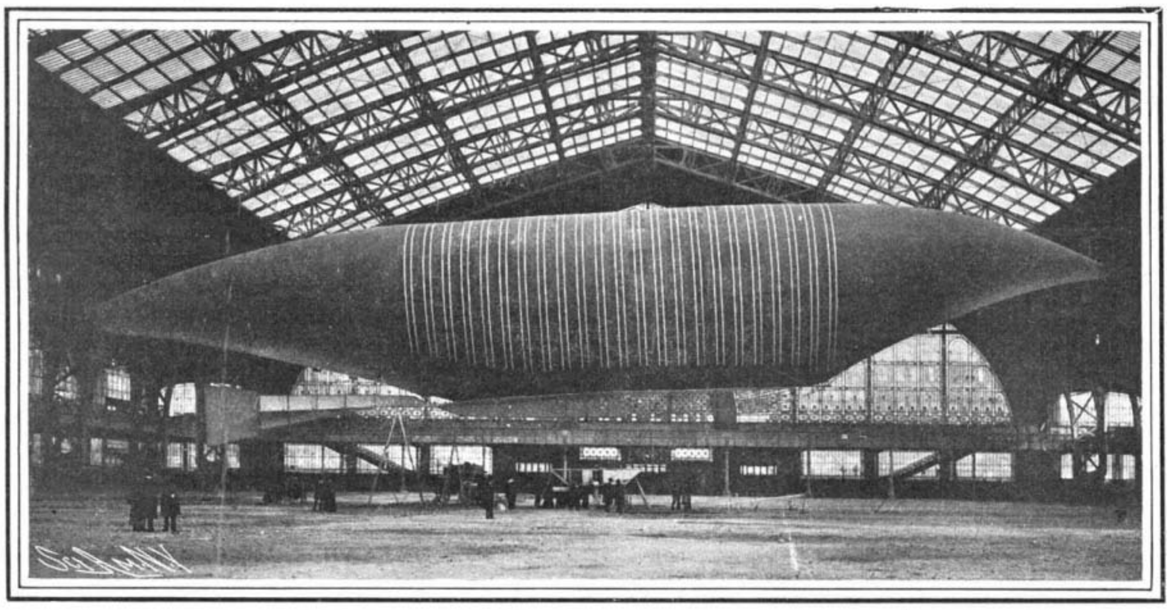
THE LEBAUDY AIRSHIP.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

The remarkable flight which was made by the Lebaudy airship on the 12th of November will no doubt mark a date in the annals of aerial navigation. The most noteworthy performance was the circuit Moisson to Mantes and back, in which the airship covered about 38 miles in 1h. 41m. and came back to the starting point. It had been the intention of the aeronauts to make the trip to Paris as soon as they felt sufficient confidence in the airship's perfection, and they have now carried out their idea with complete success.

M. Juchmes, who piloted the airship, after an enthusiastic reception, stated that he left the balloon shed at 9:20 A. M. accompanied by the machinist, Rey. After passing over the Seine region to the west of Paris it crossed the Forest of St. Germain, then entered the city by way of the Bois de Boulogne. The airship was then headed direct for the Eiffel Tower, which it reached, and landed just behind it, carrying out his original intention. As the wind came somewhat from the side, he was obliged to hold the point of the balloon to the right of the course. At the start he had 640 pounds of ballast, and threw out 286 during the trip. The maximum altitude he reached was 1,000 feet, and the mean 330 feet. The duration of the trip was 1h. 41m. From Moisson to the Champ-de-Mars, the distance in a straight line is about 32 miles. He estimates that the actual distance he made is about 38 miles. As to the speed the airship made on this trip, it can be reckoned in two ways. Taking account of the straight-line distance, it is about 19 miles an hour, or according to the real distance covered by the airship, 22.4 miles an hour. The mean speed of the wind as registered at the top of the Eiffel Tower was 20 feet per second. It blew from the northwest. At the St. Jacques Tower, 200 feet high and therefore in the atmospheric layer in which the airship sailed (it kept generally 350 feet above the ground) the wind showed 10 feet a second, blowing from the west-southwest.



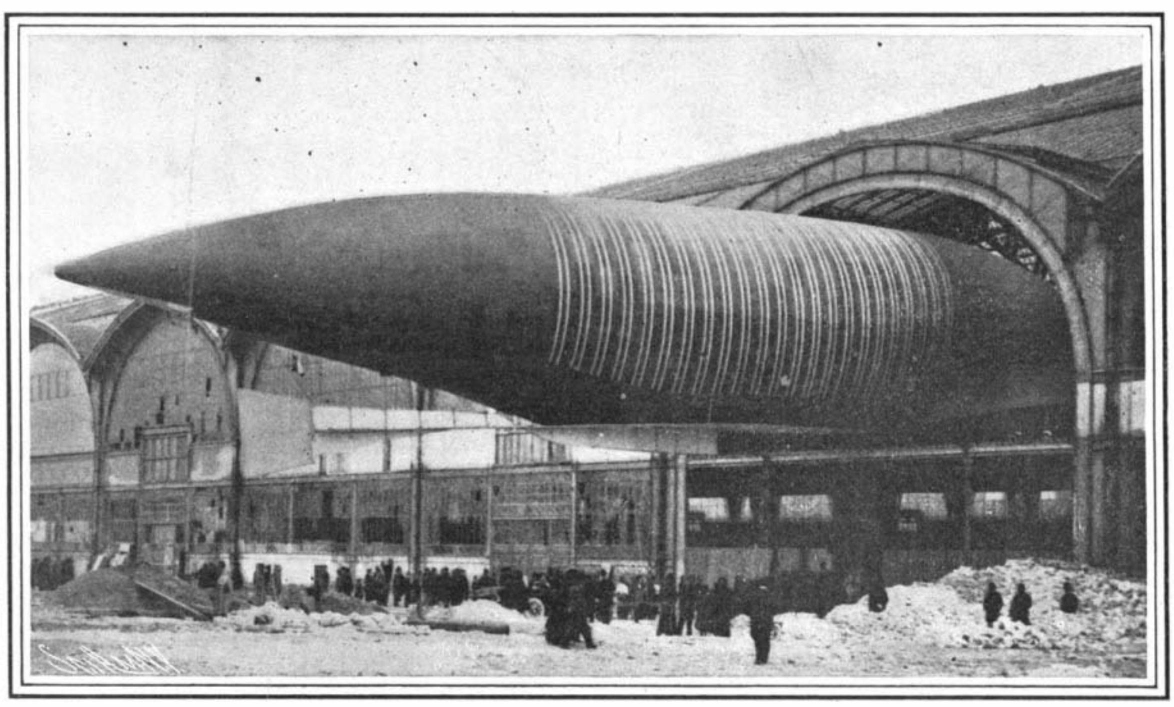
THE LEBAUDY AIRSHIP WITHIN THE MACHINERY HALL OF THE CHAMP-DE-MARS.

The balloon is asymmetrical, its midship frame being situated slightly toward the front. The total length being 190.24 feet. The midship frame is situated at 81.67 feet from the prow and 108.57 from the stern. The extreme diameter of the balloon is 32.14 feet. With respect to the length of 190.24 feet we have thus an elongation of 5.6 diameters. In the entire median part the section of the fusiform bag is not a complete circle, but a segment limited by a chord at its lower part. This means that the balloon presents a flat portion fixed to a linen-covered plane and held by a rigid frame which is attached to the side of the bag and, on another hand, supports the suspension.

The surface of the bag is about 13,000 square feet. Its weight, stitching included, is about 880 pounds. The impermeability is so complete that last fall the balloon remained inflated for more than forty days without the gas having perceptibly lost any of its ascensional force. The floating apparatus is completed by an air ballonet for compensating for the incessant variations in volume that the gas undergoes in consequence of the modifications in temperature and pressure. In the Lebaudy, the ballonet has a capacity of about 11,900 cubic feet, say about a seventh of the total capacity. It is divided into four compartments in order to prevent displacements of the mass of air. A blower of great discharge serving to inflate the ballonet is placed in the car and actuated normally by the gasoline motor that furnishes power to the propellers, but, in case of accident, may be set in operation by means of a small dynamo driven by accumulators.

A characteristic of the Lebaudy balloon is the presence of horizontal and vertical planes, the first of which concur toward limiting the pitching motions and the second assure the stability of the direction.

The car has the form of a flat-bottomed pontoon with pointed extremities. It is 15.75 feet in length, 5.25 in width and 3.28 in depth. It is formed of a metallic frame. In the experiments of 1902 it was entirely covered with aluminium, for which has now been substituted a fireproof fabric that covers only its prow. In order to stiffen all the parts of the car and firmly crossbrace the horizontal shaft of the propellers, there is arranged beneath the car a sort of crutch of pyramidal form composed of tubes and stretchers and the point of which serves for the attachment of the necessary rigging. It is through this pyramidal point that the balloon is placed upon the ground, and there is no need of a more solid base, since the landing of a dirigible does not necessitate an immediate disinflation. The car is suspended at about 10 feet beneath the oval frame by means of 28 small, flexible steel cables about 0.25 of an inch in diameter. We might be tempted to criticise the builders of the Lebaudy for having introduced into their suspension a rigid element called a "thrust frame," and which conflicts with the above principle. This is a piece of trapezoidal form, of well braced tubes, which starts obliquely from the car and ends in front of the oval frame and thus transmits to it directly, through compression, the thrust of the propeller . M. Julliot thinks that this frame, by rendering the car and balloon more completely interdependent, opposes itself to the effects of torsion that necessarily occur in turning about. At all events, the thrust frame is a new element that it was of interest to experiment with, and that seems to have given good results.



THE LEBAUDY AIRSHIP GLIDING OUT OF THE MACHINERY HALL OF THE CHAMP-DE-MARS

The motive power is furnished by a 40-horsepower Daimler motor cooled by a circulation of water and a radiator. The carbureting is of a system analogous to that of the Krebs apparatus. The gasoline tank is placed beneath the car and the motor as a measure of precaution against fire. A little compressed air is sent to it by means of a bicycle pump for feeding during the setting in operation. The exhaust pressure afterward suffices. The motor uses 30.8 pounds of gasoline per hour, say about 6 fluid ounces per horse hour.

The exhaust chamber likewise is placed under the car, between the forks of the pyramidal crutch. The mouth of the chimney is protected by a ball of wire gauze, which suffices to extinguish the projections of ignited gas. In order to prevent any ignition that might occur should drops of gasoline falling from the motor come into contact with the hot walls of the exhaust, the latter is protected by a sort of semi-cylindrical tunnel. It will be seen, then, that minutest precautions have been taken against the chances of fire.

The motor actuates two double-bladed propellers arranged on each side of the car at the extremities of a hollow horizontal journal in the interior of which revolves the driving shaft. The transmission to the propellers is effected through the intermedium of bevel wheels protected by casings. In consequence of their position it would be difficult to give the propellers a great sweep. Those now used are but 8 feet in diameter, but make up for so small dimensions by a high rotary velocity, say of from 800 to 1,000 revolutions a minute. The blades of the propellers are of steel plate, of from 0.04 to 0.06 of an inch in thickness. The arm to which each blade is riveted and welded is formed of a hollow nickel-steel tube which becomes more and more oval and flattened in measure as it recedes from the center of rotation. Each blade occupies 1-16 of the circumference.

When the balloon is freshly inflated with hydrogen possessing about one ounce of ascensional force to the cubic foot, the carrying power is 5,848 pounds. The principal elements of the dead weight are as follows:

	Pounds.
Aerostatic part	1,056
Oval platform	660
Car, motor, propellers and mechanism..	1,760
Total	3,476

There remain, then, 2,200 pounds disposable for carrying four aeronauts (660 pounds), 462 pounds of gasoline, representing a supply sufficient for a trip of 15 hours, 44 pounds of cooling water, 440 pounds of ballast, and a certain number of accessories, such as extinguishers, a statoscope indicating the ascending and descending motions, manometers indicating the pressure of the gas in the balloon, various cordage and two guide ropes in the front and rear.

In order to regulate the equilibrium and the distribution of the loads, so that the axis shall be perfectly horizontal, the builders have provided two small reservoirs of water at the two extremities of the oval platform. These communicate with each other through a flexible tube passing through the car and upon which is arranged a small pump by means of which water may be sent from one to the other.

An oil-propelled motor railroad coach is in course of construction for the Great Northern Railroad of Great Britain. The car is to be of the standard gage, with a capacity for 30 passengers. The motor will be of the Roots oil type, developing 40 horse power. Four speeds will be provided forward and reverse. There will be a cab fitted at either end of the vehicle for the accommodation of the engineer, so that the coach may be propelled either forward or backward and the engineer will always be at the front of the vehicle. The engines and propelling mechanism are being constructed by Sir W. G. Armstrong, Whitworth & Co., of Newcastle-on-Tyne, and the engine is to be available for various kinds of liquid fuel, such as ordinary petroleum oil, gasoline, paraffin or kerosene. In the first car, attention will not be devoted so much to speed as to reliability and efficiency in the motor. The top speed will not be greater than 35 miles per hour.