CAMBRIDGE LIBRARY COLLECTION

Books of enduring scholarly value

History

The books reissued in this series include accounts of historical events and movements by eye-witnesses and contemporaries, as well as landmark studies that assembled significant source materials or developed new historiographical methods. The series includes work in social, political and military history on a wide range of periods and regions, giving modern scholars ready access to influential publications of the past.

Airships in Peace and War

In 1908, the motoring journalist R.P. Hearne published *Aerial Warfare*, the first book on the subject to reach an audience beyond military strategists. Enormous advances in aviation resulted in the publication of this substantially revised edition in 1910. At a time of intense European military rivalry, the book highlighted differences in the way countries were adopting new aerial technology. Hearne makes the assumption that conflict with Germany at some point is inevitable, and identifies the airship as 'practically an invisible enemy'. At this point Germany had ten airships compared to Britain's one, and while the British regarded them as useful only for reconnaissance, the Germans had identified potential offensive uses. Reviews commended the book for its depth and numerous illustrations, but also suggested it was alarmist and anti-German. However, it brought the subject to wider attention, and was a factor behind the government's decision to invest properly in aviation research.

© in this web service Cambridge University Press www.cambridge.org

Cambridge University Press has long been a pioneer in the reissuing of out-of-print titles from its own backlist, producing digital reprints of books that are still sought after by scholars and students but could not be reprinted economically using traditional technology. The Cambridge Library Collection extends this activity to a wider range of books which are still of importance to researchers and professionals, either for the source material they contain, or as landmarks in the history of their academic discipline.

Drawing from the world-renowned collections in the Cambridge University Library and other partner libraries, and guided by the advice of experts in each subject area, Cambridge University Press is using state-of-the-art scanning machines in its own Printing House to capture the content of each book selected for inclusion. The files are processed to give a consistently clear, crisp image, and the books finished to the high quality standard for which the Press is recognised around the world. The latest print-on-demand technology ensures that the books will remain available indefinitely, and that orders for single or multiple copies can quickly be supplied.

The Cambridge Library Collection brings back to life books of enduring scholarly value (including out-of-copyright works originally issued by other publishers) across a wide range of disciplines in the humanities and social sciences and in science and technology.

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

Airships in Peace and War

Being the Second Edition of 'Aerial Warfare'

R.P. HEARNE

INTRODUCTION BY
HIRAM STEVENS MAXIM

CAMBRIDGE UNIVERSITY PRESS

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paolo, Delhi, Mexico City

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9781108061551

© in this compilation Cambridge University Press 2013

This edition first published 1910
This digitally printed version 2013

ISBN 978-1-108-06155-1 Paperback

This book reproduces the text of the original edition. The content and language reflect the beliefs, practices and terminology of their time, and have not been updated.

Cambridge University Press wishes to make clear that the book, unless originally published by Cambridge, is not being republished by, in association or collaboration with, or with the endorsement or approval of, the original publisher or its successors in title.

© in this web service Cambridge University Press www.cambridge.org

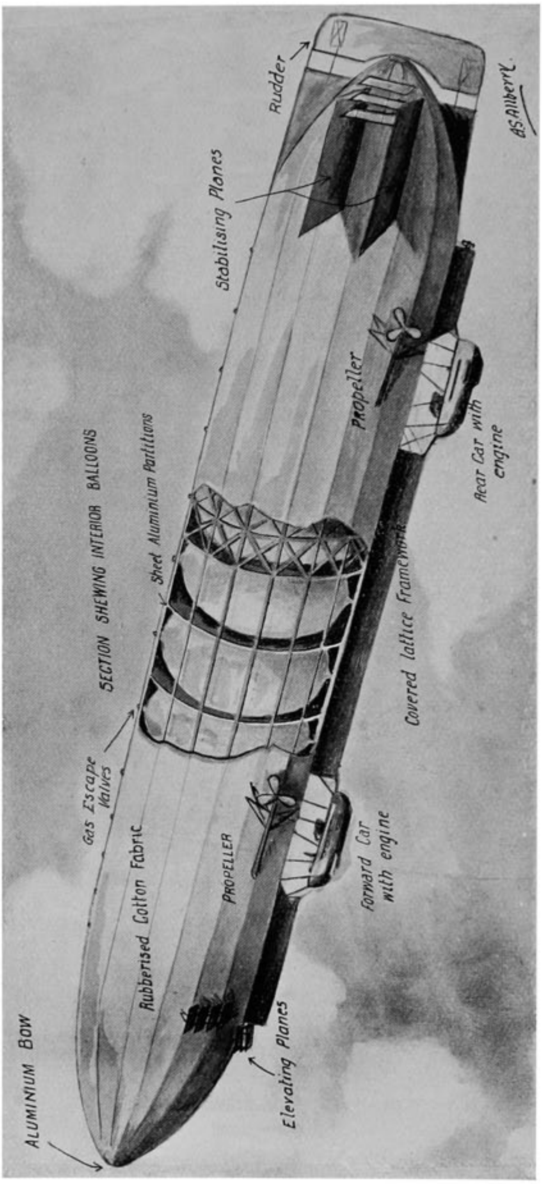
CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of
'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

: AIRSHIPS :
IN PEACE & WAR

© in this web service Cambridge University Press www.cambridge.org

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information



DIAGRAMMATIC SKETCH OF THE ZEPPELIN AIRSHIP [COPYRIGHT]
[In "Zeppelin III" a third car has been fitted with an additional engine and propellers]

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE
Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

AIRSHIPS
IN PEACE & WAR

BEING THE SECOND EDITION OF AERIAL WARFARE WITH SEVEN NEW CHAPTERS BY R. P. HEARNE AN INTRODUCTION BY SIR HIRAM MAXIM AND 73 ILLUSTRATIONS

LONDON : JOHN LANE, THE BODLEY HEAD
NEW YORK : JOHN LANE COMPANY MCMX

© in this web service Cambridge University Press www.cambridge.org

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

WM. BRENDON AND SON, LTD., PRINTERS, PLYMOUTH

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

PREFACE TO SECOND EDITION

THE first edition of this book was written early in 1908, at a time when the aeroplane record in Europe represented a flight of only fifteen minutes' duration, and when the Wrights had given no public proof of their flying powers, even in America. Information was exceedingly difficult to obtain, especially in England, where the whole subject of mechanical flight had been shamefully neglected. By the autumn of that year the Wrights had established their fame in Europe and America, and the great movement for the development of aviation had begun.

A year of astounding progress in every direction has followed. Records upon records have been made both by flying machines and dirigible balloons. The British Government has increased its grant for aeronautical purposes from £13,000 to £78,000; aerial fleets are being built by all the Great Powers; the United States has formally adopted the Wright flying machine, after a series of official tests; the English Channel has been crossed by an aeroplane in faster time than the journey from England to France had ever hitherto

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

been made; great aeronautical exhibitions have been held in London, Frankfurt, and Paris; a week of racing at Rheims brought forth the merit of the aeroplane in astonishing fashion; Count Zeppelin made an aerial journey of over 800 miles; and his ship has journeyed from the south of Germany to Berlin.

Thus, in breathless fashion, one could go on recounting the unprecedented progress of this new locomotion. But I will refer my readers to the book, and to the appendix, for a summary of progress.

On the main theme of the book, that is to say, the naval and military applications of aerial vessels, opinions change almost from day to day; but the number of sceptics is far smaller now than when the first edition appeared. Most wonderful of all, the British Government has been stirred into action, both in building airships for the army and navy, and in establishing a Scientific Advisory Committee.

There are several writers and thinkers who yet will admit no feasibility for aerial vessels, but they usually belong to the class who have given little study to the possibilities of aerial vessels. It is significant, however, that even those naval and military experts who deny the utility of ships of the air have not ceased to urge on the development of special guns to ward off aerial attacks.

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of
'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

Preface to Second Edition

As scouting agents and despatch carriers the value of aerial vessels, even in their present crude stage, is generally admitted; but the theory that airships can be used for attacking purposes (especially at night) is still stoutly resisted in many quarters. One of the most illuminating writers points out that shrapnel from high-angle guns could wreck any aerial vessel; whilst airships, when provided with ammunition, will never be able to discharge their shells accurately. Pursuing the subject, the writer argues that all artillery firing is in the nature of guesswork, and instances that the damage wreaked at Port Arthur by the big-gun fire was very much overestimated.

If we accept this latter statement that ordinary artillery fire at immovable objects like forts is inaccurate and exaggerated as to its effects, the layman can form the idea that high-angle fire at objects capable of moving quickly both in a vertical and horizontal plane will be far less accurate. If so the airship of the future will be an elusive and even dangerous target for land artillery.

The history of every new invention shows the same scepticism on the part of the experts. But the development of airships will not be checked by their opinions, nor does it seem likely that the Great Powers which have already entered upon a programme of aerial ship building will stop the work. No one can possibly foresee a limit to

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE
Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

the developments and improvements which may accrue in airships for war purposes, and if the possibilities are such as to make war more terrible and uncertain, and thus entered into more charily, then airships will have accomplished a good purpose.

The submarine and many other inventions have proved of little or no utility save for warlike purposes; but there is always the assurance that the airship in its varied forms will be an instrument of immense utility in times of peace, and will reach its highest use in that age of civilisation and true Christianity when war will be but a barbaric relic.

Several disasters occurred during the year, and showed that progress in aerial locomotion will not be too cheaply bought. Inexpert aeronauts have been urged on to foolhardy feats, and the morbid curiosity of the public has been aroused by the ill-expressed enthusiasm suddenly displayed by a section of the press in the new locomotion.

Soon after first taking up the task of writing a work on aeronautics the idea suggested itself to me that one ought to seek out and emphasise the principal object of all this great aeronautical movement. Many writers had treated the matter as if aerial vessels had already attained a very definite object, whilst others wrote as if they

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

knew of no useful end to be gained by aerial navigation.

It was clear that at the time when this book first appeared the military uses of airships were the most important and apparent. Thus I styled the book "Aerial Warfare," and treated the subject with a view to showing that aerial vessels could serve a very valuable purpose by making war more terrible, and consequently less liable to be hastily rushed into. In the past year the whole scope of aeronautics has broadened, and I therefore feel that the time is opportune to alter the title and contents of the book so as to show that aerial navigation is fast approaching an epoch when it will have important uses in peace as well as in war time.

There is just one other little point I would mention. I have been criticised by some English reviewers for assuming an unfriendly attitude towards Germany. It is with peculiar pleasure therefore that I saw the book go into a German edition, and meet with a very favourable reception in Germany. This fact completely disproves the criticism. A perusal of the book will show how high a tribute I pay to German genius.

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE
Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

INTRODUCTORY

THE events of the last few years ought to convince every thinking man that the beginning of a totally new and important epoch in the world's history has arrived. What the last century was to Electricity the present century will be to Aerial Navigation. Only a few years ago the experimenter in flying machines was looked upon and placed in the same category as those who sought to invent perpetual motion or discover the philosopher's stone. It was said of Benjamin Franklin that when he wished to make experiments with a kite, in order to ascertain if the lightning of the heavens was the same as Electricity, he took a small boy with him in order to disarm those who might have ridiculed what they thought to be a foolish and absurd experiment.

But thanks to a few earnest and clever scientific gentlemen, mathematicians, etc., one is now able to experiment and study the problem of Aerial Navigation without the least fear of ridicule.

Man has long sought to navigate the air with machines lighter than air, balloons and

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

machines heavier than the air, flying machines. Balloons have been known for some hundreds of years, but it is only during the last few years that a motor has been available which is sufficiently powerful in proportion to its weight to be used on a true flying machine, and for this remarkable motor we are indebted to those who have spent hundreds of thousands of pounds in the development of motor-cars, especially those of the racing type.

Mathematicians have always told us that a flying machine would be possible just as soon as a suitable motor for the purpose was discovered. They have always said, "Give us the motor and we will very soon give you a flying machine."

The domestic goose weighs twelve pounds and is able to fly, and it is said that in doing so she develops the twelfth part of a horse-power. Gasoline motors have already been made that develop one horse-power for every four pounds of weight, or, say, one horse-power with the weight of a small barn-yard fowl, and I find that there is a possibility of reducing this weight to about two and a half pounds, providing that all the parts are made of high grade and carefully tempered steel.

Many philosophers have maintained, and with reason, that if mankind was ever to master the air, it would in the very nature of things be

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

necessary to imitate Nature's flying-machines, birds, and depend altogether upon dynamic energy instead of the buoyancy of gas; but as the flying-machine motor was not invented until quite recently, the balloon men have had everything their own way. It would, however, appear to me that balloons can never be of any real value either in peace or war. A balloon in order to rise has to be lighter than a corresponding volume of air, that is, the machine, considered as a whole, has a less density than the air we breathe, therefore it must always be extremely delicate and fragile. Moreover, in order to lift any considerable amount it has to be made of enormous dimensions, and its great size, combined with its inherent weakness and lightness, renders it very difficult to manage except in a dead calm. The dirigible balloon, or airship as it is now called, may be likened to an ordinary ship. Suppose, for example, that one had a ship that could only leave the harbour or return to it in a dead calm; suppose, at the very best, that the ship leaked so badly that it could not remain afloat for more than twenty-four hours at a time; and suppose now, after waiting several weeks for a dead calm, such a ship ventures out of the harbour and sails about for a few hours, but is absolutely unable to enter the harbour in the face of even a light breeze,

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

without being dashed about and destroyed. She is then in the position of not being able to remain afloat or return to the place of safety. What would be thought of the utility of such a ship? And this is exactly the case with dirigibles; they can only venture out of their house on rare occasions. If any attempt is made to take them out even with a light wind blowing, the work of months is destroyed in as many seconds, and, when once out, it is impossible to rehouse them, unless the weather conditions are extremely favourable.

And then again, the speed at which an airship is able to travel through the air, even of the very long Zeppelin type, is not sufficiently high to enable it to make progress against the wind that is blowing on at least two hundred days in every year. Experiments made at the top of the Eiffel Tower have demonstrated that the average velocity of the wind throughout the year at that height, is quite equal to the highest speed that an airship is able to make. Although millions of pounds have been spent during the last few years on dirigibles, they do not appear to have made much improvement on the types that existed ten years ago. I am therefore of the opinion that if we have not already come to the end of our tether with the dirigible balloon, we are certainly very near to it.

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE
Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

On the other hand, since the development of the gasoline motor, flying machines have made a great deal of progress. Quite true, more than twelve years ago I made a large machine that had a lifting effect of more than a ton, in addition to the weight of three men and six hundred pounds of water. But this machine was driven by a light steam engine of enormous power, and the quantity of water consumed was so large that the machine could not have remained in the air but a few minutes, even if I had had room to manœuvre and learned the knack of balancing it in the air. It was only too evident to me that it was no use to go on with the steam engine, and this state of things was fully set forth by me at the time in the letters and articles which I wrote. My large machine, however, demonstrated one very important fact, and that is, that very large aeroplanes had a fair degree of lifting power for their area. It is interesting to note that this large machine of mine was mounted on a framework made in the form of sledge runners, that it had superposed aeroplanes, fore and aft rudders with a front horizontal rudder for steering in a vertical direction, that it was propelled by large canvas-covered wooden screws running in reverse directions, that the aeroplanes were two-ply so as to conceal the framework and

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

give a smooth surface on both sides, and that sharp fore and aft edges were produced by stretching the cloth tightly over a steel wire. In one of my patents taken about eleven years ago, I showed the front edge of wings or aeroplanes made rigid, and the after edge made thin and flexible. I also showed a device for flexing the outer and after edges of the wings or aeroplanes, in order to produce stability and to equalise the lifting effect on both sides of the machine. The most successful machine which has been made up to date has all of these features.

The Wright Brothers, of Dayton, Ohio, seem to have commenced experiments about ten years ago with what is known as gliding machines, and it was only after they had made a profound study of the subject and performed hundreds of experiments that they applied a screw and a propeller, and converted their gliding machine into a true flying machine. There is no question about it, the Wright Brothers were the first to perform free flight in the air. Not only this, but the work they have done and the machines they have constructed are so much superior to the machines of the Farman and Delagrange type as to be considered in a totally different category. It has been my great pleasure to witness some flights with the Wright machine

© in this web service Cambridge University Press www.cambridge.org

Cambridge
Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

near Le Mans, in France, and I can testify that with Mr. Wright on board he had as complete control of his machine as a skilful boatman would have on a placid stream. The machine rose from the ground, mounted at a fair height, and travelled at a high velocity. It turned corners the same as a bird would have done, the outer wings being much the higher, and when travelling in a straight line it moved with the rapidity and evenness of an express train. On passing over our heads Mr. Wright mounted at least one hundred feet in the air, and after performing another circle came near the ground, and after slowing up he pitched the front end of the machine upward, bringing the hind end of the sledge runners in contact with the ground, which acted as an excellent brake, and brought the machine to a state of rest on the ground very much after the manner of a bird and without the least shock.

Mr. Wright's machine is, I believe, about forty feet wide from port to starboard, and is provided with a small four-cylinder gasoline engine of 24 h.p. He has already carried a load of 240 pounds in addition to the water, the gasoline, and his own weight, and he has been able at least on one occasion to remain in the air considerably over an hour and to travel fifty-six miles.

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of
'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

The Wright machine, however, although well designed (the proof of the pudding is in the eating), is, as a whole, a very rough piece of mechanism, and is susceptible of a good many improvements in many directions. The motor has four cylinders and a heavy cast-iron fly-wheel. The iron that is in this fly-wheel would easily make two more cylinders without increasing the weight an ounce. With six cylinders no fly-wheel would be required, and the engine would develop 36 h.p., instead of 24. With this increase of power, and several changes for reducing the atmospheric resistance, 10 feet might be added to the length of the aeroplanes, and under these conditions the machine would probably carry a load of 300 lbs. for a distance of at least one hundred miles at the rate of fifty miles an hour.

But why should we stop at 36 h.p. with aeroplanes 50 feet long? Why not use aeroplanes 70 or 80 feet long, and a motor of 60 h.p., and then if all the work is well executed and the light motor equal, as far as reliability is concerned, to the best motors now in the market we should be able to attain a speed of sixty miles an hour, and keep it up for at least three hours at a stretch with a load of fully 500 lbs. in addition to the weight of the driver? Such a machine is now in sight. Mr. Wright's machine, as it now stands, could cross and re-cross the Channel

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

without replenishing its gasoline, and the machine which I have suggested would do a good deal better, and would be able to carry a considerable load besides the weight of the operator.

It is not necessary for me to point out to any one who has an imagination what this means. The dullest intellect ought to be able to grasp the situation and to realise what this new departure means. It is interesting to note in this connection why it is that the Wright machine is so much superior to the machines of Delagrange and Farman. Both have superposed aeroplanes, both are about the same size and the same weight, and both have fore and aft horizontal rudders. The workmanship on the French machines appears to be much better than on the Wright machine, still as far as flying is concerned the French machines are not in it. Wright does very much better with 24 h.p. than his competitors are able to do with 50 h.p.

Let us see now what the details are that make these French machines so much inferior to the Wright machine. In the first place they have a very complicated and rather heavy arrangement of spiral springs, levers, wheels, steel tubes, etc., to give elasticity in landing, and as this apparatus is very bulky, it not only weighs the machine down, but at the same time offers great atmospheric resistance. Then again, on the French

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE
Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

machines the wooden framework of the aeroplanes is not covered in, but exposed on the top side, and this prevents the air from running smoothly over the top side and joining the current from the underneath side of the aeroplane. This arrangement not only increases the resistance, but also diminishes the lifting effect. The French machines have only one screw and that made of metal; the blades are riveted on to a steel bar and the bar projects on the rear side of the blade; this prevents the air from following both sides of the blade, and so increases the friction and diminishes the thrust. The French propellers are much smaller than Wright's, and they only use one on each machine, while Wright uses two and consequently engages more than double the quantity of air. The speed of Wright's propeller screws is much less, and the slip of his screws in the air and the waste of power resulting therefrom is much less than in the French machines. The Wright machine s i able to travel in a straight line without the least irregularity, to swing round corners without any pitching or rearing, and to sail on an even keel under all conditions, while the French machines take a very erratic path, pitch and toss, and are very difficult to handle, especially while turning a corner.

A good deal of this is due to the gyroscopic

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE
Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of
'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

action of the screws. In the French machines, as I have said before, there is but one screw. This is of metal and of considerable weight, and, as it is connected directly to the motor shaft, it has a very high rotatory velocity, and therefore acts as a very powerful gyroscope. Suppose now that one of these screws has a right-hand pitch, and suppose that the machine is travelling in a straight line, neither turning to the right, left, up nor down. Under these conditions there will be no gyroscopic action; but suppose that the driver wishes to make a quarter turn, that is, to swing round 90° to the left, the gyroscope will then have a strong tendency to throw the front of the machine upward and the rear downward, whereas, if the driver attempts to turn to the right, the gyroscopic action of the screw exerts great force in the other direction, that is, forcing the front end of the machine downward and the rear end upward.

With a single screw working at a high velocity the steering will always be difficult, because the changing of the angle of the machine in the air will always have an influence on steering it in a horizontal direction. In fact the gyroscope is a very remarkable instrument, very little understood, and always wishes to have its own way. Like Paddy's pig, it never wishes to turn in the direction that the pressure is applied, but to start

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

off on its own account in quite another direction. Then, again, the power applied in rotating the screw has a tendency to rotate the machine in a contrary direction.

In my large machine these troubles were obviated by the use of two screws rotating in opposite directions.

The Wright machine, like my own, has two screws; they are both of the same size and the same diameter and rotate at the same velocity in opposite directions, therefore there is no disturbing influence, because whatever gyroscopic action is set up by one screw is exactly neutralised by the gyroscopic action of the other screw, which is of exactly equal force and operates in the opposite direction; therefore the Wright machine may be steered as easily as a boat without any of the erratic influences and disturbances which have so greatly puzzled those who did not understand the cause of the trouble.

When we take into consideration the lightness and cheapness of aeroplanes, the rapidity with which they can be produced, and the velocity at which they are able to travel, I think it will be seen that a fleet of dirigible balloons would stand a very poor chance when pitted against a fleet of flying machines. As flying machines will have a speed at least double that of airships, and will be much easier to manœuvre, they would not en-

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE
Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

counter a great deal of trouble nor danger in pricking the bubble and letting the gas out of their bulky opponents.

I fully agree with what the author has so strongly and so ably set forth in the admirable work which I have read with much pleasure. It is no longer a safe expedient to hide our heads in the sand like the ostrich in order not to witness what is going on in other parts of the world. On the contrary, we should accept the situation as we find it. The flying machine has come, and come to stay, whether we like it or not. It is a subject that we have to deal with, I might say that it is the burning subject of the moment, and the sooner this fact is acknowledged by the authorities, and measures taken to put us abreast with other nations, the better it will be for the safety of the nation.

HIRAM S. MAXIM.

[∴ Sir Hiram Maxim is now engaged on a very interesting flying machine of his own invention.]

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

FOREWORD

I ABHOR war: but it is hopeless to expect that a state of affairs will be reached in our time which will render it unnecessary. Warfare is a barbarous method of settling differences; but when barbaric wrongs have been done, it is in human nature to avenge them by blood; and cruelty and barbarity may never wholly disappear from our natures. Though the humanitarian feeling may become stronger and more widespread, there are, and will be, causes within and without nations which will long conduce to war. The struggle for commercial supremacy, for the preservation of markets, for the maintenance of claims and rights have, in a large measure, taken the place of the wars of religion, rapine, and racial animosity. Multitudinous little wars have given way to more terrible struggles which take longer to prepare for, and longer to recover from.

Apart from the menace caused by ever-growing armaments, in which the rich nations literally force their poorer rivals into bankruptcy by necessitating ever-growing military and naval expenditure, there are internal causes in every

© in this web service Cambridge University Press www.cambridge.org

CAMBRIDGE

Cambridge University Press
978-1-108-06155-1 - Airships in Peace and War: Being the Second Edition of 'Aerial Warfare'
R.P. Hearne Introduction by Hiram Stevens Maxim
Frontmatter
More information

commercial nation which predispose to war. Congestion of population; increase of labour-saving devices; increase of town life, with all its evils and artificialities; insensate and unscrupulous business competition; stock-market gambling; political, financial, and civic corruption; the rapid acquisition of wealth by vice, 'sweating,' speculation, fraud, gambling, and extravagant follies; coupled with the struggles between Capital and Labour, between Socialists and Individualists, have created many new conditions and new difficulties, the only popular palliative for which is good trade, that is to say, ever-growing trade. The greed for wealth and material comforts affects all classes, and grows more insatiable.

Once business declines in the wealthiest country, there is acute distress amongst thousands of people, disaffection becomes widespread, and the war of the political parties becomes more violent. Every great nation finds it imperative to keep up her trade. Competition between the different countries grows more keen, rates of production of manufactured articles increase out of proportion to the demand as more nations enter the competitive arena, and there is a mad scramble in the market-places of the world.

We are now at the stage where a battle of wits is in progress between the nations to keep up their trade, but at any moment this may

© in this web service Cambridge University Press www.cambridge.org