

Hyperblimp LLC – drone airships

Peter Lobner, 11 February 2022

1. Introduction

Daniel Geery founded Hyperblimp LLC, in 2010 in Salt Lake City, Utah, with the goal to “...promote the growth of the airship industry, particularly for humanitarian, environmental, and educational purposes. Hyperblimp is actively working with ‘green technologies,’ particularly solar electric panels and eventually fuel cells, along with extreme efficiency and advanced nanotech materials.” Their website is here: <https://hyperblimp.com>



Hyperblimp early prototype gas envelopes. Source: Pinterest



A Hyperblimp in flight. Source: Hyperblimp

2. The Hyperblimp patent

The basic concept of the Hyperblimp is patented in US7303166B2, “Highly maneuverable powered airship,” which describes an airship “.....with an aspect (fineness) ratio greater than or equal to 9:1. The powered airship may further include a motor powered by an energy source, the motor mounted to the rear portion of the exterior shell and configured for selectively providing thrust parallel to the main axis and in any direction up to 90° relative to the main axis. A solar-assisted, electrically powered airship and propeller assembly are also disclosed.”

The key features are the very slender gas envelope (2) and the great range of thrust vectoring (α) available from the single stern-mounted propeller (50). These features are highlighted in patent Figure 1.

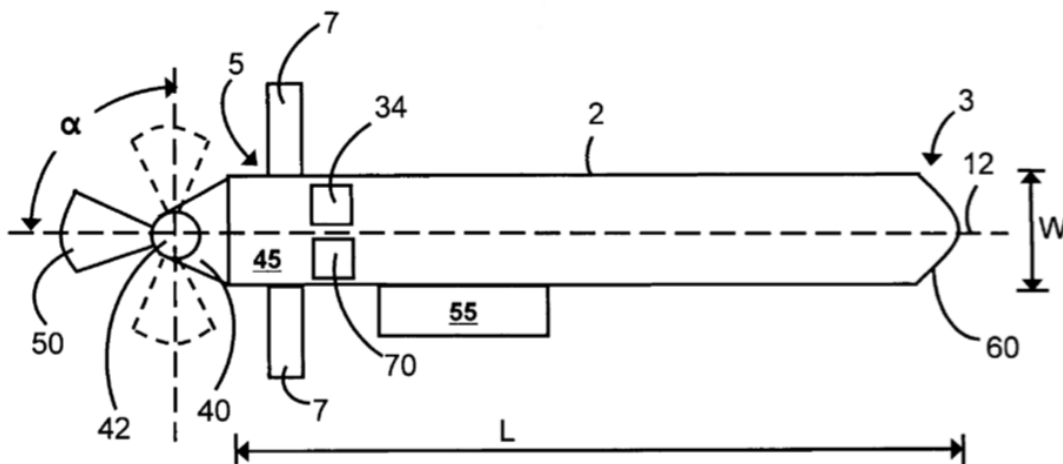


FIG. 1

In Figure 1, the stabilizing fins (7) at the stern of the airship are fixed. A payload / gondola (55) is shown attached under the gas envelope. Remote control of the vehicle is implemented with a receiver (34) and a flight controller (70).

In Figure 2, the patent shows an envelope (3) design similar to the Hyperblimps that have actually flown.

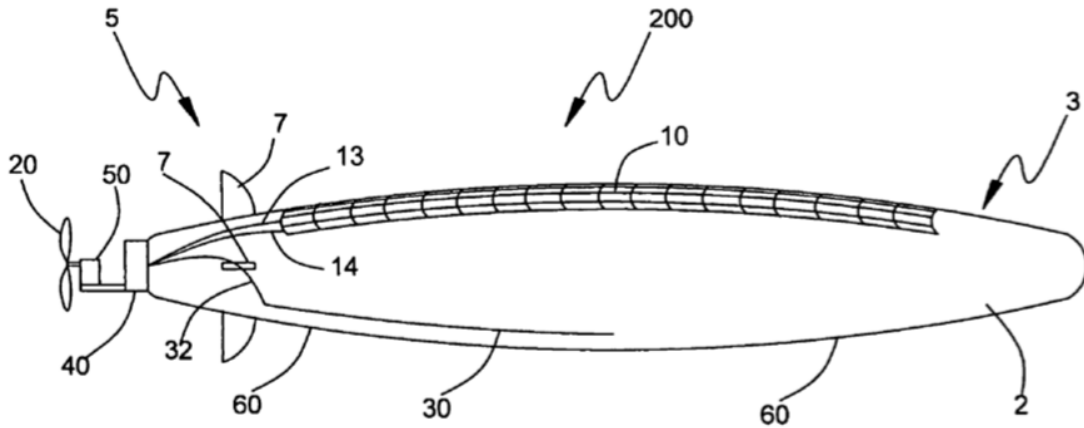


FIG. 2

The thrust vectoring motor mount assembly (40), which can deflect the motor (50) and propeller (20) in any direction up to 90° relative to the main axis, is shown in more detail in patent Figure 4.

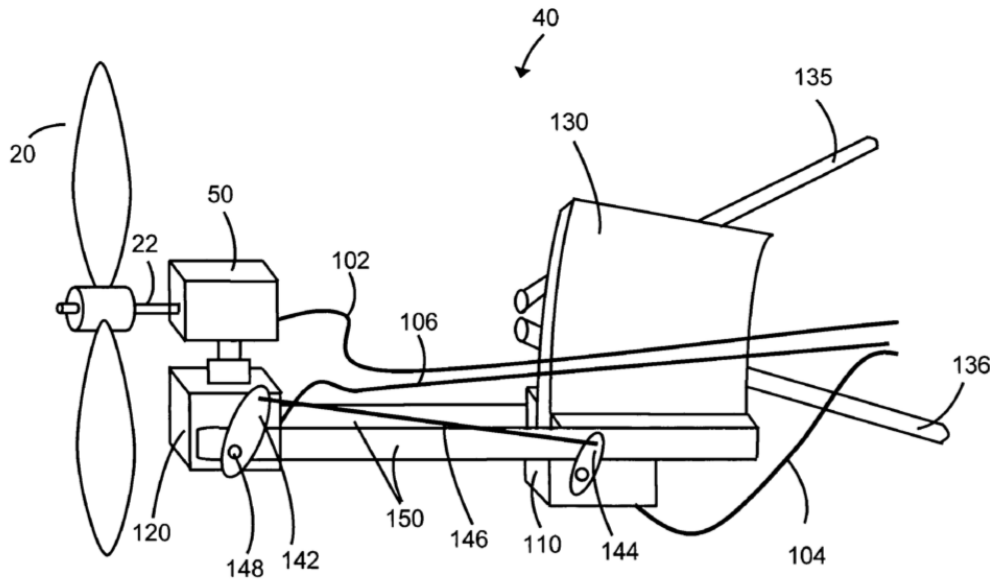


FIG. 4

Details on the operation of these thrust vectoring controls are presented in the patent, here:
<https://patents.google.com/patent/US7303166B2/en?assignee=daniel+geery&oq=daniel+geery>

The original Hyperblimp operated with only a stern-mounted vector thrust propeller, as described in the patent. Later versions of the Hyperblimp operated with a variety of propeller configurations, including the addition of a bow-mounted vector thrust propeller on the HB50, and a more highly modified configuration with two propeller units mounted under the bow and stern of the envelope.

3. The Hyperblimp HB50

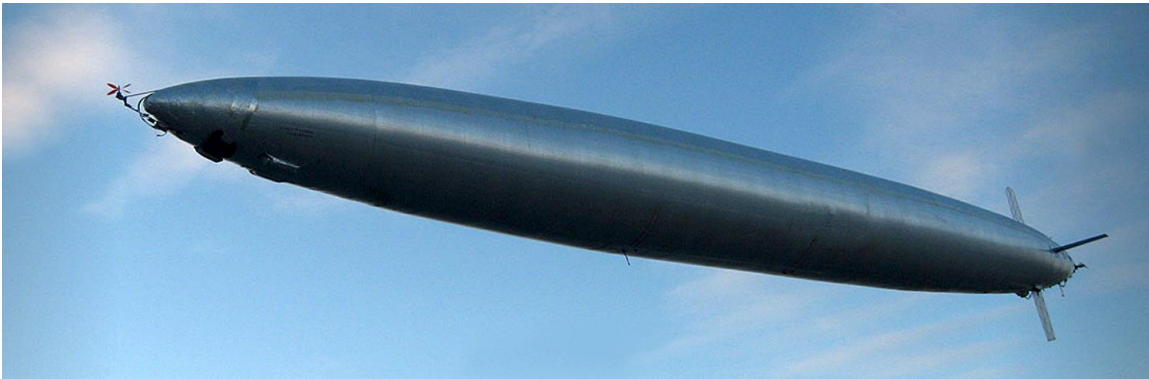
The remotely-controlled HB50 Hyperblimp is 52-ft (15.8-m) long, 4-ft (1.2-m) in diameter, has a fineness ratio of 13, flies at a top speed of 40 mph (64 kph) at operating altitudes up to 400 ft (123 m) and can stay aloft for seven hours. The electrically-powered airship has lithium polymer batteries that power the airship and payload systems. Propulsion and directional control are provided by brushless electric motor-driven, bow- and stern-mounted, thrust vectoring propellers. The airship can carry about 8.8 lb (4 kg) of payload over a range of 19 – 25 miles (30 – 40 km). A relief valve on the gas envelope allows descent to the ground in case of battery failure or other emergency. The lightweight Hyperblimp is portable and can be deployed in nearly any environment.

Hyperblimp has developed their blimp as a multi-mission UAV platform with a universal mounting system that allows almost anything that is under the payload limits to be attached to the blimp:

- Still photographic and video cameras for scenic photography, surveillance and inspections (i.e., pipelines and power transmission lines), including low-light cameras for night operations
- Infra-red and multi-spectral imaging cameras for special applications such as crop and resource surveys
- Magnetometers for detecting metals, landmines, or unexploded ordnance.
- Communications relay equipment for providing improved communications between a base and users in the field, particularly in remote areas, such as during firefighting.
- Scientific equipment for environmental monitoring.
- Advertising

In 2011, the Ogden, Utah Police Department was the first metropolitan police force in the world to use an unmanned crime-fighting airship, which was operated by police officers with pilot's licenses. For this assignment, the HB50 Hyperblimp was equipped with a radar transponder and two CCTV (closed-circuit television) cameras with night vision capabilities. The airship was used primarily at night in a manner similar to a manned patrol car. The complete airship and mission payload weighed just 30 lb (13.6 kg).

For a Forest Service fire fighting application, the Hyperblimp has been configured with a "TransPeater" communications link, 2-axis HD camera and thermal imaging camera. In this configuration, the Hyperblimp can be employed to watch fire lines and track ground operations. The Hyperblimp can be deployed with a tether and thereby avoid FAA restrictions that would otherwise apply to a free-flying unmanned vehicle.



Hyperblimp with bow & stern thrusters. Source: Hyperblimp

The Hyperblimp also has been used as a photographic platform for scenic photography and for filming sporting events, such as off-road races, marathons, and bike races in various locations.



*Hyperblimp HB50 flying near Ogden, UT, circa 2011.
Source: SWNS.com via Daily Mail*



Police technician handles the HB50 on the ground. Note the thrust vectoring stern-mounted propeller. Source: SWNS.com via Daily Mail

4. Other Hyperblimp configurations

Hyperblimps have operated in other configurations that met the original goal of high maneuverability.

Bow & stern propellers, suspended payload



Source: Screenshot from "Hyperblimp" video (19 February 2015)

Underslung bow & stern propellers, suspended payload



Source: Screenshot from "Hyperblimp" video (19 February 2015)

5. Long-range plans for the Hyperblimp

Hyperblimp reported that they are working toward a solar-powered airship that can fly 24/7 at high speed. As long-term goal, Hyperblimp stated: "...we intend eventually to fly around the world via remote control."

6. For more information

- Chris Anderson, "50 ft Hyperblimp can scoot!" 1 April 2010: <https://diydrones.com/profiles/blogs/50ft-hyperblimp-can-scoot>
- "Paul Slusser And Daniel Geery Win Lindbergh Grant - Project Will Focus On The Use Of Hyperblimps To Silently Study Right Whales," Aero News Network, 14 August 2010: <http://www.aero-news.net/subsite.cfm?do=main.textpost&id=b5da6a59-eaee-4624-be92-70f4d626b460>
- Julian Gavaghan, "The 'Hyperblimp' that hunts for criminals from the sky: World's first CCTV airship unveiled," Daily Mail, 9 September 2011: <https://www.dailymail.co.uk/news/article-2035602/The-Hyperblimp-hunts-criminals-Worlds-CCTV-airship-unveiled.html>

Patent

- US7303166B2, "Highly maneuverable powered airship," inventor: Daniel Geery, filed: 4 November 2002, granted: 4 December 2007: <https://patents.google.com/patent/US7303166B2/en?assignee=daniel+geery&oq=daniel+geery>

Videos

- "Hyperblimp maneuvering" (5:38 minutes), Daniel Geery, 14 October 2007: <https://www.youtube.com/watch?v=zDaEMDdiTIM>
- "01-17-09 Hyperblimp flying near Grantsville Utah (2:23 minutes), Spencer Deputy, 18 January 2009: <https://www.youtube.com/watch?v=QW5RKLucG1Q&t=81s>

- “Hyperblimp” (6:33 minutes), Peter Bringhurst, (2nd test flight), 19 February 2015:
<https://www.youtube.com/watch?v=5K7edXU401o>

Other *Modern Airships* articles

- *Modern Airships - Part 1*: <https://lynceans.org/all-posts/modern-airships-part-1/>
- *Modern Airships - Part 2*: <https://lynceans.org/all-posts/modern-airships-part-2/>
- *Modern Airships - Part 3*: <https://lynceans.org/all-posts/modern-airships-part-3/>