A Seven-Day Journal.

Director of the National Physical Laboratory.

ON Thursday, May 6th, it was officially announced that the Lord President of the Council had appointed Professor William Lawrence Bragg, F.R.S., at present the Langworthy Professor of Physics in the University of Manchester, to be Director of the National Physical Laboratory. Professor Bragg, who will assume his duties during the autumn, succeeds Sir Joseph Petavel, who died on March 31st, 1936. Professor Bragg is the son of Sir William Henry Bragg, and was born in Adelaide, South Australia, in 1890. He received his education at St. Peter's College, Adelaide, and Adelaide University, and came to England in 1908 when his father was appointed Professor of Physics at Leeds University. He entered Trinity College, Cambridge, where he was Allen Scholar and eventually Fellow and Lecturer in Natural Science. On leaving Cambridge he joined his father in his researches on X-rays. At this time von Laue and his colleagues had demonstrated the diffraction of X-rays by crystal structure, and Professor Bragg deduced from his results an effective method of determining the arrangement of the atoms in a crystal. A number of further investigations were carried out by him and his father, which gained for them the Barnard Medal of Columbia University in 1914 and the Nobel Prize of 1915. Early in the war he was sent to France in charge of a small company of scientists to study the problems of sound ranging, and his work led to the formation of sound-ranging contingents, and the training for this special service, of which he had charge. In 1919 he was called upon to succeed Sir Ernest (now Lord) Rutherford in the Langworthy Chair of Physics at the University of Manchester. In Manchester he has built up a large and important school of research, dealing mainly with the problems of crystal structure. In recent years he has kept in close touch with the metal industries, and has given his special attention to metal alloys. He and his associates have also solved the general problem of silicates, thus introducing order into a very complicated problem of mineral chemistry.

An Aeronautical Garden Party.

THE garden party of the Royal Aeronautical Society was held on Sunday last, May 9th, at the Fairey Aviation Company's aerodrome near Hayes. Some 4000 guests, including Ambassadors, Ministers, air attachés, and representatives of the Dominions, Colonies, and foreign countries who have come to England for the Coronation, attended despite the rain and mist, and were received by the President, Mr. H. E. Wimperis, Mrs. Wimperis, and Members of Council. Many types of civil and military aircraft were on view and demonstrated in flight, and a comprehensive exhibition of aircraft components was arranged in one of the company's hangars. Several new and interesting aircraft were shown, among which were the Fairey "P.4" bomber and the Hafner gyroplane, of which we give a description in the following note. The Fairey bomber was painted in the new camouflage colours and demonstrated in flight by Mr. C. S. Staniland most impressively, although not flown at its maximum speed. The machine showed excellent characteristics of control in executing slow rolls and banked turns. Among other interesting exhibitions of flying should be mentioned the flight of a replica of the original Blériot monoplane which flew the Channel in 1909. Several types of light aircraft were flown, some showing very good flying characteristics and performance for low engine powers and representing a great advance on the designs of only a few years ago. Many of the planes which were to be shown were unable to reach the aerodrome on account of bad weather and other reasons, and among these was the Burnelli "lifting-fuselage" air liner, which was to have been flown from New York to take part in the display.

The Hafner Gyroplane.

A NEW type of gyroplane capable of direct take-off and vertical descent, like a helicopter, was shown for the first time to the guests of the Royal Aeronautical Society's garden party. This machine is known as the Hafner gyroplane and is fitted with an 85 H.P. air-cooled radial engine. The aircraft has no wings, but has three rotor blades suspended above the pilot on a pylon. The blades, unlike those fitted to the autogiro, which are wind driven, are driven directly by the engine, which also drives a propeller at the front of the machine in the usual manner. The blades are fitted with a variable-incidence mechanism by which the machine is controlled about all axes without necessitating the use of any method of tilting the rotor head. The mechanism controls the individual blade angles, the blades being free to move up and down, as in the autogiro, and may be made to fly "down" on one side and "up" on the other side of the machine, providing banking for turns. An ordinary rudder is used for sharp turns, but all other flying movements are effected by two simple controls. A forward speed range of from 12 to 120 m.p.h. is obtainable in level flight, and the cruising speed is about 110 m.p.h., which is about 20 m.p.h. faster than the same engine provides in a conventionally designed aeroplane. It is claimed that the Hafner gyroplane ascends with a 2-yards take-off, by means of utilising the energy stored in the revolving blades, and that it clears the standard 66ft. screen in less than 60 yards and can be landed within 15 yards of a 66ft. obstacle. The flying qualities of the machine were fully demonstrated by Flying Officer Clouston, who showed that rapid changes of direction, steep climbing, and an almost perpendicular descent were possible.

Mellon Scientific Institute.

THE new building of the Mellon Institute at Pittsburgh, the world's largest institute for scientific research, was dedicated on Thursday, May 6th, which was the first of two days' celebrations to mark the event. The Institute was founded in 1911 by Mr. Andrew Mellon and Mr. Richard Mellon as an "independent non-profit scientific institution, whose sole aim would be the search for truth," and its founders have so far given to the Institute about £3,400,000. The new building, which has cost £1,200,000, is nine storeys in height and the exterior is designed after a Greek temple, with sixty-two Ionic columns of Indiana limestone. The interior is provided with passages of a total length of 3½ miles and 322 laboratories, where 185 research workers are at present employed. The laboratories are fully equipped with modern facilities and apparatus for a wide variety of research work. Among many novel features is one which, by the turn of a switch in the laboratory, enables any desired temperature to be obtained, from Arctic cold to tropical heat, while, by using another switch, a vacuum can be obtained which imitates conditions similar to those existing on the surface of the moon. It is announced that in the new building work will not be confined, as it has largely been hitherto, to research of more immediate interest to industry.

The Home Fleet in the Thames.

THE Home Fleet, under the command of Admiral Sir Roger Backhouse, arrived in the Thames on Friday last, May 7th, for a period of one week before proceeding to Portsmouth on May 13th for the Coronation Review. Included in the Fleet were the flagship H.M.S. "Nelson" and her sister ship, the "Rodney," of 33,600 tons and 33,900 tons respectively, five battleships of the "Royal Sovereign" class of 29,150 tons, the aircraft carrier "Furious" of 22,450 tons, and the cruisers "Southampton," "Newcastle," and "Cairo." The "Southampton" and "Newcastle" are of 9000 tons each. There were also twelve destroyers, five submarines, a patrol vessel, a net layer, and a depot ship. The vessels were moored up the Thames between Southend and Tower Bridge. On Saturday, May 8th, the Lord Mayor of London, Sir George Broadbridge, paid an official visit to the flagship to welcome the fleet to the Thames in his capacity as Admiral of the Port of London. He went on board the destroyer "Crusader" at Tilbury, accompanied by Alderman and Sheriff Pollizer and Mr. Sheriff McRea, and by the Sword-bearer and Sergeant-at-Arms and the City Marshal. The "Crusader" then conveyed the party to Southend. The Admiral's flag was flown during the journey and naval honours were paid. The Lord Mayor was entertained to luncheon on board the flagship.

The "Hindenburg" Disaster.

THE Zeppelin airship "Hindenburg" burst into flames as she was about to moor at Lakehurst Airport, New Jersey, on Thursday evening, May 6th. The "Hindenburg" was making her first round voyage of 1937 across the North Atlantic and had left Frankfort-on-Main on Monday evening at about 8.15 p.m. She was due to land about six o'clock on Thursday morning, but had been delayed about twelve hours by heavy head winds over Newfoundland. On her arrival at Lakehurst a thunderstorm was in progress and the ship cruised around the airport for over an hour before attempting to land. She had just tossed her nose lines to the ground when there appeared to be a sudden burst of flame from the stern of the ship. Within a few seconds the whole of the ship took fire and in a few minutes there was little left except a twisted mass of metal. The ship's complement was about 100 persons, and the death roll is now reported as thirty-five. It includes Captain Lehmann, who was acting in an advisory capacity to Captain Preuss, the commander of the ship. On Tuesday, May 11th, the Naval Board of Inquiry met to make a formal report to the United States Government, and at the same time the Board which has been appointed by the Department of Commerce began its public inquiry. The official German Commission of Enquiry is travelling on the "Europa" to New York. It includes Dr. Eckener and Director Dürr, of the Zeppelin Company, Professor Bock and Chief Engineer Hofmann, of the German Institute for Aeronautical Research; Professor Deickman, of Munich University; and Lt.-Col. Breithaupt, of the German Air Ministry.

Training Maritime Apprentices.

ON Wednesday, May 5th, a meeting took place of the Central Board for the Training of Officers for the Merchant Service. It was then announced that the educational and training scheme under elaboration since 1935 was now in full operation. It was also announced that the Board of Education had approved a grant which, with the existing income, should place the standardised training system for apprentices and cadets of the merchant service on a sound financial basis. A secretary, Captain F. A. Richardson, has been appointed, and offices have been opened at 65A, Fenchurch-street, London, E.C.3. The object of the Board is to provide educational facilities for navigational officer apprentices at sea equivalent to those available for apprentices ashore, such as technical schools, evening classes, &c. A standard syllabus of instruction with an introduction and notes has been prepared for the use of officers having apprentices under their instruction covering the whole apprenticeship period. Periodical reports on conduct and progress are to be sent to owners. Finally, an annual examination on board is to be held to test progress and to accustom apprentices to the technique of answering examination papers. Papers are set on mathematics, navigation, seamanship, miscellaneous knowledge, ship construction, and engineering. Correspondence courses at approved navigational schools are also to be recommended by the Board.

University Entry for Engineer Officers.

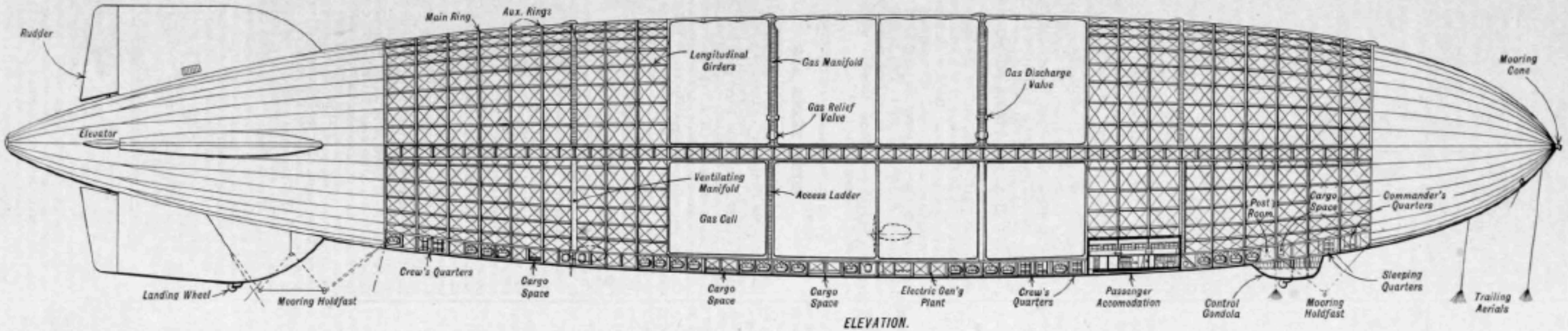
SPEAKING in the House of Commons on Wednesday, May 5th, Sir Samuel Hoare announced that a new scheme for the direct entry of engineer officers into the Navy had been adopted by the Admiralty. Under this scheme applicants, who must be not less than twenty-one and more than twenty-five years of age, must, in addition to the normal requirements for entrance into the Navy, have undergone a course of three academic years as students, and must produce satisfactory evidence that they have been regularly trained in mechanical engineering and possess sufficient practical experience. Further, the candidate must hold a degree in mechanical or electrical engineering which is accepted by the Institution of Mechanical Engineers as exempting him from parts A and B of the Institution's examination for Associate Membership. Detailed regulations and entry forms for the scheme can be obtained from the Secretary of the Admiralty or from the authorities of the Universities of Birmingham, Bristol, Cambridge, Durham, Leeds, Liverpool, London, Manchester, Oxford, Sheffield, Aberdeen, Edinburgh, Glasgow, St. Andrews, Wales, and Belfast. University entrants will undergo a two months' course in naval discipline and routine in R.N. barracks, and will then be available for appointments to ships. They will be on the same footing and have the same prospects as engineer officers who enter through the ordinary channels. Twenty commissions in the Royal Navy will be available to university graduates next September, and others will follow each half-year.

Coronation Honours.

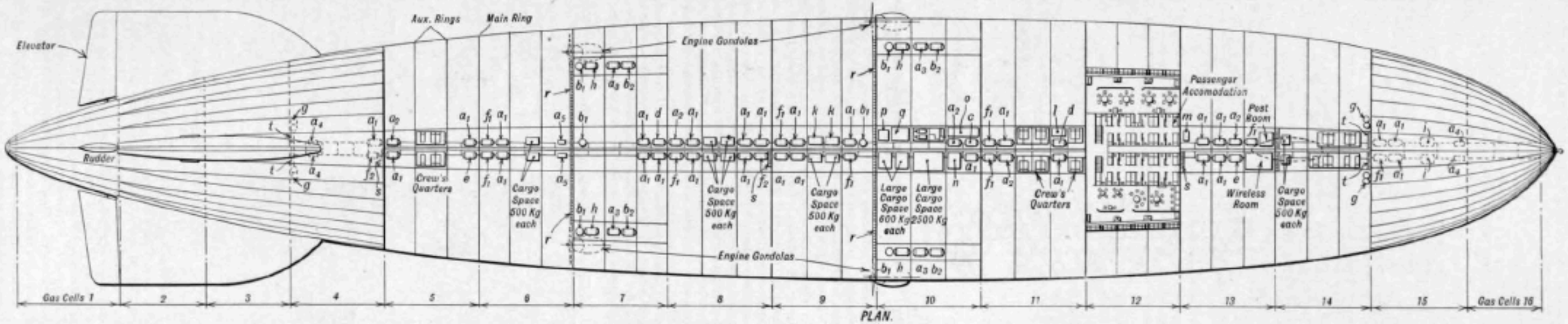
IN the official list of Coronation Honours, bestowed by the King, which was published on Tuesday, May 11th, the following names appear:—Sir Robert Horne, the chairman of the Great Western Railway Company, becomes a Viscount in recognition of his public services; Sir John Cadman, the chairman of the Anglo-Iranian Oil Company and the Iraq Petroleum Company; Admiral of the Fleet Sir Ernle Chatfield, and Sir John Siddeley, managing director of Armstrong-Siddeley Motors, become Barons. Sir David Milne-Watson, the governor of the Gas Light and Coke Company, is made a Baronet. Knighthoods are conferred upon Mr. W. V. Woods, senior vice-president of the executive of the London, Midland and Scottish Railway Company; Engineer Rear-Admiral A. G. Crousaz becomes a C.B., as also do Major-General F. S. G. Piggott, D.S.O., R.E., Major-General E. K. Squires, D.S.O., M.C., R.E., Major-General M. S. Brander, M.I. Mech. E., R.A.S.C., and Dr. D. R. Pye, M.I. Mech. E., Director of Scientific Research, Air Ministry. The G.C.B. is conferred upon Sir H. J. Wilson, Chief Industrial Advisor to H.M. Government. Dr. C. T. R. Wilson is made a Companion of Honour in recognition of his services to experimental physics.

THE ZEPPELIN AIRSHIP "HINDENBURG"

DR. H. ECKENER, DESIGNER: LUFTSCHIFF ZEPPELIN G.M.B.H. FRIEDRICHSHAFEN, CONSTRUCTORS

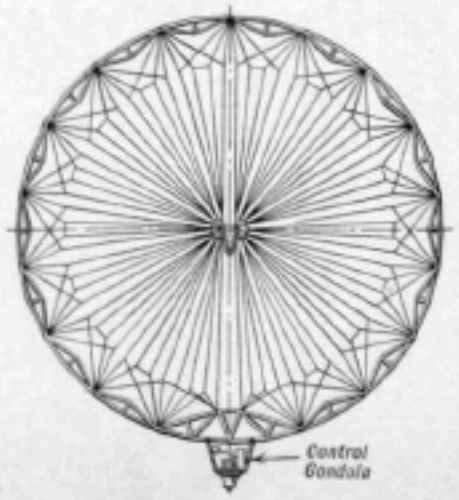


ELEVATION.

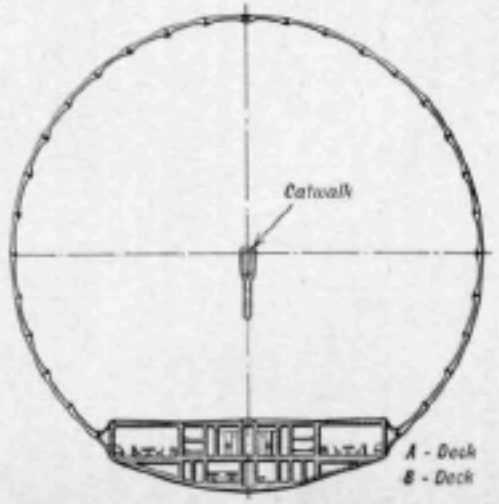


PLAN.

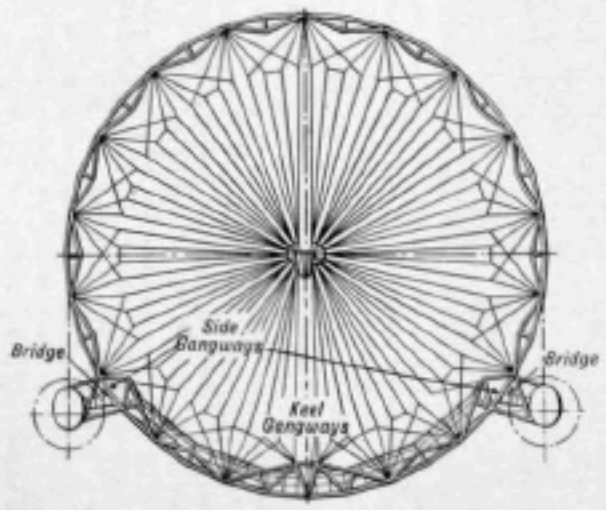
a_1-28 Fuel Oil Tanks, Each 2,500 L
a_2-4 Fuel Oil Valve Chests, Each 2,500 L
a_3-4 Fuel Oil Service Tanks, Each 800 L
a_4-4 Fuel Oil Tanks, Each 1,250 L
a_5-2 Fuel Oil Tanks, Each 850 L
b_1-6 Lub. Oil Tanks, Each 500 L
b_2-4 Lub. Oil Tanks, Each 380 L
c - 1 Drinking Water Tank, 2500 L
d - 2 Fresh Water Tanks, Each 2,500 L
e - 2 Dirty Water Tanks, Each 2,500 L
f_1-9 Tanks for Recovered Ballast Water, Each 2,500 L
f_2-2 Tanks for Recovered Ballast Water, Each 2,000 L
g - 4 Double Ballast Bags, 2 x 500 L
h - 4 Cooling Water Tanks, Each 400 L
i - 2 Luggage Comp't, Each 500 Kg
k - 2 Spare Part Rooms, Each 500 Kg
l - 1 Provision Store, 500 Kg
m - 1 Provision Store, 250 Kg
n Engineer's Rm
p - Lavatories.
q - Workshop.
o - Ventilating Fan.
r - Gangways to Engines.
s - 3 Gangways to Access Ladders.
t - 4 Gangways to Ballast Bags.



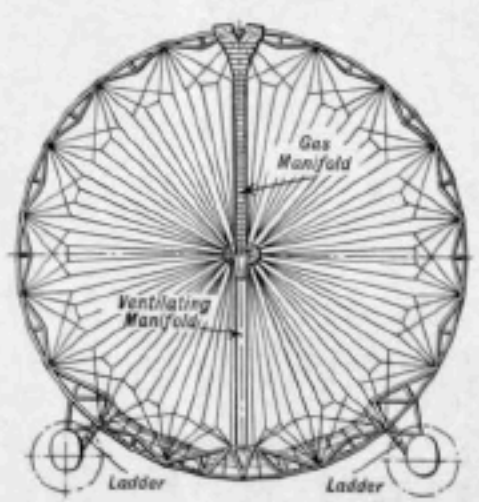
SECTION AT CONTROL GONDOLA.



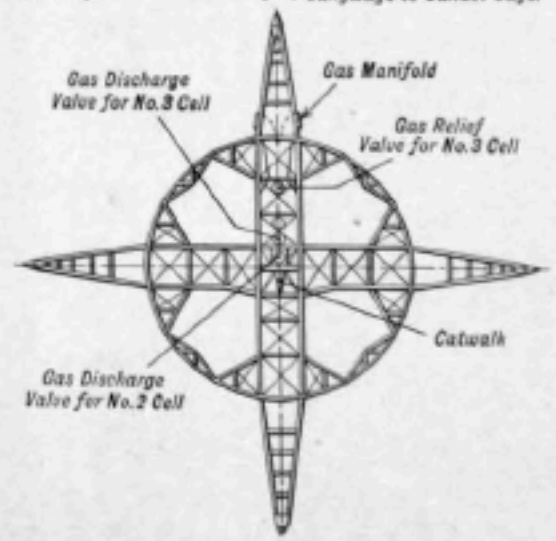
SECTION AT PASSENGER ACCOMMODATION.



SECTION AT THE FORWARD ENGINE GONDOLAS.



SECTION AT THE REAR ENGINE GONDOLAS.



SECTION AT RUDDER FINS.

"THE ENGINEER"

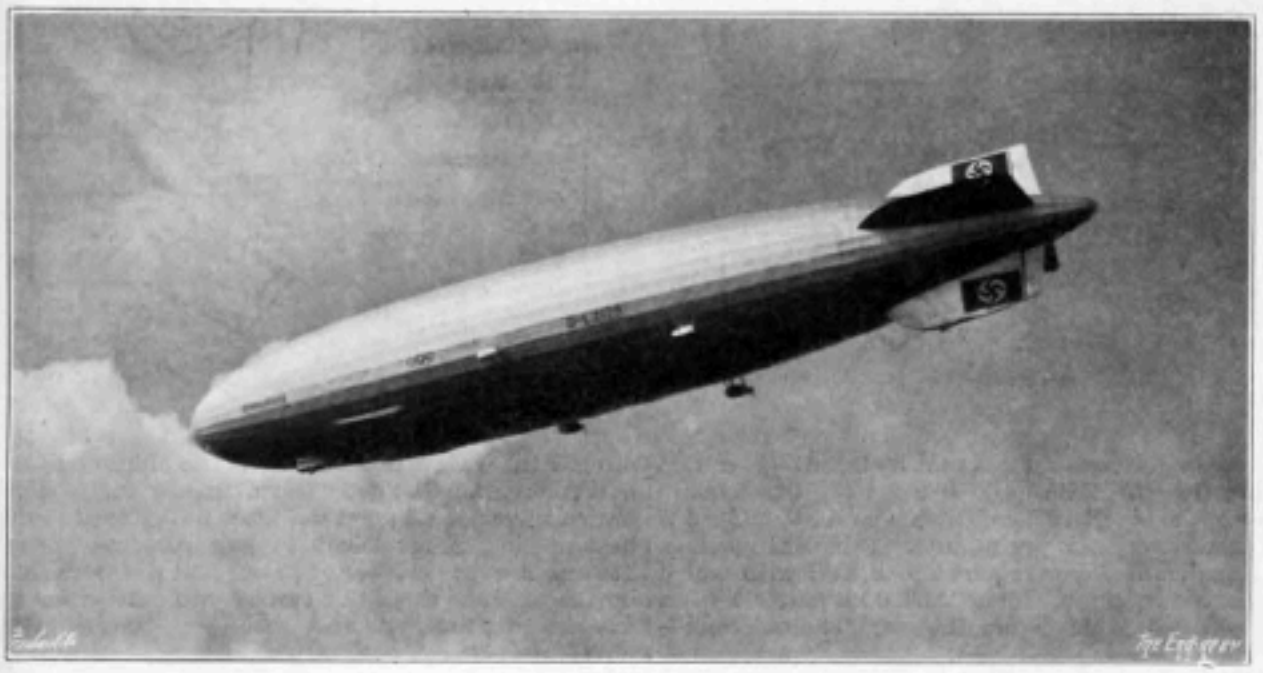
The Zeppelin Airship "Hindenburg."

No. I.

IN our Seven-Day Journal we record with deep regret the loss by fire at Lakehurst, New Jersey, of the Zeppelin airship "Hindenburg," which occurred as the ship was about to moor on her arrival on Thursday evening, May 6th, after her first North Atlantic crossing of 1937. For the first time use was being made of her new cabins, which increased the number of passengers from about fifty to seventy persons. The loss of this fine example of lighter-than-air construction, at a time when British and American interest was again being aroused in the possibilities of a commercial North Atlantic airship service, and when the postal advantages of a two-day voyage between Frankfort and New York were being recognised by all, will retard progress, but it will not stop the further perfecting of the design by Dr. Eckener and his trained staff of workers on the building and operation of airships. While the services of the sister ship the "Graf Zeppelin" have been temporarily cancelled, pending the German inquiry into the cause of the accident, it is officially announced that work is to be accelerated on the construction of the new ship, "L 130," similar in design to the "Hindenburg," which is now approaching completion at Friedrichshafen, and will, it is hoped, be ready for service in the early autumn of the present year.

The Zeppelin Company has suffered a particularly severe loss in the death of Captain Ernst August Lehmann, who, next to Dr. Eckener, did so much to bring about the very successful North and South American services of last year, an analysis of which accompanies this article.

More than usual technical interest will attach to the forthcoming American and German inquiries into the cause of the disaster, and the means which may ultimately be adopted to remove the remaining fire risks in airships, and we publish this article giving detailed particulars of the design the ship and of her machinery, so that the findings of the inquiry may be more clearly followed by our readers. We would express our indebtedness to the special *V.D.I.* "Zeppelin" issue of March 28th, 1936, in which Dipl.-Ing. W. E. Dörr gave details of the hull design and the passenger accommodation, while Dipl.-Ing. Fritz Sturm dealt with the engines. The particulars of the Atlantic services were prepared by the Zeppelin Reederei G.m.b.H.



THE "HINDENBURG" IN FLIGHT

Design of the "Hindenburg."

A few weeks ago, by permission of the German Air Ministry, we were afforded an opportunity of inspecting the "L 130" in her shed at Friedrichshafen, and also paid a visit to the "Hindenburg" at the Frankfort-on-Main airport, just before she made her first trip this year to South America. We were greatly impressed by the thorough way in which the problems of design have been worked out and embodied in the construction of the new ships, and the way in which the arrangements for the operation and navigation of the ships have been perfected.

The "Hindenburg" was designed by Dr. H. Eckener, who decided on her requirements as regards passenger and cargo-carrying, and settled the question of her propelling machinery, for which for the first time in a Zeppelin Daimler-Benz heavy oil engines were adopted. The building and construction was carried out at the works of the Luftschiff Zeppelin G.m.b.H., at Friedrichshafen, on Lake Constance, under the supervision of Director Dr. L. Dürr and the late Captain E. A. Lehmann, who was her first commander when in the early part of 1936 she entered the service of the Zeppelin Reederei G.m.b.H.

The general particulars of the hull and propelling machinery are given in the accompanying table. The gas capacity of the ship, 200,000 cubic metres, is about double that of the earlier "Graf Zeppelin," and the diameter is 10 m. greater, with an increase in overall length of about the same amount. As our drawings on the opposite page clearly show, an outstanding feature of the new design was the separation of the control gondola, which was placed below in the front of the ship, from the passenger quarters, which were arranged on two decks inside the hull of the ship. By this means more space was made available for the use of the passengers, while a better view backwards under the ship was obtained.

As regards the general construction, there was no essential difference made from the basic designs of Zeppelin construction which have been followed during the last thirty-five years of airship construction by the Zeppelin Company.

In an accompanying engraving we show a typical view of the "Hindenburg" as she appeared when in flight. The longitudinal plan and elevation on the opposite page, together with the accompanying cross sections, illustrate clearly the general design of the ship and the method of construction adopted. The arrangement of the passengers' quarters is shown, along with the parts of the ship used by the officers and the crew and the lay-out of the various tanks for fuel and lubricating oil is also marked on the drawings. A view taken at the rear of the ship shows the position of the rear engine gondolas in relation to the skin of the ship, and another view within the navigating or control cabin is also reproduced.

Hull and Machinery Particulars.

Length overall	245 m., or 804ft.
Largest diameter	41·2 m., or 135ft.
Length to breadth ratio	Approx. 6 to 1
Maximum height over landing wheels	44·7 m., or 146ft.
Maximum width over air screws	46·8 m., or 153ft.
Full gas capacity	200,000 cubic metres, or about 7,060,000 cubic feet
Propelling machinery	Four Daimler-Benz L.O.F.6 type oil engines
Maximum power each engine	1100 to 1200 B.H.P.
Cruising power each engine	800 to 900 B.H.P.
Fuel consumption normal service	0·167 gm., or about 0·373 lb. per B.H.P. hour of gas oil
Speed of engines, maximum	1500 r.p.m.
Speed of engines, service	1350 r.p.m.
Speed reduction to air screws	2 to 1
Diameter of air screws	6 m., or 19ft. 8½in.
Radius of action at 500 m., with fifty passengers at 110 kilom. per hour	20,000 kilom., or 12,000 miles
Normal service speed	121 kilom., or 75 m.p.h.
Maximum speed	139 kilom., or 86 m.p.h.
Total load carried at normal temperature and pressure	114·6 tons
Number of passengers for long voyages	50 to 70
Number of passengers for short cruises	60 to 70
Places for crew and training staff	56

Analysis of 1936 Services.

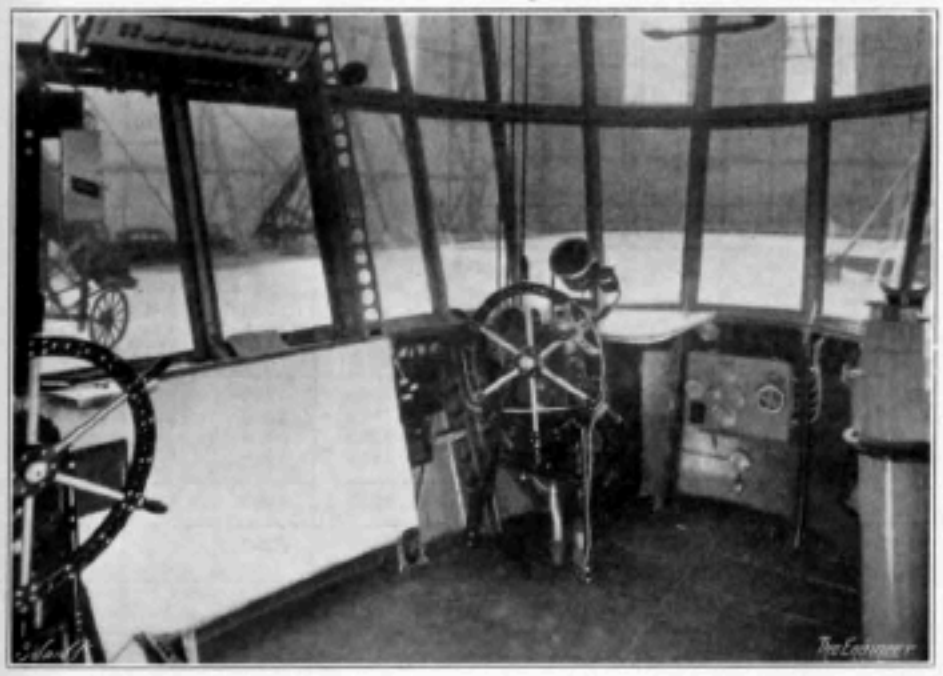
Total voyaging time	2816 h. 26 min.
Total length of voyages	308,323 kilom.
Number of passengers carried	2656
Weight of mail carried in kilos.	8294 kilos.
Weight of cargo carried in kilos.	9047 kilos.
Number of flights to December 7th	56

1936 *North Atlantic Flights.*

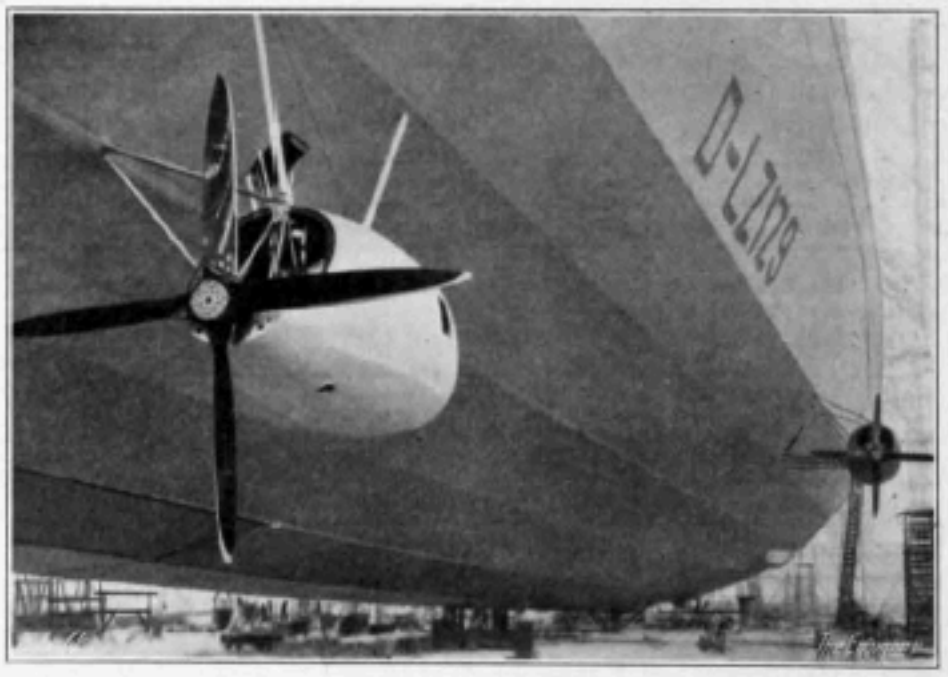
Number of round trips	10
Number of single trips	20
Number of passengers carried	1002
Weight of mails carried in kilos.	4458 kilos.
Weight of cargo carried in kilos.	4196 kilos.
Total distance travelled	136,949 kilom.
Time taken on voyages	1163 h. 42 min.
Number of Atlantic crossings, 1936	20

1936 *South Atlantic Flights.*

Number of round trips	7
Number of single trips	14
Number of passengers carried	559
Weight of mails carried	2906 kilos.
Weight of cargo carried	4851 kilos.
Total distance travelled	148,352 kilom.
Time taken on voyages	1369 h. 53 min.
Number of Atlantic crossings, 1936	14



INTERIOR OF CONTROL GONDOLA



ARRANGEMENT OF ENGINE AND GONDOLAS

From the drawings it will be seen that there are fifteen main rings dividing the hull of the ship into sixteen parts, and between each main ring there are two secondary rings. The main rings are spaced at about 15 m. apart and they are made in the form of a thirty-six-sided figure, with the longitudinal members arranged at each of the corners. As the cross sections show, the main rings carry bracing wires, which are attached to the ring members and a centrally arranged girder member in such a way that only the corners of each two sides are braced. In our next article we propose to deal further with the constructional details of the ship and the arrangement of the gas bags and the valves for filling and discharging the gas.

(*To be continued.*)