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BOAT CONSTRUCTION

3 Sheets-Sheet 1



INVENTOR.

BY *Clarence A. O'Brien*
and Harvey B. Jacobson
Attorneys

Jan. 16, 1962

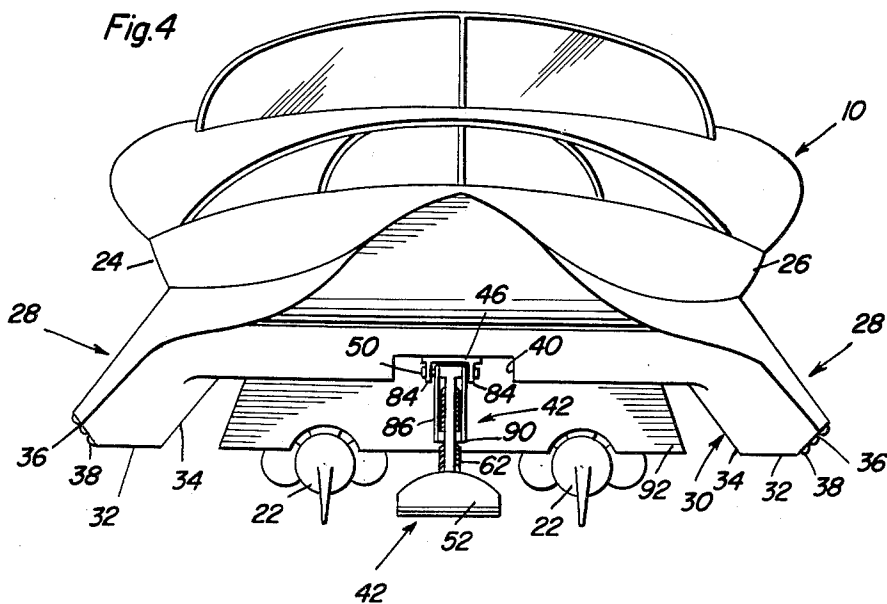
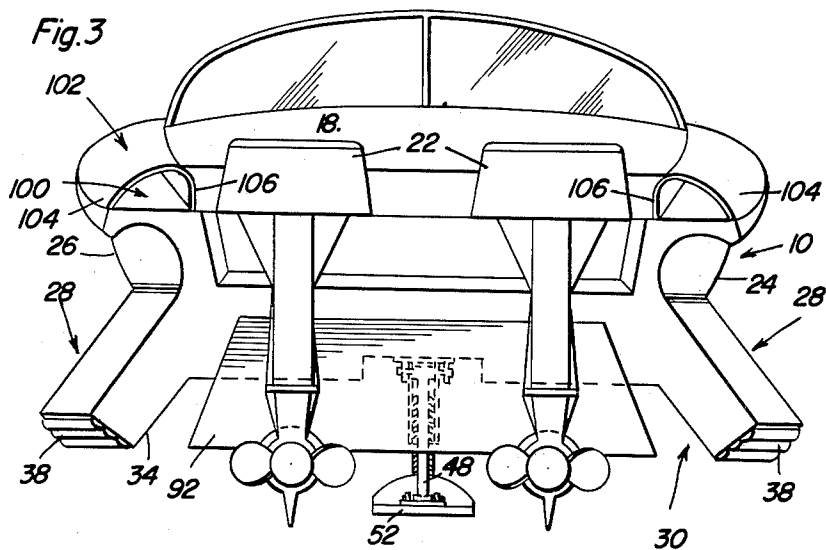
V. L. WOODFIELD

3,016,864

BOAT CONSTRUCTION

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Vinson L. Woodfield

INVENTOR.

BY *Chance A. O'Brien*
and Harvey B. Jackson
Attorneys

Jan. 16, 1962

V. L. WOODFIELD
BOAT CONSTRUCTION

3,016,864

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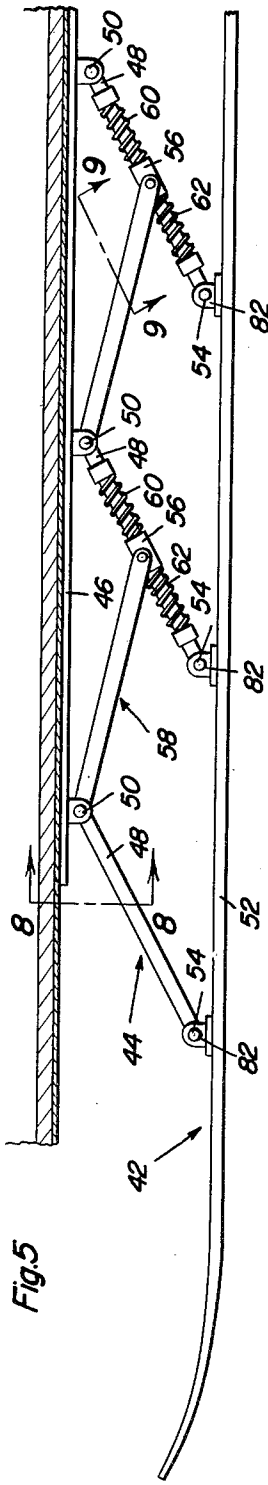


Fig. 5

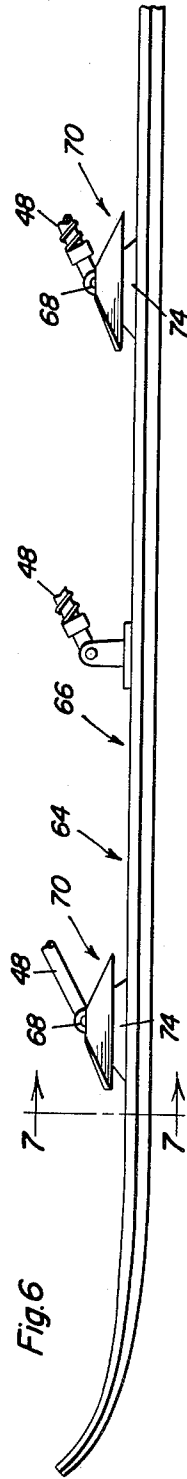


Fig. 6

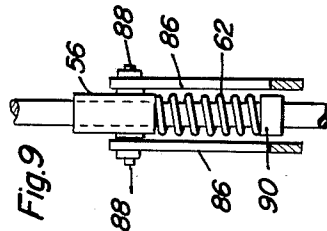


Fig. 7

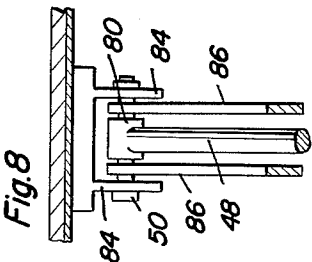


Fig. 8

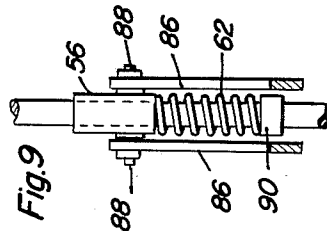


Fig. 9

Vinson L. Woodfield
INVENTOR.

BY *Chance W. Brown*
and *Harvey B. Jacobson*
Attorneys

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BOAT CONSTRUCTION

Vinson L. Woodfield, 3616 Cherry Hill St.,
Pine Bluff, Ark.

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14 Claims. (Cl. 114—66.5)

This invention relates to a novel and useful boat hull construction, and more particularly to a boat hull construction specifically designed to afford comfort while maintaining maximum safety.

Boating is becoming one of the fastest growing outdoor sports and each year brings larger boats equipped with more powerful engines. These larger and more powerful boats, while affording considerable pleasure to those enjoying this type of sport, can be quite dangerous if handled improperly. Although the boating industry has taken strides to provide stronger and hence safer boats, the advance in the designing of boat hulls producing a greater degree of safety in the form of more stable boat hulls has not been what it should or could have been if sufficient emphasis were placed on the designing of a hull having maximum stability.

The most popular type of boat hull in use is the runabout type of hull, and hulls of this type are used for many purposes, such as racing, water skiing and other forms of high speed maneuvers which, under certain conditions, can be somewhat dangerous. Some types of boat hulls are extremely vulnerable to high speed turns and have a tendency to either slide excessively, trip or rock excessively while executing a high speed turn. Under these adverse conditions, it is possible to lose control of a boat or to have persons thrown from the boat and into the water. Further, some types of hulls, while quartering a wake or heavy seas, will pitch from side to side and in some cases the bow of the hull will dig into the water, causing the forward end of the hull to veer suddenly to one side or another while leaning toward the outside of the turn. This condition can result in the boat being overturned.

The main object of this invention is to provide a boat hull construction specifically adapted to provide maximum speed and at the same time providing maximum stability. The boat hull construction of the instant invention includes the provision of a hull having a pair of longitudinally extending and transversely spaced runner members which project downwardly and are outwardly divergent to form a longitudinally extending tunnel between the runner members. The runner members are placed along the opposite sides of the hull structure and thereby afford two widely spaced separate areas of support for the hull construction while moving at high speeds. In order to minimize the possibility of one of the runners encountering a large wake and/or a relatively high wave which could cause the hull construction to pitch violently to the low side, a depending water-engaging supporting member is secured to the hull construction along the center line thereof and projects downwardly in the tunnel formed by the downwardly and outwardly divergent running members. The water engaging supporting member can be in the form of a water ski or in the form of a hydrofoil assembly. The center depending supporting member is adapted to engage the water and provide a lifting force in the center of the hull construction, thereby reducing the amount of lifting force required to be exerted by the runner members. By reducing the weight each runner member is required to support while the hull construction is moving at high speeds, the momentum of the hull construction will enable the outside runner members to cut more cleanly through a high wake or wave, to thereby reduce the pitching of the hull construction when encountering seas of this type.

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Another object of this invention, in accordance with the immediately preceding objects, is to provide a means for resiliently mounting the center water engaging supporting member disposed between the runner members whereby it will at least partially absorb the shock of any waves or swells encountered thereby.

Yet another object of this invention is to provide the lowermost ends of the outside runner members with substantially straight and longitudinally extending planing surfaces in order to lift the hull construction out of the water when travelling at high speeds, thereby reducing the possibility of the top of the tunnel formed between the runner members slapping against waves and/or swells between the runner members.

Yet another object of this invention, in accordance with the immediately preceding object, is to provide the flat longitudinally extending planing surfaces of the runner members with outwardly and upwardly inclined outside surfaces to thereby preclude the possibility of the outside edges of the runners tripping while the hull construction is executing a high speed turn.

A still further object of this invention is to provide the tunnel formed between the runner members with a deflection plate at its rear end pivotally mounted for movement about a transversely extending axis between a substantially horizontally disposed retracted position adjacent the top of the tunnel and a downwardly and rearwardly inclined extended position whereby the plate, when in the extended position, will entrap air in the tunnel and increase the lift of the hull construction while moving at high speeds.

Another object of this invention is to provide a decking for the hull construction over which there is disposed a false decking open at opposite ends but provided with down-turned side walls abutting the peripheral edge portions of the main decking, thereby forming a longitudinally extending tunnel above the main decking of the hull construction for receiving air therethrough while the hull construction is moving at high speeds to further add to the stability of the latter.

A final object to be specifically enumerated herein is to provide a boat hull construction in accordance with the preceding objects which will provide a relatively fast, stable and smooth ride.

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 a top plan view of the boat construction with portions of the false decking broken away and shown in section;

FIGURE 2 is a side elevational view of the hull construction shown in FIGURE 1 with the rear portion thereof broken away and shown in section to more clearly illustrate the details of the construction of the aft portion of the hull and to illustrate the manner in which the deflection plate is pivotally mounted thereto;

FIGURE 3 is a rear end elevational view of the boat construction on somewhat of an enlarged scale;

FIGURE 4 is a front end elevational view of the boat hull construction on somewhat of an enlarged scale;

FIGURE 5 is a side elevational view of the center water engaging supporting member on somewhat of an enlarged scale, parts of the boat hull being broken away and shown in section;

FIGURE 6 is a side elevational view of a modified form of center water engaging supporting member;

FIGURE 7 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 7—7 of FIGURE 6;

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FIGURE 8 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 8—8 of FIGURE 5 on somewhat of an enlarged scale; and

FIGURE 9 is a sectional view on somewhat of an enlarged scale, taken substantially upon the plane indicated by the section line 9—9 of FIGURE 5.

Referring now more specifically to the drawings, the numeral 10 generally designates the boat hull construction comprising the present invention which includes a cockpit 12 having opposite sides 14 and 16 and a forward wall 18. The rear end of the cockpit 12 is bounded by the transom 20 to which a pair of outboard motors 22 are secured. The hull 10 also includes a pair of opposite sides 24 and 26.

With attention now directed more particularly to FIGURES 3 and 4 of the drawings, it will be noted that a pair of runner members, each generally designated by the reference numeral 28, depend and diverge outwardly from opposite sides of the hull 10. A longitudinally extending tunnel, generally referred to by the reference numeral 30, is formed by the depending runner members 28 and is generally truncated pyramidal shaped in cross-section.

Each of the runner members 28 includes a substantially flat lowermost planing surface 32 which terminates inwardly in an inwardly and upwardly inclined surface 34 and outwardly in an outwardly and upwardly inclined surface 36. Each of the surfaces 36 is provided with a plurality of transversely spaced and longitudinally extending parallel runner elements 38 projecting outwardly therefrom.

The tunnel 30 includes a downwardly opening center longitudinally extending recess 40 from which there depends a center water-engaging supporting member assembly, generally referred to by the reference numeral 42. The assembly 42, with attention now directed more particularly to FIGURE 5 of the drawings, includes a parallelogram linkage assembly generally referred to by the reference numeral 44, including an upper longitudinally extending mounting member 46 and a plurality of inclined support rods 48 which are pivotally secured at their upper ends to the mounting member 46 by means of pivot pins 50 and at their lower ends to a water ski 52 by means of pivot pins 54. The rods 48 are disposed parallel to each other and are of the same length whereby a parallelogram linkage is formed. There is at least one sleeve 56 slidably disposed on one of the rods 48 intermediate its ends to which one end of a limit rod assembly, generally referred to by the reference numeral 58, is pivotally secured. The other end of the limit rod assembly is pivotally secured to the mounting member 46 by means of the pivot pin 50. A pair of compression springs 60 and 62 are disposed on opposite sides of each of the sleeves 56 and between the opposite ends of the rods 48 whereby the ski 52 is resiliently urged toward an extended position and resiliently urged away from a lowermost extended position. Thus, the ski 52 is resiliently mounted for vertical swinging movement through an arc toward and away from the top of the tunnel 30. With attention now directed more particularly to FIGURE 6 of the drawings, there will be seen a modified form of water engaging supporting member, generally referred to by the reference numeral 64, which is substantially the same as the water engaging supporting member assembly 42 with the exception that the ski 52 is replaced by a lower mounting member generally referred to by the reference numeral 66. The lower ends of at least some of the rods 48 have secured thereto, by means of pivot pins 68, a horizontally disposed and transversely extending waterfoil generally referred to by the reference numeral 70. It is to be understood that the purpose of the waterfoil or hydrofoil 70 is substantially the same as that of the water ski 52. The lower mounting member 66 of the water-engaging supporting member assembly 64 merely completes the parallelogram linkage of the water

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engaging supporting member assembly 64. The lower mounting member 66 includes a tubular member 72 having risers 74 thereon to which the hydrofoils 70 are secured. A longitudinally extending and downwardly projecting T-shaped bracing member 76 is secured to and extends along the lower surfaces of the tubular member 72.

The lower ends of the rods 48 each have a transversely extending journal member 78 formed thereon and the upper ends of the rods 48 each have a transversely extending journal member 80 formed thereon. The ski 52 has secured thereto a plurality of bifurcated mounting members 82 secured thereto in any convenient manner between the furcations of which the journal members 78 are received and secured by means of the pivot pins 54. The mounting member 46 includes longitudinally spaced pairs of apertured depending mounting lugs 84 between which the journal member 80 of the rods 48 and the straps 86 of the limit rod assemblies 58 are secured by means of pivot pins 50, see FIGURE 8. Each of the sleeves 56 is provided with a pair of laterally projecting and aligned stub axle pins 88 to which the ends of the straps 86 remote from the pivot pins 50 are pivotally secured.

It is to be noted that the compression springs 60 and 62 abut against opposite ends of the sleeves 56 but that a pair of stop collars 90 are secured to each of the rods 48 a spaced distance from the opposite ends thereof to provide stop elements for the remote ends of the springs 60 and 62.

Referring now more specifically to FIGURES 1 and 2 of the drawings, it will be noted that a deflection plate, generally referred to by the reference numeral 92, is pivotally secured at its forward end for movement about a transversely extending axis by means of a pair of journal blocks 94 secured to the upper surfaces of the tunnel 30 adjacent the rear end thereof for movement between a retracted position substantially horizontally disposed and immediately beneath the upper surfaces of the tunnel 30 and a position with its rear end downwardly inclined in an extended position.

The deflection plate 92 has a lever arm 96 secured thereto whose end remote from the deflection plate 92 is secured to any desirable means such as operating rod 98 for effecting swinging movement of the deflection plate 92. Additionally, it is to be understood that any convenient means may be connected to the parallelogram linkage 44 for effecting its movement to retain the ski 52 in a fully retracted position immediately adjacent the upper surfaces of the recess 40. It will be further noted, see FIGURE 2, in particular, that when the ski 52 is swung to a completely retracted position within the recess 40 the upwardly curved, forward end of the ski will be positioned beneath an upwardly curving portion of the upper surfaces of the tunnel 30.

With attention now directed to FIGURES 1 through 4 of the drawings, it will be noted that the hull 10 is provided with a main decking, generally referred to by the reference numeral 100, which extends from the forward end of the hull 10 to the transom 20 thereof and along both sides of the cockpit 12. The front wall 18 of the cockpit 12 projects above the main deck 100 and a false decking, generally designated by the reference numeral 102, is secured in spaced overlying relation to the main decking 100. The false decking 102 is provided with downturned peripheral outer side walls 104 which abut and are secured to the outer peripheral edges of the main decking 100 and inner peripheral downturned walls 106 which abut and are secured to the inner peripheral edges of the main decking 100 adjacent the sides 14 and 16 of the cockpit 12. The false decking 102 also abuts against the upper end of the forward wall 18 of the cockpit 12, to thereby define a longitudinally extending tunnel open at both ends and diverging around the cockpit 12. Suitable vertical supports 108 and 110 may be provided for the forward end of the decking 102 secured between the

confronting surfaces of the latter and the decking 100 if desired.

In operation, when the boat hull construction is moving forwardly at high speeds, the runner members 28 will lift the hull construction 10 partially out of the water, and the ski 52 or the hydrofoil assembly 64 will afford additional lift to the hull construction 10, thereby minimizing to a certain extent the weight of the hull 10 supported by the runner members 28. When the hull construction 10 is executing a high speed turn, the upwardly and outwardly inclined surfaces 36 will tend to increase the inward leaning of the hull construction 10 during the execution of the turn and the runner elements 38 on the outside runner member 28 will greatly tend to reduce the sliding of the hull construction 10.

The deflector plate 92 may be lowered to still further increase the lift of the hull construction 10 and thereby greatly increase the speed of the latter inasmuch as the wetted area of the hull will be appreciably reduced. Further, the tunnel formed between the decking 100 and 102 will increase the stability of the hull construction 10 while travelling at high speeds. The resilient mounting of either of the center water-engaging supporting member assemblies 42 and 66 will enable the hull construction 10 to be operated in shallow water without damage being done to either the ski 52 or the hydrofoils 70.

It is to be noted that any type of means may be utilized for retracting the center water-engaging supporting member assemblies such as a winch mechanism secured to the forward ends of the rods 48 in order to impart swinging upward movement thereof.

Inasmuch as the forward ends of the runner members 28 are spaced rearwardly a considerable amount from the forward end of the hull 10, the hull 10 may be beached with its bow over dry land without the runner members being lifted out of the water.

It is to be understood that the tunnel formed between the false decking 102 and the main decking 100 could be terminated at the forward end of the cockpit 12 and the air entrapped therein directed downwardly by suitable means (not shown) and released beneath opposite side pins (not shown) extending outwardly from opposite sides of the hull 10 and inclined downwardly to the rear of the hull. Further, it is to be noted that the deflection plate 92 could also be fixedly secured to the hull 10 wherein the outlet end of the tunnel between the runner members 28 will be constantly choked and thus the lift of the air entrapped in the tunnel will afford a greater lift to the hull 10.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A boat construction comprising a hull having a pair of integral longitudinally extending and transversely spaced runner members, said runner members being provided with substantially flat and generally horizontal lowermost planing surfaces and projecting downwardly and being downwardly divergent forming a longitudinally extending tunnel therebetween substantially truncated pyramidal in cross-section, a center narrow elongated water-engaging supporting member adapted to engage the water and provide a lifting force on said hull; means mounting said supporting member in spaced relation between said runner members with said supporting member projecting forwardly of said runner members and extending longitudinally of said hull and substantially horizontally disposed for vertical swinging movement toward and away from said hull, and means normally resiliently urging said supporting member to an extended position

slightly below the lower extremities of said runner members.

2. The combination of claim 1 wherein said mounting means includes means limiting downward movement of said supporting member beyond a lowermost position.

3. The combination of claim 2 including means resiliently urging said supporting member to an elevated position above said lowermost position.

4. The combination of claim 3 wherein said supporting member comprises a water ski.

5. A boat construction comprising a hull having a pair of integral longitudinally extending and transversely spaced runner members, said runner members being provided with substantially flat and generally horizontal lowermost planing surfaces and projecting downwardly and being downwardly divergent forming a longitudinally extending tunnel therebetween substantially truncated pyramidal in cross-section, a center narrow elongated water-engaging supporting member adapted to engage the water and provide a lifting force on said hull; means mounting said supporting member in spaced relation between said runner members with said supporting member projecting forwardly of said runner members and extending longitudinally of said hull and substantially horizontally disposed for vertical swinging movement toward and away from said hull, and means normally resiliently urging said supporting member to an extended position slightly below the lower extremities of said runner members, said mounting means including means limiting downward movement of said supporting member beyond a lowermost position and means resiliently urging said supporting member to an elevated position above said lowermost position, said supporting member comprising a waterfoil assembly, said assembly including at least one horizontally disposed waterfoil member.

6. The combination of claim 1 wherein said mounting means includes a parallelogram linkage.

7. The combination of claim 6 wherein said parallelogram linkage comprises at least one pair of parallel inclined support rods pivotally secured at their upper ends to said hull and to said supporting member at their lower ends for movement about transversely extending horizontally disposed axes, a sleeve slidably disposed on at least one of said rods intermediate its ends, a limit rod having one end pivotally secured to said sleeve at one end and to said hull at the other end for movement about transversely extending horizontally disposed axes, said limit rod being inclined oppositely relative to said support rods.

8. The combination of claim 7 including means resiliently urging said sleeve to the lower end of said rod and means resiliently urging said sleeve to the upper end of said rod.

9. The combination of claim 1 including a deflection plate, means pivotally mounting said deflection plate adjacent one edge thereof and between said runner members adjacent the rear end of said tunnel for movement about a transversely extending axis between a substantially horizontally disposed retracted position adjacent the top of said tunnel and a downwardly and rearwardly inclined extended position.

10. The combination of claim 1 wherein said runner members are buoyant.

11. The combination of claim 10 wherein at least a major portion of the lowermost surfaces of said runner members are substantially flat, said flat lowermost surfaces terminating outwardly in outwardly and upwardly inclined surfaces and inwardly in inwardly and upwardly inclined surfaces.

12. The combination of claim 11 including a plurality of transversely spaced and longitudinally extending parallel runner elements formed on each of said outwardly and upwardly inclined surfaces projecting outwardly therefrom.

13. The combination of claim 1 wherein said hull includes opposite sides and ends, a cockpit extending be-

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tween said opposite sides and spaced therefrom, a main decking secured between the upper peripheral edges of said cockpit and said opposite sides, a false decking secured over said main decking and spaced therefrom, said false decking including peripheral downturned side walls abutting the peripheral edge portions of said main decking forming an air space therebetween, the forward and rear ends of said air space being open whereby a longitudinally extending tunnel is formed.

14. The combination of claim 13 wherein said false decking extends forwardly of said cockpit to form a single opening for said tunnel.

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