United States Patent [19]

Schrink

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[54] **AIR CUSHION CRAFT AIR SUPPLY**

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[73] Assignee: **Little Systems, Inc.**, Beverly Hills, Calif.

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[52] **U.S. Cl.** **180/121**, 180/123, 180/124

[51] **Int. Cl.** **B60v 1/00**

[58] **Field of Search** 180/116, 117, 118, 119, 180/120, 121, 122, 123, 124, 125, 127, 128, 129

[56] **References Cited**

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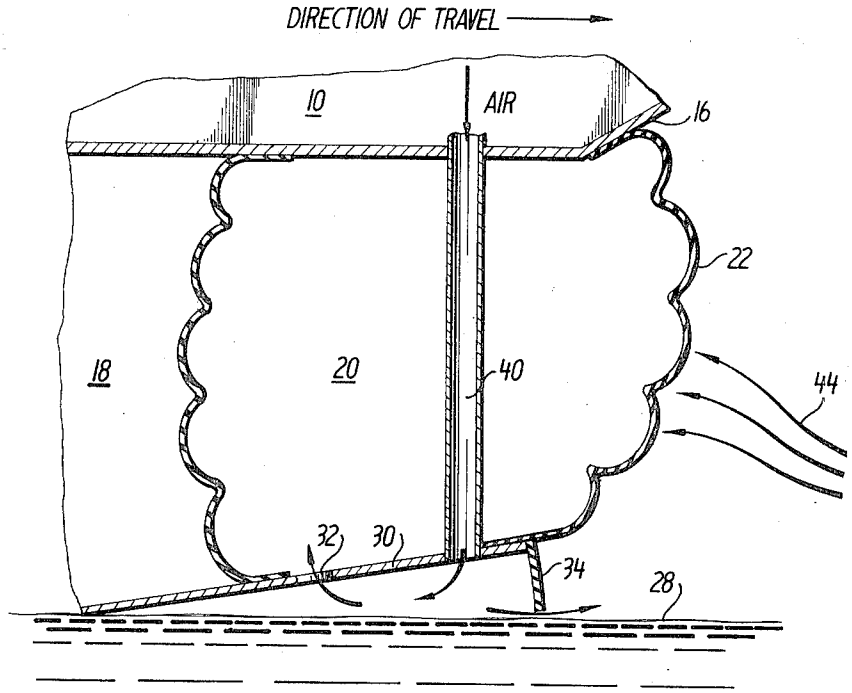
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[57] **ABSTRACT**

A rigid base having air supplied directly thereunder is provided for each air cushion seal of the type customarily found on the periphery of air cushion craft or "surface effect" ships.

5 Claims, 3 Drawing Figures



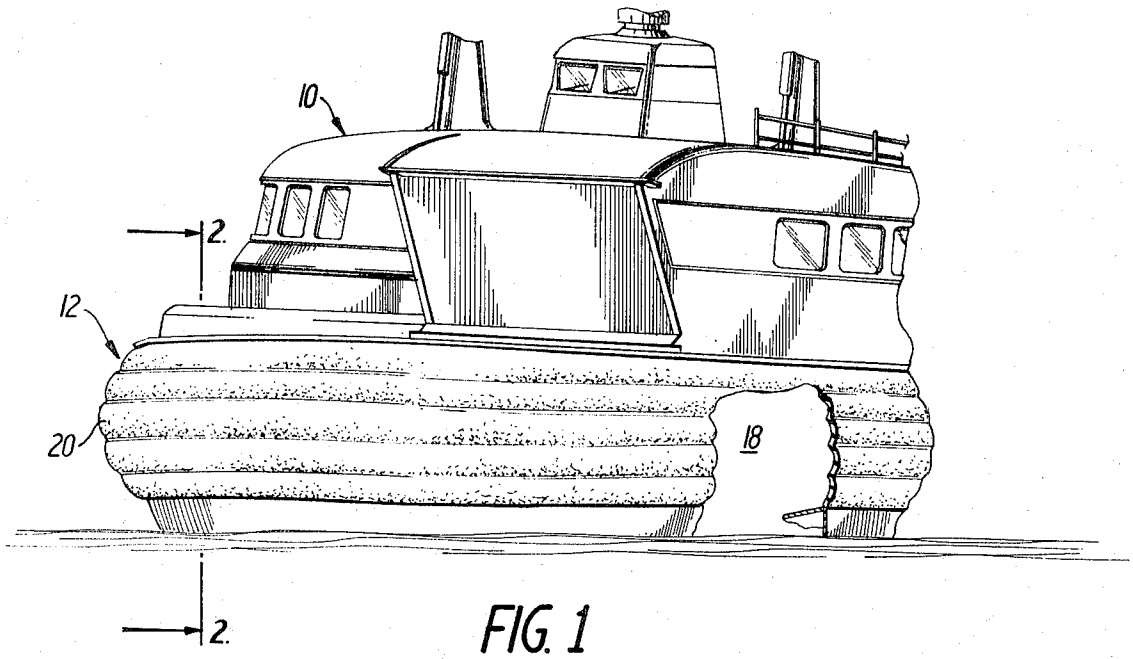
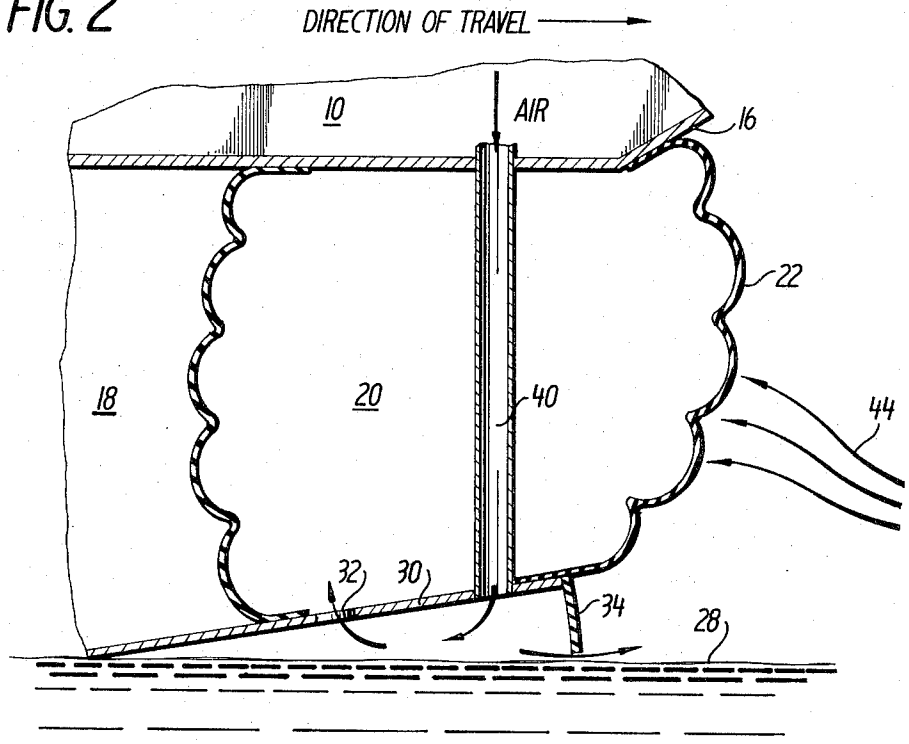

10
2
12
20
18
2

FIG. 1

FIG. 2


DIRECTION OF TRAVEL
10
AIR
16
22
18
20
40
44
32
30
34
28

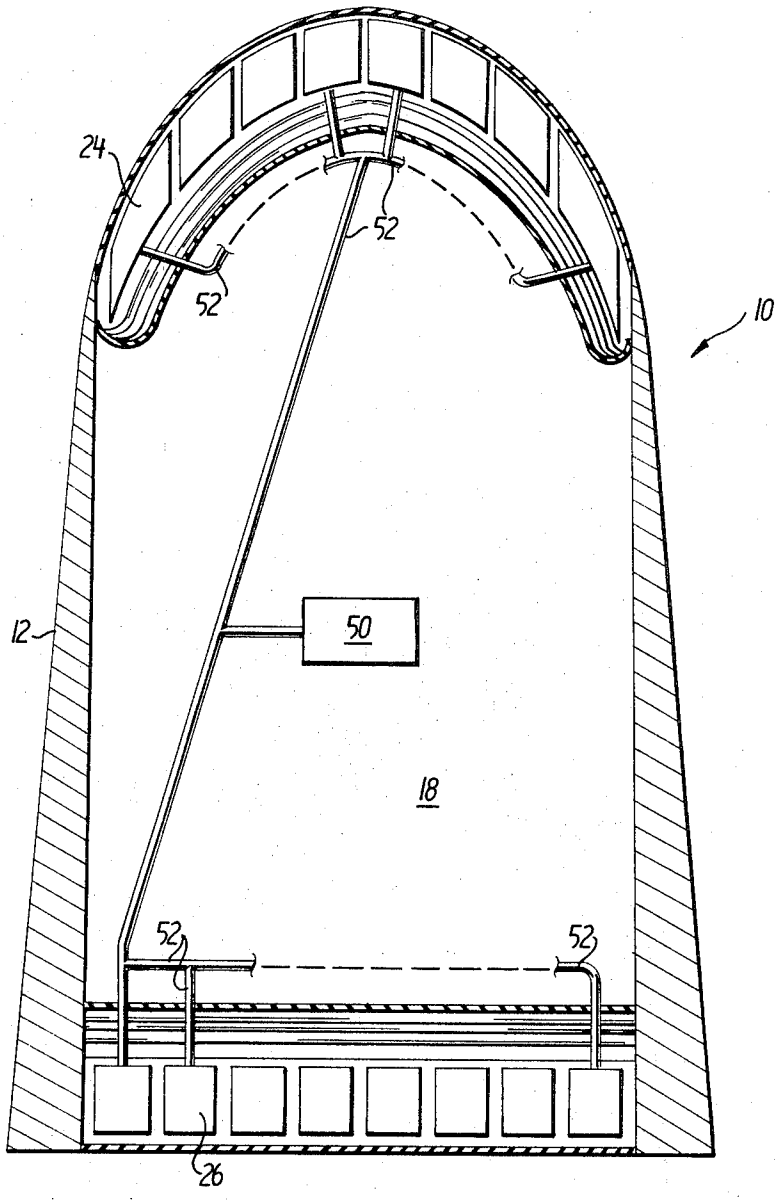


FIG. 3

AIR CUSHION CRAFT AIR SUPPLY

BACKGROUND OF THE INVENTION

It has been known before to use air cushions to suspend a ship during transport above water, or perhaps land or marshy land. Such a vessel is conventionally known as an air cushion craft, hovercraft, or in the vernacular sometimes known as a "surface effect ship." Conventionally, these surface effect ships are suspended on the air cushion, which is surrounded on the periphery by a skirt. Such skirts have been shown to be cellular in structure, as for example in U.S. Pat. No. 3,631,938 to Eggington and in co-pending application, Ser. No. 355,510, filed Apr. 30, 1973 simultaneously with this application. These skirts form a buffer on which waves, tall grass and other sea- and marsh-imposed conditions react. Many problems have arisen when the wave or other shock-like condition strikes the skirt and the skirt fails to adjust in immediate response to the shock-like condition. The failure of the skirt to adequately respond to the shock-like condition, it is felt, has been cause of such air-suspended vessels "plowing-under" and capsizing, as several have done in recent years. Thus, it is important and urgently needed in the art to provide a cell-like air cushion craft skirt which will immediately, automatically and adequately respond to shock conditions which the sea or marshland presents to the craft.

SUMMARY OF THE INVENTION

In a vessel of the air suspended type, a new pneumatic cushion cell arrangement is described having a rigid water contact sealing base. Air is forcibly supplied underneath the sealing base so that an air pocket exists between the sealing base and the water at least over a portion of the sealing base surface area.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a perspective view of the invention in its normal environment;

FIG. 2 illustrates a fragmentary side elevational view of the preferred embodiment of the invention;

FIG. 3 illustrates a plan fragmentary view of the invention in the preferred embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

To achieve the desired end a new construction of a skirt **12** has been discovered for placement about the lower periphery of the conventional hovercraft or air suspended vessel **10**, reference being had to FIG. **1**. The air cushion **18** is held underneath the vessel **10** by means of skirt **12** which surrounds the air cushion **18** on the periphery of the vessel **10**. This skirt **12** can be constructed with cells **20** at least on its bow and stern peripheral segments, as will be described in more detail below. Such new construction is explained and understood more clearly when FIG. **2**, the view taken along line 2—2 in FIG. **1**, is understood.

In FIG. **2**, an air sealing cell **20** is shown depending below the forward edge periphery **16** of vessel **10**. The cell **20** consists of flexible walls **22** which enclose a cell **20**. The cells **20** are freely capable of vertical compression and extension. The walls **22** are disposed in airtight relationship with the underside of the periphery edge **16**. The lower end of the cell is comprised of a rigid, sealing base **30** which is in airtight coupling with the flexible walls **22**. An orifice **32** is formed in the rigid base **30** so that air inside the cell and air between the rigid base **30** and the water surface **28** can freely pass through the rigid seal base **30**. It may be desired to adjust the size of the orifice **32** so that the freedom of air passage therethrough can be restricted to a desired degree, thus creating a dampening effect. It may be desirable to form the orifice **32** having a horizontal overlap of the forward lip of the orifice to the rearward lip.

In the preferred embodiment as shown in FIG. **2**, the rigid base is canted with the rearward end lower and in direct contact with the water level **28** so as to present an air planing surface to the water when the vessel **10** is in forward cruising speed.

It is contemplated that the cell **20** could be a single cell extending for the length of the periphery **16** in which the rigid seal base will be used. The cell **20** could be, however, a small oval- or rectangular-shaped cell. In such an event a plurality of such cells would be constructed in airtight, adjacent relationship along the periphery **16** of the air suspended craft. A rigid seal base **30** contact could be provided for each individual cell, or a single, common rigid seal base **30** could be positioned underneath adjacent cells.

If a series of adjacent cells **20** is utilized, the cells could be in pneumatic contact with each other or could be individually airtight and separate from one another. Air could be supplied to the cells either individually through separate conduits **52** as illustrated in FIG. **3**, or, in the case of adjacent cells being pneumatically connected, by one air supply conduit.

Air under pressure will be supplied through conduit **40** from a compressor or pump **50**. As shown in FIG. **2**, conduit **40** supplies air directly to the underside of rigid base seal **30**. Air pressure is trapped between rigid base seal **30** and the water level **28** by a flexible skirt **34** which depends from the forward edge of the rigid base seal **30**. Some air will escape from this small air pocket forward underneath the skirt **34**. A substantial amount of air will be forced from this air pocket through orifice **32** and into cell **20**. It is in this manner that cell **20** will be inflated to cause the sealing of air cell **18** and the lift of the air suspended craft **10**. Rigid seal base **30** may have its configuration varied so as to present a better planing surface to water. For example, it is contemplated that rigid base seal **30** could have a curved surface, or could have its forward end canted counterclockwise as in the description illustrated in FIG. **2**.

It may be desired to construct conduit **40** of material having comparable flexibility to the flexible walls **22** of the cell. It is preferred, however, to construct the conduit **40** at least for that portion which will be within the confines of cell **20** of a rigid or semi-rigid material. Thus, when the air cell **20** compresses vertically, the rigid or semi-rigid conduit **40** portion within the cell will retract into the vessel **10**. Otherwise, a flexible conduit **40** may have a tendency to fold over or otherwise collapse and present a blockage to the air being supplied to the air pocket.

In operation, air supplied under pressure is sent in the direction of the arrow shown in FIG. **2** through conduit **40**. A small air pocket is developed between the rigid base seal **30** and the water level **28**. The air is trapped within this pocket by the skirt **34**, although some air should be expected to escape between the edge of skirt **34** and the water level **28**. The rigid seal base **30** will

always be in contact with the water, most probably at the rearward edge. Air within the pocket will flow through orifice **32** and into cell **20.** The cell **20** begins to act as an air spring and to lift the air suspended craft **10.** At this point, the air being supplied under pressure to the central cell **18** will then lift the vehicle **10** and support it on an air cushion.

When the vessel **10** travels in the direction of the arrow as shown in FIG. **2,** air and water waves will strike the cell **20** as indicated by arrows **44** in the drawing FIG. **2.** Since the walls **22** of the cell **20** are flexible, as well as the skirt **34,** the cell **20** will act as an air spring and will either retract or expand so as to accommodate the sudden shock of waves and the like. Maintaining the air pocket between the rigid base seal and the water level effectively prevents the forward edge of the rigid base seal **30** from dipping below the water level **28.** By always providing this air planing surface of rigid base seal to the water, the plowing-under which has occurred in the past will be eliminated.

I claim:

1. A vessel having a periphery about a hull and suspended upon a large, central air cushion during transport over a surface comprising:

a. at least one air cushion cell disposed depending from at least a bow section of said periphery forming a bow seal for said larger, central air cushion;

b. each said cell including a flexible wall and capable of vertical compression, and being fixed at its upper end to said periphery of said vessel;

c. each said cell further including a rigid base having an orifice therein for allowing air to pass therethrough, said rigid base disposed oriented at a planing angle relative to said surface, and having a portion of said rigid base in substantial contact with the said surface;

d. a chamber of air defined between the said surface and the lower side of said rigid base; and

e. air conduit means disposed in pneumatic contact beneath said rigid base with said chamber, said conduit means receiving air under pressure from a central air pressure source.

2. The vessel as claimed in claim **1,** said cell further comprising a forward skirt disposed at the forward end of, and downwardly from said rigid base.

3. The vessel as claimed in claim **2,** wherein said skirt is flexible and fixed to said forward end of said rigid base.

4. The vessel as claimed in claim **1** further including at least a second said air cushion cell disposed depending from at least a stern section of said periphery forming a stern seal for said central air cushion.

5. The vessel as claimed in claim **4** wherein said bow seal and said stern seal each comprise a plurality of smaller air cushion seals disposed in adjacent, airtight relationship.

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