APPENDIX

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RESEARCHES ON THE SPREADING OF A VIRTUAL SURFACE PARACHUTE (WINDMILL)

BY G. SERRAGLI.

The spreading of a virtual surface parachute (windmill) is explained in the first part: by "spreading," is understood the variation of axial thrust obtaining when the windmill passes from immobility, by successive increments of angular velocity, to its normal and stable functioning velocity.

Practical cases are then determined: helicopter with braking propeller and inverted rotation etc. In particular the case of a type of Autogiro (similar to the "Alérion," is examined, in which the ordinary organ of sustentation is a fixed surface constituted by an immobile or "calée," propeller, which becomes a windmill during the fall of the apparatus when disconnected from its hub. This could probably lead to an improvement of the Autogiro, because the fixed organ of sustentation would possibly have better qualities than the low incidence windmill. The two systems would be equivalent during fall.

The variation of thrust of the mill at a constant forward velocity is determined at this point. In view of the difficulty of this experimental study, it is suggested to determine the diagrams of the motive couple $C$ and of the thrust $S$ in function of $\Omega$ ($\Omega$ angu-
lar velocity of the mill) by means of the methods of calculation of helicoidal propellers. Particularly use is made of:

a) for high incidences – an approximate method based on the knowledge of the relative polars of wing profiles similar to that of the propeller blade;

b) for low incidences – the method called "of average increments," by Prof. Eng. E. Pistolesi of the Royal School of Engineering at Pisa.

With the diagrams of the $C_m$ and of the $S$ thus obtained it is possible by means of a number of calculations to determine a $S = f(t)$ which is the object of the research.

As far as the spreading at a variable forward velocity is concerned, the Author suggests that it be determined by an approximate process based on the data obtained from a series of diagrams of spreading obtained in correspondence with a complete series of different constant forward velocities. An example of the actual fall of an helicopter, 8 meters in diameter, is given.

The Author finally proposes to improve the spreading by means of a provisional regulating of the pitch of the mill so as to obtain the maximum angular acceleration.

In conclusion the Author states that the regulation of the pitch constitutes also in this case a real necessity for the practical realisation of the helicopter.

L. W.

CALCULATION ON THE ROBUSTNESS OF THE PROPELLER

BY ENG. A. GIGLI.

Tracing of the "primary" and "secondary" projections of the baricenter line (propeller).

In the first chapter entitled "Generalities" the author makes a qualitative analysis of the forces obtaining during the rotation of a propeller with constant angular velocity. They may be resumed as follows:

Stresses on the propeller blade due to rotation:

_Traction_: due to the centrifugal force.

_Flection_: _primary_ due to the centrifugal action and aerodynamic action.
secondary due to the centrifugal action and aerodynamic action.

Shear:  primary due to the aerodynamical action only.
        secondary due to the aerodynamical action only.

Torque: due to the aerodynamical actions and centrifugal actions.

Of these forces only the first two (traction and flection) are of importance with respect to the robustness of the propeller; in the end, however, only tractive stresses must be taken into consideration, because flections, both primary and secondary, due to the aerodynamical action are balanced exactly at all points with those due to the centrifugal force, by suitably shaping the axis of the blade (line of the baricenters of the sections). The object of the present study is to determine said shaping (and consequently the suitable deformation of the axis of the propeller blade).

In Chapter 2 entitled “Mass Forces” it is shown that it is easy to trace graphically the diagram of the centrifugal force along the blade, as well as the diagram of the unitary tractive stresses at the different sections.

In Chapter 3 entitled “Aerodynamic Forces” it is shown how the diagrams indicating the distribution of the aerodynamic forces along the blade may be traced with sufficient approximation, distinguishing the components parallel to the axis of rotation (primary) and those in the plane of rotation (secondary). (See Pistolesi: Theory and Construction of Propellers – Lectures at the Politechnic School at Turin, 1919).

Finally in Chapter 4 entitled “Compensation of bending moments” it is shown how, the blade being assumed to be divided into a number of sections, it is possible to displace one section with respect to the next, in such way as to determine in the various sections under consideration and as a result of the centrifugal force, bending actions equal and opposite to those due to the aerodynamic actions, so as to exactly balance each other, both in first projection (first in a plane passing through the axis of rotation) and in second projection (second in a plane normal to the axis of rotation). The graphic methods suggested fulfill the required purpose and must be preferred to the equivalent numerical methods.
The scales for reading the various diagrams are clearly placed in evidence, thus making the graphic development of these calculations a simple operation.

THE WORK OF THE DANIEL GUGGENHEIM FUND FOR THE PROMOTION OF AERONAUTICS

BY PROF. GIACOMELLI.

(Lecture held June 15 at the Italian Association of Aerotechnics).

The work of the Daniel Guggenheim Fund during 1928 distinguishes itself from that of the previous years on account of a greater effort towards safe flying. Such greater effort was made possible by the fact that in the two preceding years the Fund had successfully solved other problems such as popularization of aviation in the United States and creation of the first air lines for passenger transportation.

In 1928 the United States were entirely airminded and aeronautical enterprises had developed to a very remarkable point; the Fund then devoted her attention to the problem of safe flying.

To this end, 3 different ways have been followed: identification of cities, villages and other inhabited centers in the United States by means of the name of the city, village or center, printed on the roof of outstanding buildings; creation of an experimental center for the study of all problems connected with navigation in a fog, under the direction of Dr. Doolittle, well-known pilot; New York congress, of October 1928, for safe flying.

The lecture describes in detail what the Fund has done along these three ways. Particular attention is given to the New York congress, the conclusions of the most important papers submitted being mentioned.

Prof. ENRICO PISTOLESI, Direttore responsabile.