The Development and Future of the Airship.

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In view of the growing interest in the development of Airships as a step towards the improvement of commercial relationship between the Mother country and the various parts of her far flung Empire, there must be some to whom this subject is of interest, and therefore, as one who has had experience, both in the construction and in the actual flying of several types of Airships, I submit the following brief account of the development of the Airship of to-day and also the possibilities that lie before this type of aircraft

The earliest experiments of a serious character in " Lighter than Air " type of aircraft took place about the year 1776, immediately following the discovery of Hydrogen gas by Cavendish, but it was not until 1783 that the first really successful flight was made by a Frenchman, Professor Charles, who remained in the air for three and three-quarter hours and covered a distance of forty miles in a balloon of his own design, the lifting medium of which was Hydrogen

Once the practicability of this type of aircraft was established, the flight across the English Channel was talked of Many of my readers will recall the epoch-making flight of M Bleriot across the Channel on his " heavier than air " machine on June the 25th, 1909, but one must go back another one hundred and twenty-four years before this to the first crossing, when in January, 1795, Blanchard crossed from Dover to Calais in a free balloon Several other experimenters having met with a fair degree of success and having proved to their own satisfaction the possibility of getting off, and staying off, the earth for a reasonable time, they set about discovering the manner by which these balloons might be navigated, that is to say, how they might become independent of the wind or air currents, and on the contrary drive their craft if needs be in opposition to these

Space will not permit more than a brief reference to the years of patient experimenting and dogged perseverance of these early aeronauts, to whom we owe much of our present knowledge, and who suffered disappointment and often disaster rather than confess themselves beaten The science of aeronautics owes much to such men as Montgolfier, Meusnier, Giffard, Tissandier, Krebs, Schwartz

and many others whose ideas, if not actual designs, were of great assistance in later experiments

The year 1898 brought the age of tentative experiment to a close, and in this year the problem of " lighter than air " flight was seriously attacked by two men whose names have since become familiar to all my readers who have followed the development of aerial navigation, however slightly These were Santos Dumont, a Brazilian, resident in France, and Ferdinand von Zeppelin, a German

Both of these designers worked along vastly different ideas as to design and methods of construction, for Santos Dumont adhered throughout to the non-rigid type, whilst von Zeppelin struck out on a new sytem entirely, that of constructing an airship having a structural rigidity of its own by which its form was to be maintained independent of the pressure of the gas inside, thus differing from the non-rigid, which relies solely on its gas pressure inside the envelope to maintain its correct shape

It may be here noted that it is along the developed lines of von Zeppelin's rigid type of construction that modern Airship design and construction is being carried out, as it is considered in the present stage of development the non-rigid type has limitations from a commercial point of view, a large gas capacity being requisite to ensure a high useful load for long range operations

Space again will not permit more than to remark upon the success that attended von Zeppelin's efforts In June 1909, his fifth ship, Zeppelin V, made a successful flight of 38 hours' duration, and by the outbreak of war in 1914, nearly thirty Zeppelins had been constructed

Santos Dumont's activities in France did not, however, lead to the same degree of success as his German rival, but this was probably due to the handicap he experienced with insufficiently powered engines and also latterly to the fact that has attention was drawn away to the possibilities of the " heavier than air " type of machine, or aeroplane, with which the Wright brothers were then successfully experimenting in America

To such men, however, as the Lebauy brothers, two Frenchmen, Major Parseval, a German, and Senor Torres, a Spaniard, and one or two others, belongs the credit for the furtherance of the construction and design of non-rigid airships, the types of ship evolved bearing their respective designer's name, such as the Lebaudy, the Parseval, and the Astra Torres

We must now retrace out steps a little and review the progress of Airship design and construction in England As was the case with the Aeroplane, Great Britain left France and Germany to do all the early experimental work in Airship Construction The Royal Engineers were confined to balloon work pure and simple, and such experiments as were being made with Airships were by private enterprise

In 1900, a Dr Barton built an airship at the Alexandra Palace, and made a successful flight across London in it, but it was not until 1904 that the first really successful British Dirigible was produced, its designer being Mr E T Willows, of Cardiff His continued efforts resulted in 1908 in a device of his being patented and taken over by the Government In 1909 Mr Willows made a flight in one of his dirigibles from Cardiff to London, and the writer clearly recollects the excitement and enthusiasm of the spectators as the little ship crossed the Somerset

coast at a comparatively low altitude, on its way to London This flight took ten hours, at an average speed of fourteen miles per hour

Meanwhile airship construction had been proceeding since 1907 at the Government establishment at Farnborough, which resulted in several small airships of the non-rigid type being built for the Army By 1912 the most successful of the British airships up to that time was the " Beta," but she was a comparatively small ship to the types then being successfully flown on the Continent The war period was responsible for much development of the Airship, and by the last year of the war Great Britain led the world in the design and number of non-rigid airships, of which there were types known as the " S S " or " Blimp," the " C " or " Coastal" and the " N S " or " North Sea " These ships were employed on useful and fruitful patrol and escort work, working far out to sea, and in all weathers, proving beyond doubt the value of the airship for flights of long duration, where varying speeds are necessary

Rigid construction proceeded from 1914, and several types of rigids were successfully operated during the war, and these designs led later to the building of R 33 and R 34, the two ships that are so familiar on account of their records of performance In 1919 the R 34 under the command of Major Scott, made its historic flight from Scotland to U S A and back to Pulham, Norfolk, carrying thirty persons in addition to about eight tons of petrol as well as ballast, stores, etc , the return journey being accomplished in 75 hours 3 mins from time of leaving America to landing at Pulham This splendid flight established beyond doubt the future value of the airship for long distance commercial purposes, if developed along the correct lines, whilst the more recent involuntary exploit of R 33 did much to prove that a ship of sound construction, sufficiently engined, and in capable hands, would be navigable even in high winds, which was a point that had often been held up against large airships as doubtful

And now, having given the foregoing very condensed resume of the years of experiment and slow but sure development that have brought up to our present stage of knowledge of the necessary requirements in design, I intend to put forward briefly the great possibilities of the airship for commercial purposes, but would emphasise the fact that the ultimate success of such an undertaking can only be attained by a further great amount of experiment and research It must be remembered that the two 5,000,000 cub ft airships, the R 100 and R 101, are over twice the capacity of any previous airship, and this big increase in size has only been made possible by the careful investigation of airship design which has been systematically carried out The construction of the mooring mast has done away to a great extent with the difficulty of handling these large ships on the ground The data regarding the Aerodynamic forces which act over the hull of a ship in flight, obtained by the recent experimental flights of R 33, the exhaustive full-scale experiments on structure under extreme load conditions, together with the careful study and recording of the Meteorological conditions to be encountered on long flights to Egypt and the East, are all indispensable to the design staff Unstinted research should be the basis of all aircraft work, and in the present development of the airship this necessity is evidently fully recognised , important experiments have

already taken place and others are now in progress There may be set-backs from time to time, as there have been in all new undertakings, but one feels confident that an optimistic view can be taken for the future of airship transport

It is often not realized that airship travel is not so new and novel as is generally believed Dr Eckener recently stated that, prior to the war, German passenger airships made over 2,000 flights and carried 42,000 people without mishap, and that after the Armistice the " Bodensee " carried 2,450 people in addition to a large amount of mails and freight without injury either to passengers or crew

One has only to visualise a journey by air to India to appreciate the many advantages airship travel will have over the existing modes of travel Passengers would embark in England, say, at Bedford, and after a journey of two days would land in Egypt, for say, half-a-day, to allow the ship to re-fuel Another two or two and a half days on an average should see them landed in India They have only had the trouble of passing through one Custom House and no change of craft

As for the effect on mails, if the present time of transit is cut down by more than a half, there is not much doubt that the bulk of first-class mail will go by air, even at the expense of a moderate surcharge It is difficult at this stage to judge the attitude of the general public towards air transport, but judging solely by the popularity and the returns of the London to Paris air route, there should be no great difficulty in obtaining sufficient traffic to fill the ship on each flight, especially in view of the enormous saving in time Furthermore, it is becoming more and more evident that *time* and not *distance* is the factor that counts most, both in the world of politics and of commerce

If our Empire is to speak to the nations of the world with one voice, we can only do so if it be possible to get together quickly, thrash out our differences of opinion where necessary, and agree on a policy that will ultimately be for the good of the Empire as a whole, rather than adopt courses that will benefit only one or two particular units

In commerce, we have had illustrated to us at Wembley the wonderful scope for trading within the Empire, but these markets are being intensely cultivated by foreign interest, and if the home manufacturer is to hold his own and further extend his market, he must be in a position to be able to get considerably closer to the Dominion buyer than he has done in the past *Time* has been the factor preventing him from personally investigating new fields for his goods, and it is by curtailing *time* that effective Aerial Transport would give a new impetus to inter-Empire commerce

It is along these lines and with these objects in view that the present work of Airship construction is being developed, with great prospects of success, the realisation of which will mean a drawing together of the far-off dominions to the Motherland, and a consequent development of our Empire communications and trade