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BOAT

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Fig. 1

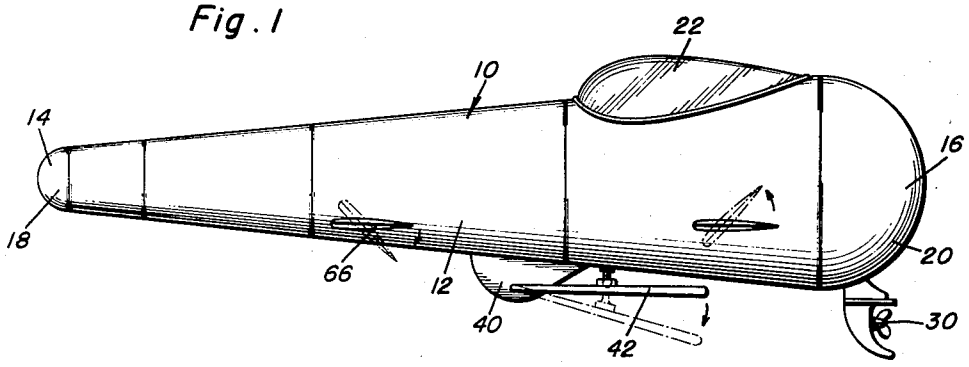


Fig. 2

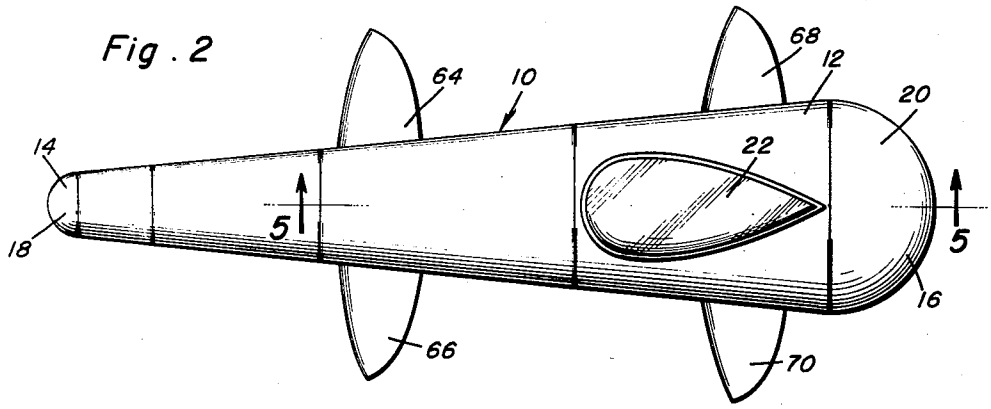
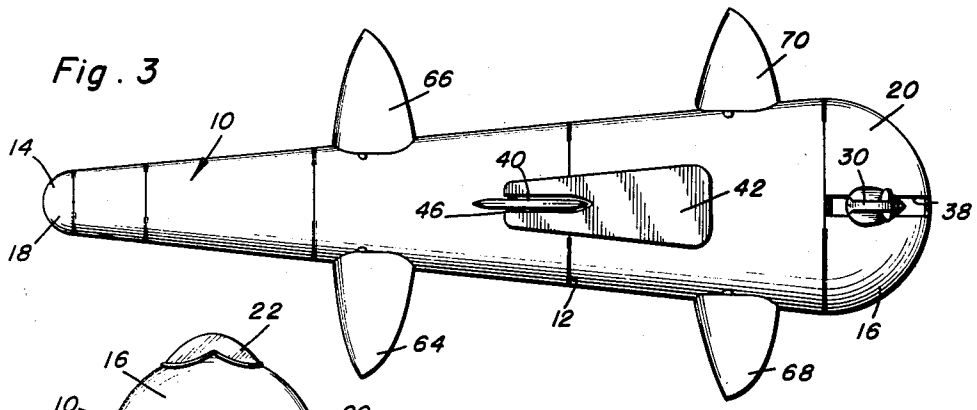


Fig. 3



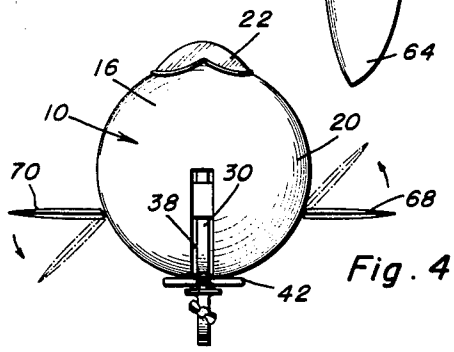


Fig. 4

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Fig. 5

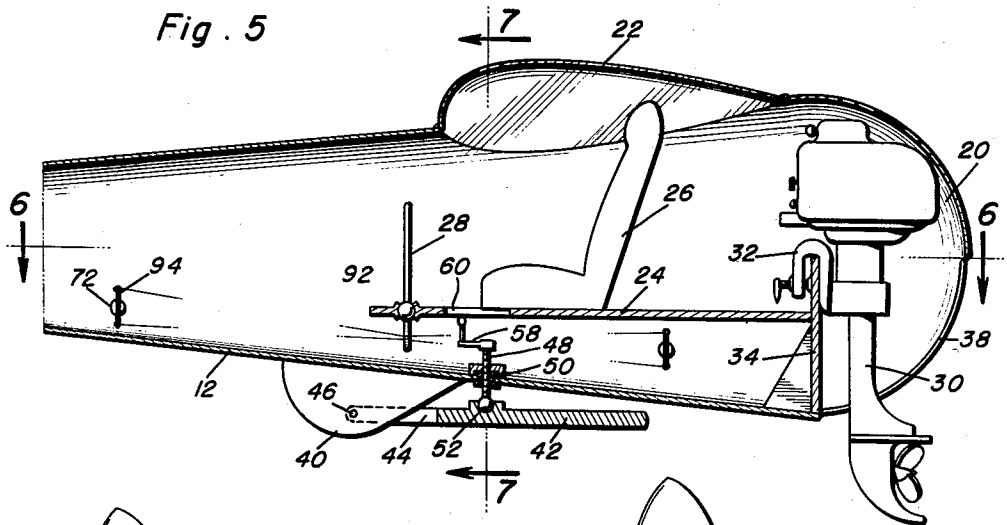


Fig. 6

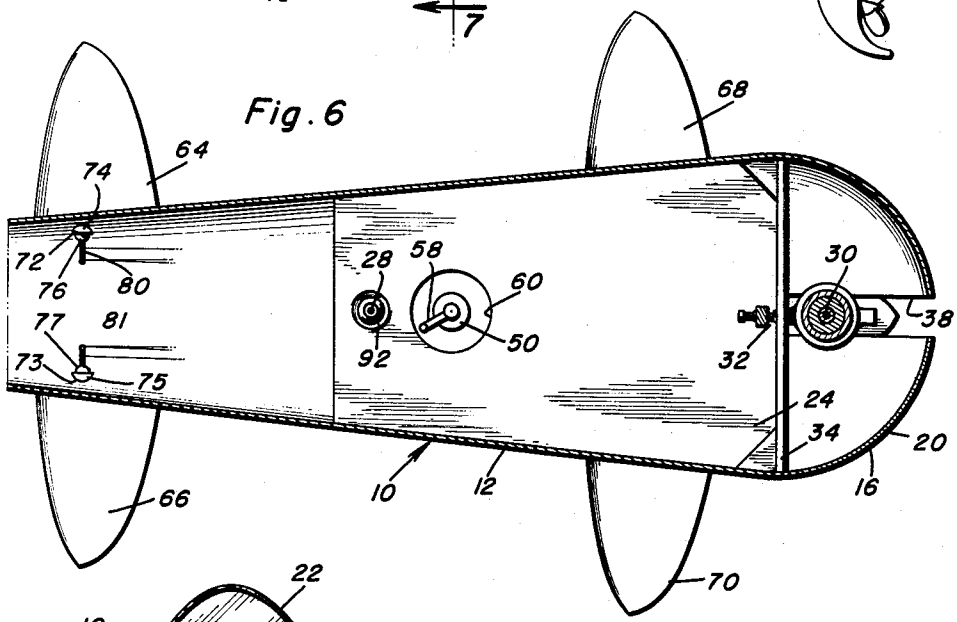
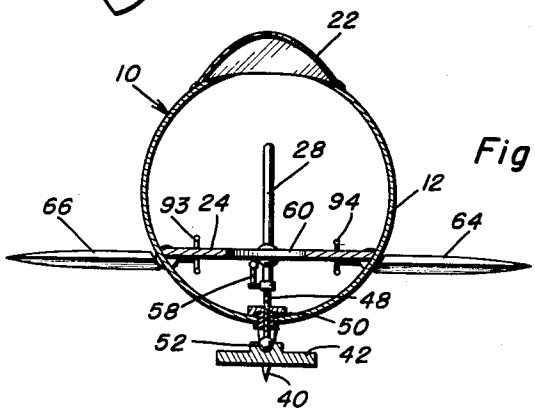


Fig. 7



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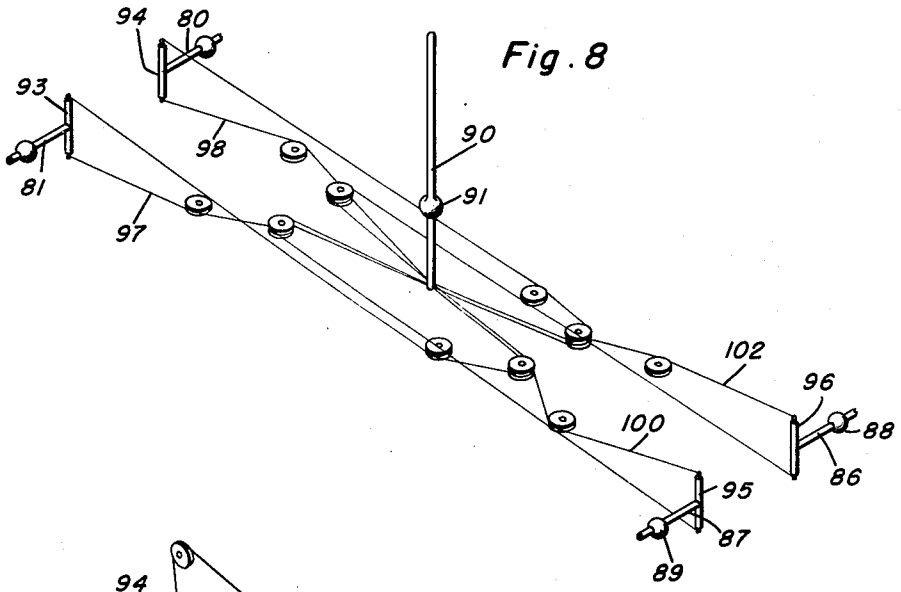


Fig. 8

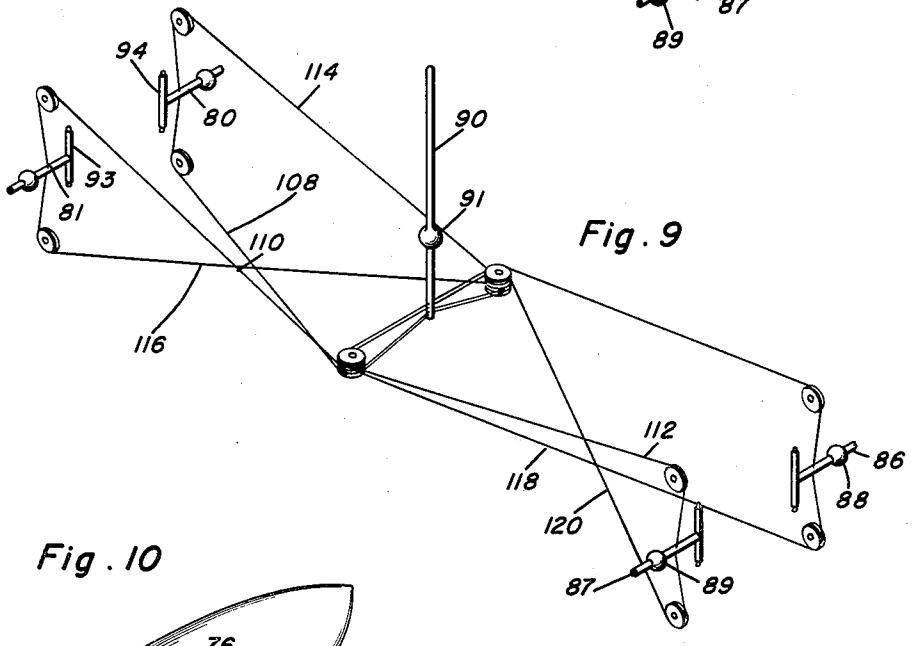
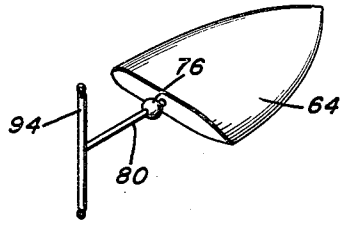


Fig. 9

Fig. 10



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BOAT

Glenn E. Perce, Aurora, Ill.

Application July 17, 1956, Serial No. 598,400

1 Claim. (Cl. 114—66.5)

This invention relates to improvements in boats and more particularly a boat which is capable of both underwater and surface navigation.

An object of the present invention is to provide an improved boat which has a system of control that is unique, providing excellent response, maneuverability and surety in travel at any speed, from a very low minimum to exceedingly high speed operation.

A further object of the present invention is to provide a boat which is capable of extremely high speeds and at such speeds capable of great maneuverability.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is an elevational view of a boat constructed in accordance with the invention;

Figure 2 is a top plan view of the boat in Figure 1;

Figure 3 is a bottom view of the boat of Figure 1;

Figure 4 is a rear view of the boat of Figure 1;

Figure 5 is an enlarged sectional view taken approximately on the line 5—5 of Figure 2;

Figure 6 is a sectional view taken approximately on the line 6—6 of Figure 5;

Figure 7 is a transverse sectional view taken on the line 7—7 of Figure 5;

Figure 8 is a perspective view showing a part of the control system for the fins of the boat;

Figure 9 is a perspective view showing another part of the control system, which, in construction, is superposed with respect to the remainder of the control system shown in Figure 8;

Figure 10 is a perspective view of one of the fins, the means for mounting the fins for universal movement and a lever to apply rotary adjustment to the fin for certain maneuvers in the water.

A boat constructed in accordance with the invention is capable of both underwater and surface propulsion. The illustration in the accompanying drawings is of a surface craft, although very minor modification, consisting principally of sealing and making water-tight certain parts, is all that is necessary to have an underwater craft. The control features of the underwater craft and the surface craft will be the same.

Boat **10** consists of a hull **12** which is approximately circular in cross-section from the bow **14** thereof to the stern **16**. The bow is formed of a hemisphere **18** joined to the hull, while the stern is formed of a hemisphere **20** that is also joined to the hull. The portions of the hull between the bow and stern hemispheres resemble a truncated cone; that is, it tapers from a smaller bow to a larger stern, with the diameter of the hull increasing while moving from the bow to the stern. Canopy **22** is either hinged or detachably connected to a part of the hull for access to the interior thereof. Deck **24** is located below the canopy and supports a seat **26** behind control

member, as stick **28** or a wheel. It is readily appreciated that any type of power plant for the boat may be used, and, accordingly, a standard outboard motor **30** is illustrated, this outboard motor having its clamp **32** attached to transom **34**. The transom is located in an opening **38** formed in the bottom part of the aft hemisphere **20**, and suitable controls for the outboard motor may be arranged at a place convenient to the pilot of the boat.

There is a keel **40** which protrudes from the hull between the bow and stern thereof. Center board **42** on which the boat is adapted to plane is provided with a slot **44** at one end, between which keel **40** is fitted. Pivot pin **46** connects the center board **42** to the keel. There are means to raise and lower the center board for proper adjustment. These means comprise a screw **48** that is passed through packing **50** in an opening in hull **12** adjacent to keel **40**. A ball joint **52** connects screw **48** to an intermediate part of center board **42**, and there is a crank **58** at the upper extremity of the screw accessible to the pilot through a hand hole **60** in deck **24**.

In order to provide control forces for the boat, there are two sets of fins. There is a fore set of fins including fins **64** and **66**, together with an aft set of fins that includes fins **68** and **70**. Each fin is very similar in construction. The fore set of fins **64** and **66** are mounted by ball joints **72** and **73**. Each ball joint comprises a socket, for example, sockets **74** and **75**, in which balls **76** and **77** are seated. The sockets are carried by the hull, while the balls are carried on spindles **80** and **81** respectively, the spindle **80** being secured to fin **64**, while the spindle **81** is secured to fin **66**. The spindles are arranged in axial alignment so that the fins are capable of rotation about a common axis which lies on a chord at the cross-sectional circle of the hull configuration at the axis of rotation of the pins **64** and **66**. Accordingly, the fins are disposed below the longitudinal center line of the hull.

The aft set of fins **68** and **70** are mounted in an identical fashion, including spindles **86** and **87** having balls **88** and **89** respectively mounted in sockets that are carried by the hull. These spindles are arranged coaxially on a chord of a circle considered similarly to the previously described in connection with the disposition of pins **64** and **66**. A single wheel or control stick, as at **90**, constitutes the control members for simultaneously actuating all of the fins. As clearly evidenced on inspection of Figure 8, the control stick **90** is mounted on a ball joint which includes ball **91** in socket **92** which may be carried by the deck. The lower end of the control stick has control cables connected to it. The cables are entrained over a network of pulleys carried by the hull **12** and are arranged such as to cause spindles to be rotated in response to forward or rearward movement of control stick **90**. To accomplish this, the inner extremity of each spindle has a rocker fixed to it. There are rockers **93**, **94**, **95** and **96**, respectively, one being secured to the inner extremity of each spindle. When the control stick is moved forward, cables **97** and **98** cause spindles **80** and **81** to rotate in one direction inasmuch as they are secured to the lower ends of rockers **94** and **93** and allow the spindles **87** and **86** to be rotated in the opposite direction to the upper ends of rockers **95** and **96**. Meanwhile, cables **100** and **102**, which are secured to the upper extremities of rockers **96** and **95** and after being appropriately wrapped around the network of pulleys, secured to the lower end of stick **90**, apply a positive rotational force onto the spindles **86** and **87** in a direction opposite to that of spindles **81** and **80**. This causes a resulting, corresponding rotary control movement of each of the fins, inasmuch as the fins are secured to their spindles. This adjustment is seen in Figure 1. Movement of the stick in the opposite direc-

tion causes a corresponding movement of the fins, but in the opposite directions. In operation, the control movement applied by the stick **90** is to cause the boat to be raised or lowered.

In order to cause the boat to bank, stick **90** is oscillated from one side to the other. This causes the control fins to be raised or lowered throughout a range of approximately 45 degrees up and 45 degrees down (see Figure 4). The control cable arrangement of Figure 9 is such as to cause the fins on the starboard side to move in unison, say downward, and at the same time the fins on the port side move in unison in the opposite direction, which will be upward. In order to achieve this, the control system of Figure 9 is used, it being understood that both of these systems are applied to the same control stick and simultaneously, that is, the systems of Figures 8 and 9, but they are shown separately in the two figures for clarity. By moving the stick **90** in one direction, for example to the left, the right fins connected to spindles **86** and **80** are lifted by having pulley movement applied to cable **108**, the latter being secured to both spindles **80** and **86** at a point inwardly of the ball sockets which mount the spindle for universal movement. At the same time, the left fins are moved down by a pull applied to cables **110** and **112** that are secured to the spindles **81** and **87** and guided from above over a network of pulleys. The cables **114** and **116** for the bow fins are pulled in the opposite direction by stick **90** when it is moved to the right, while the corresponding cables **118** and **120** are operated in the opposite direction from that when the stick was moved to the left. This causes the fins to be operated in the opposite direction for making a right turn. In operation of this part of the control system, the stick is moved from one side to the other in order to raise and lower the fins; that is, the fins on the starboard side are raised, while the fins on the port side are lowered, and vice versa. This applies rolling control to the boat, permitting it to achieve correct attitudes in its movement through the water.

It is understood that various modifications may be made herein without departing from the invention. For example, instead of cables, a hydraulic system may be adopted for the control. Inboard engines of any type and outboard engines of any type may be substituted for the outboard motor **30**. Other modifications as fall in the scope of the following claim may be resorted to.

What is claimed as new is as follows:

A high speed and maneuverable boat comprising a hull, said hull having a generally circular cross-section and being tapered from a smaller forward diameter to a longer aft diameter to form a truncated cone, a first hemisphere having a diameter equal to said smaller forward diameter fixed to the forward portion of said hull, a second hemisphere having a diameter equal to said longer aft diameter fixed to the aft portion of said hull, a plurality of control fins, said plurality of control fins including a forward and an aft pair of fins, each of said plurality of fins being mounted for rotational movement about an axis which forms a chord of said circular cross-section, and angular longitudinal movement about a terminal end of said fin, means carried by said boat to actuate said fins, said means including a control stick in said hull, control cables connected to said stick and said fins for synchronously controlling said fin movement, and a center board pivotally dependingly supported from beneath said hull, means in said boat for adjusting and maintaining said pivotal position of said center board, a slot in said center board, said slot accommodating said keel, said keel fixed to said hull and pivotally connected to said center board.

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