17 is mounted on top of frame members 16 and may be of suitable size and material to comfortably support the operator. Buoyancy member 13 is mounted within frame 10 and is provided for the purpose of maintaining the vehicle in an upright position at or near the surface of the water when at rest. Member 13 may be an air tank or may be comprised of suitable buoyant material, for example, foamed plastic and is held in place by suitable fastening means.

A water-tight housing 21 is provided within the rear portion of the frame and is in communication with the atmosphere through a pair of snorkel tubes 18 so as to provide air inlet and exhaust outlet means for the driving means 22 contained therein. Housing 21 may be held in place by suitable fastening means. Driving means 22 may be any suitable source of rotational energy, for example, an electric motor or an internal combustion engine. It is contemplated that the newly developed internal combustion engine known as the "Wankel" engine will adequately serve as a driving means in this vehicle. It is understood, of course, that other types of engines may also be suitable.

A propulsion tube means 100 is mounted in position beneath stationary ski 38 and in proximity to its rearward portion. Propulsion tube means 100 includes a circular shroud 27 which is rotatably mounted about a

vertical axis at bearing means 28 to shaft 30. A shaft 26 is journalled for rotation within shroud member 27 in suitable bearing means 53 and 54. A pair of propellers 51 and 52 are mounted on shaft 26. Shaft 26 is shown operatively connected to the output of driving means 22 by a pair of universal couplings 23 and 25 and drive shaft 24. This particular driving arrangement is shown by way of illustration only as it will be clear to those skilled in the art that other driving means, such as flexible shafts and the like, may also be used.

A hollow shaft member 34 is fixed to the top surface of shroud 27 and is rotatable with respect thereto. A shaft 33 extends through shroud 27 in proximity to its rearward end and is journalled in shaft 34 for rotation with respect to shroud 27. A rudder member 32 is fixedly attached to shaft 33. Hollow shaft member 34 is fixedly connected to arm member 35 having an elongated opening 101 which in turn is journalled for rotation and reciprocation on a fixed shaft 40 which is mounted in stationary ski member 38. Member 37, shown in arcuate shape, is rigidly attached to arm 35 and extends laterally therefrom for connection to a pair of steering cables 45 and 46. A further pair of steering cables 41 and 42 are connected to a transversely extending arm 36 which is non-rotatably connected to shaft 33. Cables 41 and 42 are connected to rudder cables 45 and 46 by connectors 44 and 43. Cables 45 and 46 extend forwardly to a pair of conduits, 70, therefor, and to connections 90 and 91 respectively. While not shown in detail on the drawings, it will be apparent to those skilled in the art that in order for the steering handle bar 60 to effect a turn in the direction which it is being turned, a reversal of this motion must be applied to the propulsion tube means and the rudder must be used. The means of achieving this phenomenon are not shown on the drawing although one readily apparent solution will be seen in crossing the cables somewhere intermediate the conduits 70 and the rearward portion of the vehicle.

The forward portion of the propulsion tube assembly may be adjusted in a vertical direction through the use of crank member 31 connected to the top end of shaft 30. The top end of shaft 30 is suitably threaded to co-act with member 29 having complementary threads therein so as to provide this adjustment. By modifying the longitudinal axis of propulsion tube assembly 100 with respect to the longitudinal axis of ski member 38, the stability of the vehicle may be adjusted in accordance with the weight of the operator. By having a negative angle of the longitudinal axis of the propulsion tube assembly, there is a tendency for the propulsion tube to pull the aft, or rearward end, of ski member 38 down into the water to provide increased stability. On the other hand, by having a positive angle with respect to the axis of the ski member 38, a force will be exerted upwardly to aid in lifting ski member 38 toward the surface of the water and may be used to compensate for the additional weight of an operator. It will be apparent that the speed and stability of the vehicle may be suitably modified in accordance with the operator's wishes.

It may now be apparent that the propulsion supplied in the present invention is that of a jet of water which is essentially harmless to the operator or others who may inadvertently come into contact with the vehicle. This feature alone will result in the elimination of a substantial number of accidents involving aquatic recreational sports and activities.

In operation, the vehicle is placed in the water and the operator is seated on the vehicle with his feet in engagement with member 65 on the forward ski 66 so as to maintain it in the extended position shown in dotted outline of FIG. 2. It will be apparent to those skilled in the art that a so-called "dead man's throttle" is desirable in this type of vehicle and it is contemplated that such a device will be incorporated. The forward thrust provided by the jet of water from the outlet of propulsion tube assembly 100 in combination with the support afforded by the relative movement between the stationary and forward ski members will rapidly bring the vehicle into a planing position on the surface of the water. Desired trimming of the operation of the vehicle may be then effected by the operator through suitable adjustment of the angle of propulsion tube assembly 100 by actuation of crank means 31.

In order to effect turns with the vehicle, handle bar member 60 is turned by the operator to turn forward ski 66 about the substantially vertical axis of shaft 12 and to rotate first the propulsion tube assembly 100, for shallow turns, and subsequently the rudder member 32, so as to deflect the stream of water for deeper turns.

In FIGS. 3 and 4 the position of the rudder and propulsion tube assembly for deep and shallow turns, respectively, are shown. In FIG. 4, the rotation of handle bar 60 through a small angle applies a forward force to cable 45 from connecting means 90 and allows cable 46 to move in a rearward direction from connecting means 91. This turns the laterally extending member 37 so as to position the rear end of propulsion tube assembly 100 slightly off center and therefore at a slight angle to the longitudinal axis of stationary ski member 38. The slack present in cables 41 and 42 allows the rudder member 32 to remain parallel to the longitudinal axis of the propulsion tube assembly. This allows the efficiency of the propulsion tube assembly to remain the same as that which is attained for normal straight line operation. Should a deeper turn be desired, further movement of handle bar member 60 in the same direction removes the slack from cable member 42 connected to cable 45 at connector 43 which rotates laterally extending member 36 connected to shaft 33. This serves to position the rudder at a predetermined angle with respect to the longitudinal axis of the propulsion tube assembly 100 so as to deflect the stream of fluid therefrom and aid in turning the vehicle. At this time, the slack in cable 41 is sufficient to allow rotation of shaft 33 and positioning of rudder 32 to effect the desired turn.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. In a self-propelled aquatic vehicle of the type wherein stationary and steerable skis are utilized to support a rider upon movement over a body of water; a propulsion tube means mounted for lateral rotational movement at its top forward end below the rear end of a stationary ski and rotatably mounted at its top rearward end to one end of a movable mounting therefor, said movable mounting being rotatably journalled at its other end in proximity to the rear end of said stationary ski; and manually operable means for rotating said movable mounting.

2. The apparatus of claim 1 in which said manually operable means are operative simultaneously to turn a steerable ski.

3. The apparatus of claim 1 in which a rudder is rotatably journalled in the rearward end of said propulsion tube means and is connected to the manually operable means.

4. The apparatus of claim 3 in which the rudder is rotated only after the movable journal has moved a predetermined distance.

5. The apparatus of claim 1 in which the top forward end of the propulsion tube means is vertically adjustable through the mounting therefor.

6. A self-propelled aquatic vehicle comprising in combination; a buoyant longitudinally extending frame having a generally vertically extending shaft, including man-

ual driving means therefor, rotatably journaled at the forward extremity of said frame; a first ski mounted on the bottom of said frame; a second ski pivotally connected to the lower end of said shaft for rotation about an axis extending laterally of said shaft; means mounted on the top rearward portion of said last named ski for engagement by an operator of the vehicle for rotating said ski to an initial starting position; motor means carried within the frame and including a waterproof housing; and means connecting said motor means to a driving means disposed beneath said first ski.

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