Dec. 4, 1962 E. C. KIEKHAEFER 3,066,639

OUTBOARD MOTOR DRIVEN HYDROPLANING BOAT WITH DORSAL FIN PLENUM CHAMBER

Filed Feb. 13, 1961 2 Sheets-Sheet 1

Fig. 1.

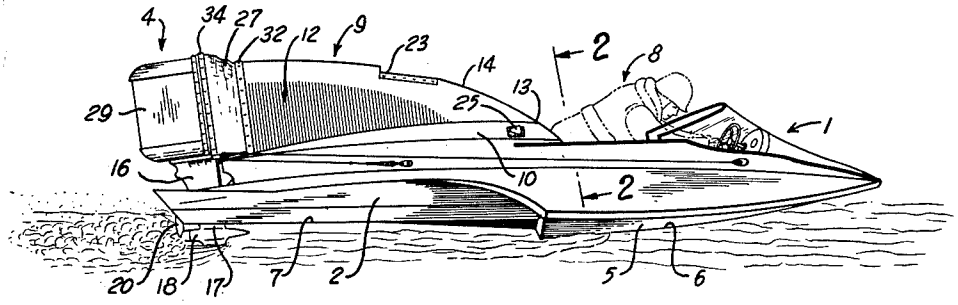


Fig. 7.

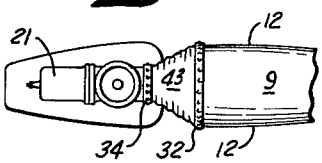


Fig. 2.

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Fig. 3.

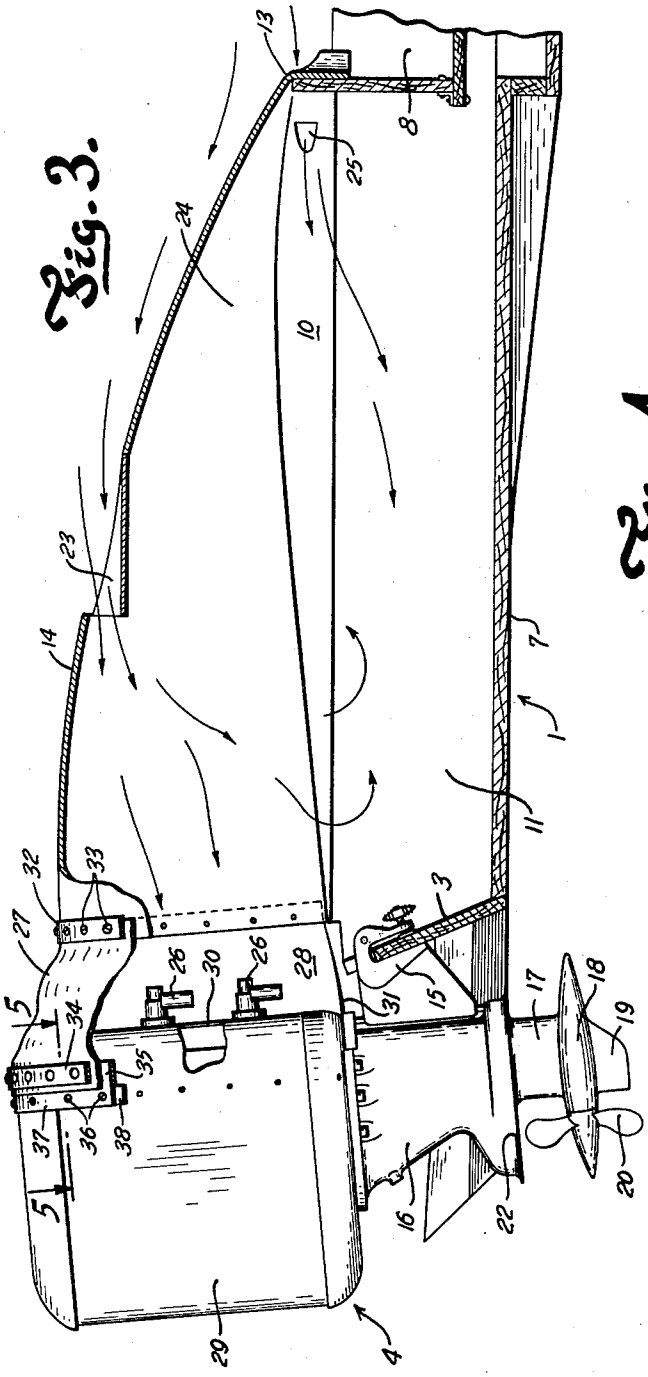


Fig. 4.

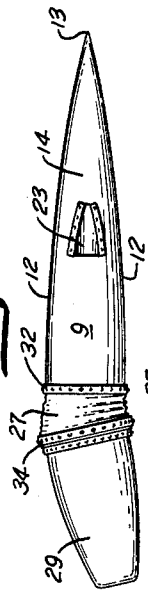


Fig. 6.

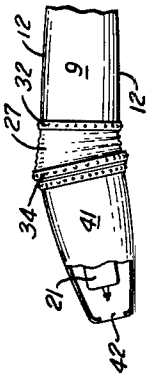
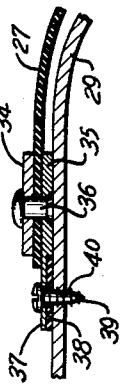


Fig. 5.



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OUTBOARD MOTOR DRIVEN HYDROPLANING BOAT WITH DORSAL FIN PLENUM CHAMBER

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10 Claims. (Cl. 115—17)

This invention relates to certain improvements in outboard driven hydroplaning boats of the type described and claimed in applicant's Patent No. 2,909,140 issued October 20, 1959.

Generally, the aforesaid patent is directed to a hydroplaning boat of the type wherein the hull includes transversely spaced sponsons having lower planing surfaces which extend forwardly from generally amidship, and a cockpit or cab is provided in the hull forwardly from amidship and above the planing surfaces. The boat is driven by a dirigible outboard motor secured on the rear of the boat and at planing speeds the propeller of the motor is adapted to operate under surface pitch conditions. A dorsal fin projects upwardly from the hull and extends rearwardly from the cockpit along the longitudinal centerline of the boat and in alignment with the motor to a location spaced forwardly from the powerhead of the motor. The dorsal fin provides air reaction surfaces which enhance the stability of the boat and also serves to direct air rearwardly against surfaces of the dirigible motor whereby the motor acts as an aerodynamic rudder to improve steering control of the boat.

According to this invention, the interior of the dorsal fin serves as a plenum chamber receiving air through a plurality of scoops provided in the fin and/or its base structure. A substantially airtight tubular bellows-like connecting member extends between the fin and motor placing the engine carburetors in communication with the plenum chamber. With the boat under way, high velocity air enters the plenum chamber through the scoops and is converted to a pressure head to increase the air available for carburetion. The positive pressure within the plenum chamber serves to improve engine efficiency making it possible to attain higher boat speeds.

The drawings furnished herewith illustrate the best mode for carrying out the invention as presently contemplated and set forth hereinafter.

In the drawings:

FIG. 1 is generally a side elevation of the outboard motor driven hydroplaning boat showing the dorsal fin being utilized as a plenum chamber in accordance with this invention;

FIG. 2 is an enlarged sectional perspective view taken generally on line 2—2 of FIG. 1;

FIG. 3 is an enlarged vertical longitudinal fragmentary section taken generally on line 3—3 of FIG. 2 to show further detail with respect to the plenum chamber;

FIG. 4 is a partial top plan view showing the motor and dorsal fin with the bellows-like airtight connecting member extending therebetween and the motor disposed at a turning angle;

FIG. 5 is an enlarged detail section taken on line 5—5 of FIG. 3 and showing the sealing connection between the motor and the flexible connecting member;

FIG. 6 is a view similar to that of FIG. 4 with parts broken away and showing an embodiment wherein the cowl enclosing the engine is provided with an opening rearwardly thereof; and

FIG. 7 is a view similar to that of FIG. 4 with parts broken away and the motor disposed straight away with respect to the dorsal fin and showing an embodiment wherein the engine cowl is removed and the bellows connecting member is secured directly to the engine.

Referring to the drawings, the hydroplaning boat 1 generally includes a hull 2 having a transom 3 adapted to support the dirigible outboard motor 4 centrally thereof for driving the boat.

As described in the aforementioned Patent No. 2,909,140, the boat hull 2 includes outwardly projecting sponsons 5, only one being visible in the view of FIG. 1, which extend forwardly from generally amidship to provide a pair of transversely spaced planing surfaces 6 beneath the boat. Amidship the planing surfaces 6 are stepped beneath the bottom 7 of the boat and extend forwardly and curve upwardly to merge forwardly with the bottom of the hull 2. The cab or cockpit 8 is disposed on the longitudinal centerline of the boat forwardly from generally amidship so as to be located above the planing surfaces 6.

The boat includes a hollow dorsal wedge-shaped or tapered fin 9 which extends upwardly from its base 10 mounted on the hull 2 to enclose the upwardly opening cavity 11 in the hull rearwardly of the cockpit 8. The fin 9 is disposed along the longitudinal centerline of the boat in alignment with the motor 4 and extends generally from the rear of cockpit 8 to a location spaced forwardly from the motor. As viewed from above and from the front, the fin 9 may assume varying configurations, but according to the embodiment shown in the drawings, the fin includes spaced generally vertical sidewalls 12 which taper forwardly and inwardly to a virtual point at 13 adjacent the cockpit 8, capped by an arcuate portion 14. Generally, it can be said that a transverse section through the fin 9 would have an arch-like configuration, and the arch-like configuration increases in size as successive transverse sections are taken progressively rearwardly from point 13. The tapered or wedge-shaped fin 9 serves as an air-foil providing reaction surfaces for the air through which it moves to stabilize the boat and generally directs the flow of air rearwardly.

The outboard motor 4 includes the usual bracket assembly 15 adapted for securement on transom 3 and which is pivotally connected to motor housing 16 for turning movement of the motor on a generally vertical steering axis. The lower unit 17 of motor 4 including the gear case 18 and downwardly extending skeg 19 is secured to the lower end of housing 16 and carries the propeller 20 rearwardly thereof. The propeller 20 is driven by an internal-combustion engine 21 through drive means, not shown, and is disposed beneath the anticavitation plate 22 spaced above gear case 18. As shown in FIG. 1, the propeller 20 operates under surface pitch conditions at planing speeds with only the skeg 19 and one blade beneath the water surface and the gear case 18 above the water surface.

According to this invention, the hollow fin 9 together with adjacent portions of boat 1 are adapted to serve as a plenum chamber which when placed in communication with engine 21 of motor 4 provides air for engine combustion at a pressure substantially greater than atmospheric pressure to increase engine efficiency and thereby make possible higher boat speeds.

As shown in the drawings, the fin 9 of the boat is provided with an air scoop 23 in the upper arcuate portion 14 thereof through which atmospheric air enters the plenum chamber 24 internally of the fin and the adjacent hull cavity 11 of the boat rearwardly of cockpit 8. The plenum chamber 24 may be pressurized by any number of air scoops providing the desired result and in the embodiment shown in the drawings two additional smaller air scoops 25 are provided in the base 10 for the fin.

The plenum chamber 24 is placed in communication with the carburetors 26 of engine 21 by means of the generally air-tight flexible bellows-like tubular connect-

ing member 27 which spans the gap 28 between the boat fin 9 and the engine cowl enclosure 29. Carburetors 26 are mounted on the engine 21 and extend forwardly through the relatively large opening 30 at the front of the cowl enclosure 29.

The member 27 generally extends from one side of the drive shaft housing 16 over and around the cowl enclosure 29 to the other side of housing 16 and around the corresponding portions of fin 9 leaving only a small slot-like opening at 31 in the bottom of member 27 immediately above the boat transom 3. In the operation of the plenum chamber 24, air leakage from the chamber through the opening at 31 is negligible so that for all practical purposes member 27 may be considered to be a generally closed tubular connection between the fin 9 and cowl enclosure 29.

Forwardly, the connecting member 27 is sealingly secured between the outer surface of fin 9 and a suitable contoured band 32 by means of suitable fastening members such as bolts 33. Rearwardly, the connecting member 27 is secured to the cowl enclosure 29 between an outer band 34 and a mounting flange 35 by suitable fastening means such as the rivets 36 as shown in FIG. 5. Assembled to the cowl enclosure, the rearwardly extending portion 37 of mounting flange 35 is spaced outwardly from the cowl and a compressible sealing band 38 is interposed between the cowl and flange extension 37. A plurality of spaced screw fasteners 39 extend through flange extension 37 and the sealing band 38 and engage in threaded openings 40 in the cowl to sealingly secure member 27 to the cowl.

In operation and with the boat 1 moving over the water at planing speeds, atmospheric air for engine combustion passes through the air scoops 23 and 25 at a considerable velocity and enters the plenum chamber 24 within the fin 9 and adjacent hull portions of the boat. Upon entering the relatively large cavity of plenum chamber 24, the air is slowed down and some of the velocity head of the incoming air is converted to a pressure head to effectively pressurize the air within the plenum chamber and thereby increase the supply of air available for carburetion. The increased air available for carburetion serves to improve engine efficiency making it possible to attain a higher boat speed.

Ordinarily it would be desired to build up the highest possible pressure in plenum chamber 24 to provide a maximum supply of air for carburetion. According to the embodiment of FIG. 6, however, a lesser pressure build-up is anticipated. In FIG. 6 the cowl enclosure 41 for engine 21 is provided with an opening 42 rearwardly thereof so that the pressurized air in excess of that required for carburetion passes around the engine and is discharged rearwardly through the cowl opening. While engine 21 is ordinarily water-cooled, the air passing around the engine provides an additional cooling effect which may serve to improve engine efficiency.

The area of cowl opening 42 should be substantially less than the combined areas of the intake scoops 23 and 25 to provide the desired pressure in plenum chamber 24. With this construction the air discharging through opening 42 when the boat is traveling at top speed will have a greater velocity than the incoming air through scoops 23 and 25.

In the embodiment of FIG. 7, the engine 21 is operated without a cowl enclosure and the bellows-like connecting member 43 is adapted for securement directly to the engine block to conduct the pressurized air from plenum chamber 24 to the carburetors 26 for engine combustion.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In combination, a hydroplaning boat including a hull having a stepped bottom with planing surfaces extending forwardly from generally amidship and cockpit over said planing surfaces, a hollow rear-opening wedge-shaped dorsal fin projecting upwardly from the boat hull and extending rearwardly from the cockpit along the longitudinal center line of the boat, an outboard motor secured to the rear of the boat generally in alignment with the fin and including an engine having combustion air intake means, said hollow fin being adapted to serve as a plenum chamber and having air intake means facing forwardly to pass air into the chamber during forward movement of the boat, said air intake means for said fin being adapted to direct air into the chamber at a relatively high velocity when the boat is under way and said chamber being adapted to convert a portion of the velocity head of the entering air to a pressure head and thus pressurize the air within the chamber, and air conduction means disposed between the plenum chamber and the engine to conduct the pressurized air from the chamber to the engine for engine combustion.

2. The invention of claim 1 wherein the outboard motor is dirigible to provide for steering control of the boat and the air conduction means is a flexible bellows-like member adapted to accommodate steering movements of the outboard motor.

3. The invention of claim 1 wherein the air intake means for the plenum chamber comprises at least one air scoop provided on the dorsal fin and opening forwardly.

4. In combination, a hydroplaning boat including a hull having a stepped bottom with planing surfaces extending forwardly from generally amidship and a cockpit over said planing surfaces, a hollow rearwardly opening wedge-shaped dorsal fin projecting upwardly from the boat hull and extending rearwardly from the cockpit along the longitudinal center line of the boat, an outboard motor secured to the rear of the boat and adapted to drive the boat at planing speeds, said motor including an engine and a cowl enclosing the engine, said cowl being generally in alignment with said fin and spaced rearwardly therefrom and having openings forwardly and rearwardly thereof, said hollow fin being adapted to serve as a plenum chamber and having air intake means facing forwardly to pass air into the chamber during forward movement of the boat, said air intake means being adapted to direct air into the chamber at a relatively high velocity when the boat is under way and said chamber being adapted to convert a portion of the velocity head of the entering air to a pressure head and thus pressurize the air within the chamber, and air conduction means connecting the fin on said boat and the cowl of said motor to conduct the pressurized air within the chamber to the cowl for engine combustion with the pressurized air in excess of that required for combustion moving rearwardly through the cowl and around said engine to cool the engine.

5. The invention of claim 4 wherein the air intake means for the plenum chamber comprises at least one air scoop provided on the dorsal fin and opening forwardly.

6. The invention of claim 4 wherein the outboard motor is mounted dirigibly on the boat to provide for steering control of the boat and the air conduction means is flexible to accommodate steering movements of the outboard motor.

7. The construction of claim 4 in which said air conduction means comprises a flexible tubular bellows having its forward end secured to the rear end of said dorsal fin to receive air therefrom and having its rearward end secured to said cowl to direct air thereinto.

8. In combination, a hydroplaning boat including a hull having planing surfaces extending forwardly from generally amidship and a cockpit over said planing surface, said hull further having a rear transom and an upwardly opening cavity between the transom and the cockpit, a hollow rearwardly opening wedge-shaped dorsal

fin projecting upwardly from a base portion mounted on the hull to enclose the hull cavity and to place the fin along the longitudinal center line of the boat rearwardly of the cockpit, an outboard motor secured to the transom of the boat and adapted to drive the boat at planing speeds, said motor including an engine and a cowl enclosing the engine, said cowl being generally in alignment with said fin and spaced rearwardly therefrom and having openings forwardly and rearwardly thereof, said hollow fin and hull cavity together being adapted to serve as a plenum chamber and having air intake means facing forwardly thereof, said air intake means directing air into the chamber at a relatively high velocity when the boat is under way and said chamber being adapted to convert a portion of the velocity head of the entering air to a pressure head and thus pressurize the air within the chamber, and air conduction means connecting the fin on said boat and the cowl of said motor to conduct the pressurized air within the chamber to the cowl for engine combustion with the pressurized air in excess of that required for combustion moving rearwardly through the cowl and around said engine to cool the engine.

9. The invention of claim 8 wherein the air intake means for the plenum chamber comprises a plurality of air scoops opening forwardly with at least one of said air scoops being provided on the dorsal fin.

10. In combination, a hydroplaning boat including a hull having planing surfaces extending forwardly from generally amidship and a cockpit over said planing surface, said hull further having a rear transom and an upwardly opening cavity between the transom and the cockpit, a hollow rearwardly opening wedge-shaped dorsal fin

projecting upwardly from a base portion mounted on the hull and adapted to close the hull cavity, said fin being disposed along the longitudinal center line of the boat and rearwardly of the cockpit, an outboard motor dirigibly secured to the transom of the boat and adapted to drive the boat at planing speeds, said motor including an engine and a cowl enclosing the engine, said cowl being generally in alignment with said fin and spaced rearwardly therefrom and having an opening forwardly thereof, said hollow fin and hull cavity together being adapted to serve as a plenum chamber and having air intake means placing the chamber in communication with the atmosphere, said air intake means directing air into the chamber at a relatively high velocity when the boat is underway and said chamber being adapted to convert a portion of the velocity head of the entering air to a pressure head and thus pressurize the air within the chamber, and a substantially tubular connecting member extending between the fin and the cowl and sealingly connected thereto, said member being flexible and extendible to accommodate steering movements of the outboard motor relative to the boat and being adapted to conduct the pressurized air within the plenum chamber to the cowl for engine combustion.

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