of the spars and points of attachment of fittings. The fittings which had been evolved did distribute the pressure and no serious defects had been found. Referring to Mr. Mooney's remarks, he pointed out that the statement questioned referred to machines in action in France, and not to machines constructed and not flown. An all-metal machine had been constructed in the Midlands for a naval officer several years before the war and all-metal machines were exhibited at the first aero show in this country in 1909, one being made by Major Low. He congratulated Mr. Mooney on the great improvements recently made in his spars as the result of incorporating suggestions placed at his disposal by members of the Technical Department. With regard to the machine stated to have a load factor of 9.5, he would like to know the weight of this spar in comparison with that of a wooden one, grade A spruce of the same strength in steel. He regretted that he had not been given permission to describe Mr. Mooney's experiments in the lecture.

The CHAIRMAN said the Paper would, he thought, be the parent of many Papers on similar lines and following up the ideas Dr. Thurston had given them. He proposed a hearty vote of thanks to Dr. Thurston for his most valuable contribution to the records of the Society.

Major-General R. M. RUCK, R.E. (President of the Society) moved a vote of thanks to General Bagnall Wild for presiding. He was an old brother officer, and he would spare him a list of the very excellent things he might have said of him, but the work he had done during the war had been extremely valuable and of great national importance. He also expressed the appreciation of the Council of the excellent lecture and discussion they had had, and the good attendance, both in quantity and quality.

ABSTRACTS.

Abstract of paper appearing in "Engineering," September 19th, 1919, by M. A. S. Riach, entitled, "A Complete Theory of the Screw Propeller Working in Air."

The modern theory of the screw propeller, particularly the airscrew developed by the author, is employed in an attempt to generalise the conditions in order to produce a simplification of the method when applied to problems in the design of airscrews. The usual procedure, in commencing the design of an airscrew to satisfy given conditions, of arbitrarily choosing values for the angles of attack of the individual blade elements, is discarded as involving too much statistical labour in favour of the new process described in the paper. This new process consists in so arranging the disposition of the blade sections, chord blade widths, and angles of attack, along the blade length that the final slip velocity at all radii becomes a constant quantity. This immediately results in a great simplification of the analytical work necessary and enables the complete design of any airscrew to be generalised, so that in any design the whole of the work of computation usually necessary may be avoided, its place being taken by a few graphs from which the required airscrew characteristics may be at once read off. At the same time the efficiency of an airscrew, designed to fulfil any set of conditions, is immediately to hand with the result that the best type may be selected, giving greatest economy in any case. The main analysis of the paper is at the outset concerned with obtaining a sufficiently approximate relation between the variable horse-power, density, airscrew diameter, flight velocity, and engine revolutions. For this purpose it is necessary to allow for the aerodynamical "drag" losses on the propeller blades. This is obtained to a sufficiently close approximation and constitutes a correction on the older methods of assessment. Incidentally the analysis throws some light upon the problems of the ventilating fan and direct lift flying machine. The method is quite general and may be applied to methods of assessment other than those adopted by the author in his paper.