Sept. 13, 1927. 1,642,270

T. B. SLATE

AIRSHIP

Filed July 23, 1925 2 Sheets-Sheet 1

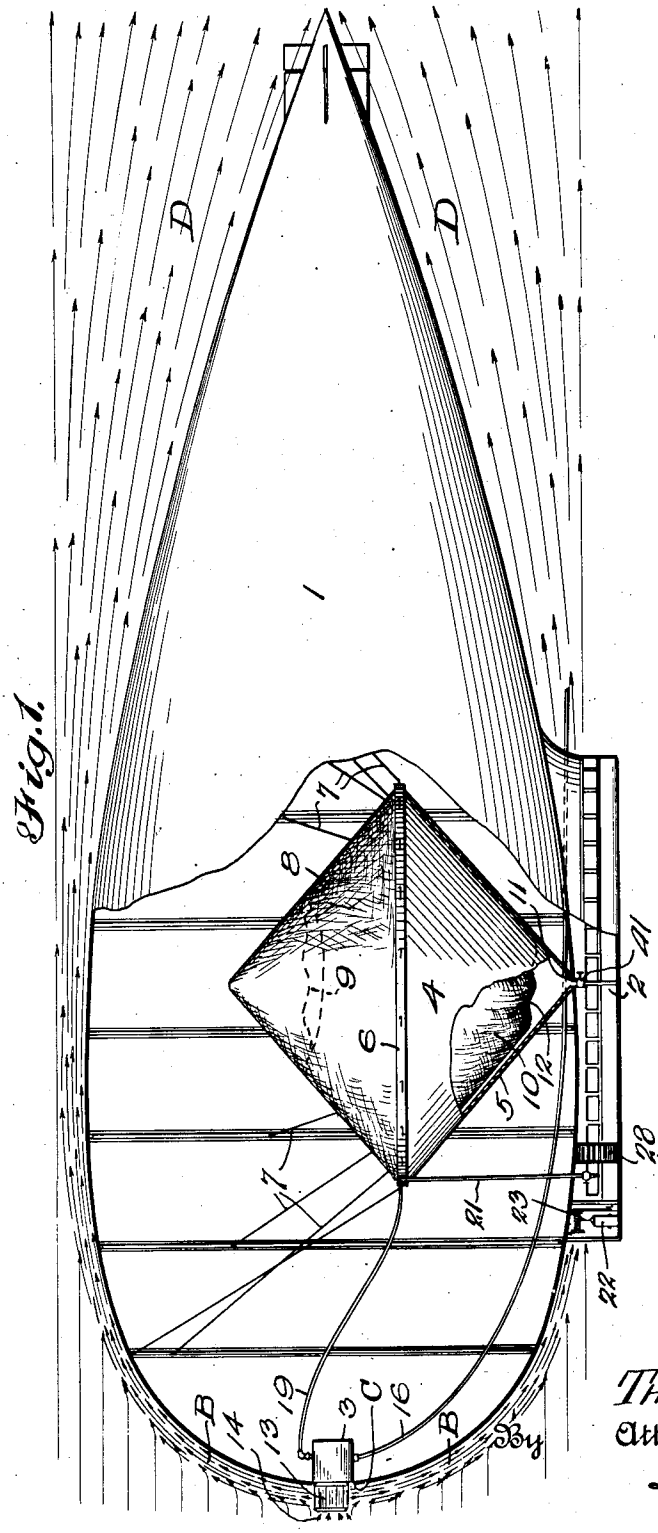


Fig. 1.

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Fig. 2.

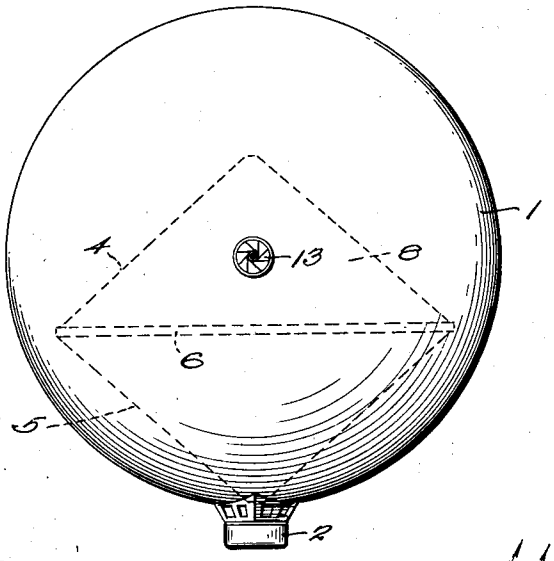


Fig. 3.

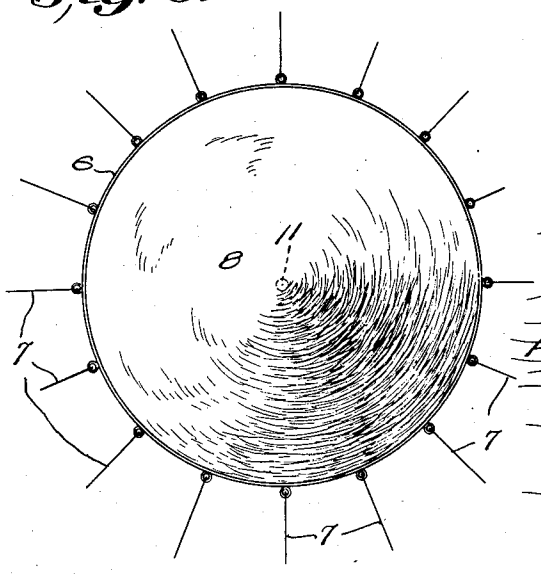
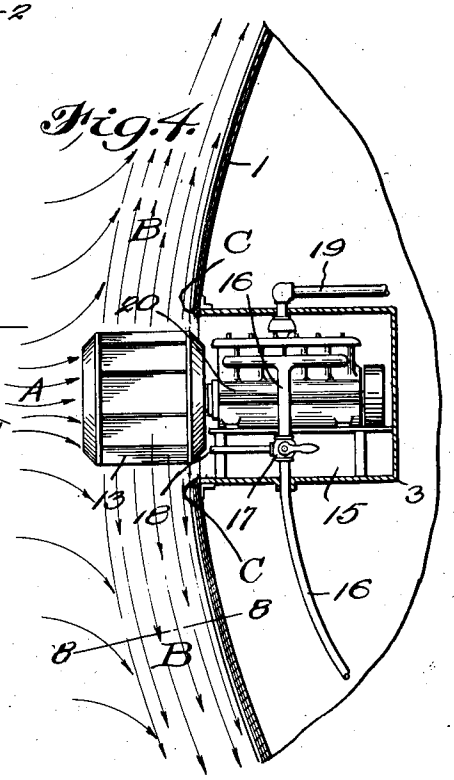


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS BENTON SLATE, OF GLENDALE, CALIFORNIA.

AIRSHIP.

Application filed July 23, 1925. Serial No. 45,649.

It is the object of my invention to provide a novel means of propulsion for an airship of the lighter than air type adapted to relieve the frame of the ship of the air pressures due to a high velocity through the air and due to storm conditions in bad weather. It is also my object to provide in this type of propulsion a novel and efficient means of applying the power directly to the displacement of air completely over the forward end of the ship and replacing it from the point of largest diameter of the ship back to the tip or tail end of the ship without producing a vacuum at the rear of the ship.

It is also an object of my invention to provide a ship with a novel combination of structure and means of propulsion that will efficiently propel through the air a ship of greater diameter compared to length than has heretofore been practicable and to increase the factor of safety in storm conditions through wrenching cross currents of air and which will also provide a heavy covering of air flowing completely around the ship and longitudinally with the ship to protect it from cross currents of storm conditions. It is also my object to provide a greater internal volume with a lesser external surface, thereby gaining a greater factor of gross lift over gross weight of the ship, resulting in greater pay load capacity.

Figure 1 is a diagrammatic view of my invention, partly in section, with the direction of air currents indicated by arrows;

Fig. 2 is a front end view of the ship;

Fig. 3 is a top plan view of the compensation bag 8;

Fig. 4 is a detail sectional view through the forward end of the air ship with the propeller and motor shown in side elevation.

Like characters of reference designate like parts in each of the several views.

Referring to the accompanying drawings, I provide an airship shell or covering 1 of a suitable light metal approximately of the shape shown in Fig. 1 and having a passenger and freight compartment 2 extending longitudinally of the shell; and a power plant compartment 3 positioned at the forward end of the ship.

An important feature of my invention is the provision at the forward end of the ship of a radial blower type fan 13 taking air at its forward axis and delivering it from its periphery in a solid radial sheet at right angles to its axis. The rear ends of the fan blades are in alinement with the adjacent surface of the shell 1 of the airship so that the rear surface of the radial flow of air will come in contact with the surface of the ship at C.

I provide a suitable engine 20 mounted in the engine compartment 15. Engine 20 is provided with a pipe 16 passing through the gas compartment of the ship and terminating at the rear of passenger and freight compartment 2 of the ship. I provide an exhaust pipe 18 for exhausting directly to the atmosphere and also provide a suitable valve 17 for directing the exhaust to either pipe 18 or pipe 16.

The engines are geared directly to one main fan shaft on which is mounted a centrifugal blower type fan operated at high velocity and adapted to take a great volume of air in at its forward open end and discharge it in a solid radial sheet at the periphery of the fan. The fan is adjusted longitudinally of the ship so that the rear surface of the current of air from the fan comes in contact with the surface of the nose of the ship at its extreme forward end, as indicated at C in Fig. 1. The fan 13 is open at both ends and a suction from the rear end of the fan pulls the radial flow of air tightly against the surface of the forward end of the ship at the point of contact and thus seals the passage, the current of air following the contour of the ship. The suction of the fan pulls down a less than atmospheric pressure over the area inside the point of contact designated C. The tendency of a great volume of air discharged from the fan at high speed is to cause a less than atmospheric pressure between the surface of the ship and the air flow, causing the ship to move toward the radial air stream at a speed governed by the velocity given to the radial air stream by the fan.

The remaining volume of air in front of the ship that does not flow through the fan will be entrained into the stream of air flowing from the fan at high velocity and will follow the contour of the ship without building up pressure on the nose of the ship, and will pass the volume of air for the ship's displacement past its largest diameter at high speed. The first result is to effect a complete displacement of the air pressure from in front of the airship allowing the ship to

move forward at a speed proportionate to the amount of power applied. The second result is that the great volume of air thrown around the nose of the ship and past its largest diameter at high speed, then loses its velocity and begins to replace immediately behind the largest diameter of the ship the space occupied by that portion of the ship, thus allowing the ship to travel on without producing a partial vacuum behind the ship. This result relieves the power plant of the burden of pulling a volume of air behind the ship for replacement.

With this system of propulsion the fan does not function in the manner of the usual propeller and does not pull on the ship directly by its shaft, and power is not concentrated at one point on the ship but the propelling means or force is applied completely over the exterior surface of the ship's hull from one end to the other. Consequently, pressure on the ship's hull is relieved and cross currents of air which otherwise would tend to wrench the ship in storm conditions would not be able to strike the ship until after they have first come in contact with the flowing stream of air discharged by the fan and which follows the contour of the ship longitudinally and has a cushioning effect on cross air currents. More efficient control of the ship by the rudders is possible because of the even flow of air following the ship to its rear end as indicated by arrows in Fig. 1.

Complete replacement of the air following the passage of the ship tends to hold the rear end of the ship steady and will not allow it to swing around from one side to the other of the area displaced by the ship. If a ship is forced through the air by the ordinary means and has to draw its displacement from the surrounding atmosphere it will bring it from the course of least resistance and if the atmosphere is at all disturbed by wind or storm conditions this course of least resistance is liable to be from any direction, causing cross currents over the rear of the ship where the rudders are located.

What I claim is:

1. In combination with an airship, a radial blower fan for propelling the ship, said fan being mounted on the forward end of the ship and displacing air from in front of and at right angles to the axis of the airship and replacing air beginning immediately at the rear of the largest diameter of the hull of the ship and continuing to the extreme rear end of the ship, whereby to propel the ship with the least possible disturbance of the atmosphere surrounding and slightly distant from the hull of the ship.

2. In combination with an airship, a radial blower fan for propelling the ship, said fan being positioned at the central portion of the forward end and displacing air from in front of and at right angles to the axis of the airship and replacing air beginning immediately at the rear of the largest diameter of the hull of the ship and continuing to the extreme rear end of the ship.

3. In an airship of the lighter than air type, a blower fan positioned at the center of the nose of the ship and having the rear edges of its blades aligned with the surface of the nose of the ship to produce a stream of air flowing radially from the fan and at right angles to the axis of the airship and following the contour of the ship to displace air from in front of the nose of the ship and to function as an air cushion to protect the ship from wrenching cross-currents of air under storm or similar conditions.

4. In combination with an airship, a radial blower fan mounted on the nose of the airship and having its axis longitudinal with the airship, the rear edges of the blades of the fan being approximately aligned with the adjacent surface of the nose of the airship and at right angles to the axis of the airship and adapted to displace air from in front of the airship creating a high-speed current of air flowing over the nose of the ship with sufficient force to entrain air directly in front of the ship and to carry it around the largest diameter of the ship, whereby to create a less than atmospheric pressure in front of the ship and a slightly greater than atmospheric pressure on the rear tapering portion of the ship to propel it.

5. In combination with an aerial craft, a radial blower having its axis of rotation longitudinal with the body of the craft, and having both ends of the blower open and having an air space adjacent the inner blades, the rear edges of the blades of the blower being substantially aligned with the nose of the craft to create a vacuum between the craft and the air stream leaving the blades of the blower to cause the air stream to follow the contour of the craft, displacing air from in front thereof and replacing air at a point beginning rearward of the largest diameter of the craft and continuing to the rear thereof to propel the ship and to increase the control exerted by the rudder.

6. In combination with an airship, a centrifugal blower mounted on the nose of the airship and delivering a radial volume of air over the nose of the airship in a direction at right angles to the axis of the ship and leading away from the contour of the nose of the ship to cause a partial vacuum between the airship and the air stream delivered from the fan.

7. In combination with an airship, a radial blower fan mounted on the forward end of the ship, said fan having an air space adjacent the inner nose of the blades and discharging air in a direction at right angles to the axis of the airship, the fan being open

at its forward end and permitting an uninterrupted flow of air through the forward end of the fan and for substantially the entire length of the blades permitting a full supply of air at the rear end of the blades, whereby to cause an uninterrupted flow of air at right angles to the axis of the blower and produce a suction of less than atmospheric pressure directly adjacent the forward end of the ship and extending to its largest diameter.

8. In combination with an airship having its contour gradually and continuously curved out from the nose until the largest diameter of the airship is reached and then having the contour of the ship gradually tapering rearward in nearly a straight line, a radial blower mounted on the nose of the ship and discharging an air stream from the periphery of the blower in a direction nearly parallel with but slightly away from the contour of the ship from the nose of the airship to its largest diameter and thereafter being dissipated into the surrounding atmosphere, such expansion being equal to or greater than the tapering contour of the rear end of the ship to cause a partial vacuum to surround the forward end of the airship continuously from the periphery of the blower to the point of the largest diameter of the ship and adapted to produce a pressure approximately at or greater than atmospheric pressure continuously from the plane of the largest diameter of the airship to its rear end for the purposes described.

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