

Tensairity Hot Air Airship

Peter Lobner, updated 18 March 2022

1. Introduction

In 2008, inventor Andreas Reinhard and his firm Iii-Solutions GmbH filed an international patent application, which was published the following year as WO2009/046554 A1, "Hot Air Airship." The object of this invention was to provide a motor drive for a hot air airship that simultaneously provides the thermal buoyancy for the airship.

2. Novel airship structure

The airship has a "Tensairity structure" consisting of an insulating aeroshell (1), one upper and one lower tension-compression rod (2 & 3) which extend over the entire length of the airship, and node elements (4 & 5) at the bow and stern of the airship to tie the tension-compression rods together. A three-passenger gondola is supported by the lower tension-compression rod. A solar array (13) is on the top of the hull.

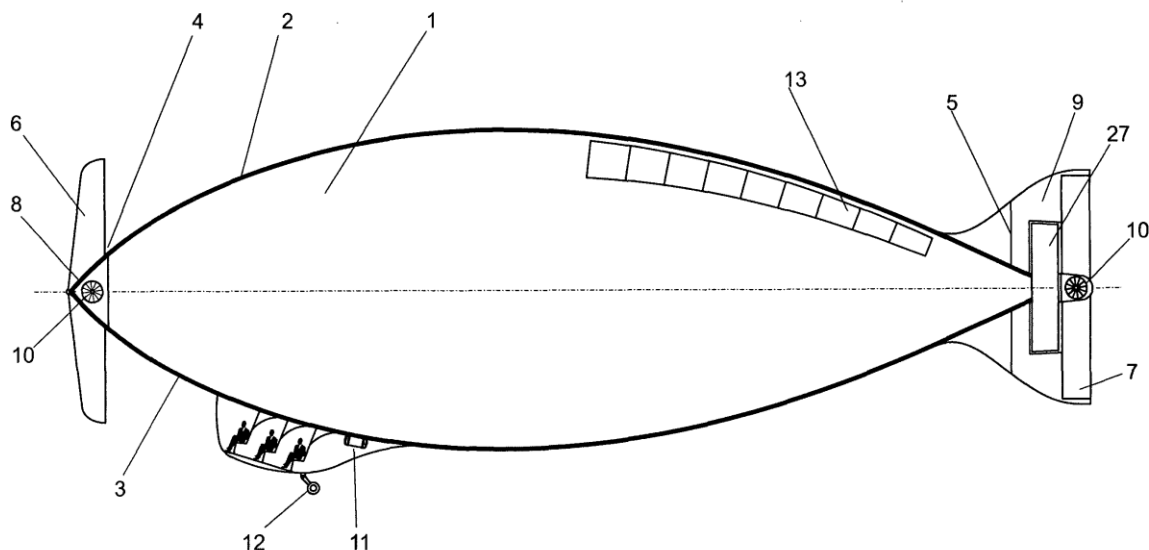


Fig. 1

*General arrangement of the Tensairity airship.
Source: WO2009046554 A1, Figure 1*



Rendering of the Tensairity hot air airship. Source: Airshipworld Blog (20 April 2009)

3. Operation of the hot air airship

Fore and aft rudders (6 & 7) are mounted on fore and aft cones (8 & 9) that can be rotated $\pm 90^\circ$ about the longitudinal axis of the airship; fore and aft electric powered lateral thrusters for low speed maneuvering (10) also are mounted in the rotation cones. The rudder surfaces (6 & 7) function as lateral rudders in the vertical position or as horizontal wings when rotated 90° , giving them the ability to control the airship in both the horizontal and the vertical planes.

The airship's shrouded main propulsor (27) is driven by a set of small kerosene-burning turbines within the aeroshell. These turbines are arranged to drive a common main propulsion shaft (29) and also power a generator, which supplies electric power for airship systems, the lateral thrusters, and charges a battery. Fresh air ducts direct air from outside the aeroshell to the turbine inlets. The hot exhaust gases can be directed either to the interior of the hot airship or to a heat exchanger that heats the interior air during recirculation and fresh-air modes of operations. After passing through the heat exchanger, the exhaust gasses discharge outside the airship.

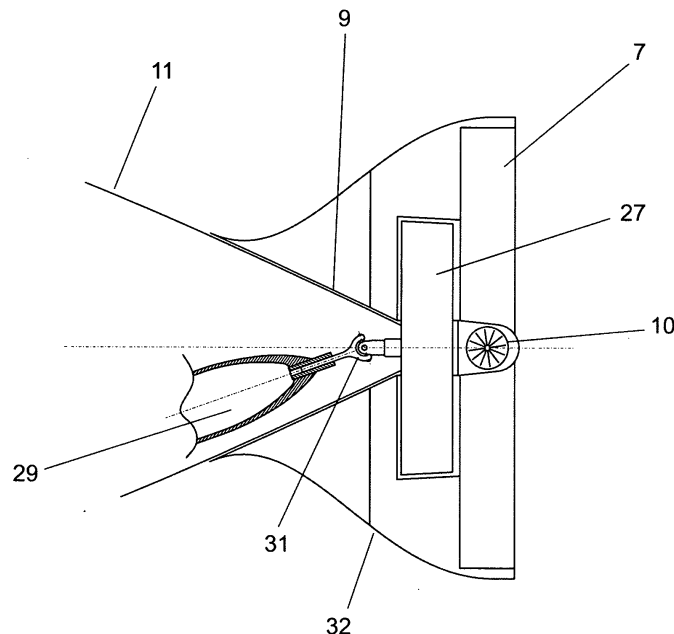


Fig. 3

General arrangement of the main propulsion drive and stern control surfaces. Source: WO2009046554 A1, Figure 3

For redundancy, electric power can be supplied by photovoltaic cells on the upper surface of the airship (13). A kerosene burner can generate the necessary hot air for buoyancy when the turbines are not available.

4. For additional information

- "'Prospective Concepts' transitions into 'iii solutions' - files patent for 'hot air airship'," Airshipworld Blog, 20 April 2009: <http://airshipworld.blogspot.com/2009/04/prospective-concepts-transitions-into.html>

Patent

- Patent WO2009/046554A1, "Hot air airship," Inventor Andreas Reinhard, Filed 6 October 2008 by Iii-Solutions GmbH, Published 16 April 2009: <https://patents.google.com/patent/WO2009046554A1/en>

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