A TEXT-BOOK OF AERIAL ENGINEERING: THE PROBLEM OF FLIGHT

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A Text-Book of Aerial Engineering: The Problem of Flight by Herbert Chatley

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HERBERT CHATLEY

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Trieste

THE
PROBLEM OF FLIGHT:

A TEXT-BOOK
OF AERIAL ENGINEERING.

BY

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PREFACE.

In view of the fact that we now appear to be on the verge of a practical solution to this classic problem of flight, I beg to submit to the engineering profession an epitome of the knowledge at present available on the subject. In the mathematical consideration I have adopted the principle, well established in engineering practice, of omitting those factors which appear to be unimportant. The formulæ are therefore "engineering formulæ" in the strict sense of the word, *i.e.* they are not the result of a deep mathematical analysis which it is, in the majority of cases, almost impossible to apply.

I sincerely hope that the rules, in conjunction with practical experiments, will prove useful, both before and after the new and more fortunate Icarus has flown from London to Manchester.

My thanks are cordially given to the individuals and firms who have supplied blocks for use in this book, viz.: Sir H. Maxim, *The Times* (*Encyclo. Brit.*), Valentine and Thompson (*Travels in Space*), Electrical Power Storage Co., Adams Manufacturing Co., De Dion Bouton Co., Ltd., Baird & Tatlock, *Model Engineer*, and Cambridge University Press.

H. CHATLEY.

May 1907.

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FLIGHT.

CHAPTER I.

THE PROBLEM OF FLIGHT.

FOR ages men have been trying to achieve, by mechanical means, the feat (which is so easily accomplished by bird, bat, and insect) of flying. It is only within the last hundred years (unless of course we refer to Dædalus, who has omitted to leave working drawings and a recipe for mixing a good wax) that we have been able to hope that the problem would soon be solved. The chief causes which have led to this result are as follows:—

(1) A more thorough knowledge of applied mechanics, which has enabled us to cut down weights and sizes and yet to secure adequate strength.

(2) A reduction in the weight of prime movers and an improved quality of material, so that a small weight in machinery produces a very considerable power.

(3) A careful study of the flight of birds, wind pressure, and air propulsion.

All the difficulties are not yet solved, however, so that although we have now dirigible balloons and partially successful aeroplanes, there are problems still needing attention.

At the outset it must be understood that there are two classes of air-vessels:—

(A) Lighter than air.

(B) Heavier than air.

These are different in every respect, and for many years each type has had its staunch adherents, who were convinced that theirs and no other would be the final type in aerial navigation. As a