

Goodyear Aircraft Corp. - Dynamic lift airship

Peter Lobner, updated 8 March 2022

1. Introduction

In the mid-1950s, Goodyear Aircraft Corp. (which became Goodyear Aerospace Corp. in 1963) was a pioneer in the development of design concepts for non-rigid, dynamic lift airships with a broad airfoil-shaped hull that combined the aerostatic lift from helium with aerodynamic lift to carry heavier loads than could be handled with aerostatic lift alone. Tricycle landing gear enabled the large airship to move on the ground, takeoff and land. Today, this type of airship would be called a hybrid airship.



2. Goodyear's dynamic lift airship patent

Goodyear applied for a patent on 3 January 1955 and the patent was granted on 22 January 1957.

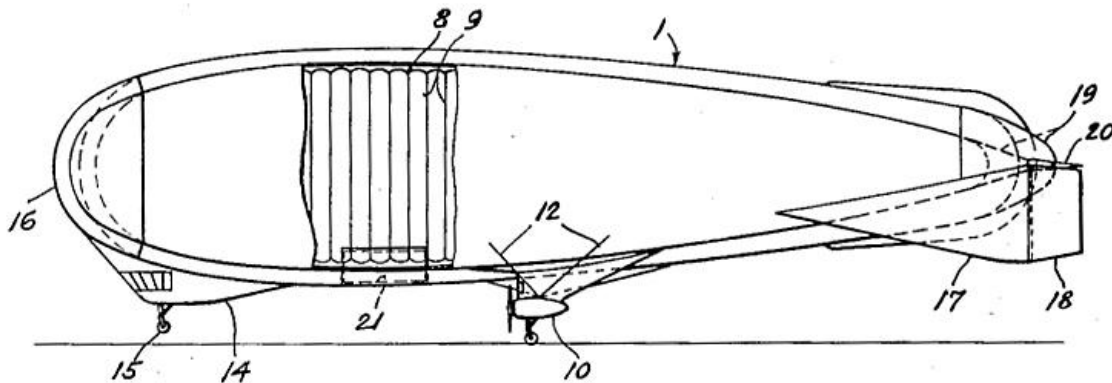


Fig. 2

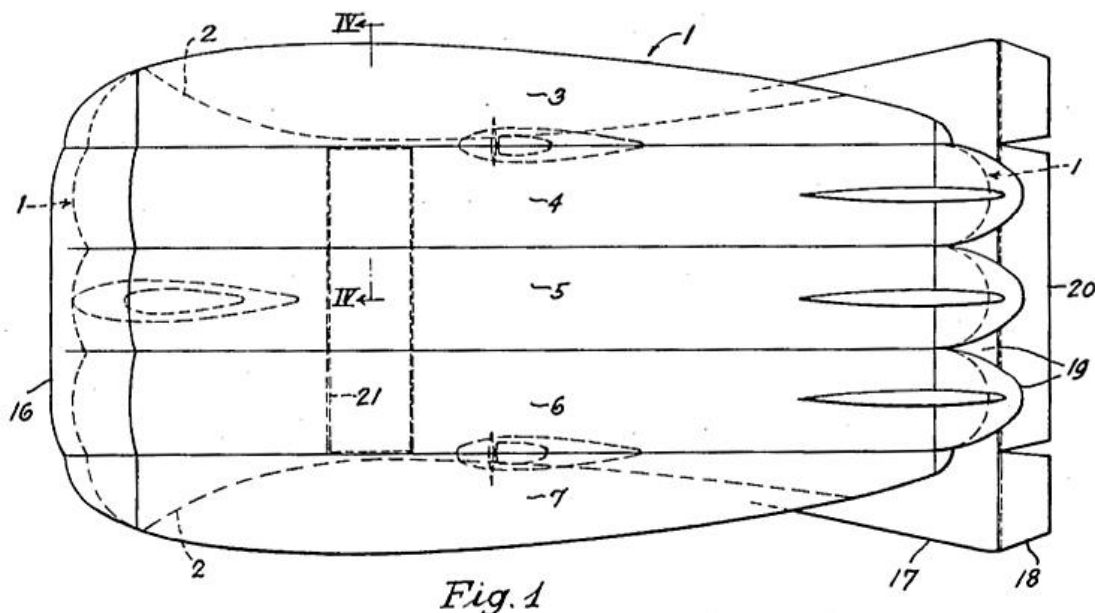
Longitudinal section view of a Goodyear dynamic lift airship.

Source: Patent US2778585A

The elevation view in patent Figure 2 shows the longitudinally-curved, streamlined airfoil shape of the gas envelope (1), which has a

substantially greater width than height in order to generate aerodynamic lift at a given angle of attack. From the join line of adjacent lobes, the top and bottom of the gas envelope are connected by catenaries and cables (8, 9). The cables establish the desired longitudinal contours of the gas envelope, which includes two air compartments or ballonets (2) in the outermost lobes.

A rigid front structure (16) protects the bow of the airship. The gondola (14) and nose landing gear (15) are at the bow, under the gas envelope. Two propulsion engines (10) and the main landing gear (11) are attached at strengthened intersections between lobes in the gas envelope and are stabilized with cables (12, 13). A cargo compartment (21) is under the gas envelope, near the center of aerodynamic lift.



*Overhead plan view of a Goodyear dynamic lift airship.
Source: Patent US2778585A*

A rigid structure (19) runs across the stern of the gas envelope to carry the aerodynamic loads from the fins and rudder (17, 18) and the elevator (20) and distribute those loads into the gas envelope.

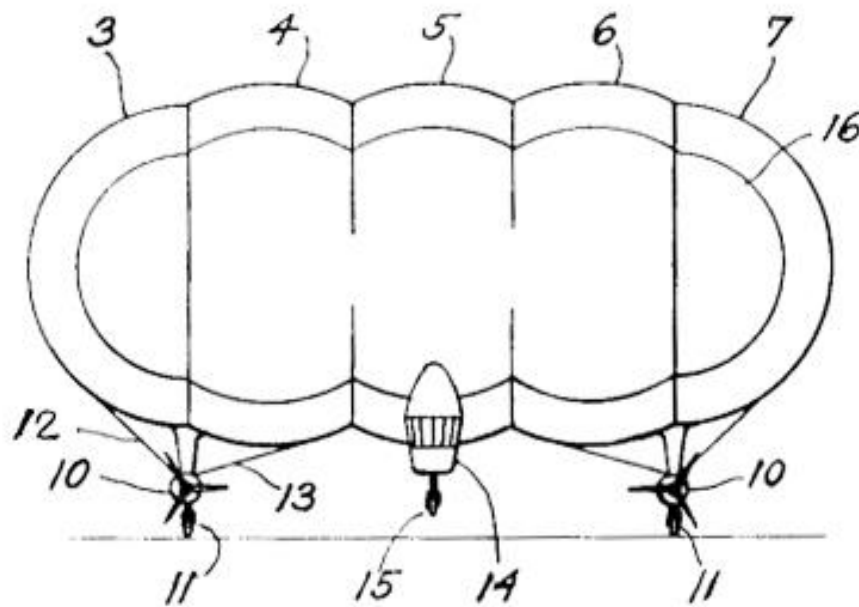


Fig. 3

Bow view of a Goodyear dynamic lift airship. Note the five lobes (3, 4, 5, 6 & 7) of the gas envelope, the gondola (14) and the bow protective structure (16). Source: Patent US2778585A

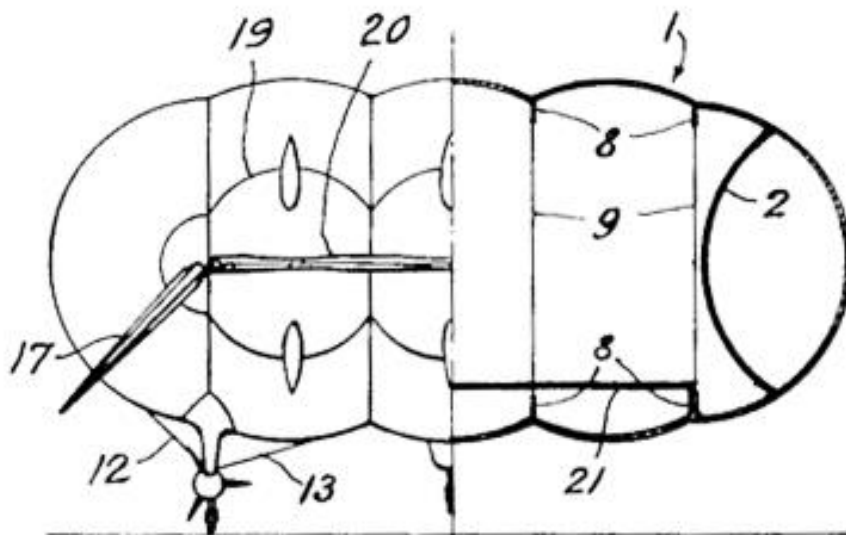


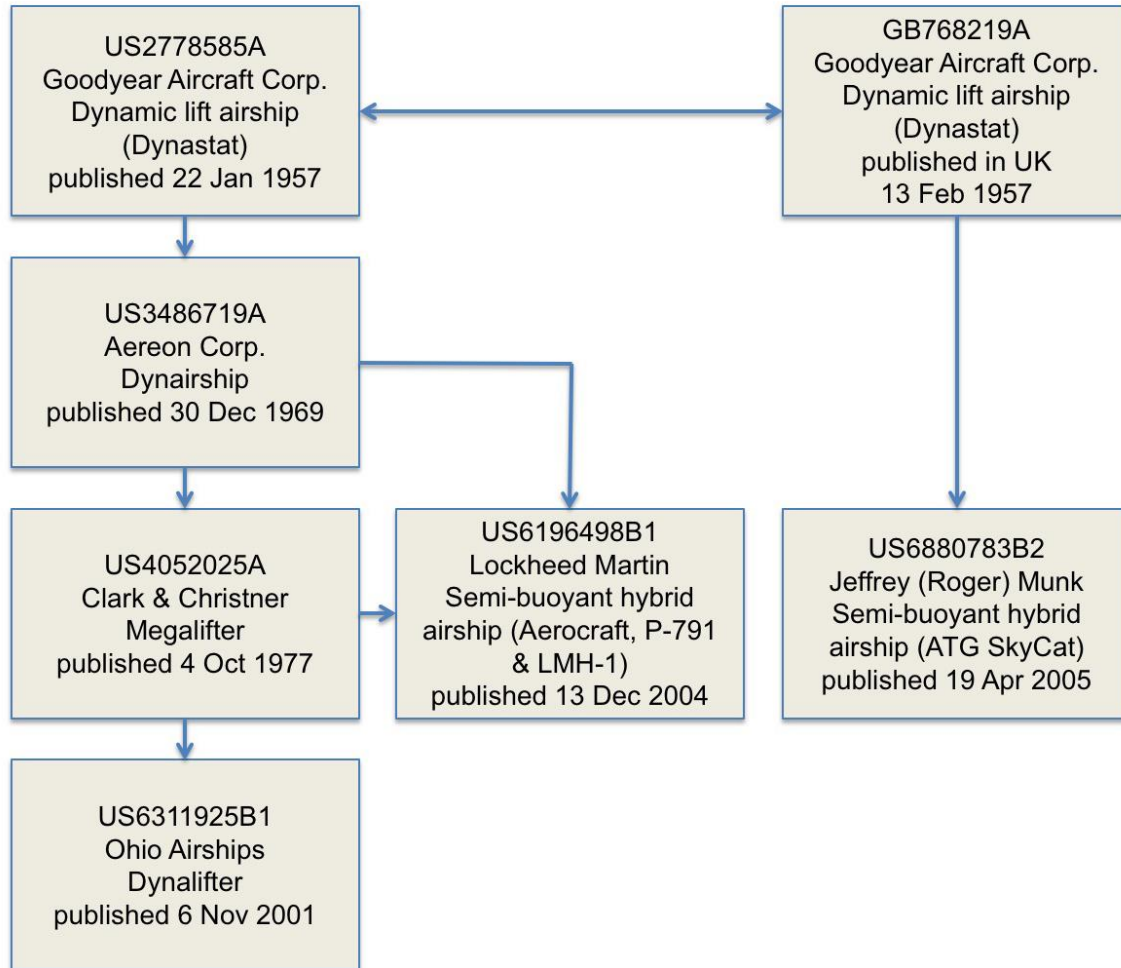
Fig. 4

Stern views of a Goodyear dynamic lift airship. Note the catenary (8) and cables (9) between lobes, the angled tail fin (17), the stern protective structure (19) and the elevator (20).

Source: Patent US2778585A

3. Legacy of Goodyear's dynamic lift airship patents

The Goodyear Aircraft Corp. dynamic lift airship patents, US2778585A and GB768219A, established important technical precedents that have been referenced in the patents for several other semi-buoyant, heavy-lift, hybrid aircraft and airships, as summarized in the following graphic.



4. For more information

Patents

- US2778585A, “Dynamic Lift Airship,” inventor Donald B Tschudy; application filed 3 January 1955; granted 22 January 1957, assigned to Goodyear Aircraft Corp.:
<https://patents.google.com/patent/US2778585/en>
- GB768219A, “Dynamic Lift Airship,” filed 13 April 1955, granted 13 February 1957, assigned to Goodyear Aircraft Corp.:
<https://patents.google.com/patent/GB768219A/en>

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