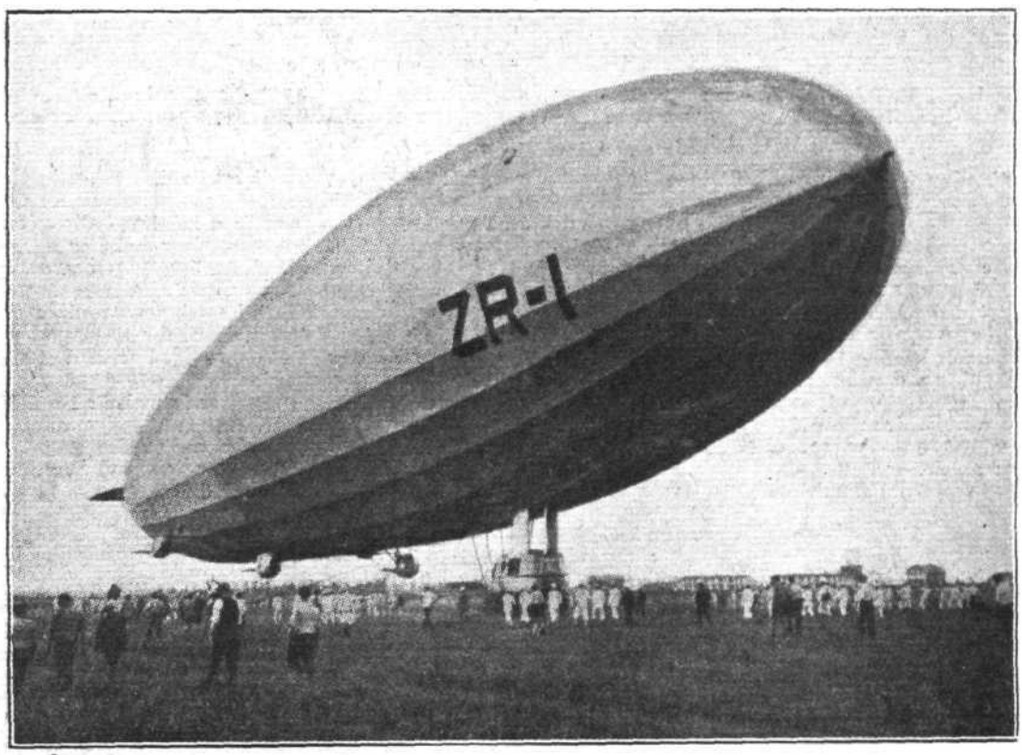
FLIGHT

Z.R.1, THE FIRST AMERICAN-BUILT RIGID AIRSHIP

IN view of the recent liveliness in respect to rigid dirigibles, the following notes on the American airship Z.R.1 may be of interest. The plans for Z.R.1 were started towards the end of 1919, but it was actually laid down in the beginning of 1922, and was practically completed by last August, when the launching tests were carried out in the hangar at Lakehurst, where the ship was constructed, on August 20. The launching was supervised by Comdr. R. D. Weyerbacher, U.S.N. (who had charge of the assembling of the airship), and consisted in gradually releasing from the ballast tanks 32 bags, or 8 tons, of water. Some 300 marines and sailors held the ship down as it rose and guided it across the hangar, when it was then anchored and shed tests commenced. On September 4 Z.R.1 was taken out of the hangar, and the first trial flight successfully accomplished.

Before recording the details of this trial flight it may be as well, perhaps, to give the following particulars of Z.R.1. Generally speaking, the Z.R.1 resembles the more recent type of Zeppelin, or R.34, both in appearance and in many constructional details. However, whilst the Z.R.1 is admittedly modelled on the Zeppelin, there are embodied in its design several modifications and, it is claimed, improvements. The factor of safety in Z.R.1 is much larger than in any other rigid.



Z.R.1, the First American-built Rigid Dirigible: The Z.R.1 is 680 ft. long, and has a capacity of 2,150,000 cubic ft. of helium. It is fitted with six 300 h.p. Packard engines. It is shown here just before making its maiden flight on September 4.

The construction, from start to finish, of a rigid airship in America entailed many difficult problems calling for numerous calculations and much research work, whilst the disasters to Z.R.2 (R.38) and the "Roma" led to a thorough investigation being made into the designs of Z.R.1 including a series of experiments and tests on models and full-size girders, etc. In the production of the aluminium alloy alone was presented a serious problem. As far back as 1916 Comdr. Hunsaker had called to his assistance the Aluminium Co. of America in this connection, and after considerable experiment the metal was finally produced in quantity and of highly satisfactory quality. The problem of fabric was turned over to the Goodyear Tire and Rubber Co. This firm, it may be of interest to mention, purchased the intestines of 1,400,000 cattle before the 900,000 satisfactory skins necessary for manufacture into gold-beaters' skin were obtained.

The production of the engines was handed over to the Packard Motor Car Co., who were requested to develop a six-cylinder of 300 h.p. Actually they produced an engine developing 357 h.p., which, it is claimed, is superior to the Maybach engine used in the original Zeppelins.

The Z.R.1 has an overall length of 680·15 ft. and a maximum diameter of 78·74 ft. Its height, from the bottom of the engine cars to the topmost observation post amidships is 93·18 ft. The hull framework follows more or less usual Zeppelin practice, and consists of 25 longitudinal girders and 20 main transverse rings—24-sided. The latter are wire braced transversely, and between each main ring is a secondary ring. The rectangles formed by the longitudinal girders and the rings are also wire braced. The twenty-fifth longitudinal girder is located some 10 ft. up from the bottom of the hull and is joined to the two lower girders by a series of inverted V girders, thus forming a triangular passageway along the bottom of the hull from bow to stern. The main rings divide the hull into 20 compartments, each of which contains one of the gas-bags. These are made of light cotton fabric, with gold-beaters' skin rubber-cemented to the inner surface.

Over the framework of the hull is an outer covering of light-weight cotton fabric, laced in sections to the girders, with bands of fabric cemented over the junctions of the sections. The fabric is covered with an aluminium dope on its outer surface and with black dope on its inner surface. This method of doping, which has given satisfactory results in practice, helps to diffuse light and heat rays which would otherwise produce abnormal changes of temperature and pressure of the gas in the inner gas-bags. These latter are filled with the non-inflammable gas Helium to the total capacity of 2,150,000 cubic ft. Incidentally, it may be of interest to note that it cost a quarter of a million dollars to fill the Z.R.1 with this amount of Helium.

Suspended beneath the hull are six streamlined cars, constructed of duralumin. Each of these cars contains an engine. Car No. 1 is farthest aft; next come Nos. 2 and 3, one on each side of the hull; and amidships are Nos. 4 and 5, also at each side, but closer in. Right forward is No. 6, which contains the control and wireless stations as well as the engine section.

The control car is the quarter-deck of the airship. Its power-plant is aft. Next is the radio compartment, and next the control quarters themselves—a space but 18 or 20 ft. long, 10 ft. wide and about 9 ft. high. In this the captain, his executive officer, the officer of the deck, the steering coxwain and the elevator coxwain are stationed. Back of them are the radio operator and the chief engineer. The control cabin is completely enclosed with mica sheets. Right in front is the directional wheel, controlling the rudder; to the left is the elevator wheel. Running backward through the ship for nearly 700 ft. are the control wires, four in number for each control. The factor of safety is further increased by the location, three-quarters of the way aft, of a duplicate set of controls, for use in case of necessity.