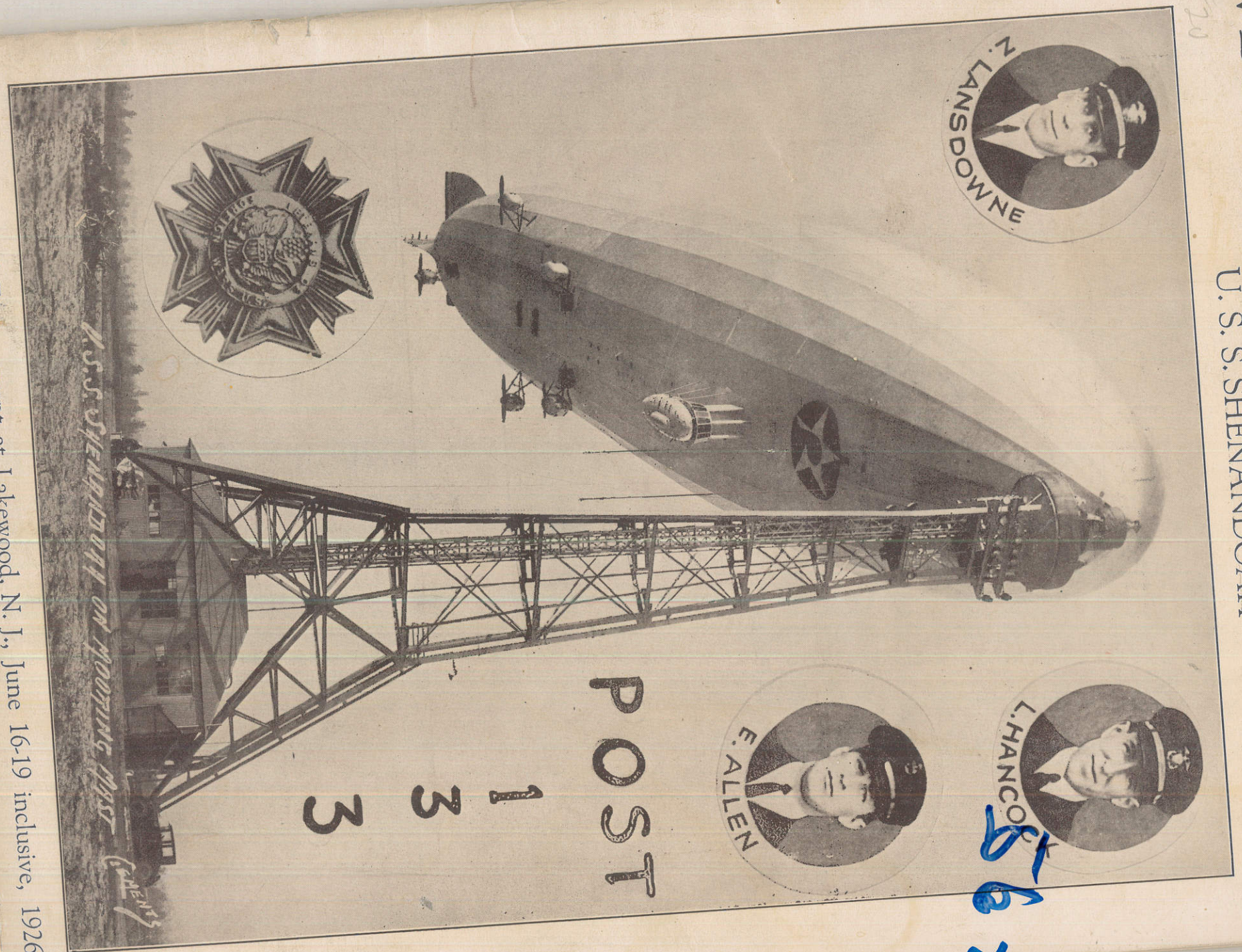


#20

VETERANS OF FOREIGN WARS

U. S. S. SHENANDOAH



POST
1
3
3

Seventh Annual Encampment at Lakewood, N. J., June 16-19 inclusive, 1926

562276

This was brought over on the Z.R.111-from
Friedrichshafen, Germany to Lakehurst N.J.-
Oct.15 1924, wrapped around a rye bread.

BILL SCHNEIDER
670 Grove Ave.
Edison, New Jersey 08917

5
6-22-84

George

Sandy Posev • LuLu Roman • Donna Stoneman

185531

On Oct. 1924 the Z R 111 arrived at the NAS Lakehurst===on her
delivery flight. I took the train there. The german crew was unloading the
zepp. I just recall loaves of rye bread. See the zerox on the bread.
I have the wrapping from one loaf===this is a piece.

...almost any condition of wind and weather.
 Docking maneuvers, or the taking of an airship into or out of its
 berth, are limited to winds below 20 to 25 m.p.h. for rotatable

October 15, 1924.

...val Air station
 ...hurst NJ
 ...each car Please congrat
 ...formance of this
 ...or Eckener
 ...olla

ION

VICE-PRESIDENT

CLASS OF SERVICE		SYMBOL
Telegram		Blue
Day Letter		White
Night Message		N L
Night Letter		N L

If none of these three symbols appears after the check (number of words) this is a telegram. Other vessels character is indicated by the symbol appearing after the check.

The Development of Large Commercial Rigid Airships

By KARL ARNSTEIN,¹ AKRON, OHIO

In this paper the author discusses the safety of the airship, which he considers to be very high because of the multiplicity and overlap of various means of achieving the same end. He then analyzes the various types of load, aerostatic and aerodynamic, which an airship experiences, and makes well-based recommendations for methods of structural analysis, and for load factors. On the basis, partly of past experience, partly of careful investigation of various projects, he studies the variation in weight with volume of various structural elements. He finds that the specific dead weight still decreases for airships up to 15,000,000 cu. ft. capacity, although only slightly beyond this point. From the point of view of transportation efficiency, the improvement with larger sizes continues almost indefinitely, at any rate well beyond the 15,000,000 cu. ft., which is the largest volume contemplated at present. The author's final conclusion is that it is possible to construct airships of any size which may be required to meet transportation problems, and that economy will improve from every point of view with larger sizes.

ALTHOUGH lighter-than-air aeronautics can already look back upon almost one and a half centuries of history, it was not until the advent of the light internal-combustion engine that the development of the airship as well as of heavier-than-air aviation became feasible. Since that time, about twenty-five years ago, the two branches of aeronautics have seen marvelous developments, in which each one has maintained its own field, supplementing the other.

The airship has naturally developed into a large and long-range craft affording great reliability and the utmost comfort to a large number of passengers, a comfort comparable to that of modern ocean liners but improved by the absence of noise, vibrations, and seasickness. The airplane is the ideal small unit craft capable of rather high speed.

The considerable investment required has somewhat delayed the commercial development of large airships, and they have been given much less of a commercial opportunity to show their merits than, for instance, the airplane. It is a fact that heavier-than-air aviation would also greatly benefit from the development of rigid-airship lines. Airplanes would not only act as fast feeders and distributors, but they would also be carried on airships for taking aboard or delivering load at intermediate ports, dispensing with the necessity of landing the big airship at points with insufficient facilities.

SAFETY AND RELIABILITY

The inherent safety and reliability of the Zeppelin are mainly due to the principle of the multiplicity of independent means. Instead of depending on a single means for every vital purpose (for instance, on internal pressure as does the non-rigid airship for retention of gas and form), it is the advantage of the big unit that it permits subdividing the means so that they overlap and substitute for each other in case of emergency.

Some illustrations will show how this principle applies in certain respects to all types of airships and in some respects especially to the Zeppelin type of ship.

¹ Sources of Lifting Power. The airship has two independent sources of lifting power: aerostatic, due to the buoyancy of the lifting gas, and aerodynamic, due to the dynamic reaction of the ship's hull and fins when flying at some angle of pitch. The airship still floats aloft, even if its motors are shut off, or, on the other hand, a loss of lift such as results when a gas cell is damaged, can be easily taken care of by the dynamic lift.

² Multiplicity of Buoyancy Units. The rigid airship utilizes the bulkhead or compartment system of the steamship by carrying the gas in a dozen or more gas cells. In case of damage to one or more cells the ship merely loses a certain amount of aerostatic lift which can be compensated for by dropping ballast, and the ship is not forced down. Usually repairs can be made in flight.

³ Triple-Layer Principle of Hull. In the single-cover system, most typically represented in the non-rigid type-of envelope, this cover must hold the lifting gas, take all stresses of static or dynamic origin, and serve as a cover against rain, hail, or snow. Thus damage to the single cover impairs it in respect to all of the three functions it serves.

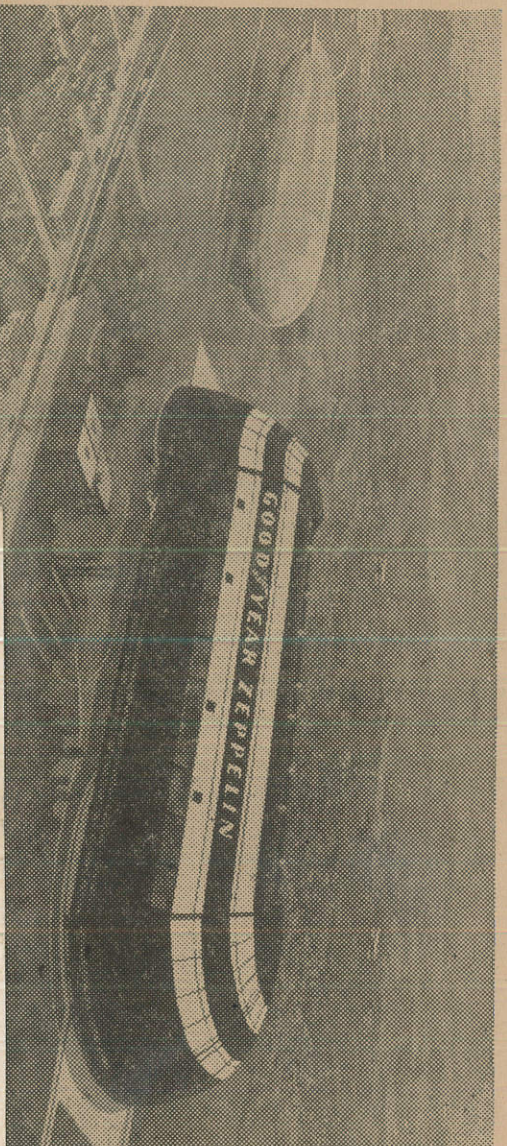
In the rigid airship three units are provided, one for each of these purposes. The gas cells serve for the retention of the gas; a complete metal framework surrounding these gas cells takes all stresses, securing maximum strength with minimum weight, and the whole is enclosed by a taut doped and metallized fabric cover for protection against the elements, which reflects heat and offers a smooth flying surface. A network surrounding the gas cells protects them against expansion, while the air space between outer cover and gas cells serves as valuable ventilating space.

This arrangement of dividing the functions has the advantage that one structural part may replace or assist another. This means, for instance, that the outer cover, if properly applied and maintained, will act as a valuable stress-bearing unit, lowering the stresses in the metal structure and taking shear forces even with the structure intact. Or in case of the destruction of a part of the metal framework, the fabric at this point conveys shear forces from one intact section to the other. These features make the rigid airship a very rugged and coherent structure.

⁴ Multiplicity of Propulsive Means. The large airship has so many motor units that the failure of even two of them does not endanger the ship's safety or even reduce the speed to a serious degree.

An important contribution to real safety is the prevention of damage. The modern rigid airship is a very compact unit, housing most of its vital parts inside its structure. External appendages that can get fouled or wrench loose are avoided. The control car is built integral with the ship's structure and the passenger compartments, and in the large ships even the power cars, are located inside. This feature renders complete overhaul of motors and extensive repair work possible during flight.

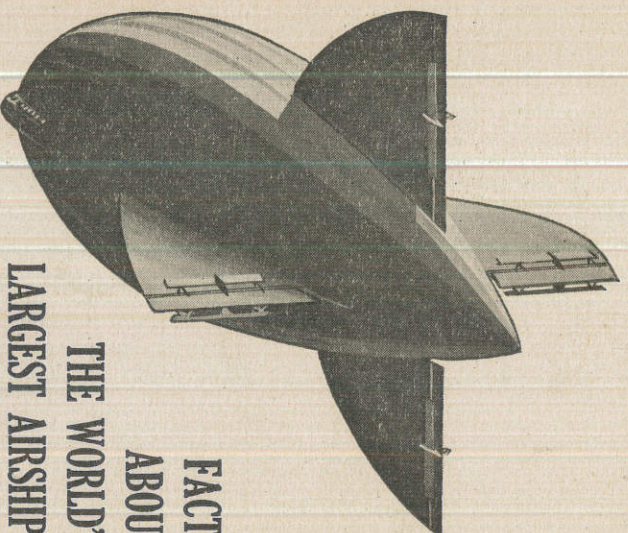
Constant inspection of all parts of the ship in order to locate and repair a weakness in time is very important. The larger ships will be so constructed that there will not be a single part that will not in some way be accessible in flight. The fact that the operating crew constantly rides inside the structure automatically provides that more attention will be given to the important matter of inspection.



Artist's drawing showing how finished Goodyear Zeppelin will appear.

Building the Airship For

A Complete
Structure of
Corporation



**FACTS
ABOUT
THE WORLD'S
LARGEST AIRSHIPS**

Being Built by the Goodyear
Zeppelin Corporation at
Akron, Ohio

COMPARATIVE SIZES

Name	Volume, Cu. Ft.	Length Overall, Ft.	Maximum Diameter, Ft.	Height Overall, Ft.	Gross Lift, lbs.	Useful Lift, lbs.	Number of Engines	Total Horsepower	Maximum Speed, M.P.H.	Range at 50 M.P.H.	Cruising Speed Without Refueling
Los Angeles Zeppelin	2,470,000	658.3	90.7	104.4	153,000	60,000	5	2,000	73	4,000	6,125
Graf Zeppelin	3,700,000	776	100	113	258,000	100,000	5	2,750	80	4,480	84
Akron	6,500,000	785	132.9	146.5	403,000	182,000	8	4,480	84	10,580	

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