



US005927653A

United States Patent [19]
Mueller et al.

[11] **Patent Number:** **5,927,653**
[45] **Date of Patent:** **Jul. 27, 1999**

[54] **TWO-STAGE REUSABLE EARTH-TO-ORBIT AEROSPACE VEHICLE AND TRANSPORT SYSTEM**

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[21] Appl. No.: **08/632,786**

[57] **ABSTRACT**

[22] Filed: **Apr. 17, 1996**

A two-stage wingless reusable aerospace vehicle having upper and lower stages that take off from a take-off area and separate at a separation point along a first trajectory. The separation forces are generated by air retained between the upper and lower stages, which is at a pressure higher than ambient pressure at the separation point. The lower stage is then propelled along a return trajectory to a landing area. After separation from the lower stage, the upper stage continues to an Earth orbit for deployment of a payload. After deploying the payload, the upper stage moves out of the Earth orbit, re-enters the Earth's atmosphere, and returns to the take-off and landing area. The upper and lower stages are powered by liquid oxygen and kerosene engines. The aerospace vehicle is transported to a take-off area by a transport vehicle having a first fixed carriage and a second translatable carriage that is adapted to move the upper stage relative to the lower stage for assembly of the aerospace vehicle while in the horizontal position. The transport vehicle then pivots the aerospace vehicle from the horizontal to the vertical position for launching.

[51] **Int. Cl.**⁶ **B64G 1/40**

[52] **U.S. Cl.** **244/172; 244/158 R; 244/160; 244/172; 244/138 R; 244/164**

[58] **Field of Search** **244/172, 158 R, 244/63, 16, 160, 138 R, 164, 100 A, 129.4, 129.5; 102/377, 378**

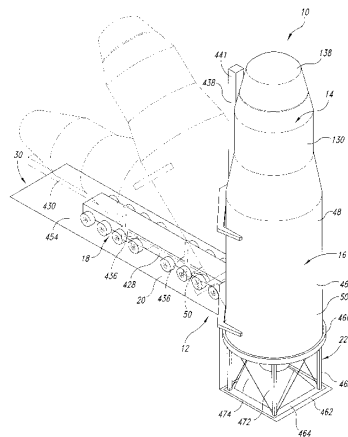
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57 Claims, 26 Drawing Sheets



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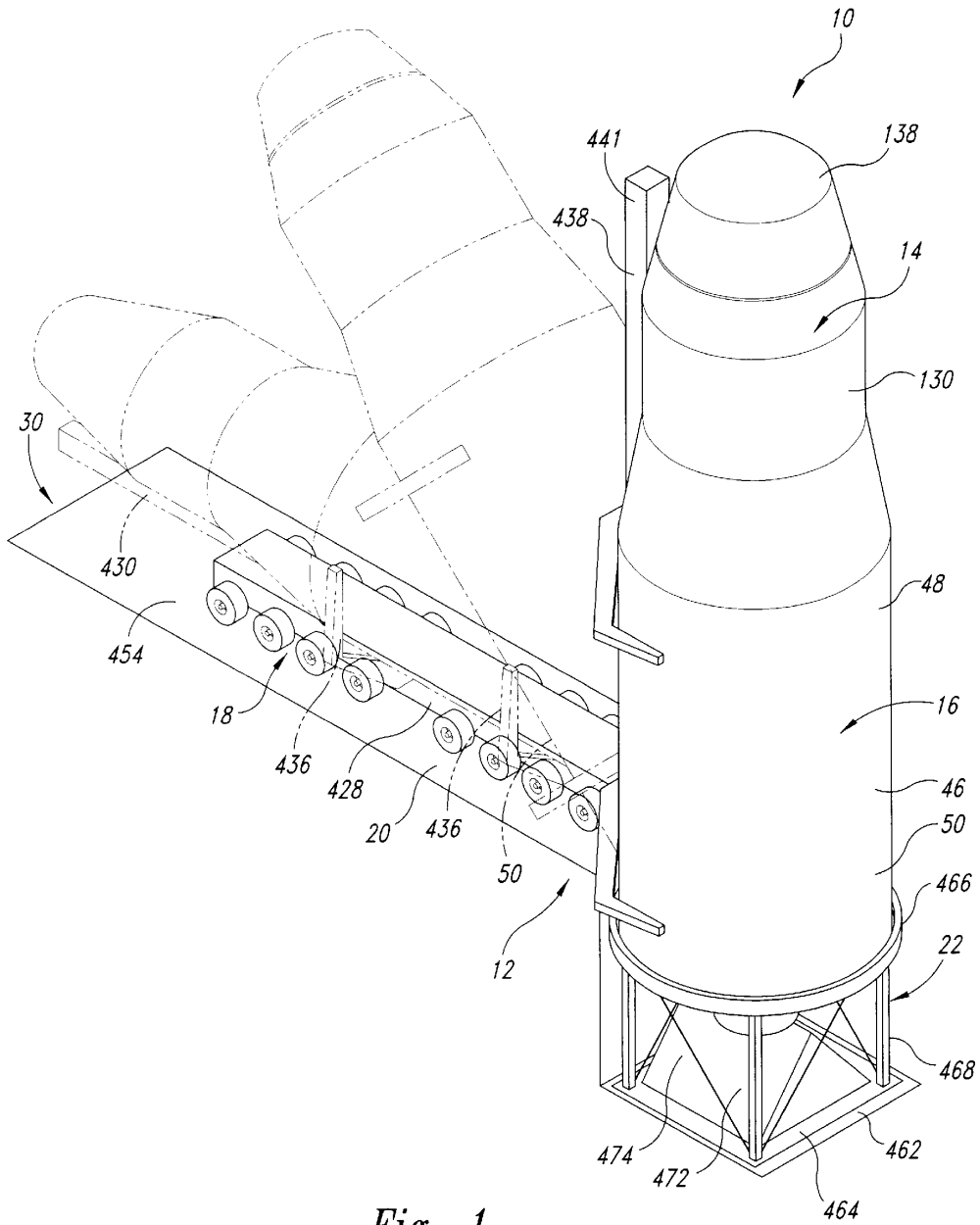


Fig. 1

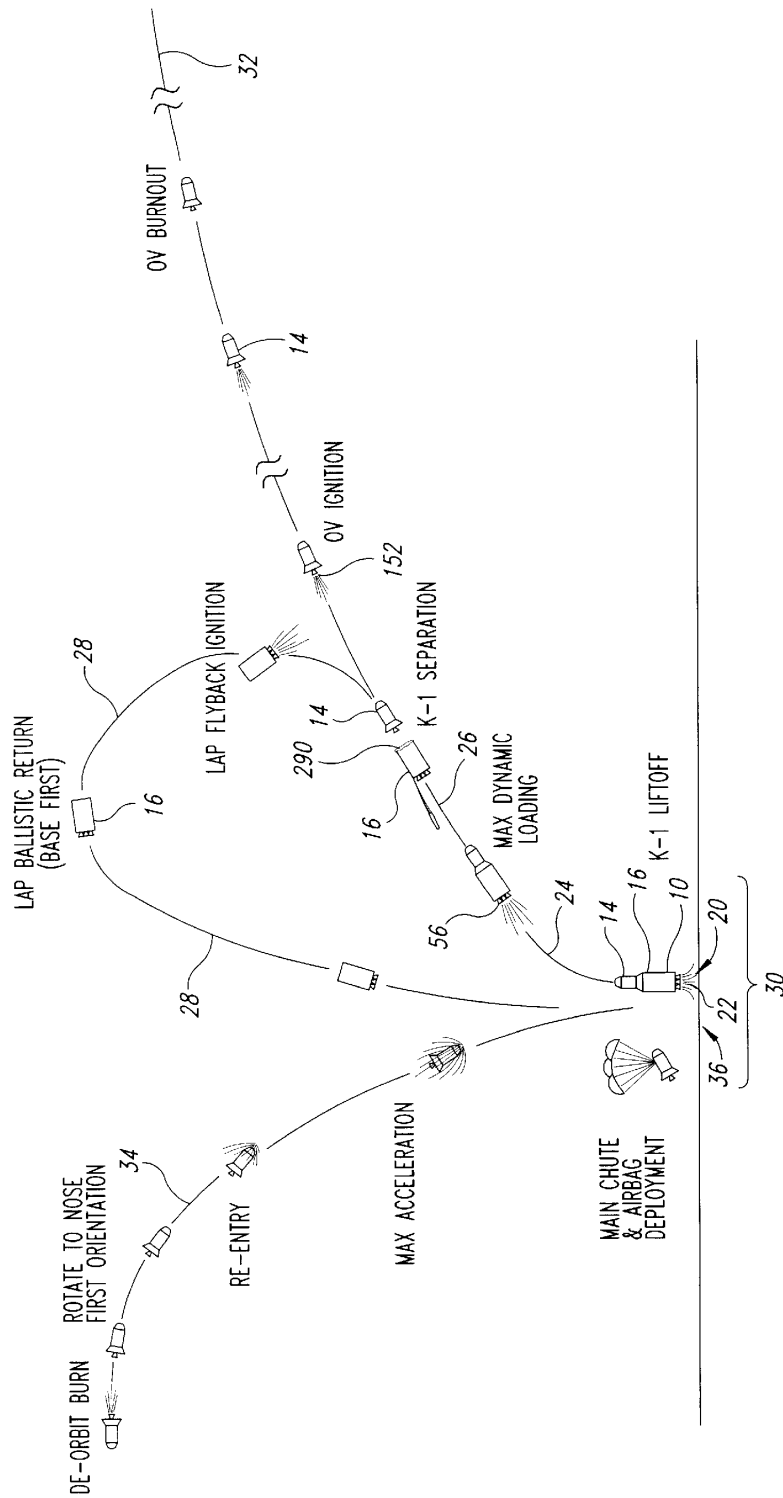


Fig. 2

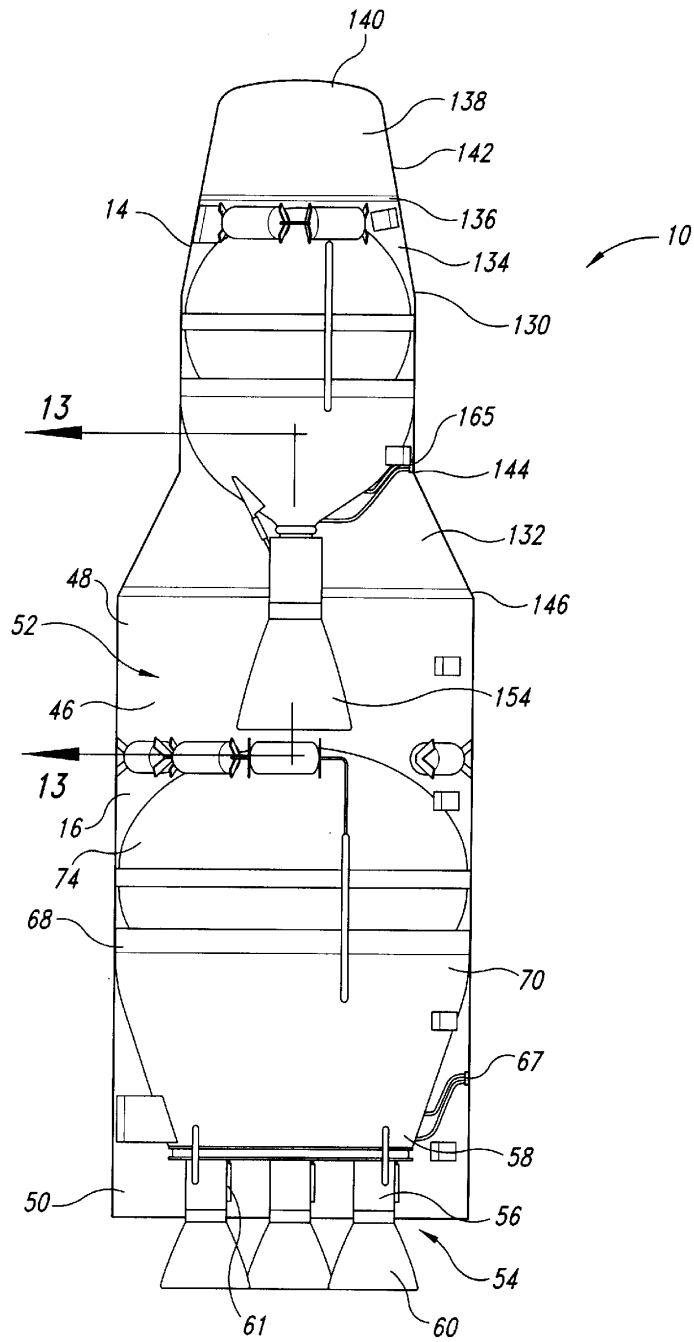


Fig. 3

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