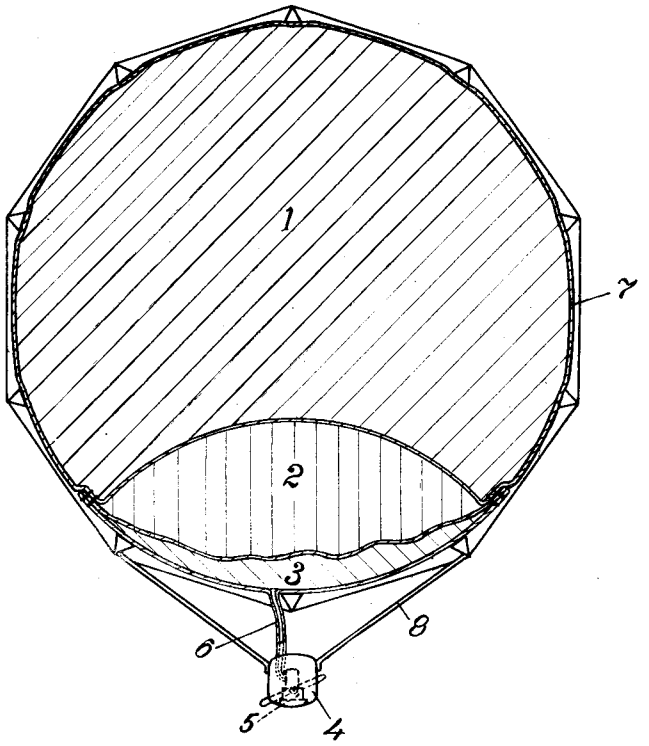
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GAS INFLATED AIRSHIP

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GAS-INFLATED AIRSHIP.

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My invention relates to airships and more especially to airships which are supported by lifting gas and are propelled by means of an internal combustion engine.

The weight of such ships comprising hull, engine, outfit, and also its disposable lift is carried by means of its lifting gas. This gas must be of very low specific gravity so that the difference between its weight per unit of space from that of the surrounding air may be as large as possible. It has become normal to use hydrogen as lifting gas in airships. Another lifting gas is helium, which has the advantage over hydrogen of being non-inflammable, but helium is of a much higher price than hydrogen because of its scarcity and its costly manufacturing process. That is why helium-inflated airships must be operated in a very careful manner so as to avoid any unnecessary loss of gas.

The airship while travelling uses up the fuel which it has aboard for the purpose of driving the engines. Generally such fuel is gasoline in sheet metal tanks. The weight of this fuel is compensated by an adequate portion of the ship's gas space inflated by the lifting gas. Consumption of the fuel in the motors while travelling reduces the weight to be carried by the ship, because the exhaust gases are allowed to escape into the atmosphere. Thus the ship will be getting lighter and lighter while travelling through the air. A certain amount of the surplus lift may be compensated by turning the ship's nose downwards thereby creating a dynamic moment holding the ship down but only while it is being propelled. As soon as the engines are stopped or when the surplus lift exceeds the dynamic downward moment, the ship will rise and an adequate portion of the lifting gas will be expelled by the automatic gas valves which are necessary to prevent the gas bags from being torn because of the increase of inner gas pressure compared with the outside air pressure. Rising of the airship may be arrested by letting out an adequate portion of lifting gas through the valves to be operated at will. But—especially when travelling over long distances when considerable fuel weight will be consumed—it will be indispensable to let gas escape while travelling and before landing to get the ship approximately to equilibrium.

The main object of my invention is to procure such approximate equilibrium during the flight and before the landing of the air ship with a minimum of loss in lifting gas.

A secondary object is a considerable saving in the lifting gas capacity for an airship of a certain performance.

A further object is the saving of weight in the airship structure.

There will be connected with my invention other advantages which will be pointed out later or which will appeal to the expert without further explanation.

I attain all these advantages by applying a special method of operation which consists mainly in using a gaseous fuel for the engines instead of a liquid one. But my fuel gas should have a specific gravity approximately equalling that of air, or a mixture of gases may be applied, this mixture having substantially the same specific weight as air. Gases of this kind for example are oil gas, acetylene and other hydrocarbonic gases as C_2H_6, C_2H_4, C_2H_2 and the like. They even have a better heating quality than gasoline has so that the same effect of the motor affords less fuel. But the main advantage connected with the provision of such fuel gas instead of liquid fuel is that consumption of fuel will cause no, or only a very small, change in equilibrium of the airship as the weight of the gas being consumed is equal to the weight of the air which will occupy its space afterwards. Furthermore it will not be necessary to provide lifting gas for the purpose of lifting and carrying fuel, because my fuel gas will need no support being equal in weight to the surrounding air. Only the necessary space for the fuel gas has to be provided. No lifting gas being wanted for support of the fuel gas the gas space saved in this way may serve for storing the fuel gas. My fuel gas having better heating quality than gasoline the space for its storage may even be smaller than the space saved from the lifting gas space so that the total gas capacity of the airship may also

be smaller than that of an airship of the same performance but with liquid fuel. A further advantage resulting from the application of fuel gas according to my invention is the circumstance that no special structure or reinforcements need be provided for supporting the fuel so that the dead weight of the airship will be lower than otherwise. This feature will come into effect especially with rigid airships. Furthermore a better longitudinal distribution of lifting force and load may be attained thus allowing for better local compensation between these two forces. This again will allow a certain reduction of structural weight.

Operation of airships according to my invention will also have the following advantage: Gasoline consumption will always have an effect on the trim of the ship; with fuel gas of approximately the same specific gravity as air there will not be any influence on the ship's trim caused by fuel consumption.

The gas space for lifting gas and that for fuel gas may be completely separate from each other. But I prefer to arrange them relative to each other so that expansion of one of the gases may result in bulging into the other gas space if the state of inflation therein does so allow. Besides the two gases may be contained in one common bag or cell or in separate bags for each gas, or combination gas bags may be provided having partition walls dividing them into individual compartments. With rigid airships where the hull is subdivided by cross members into compartments the above consideration with regard to the possible arrangements of gas bags applies to every individual hull compartment.

Another advantage connected with my invention may be pointed out. The cells or bags intended for inflation with fuel gas, having the specific gravity of air, are not required to be of the same quality as those inflated with lifting gas having a very low specific gravity. Therefore, the fuel gas bags may be manufactured from lighter and less expensive material, thereby resulting in a saving both in weight and cost.

Having given a general description of my invention I now want to point it out more in detail referring to the drawing which represents an example embodying my invention.

The figure represents the cross section through a dirigible airship. The strong gas cell 1 is inflated with lifting gas. Cell 3 contains the fuel gas and is of light construction only. Cell 2 is adapted to be inflated with air for the purpose of substituting the consumed fuel gas and to serve as a ballonet for securing the shape of the outer cover 7 of the airship by means of a blower (not shown) or the like. A piping 6 connects cell 3 with engine 5 situated in car 4. The lifting forces of the lifting gas are transmitted to the loads by supporting means 8, which may be ropes, wires or other structural elements.

I prefer to press the fuel gas to the motor, but there may as well be provided a device for sucking it from its container.

It may be advisable to carry also a certain amount of liquid fuel in the airship besides the fuel gas. It will then be possible to consume such liquid fuel whenever circumstances should afford an increase of lift of the airship while travelling. In case a fuel gas is chosen which is a little lighter than air its consumption would cause a decrease of lift of the airship. I prefer to use a fuel gas which is a little heavier than air so that its consumption will create a small increase of lift which will be compensated by unavoidable small losses of lifting gas and by other unforeseeable circumstances during flight of the airship.

I do not want to limit myself to the details described or shown in the drawing as many variations will occur to those skilled in the art.

What I claim is:

1. An airship comprising a structure adapted to be inflated with gas; a motor adapted to propel said structure; a gas contained in said structure and being of lower specific gravity than air; a second gas contained in said structure and having a specific gravity substantially alike that of air; said first gas being adapted to serve as lifting gas; said second gas being adapted to serve as fuel for said motor.

2. An airship comprising a gas cell having lifting gas therein; a second gas cell having fuel gas therein of substantially the same specific gravity as air; said first gas cell together with said second cell forming one uniform airship body.

3. An airship comprising a gas cell having lifting gas therein; a second gas cell having fuel gas therein of substantially the same specific gravity as air; and a structural element separating said first cell from said second cell.

4. An airship comprising a gas cell having lifting gas therein; a second gas cell having fuel gas therein of substantially the same specific gravity as air; and a flexible wall separating said first cell from said second cell.

5. An airship comprising a gas cell having lifting gas therein; a second gas cell having fuel gas therein of substantially the same specific gravity as air; and an air ballonet operatively associated with the gas cells.

6. An airship comprising a gas cell having lifting gas therein; a second gas cell having fuel gas therein of substantially the same specific gravity as air; a load suspended

from said airship; and means for transmitting the lifting force resulting from said lifting gas to said load.

7. An airship comprising a gas cell having lifting gas therein; a second gas cell having fuel gas of substantially the same specific gravity as air; and load transmitting means supported from said first gas cell.

8. An airship comprising a hull; said hull being subdivided vertically into two compartments; one of said compartments having lifting gas therein; the second one of said compartments having gas therein of substantially the same specific gravity as air; and load transmitting means supported from said first compartment.

9. An airship comprising a hull; said hull being subdivided vertically into two compartments; one of said compartments having lifting gas therein; the second one of said compartments having gas therein of substantially the same specific gravity as air; an air bag within the hull serving as a ballonet; and load transmitting means supported from said first compartment.

10. An airship comprising a relatively strong structure having lifting gas therein and a relatively light structure having gas therein of substantially the same specific gravity as air; said two structures together forming the hull of said airship.

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