

What Wilbur Thought of Gas Bags

More than three years after Kitty Hawk, the Wright brothers, Orville and Wilbur, had still failed to market their airplane in the US. It was then that they received a request from a German arms dealer, Isidor Loewe. Loewe saw military potential in their invention and asked for a comparison of heavier-than-air flyers and airships. Hard as it is to believe today, France and Germany were pinning their airpower hopes on gas-filled dirigibles; France had just built a huge one, "La Patrie." Wilbur sent to Loewe a letter of reply. It is a classic of acerbic technical criticism, the point of which, as he accurately noted, was that airships indeed "were a thing of the past," and the future belonged to the airplane.

An airship must displace a quantity of air whose weight is equal to that of the airship and its load. It must therefore be very large and unwieldy—in fact, 800 times larger than a boat of equal tonnage. This huge size entails many ill consequences: (1) the cost of construction is enormous; (2) the delicacy of the gas bag and the great area exposed to the wind makes it impossible to save an airship from destruction during ordinary gales without the use of a shed; (3) the cost of such huge sheltering sheds is very great; (4) the great size of the sheds requires that they be permanent installations, not removable from place to place so as to accompany an army; (5) a small army of attendants and a wagon train of gas generators and other equipment is required.

On the other hand, the aeroplane flyer is small and therefore cheap to construct. In a gale, only its edges are exposed to the wind, so the fiercest storm cannot wreck it when at anchor. It can be taken along with an army throughout a campaign and requires but trifling attendance and equipment.

The cost of an airship of the type "La Patrie," including its equipment, is fully 10 times as great as that of a flyer with its equipment, and there is a similar disproportion in the cost of upkeep.

It results that airships must necessarily be used in small numbers and for that reason under conditions which preserve them from danger of destruction by the shots of the enemy. But the cheap aeroplane flyer can be supplied to the army in such numbers that they can be used with the greatest freedom without fear of great monetary loss or of exhaustion of the supply if one is destroyed by the shots of the enemy now and then.

But cost and convenience in handling are really secondary matters. The real advantage of the aeroplane flyer over the gasbag airship lies in its enormously greater speed and serviceability. Since the airship is a floating body it follows the law that power must increase as the cube of the speed, the size remaining constant. But as larger engines require larger gas bags, it practically results that in order to merely double the speed it is necessary to increase the contents of the gas bag and also the power of the motors 64 times!

La Patrie, on the 14th of July, in a dead calm, traveled its length (60 meters) in seven seconds, so its true speed under ideal conditions is 8.7 meters a second, which is about 20 miles an hour, or several miles less than its claimed speed. Its motors are of about 70 horsepower. An airship of the same excellence of design to go 40 miles an hour would need to be 64 times larger and carry motors of more than 4,000 horsepower. ...

The relatively insignificant speed of the airship entails another very serious disadvantage. Since a flight of 50 miles against a 15-mile wind requires from 18 to 15 hours, while a similar flight by a

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Wilbur Wright
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"Keeper File"

flyer requires only two hours, it follows that the probability of a failure in the machinery or motor is at least five times as great in the first case as in the second. Up to the present no airship has succeeded in remaining in the air as long as four hours in daytime, nor has a circuit of 50 miles been made even in the lightest wind, though the French have been working on war airships for more than 20 years.

The flying machine, on the other hand, is constructed on the principle of the inclined plane, and the resistance is, within narrow limits, a constant factor of the weight. Therefore its velocity may be doubled with only doubled horsepower, and speeds up to 75 miles an hour are easily attainable, even by small machines. The 1905 Wright flyer flew 24 miles in 38 minutes in a circular course, a speed of 38 miles an hour. Against a 10-mile wind it would advance three times as fast as "La Patrie," against a 15-mile wind five times as fast. (The 1907 machines will do still better, as their speed will be 45 miles an hour in a calm.)

The difference is really greater than this, because airships in strong winds pitch about, veer from side to side, and often make complete circles in spite of all attempts to hold them to a direct course. All this greatly increases the resistance and reduces the nominal net speed. The speed of flyers is little affected by local variations in the direction of the wind.

But the flying machine has still another advantage of the greatest importance. It is so small and inconspicuous, and moves so fast, that it is safe from the shots of the enemy at comparatively short distances. It comes and goes before the gunners can train their pieces and get the range. Moreover, shots piercing the cloth do no serious harm. But the enormous airship with its slow motion and vulnerable gas bag cannot safely approach nearer than 3,000 yards, at which distance observations are of no military value under ordinary atmospheric conditions, since numbers cannot be estimated, nor wagon trains distinguished from cavalry and artillery. At critical times, 20 or even 50 flyers can be sent out at once to obtain knowledge of the enemy's movements and concentration of forces. If only one-half should return bringing the desired news, the cost in life and money would be less than that of an ordinary reconnaissance. ...

The airship has reached its limit and must soon become a thing of the past. The future is for the speedy, cheap, and hardy flyer. The results already attained with flyers make it manifest that the airship will be superseded within a few years and that money spent in attempts to improve the latter will be practically wasted. Every recognized scientific student of aeronautics in the world favors aeroplanes as against airships. ■