

CAPT. FERBER'S AEROPLANE EXPERIMENTS.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

One of the first of the prominent French aeronauts to undertake experiments with aeroplanes is Capt. Ferber, of the artillery corps. Being a mathematician of great capability, he was able to make an extensive series of calculations upon the theoretical forms which should be best adapted for aerial flyers, and this he did at some length, though unfortunately these calculations (which are of an exclusively mathematical nature) are not well suited for reproduction. It must not be forgotten, however, that Capt. Ferber, besides being occupied with the theoretical part of the subject, is at the same time one of the first aeronauts in France to take up the construction of aeroplanes carrying one or even two persons. He is, in fact, a pioneer in this work, which has now reached such a successful development in France. At present he is engaged in constructing a new aeroplane with which he expects to experiment in the near future. Concerning the work which he has already carried out, he has kindly furnished the writer with the following information, together with views of his apparatus.

In the first place, he decided to abandon the horizontal or lying-down position of the aeronaut upon the frame, which is found to entail many disadvantages; and in the newer forms of apparatus he adopted a comfortable seat for the pilot. No doubt this acts to increase the air resistance to some extent, but this may be diminished in turn by using a light and inclosed frame which will have a suitably designed form with pointed end in order to bring the resistance down as low as possible. In the new design of flyer he adopted a tail of considerable length, which he found to be a decided advantage.

Since the experiments of 1903 he has used side rudders on the aeroplanes, and these were built so as to have a powerful action. He was, however, obliged to make a number of experiments in order to find out the best design to give the rudders, for in the first trials of the apparatus, when he came to work them, he found that they had turned the aeroplane in just the opposite direction from what he expected. Another modification came in

as regards the general curve lines of the aeroplane system, and from an esthetic standpoint at least the *ensemble* seems to have gained somewhat over the preceding type. In place of using sliding surfaces having the form of skates upon the bottom of the framework, he now employs a set of small rollers or wheels, so that the aeroplanes can be propelled easily along the ground by the action of the propeller. Since then many of the new aeroplane workers have adopted the idea of the wheels, as it enables the experimental flights to be easily carried out. Since 1904 Capt. Ferber has made considerable progress in his new aeroplane designs. Some of the forms which he adopted will be noticed in the accompanying views. The length of flight which he made in the different trials of the apparatus depends upon the experimental grounds, seeing that the trajectory is a straight line inclined at one-fifth and traversed at the rate of 7½ meters (24.6 feet) per second.

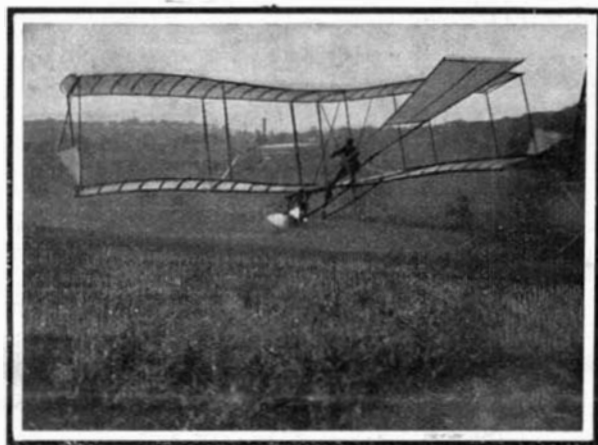
More recently he constructed an apparatus having two places in tandem, and in this way he was enabled to take a second person upon the aeroplane, this being somewhat of a novelty. With this apparatus he made a series of flights, having on board the aeronaut Burdin, who occupied the front seat, while Capt. Ferber governed the maneuvers of the aeroplane from the rear seat. The 88 kilogrammes (194 pounds) which were reserved upon the No. 6 aeroplane for the motive apparatus, including the motor complete with the fuel supply, besides the transmission shafts and gears, the propeller, and the frame, represented but 4 horse-power in 1901 and 6 horse-power in 1903, but in 1905 Capt. Ferber was able to secure 12 horse-power with the above weight. In his newer form of aeroplane he proposes to get 20 horse-power, or even more, out of

the motor outfit, following the progress which has been made within a recent period in the construction of special light-weight gasoline motors. The No. 6 aeroplane was put through a series of trials at the grounds which were arranged specially for the purpose at Nice. It gave but 6 horse-power, however, seeing that this aeroplane is in fact the apparatus which he used as far back as 1903, somewhat modified in the leading



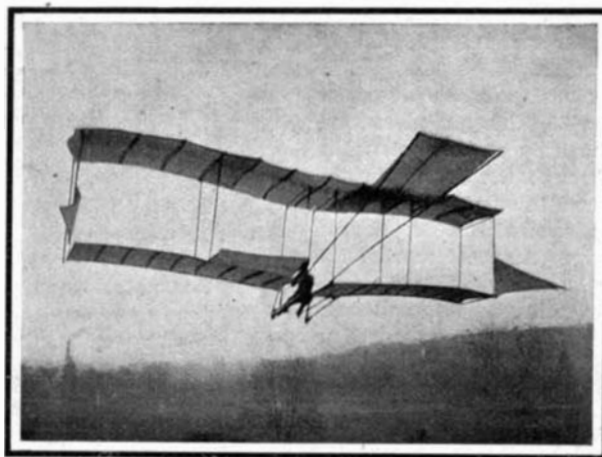
The Aeroplane Carrying Two Men and Making a Long Glide.

curves of the design; and it has therefore a better all-around form. Up to this time Capt. Ferber experimented with the aeroplanes attached to a wire when they were driven by the propellers, or, in other cases, they were allowed to sail downward from an elevated point. However, he was able to make a direct flight through the air on the 27th of May, 1905, this being the precursor of the more recent successful flights of Santos Dumont and others. The power which was given on this occasion by the 6-horse-power motor was



Capt. Ferber Making the First Flight in Europe with a Motor-Driven Aeroplane on May 27, 1905.

The aeroplane was raised with a wire, which was then cut. The 6-horse-power motor drove the machine a short distance at a downward incline of 14 to 20 per cent.



Capt. Ferber's 1904 Apparatus with Triangular Vertical Rudders at the Ends.

The aeroplane is shown while in the air during one of the test flights with the designer aboard. Note the curves of the surfaces and the lateral rudders for steering.

not, however, enough to allow the aeroplane to make a flight along the ground and above the surface, as was done later on, but it was sufficient to reduce the original flying angle of one-fifth to one-seventh. Capt. Ferber expects to mount a new 12-horse-power motor upon this aeroplane, and he will then continue his experiments in the hope of obtaining some interesting results. Not long since, he had the apparatus stored at the government balloon establishment of Chalais-Meudon, in the suburbs of Paris, and a serious

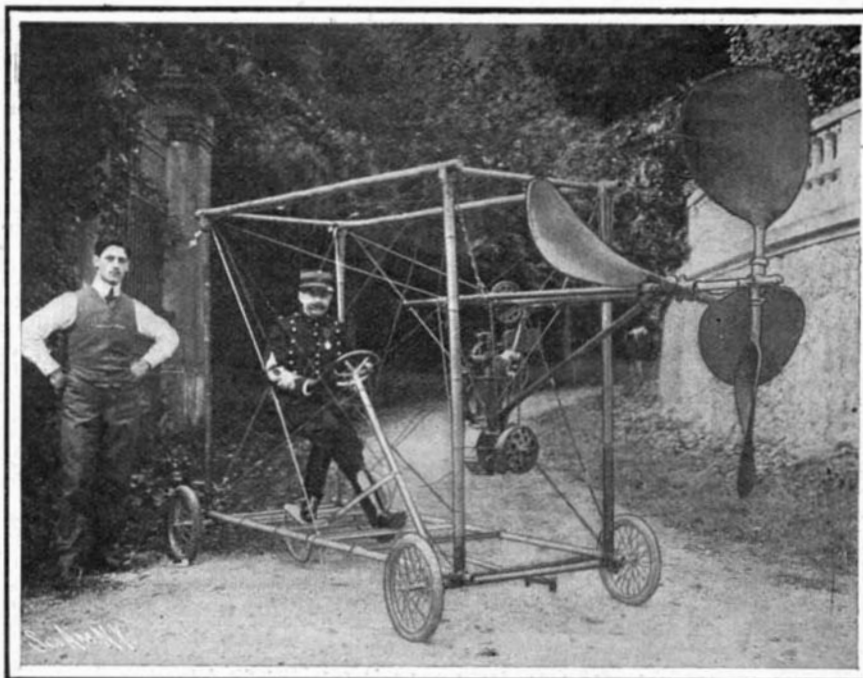
taught blanket and basket making and bead work, while at the Pima training school basketry is taught. At some of the schools, especially in New Mexico, pupils are encouraged in pottery work, and some unique models in vases and jugs have been developed. Lace making and Mexican drawn work receive considerable attention in the schools of New Mexico.

These instructions in handicraft are only in keeping with the revival of the arts in America, and their introduction into the curricula of various educational institutions throughout the country.

But industrial training is not subordinated to instruction in the crafts. At the non-reservation training schools, where facilities are ample for giving practical instruction in the trades, the capabilities and aptitude of the pupil along certain lines are carefully noted, and he is given thorough and finished training, that he may be able, if necessary, to follow a particular trade after leaving school. Even in the reservation schools sufficient instruction is given to enable the pupil to build a barn or small house, and do such repair work as is necessary about the farm.

The girls are carefully instructed in general housework. They are taught sewing, plain cooking, butter making, and the care of milk, etc. Cooking is one of the chief accomplishments which an Indian girl needs to make her a successful housekeeper. To secure this, detailed directions and graded sample lessons, correlating cooking with language and number work, are given.

The system of industrial training, coupled with the crafts, is intended to bring civilization to the door of the Indian, rather than to undertake to bring him to civilization; and it is believed that the policy will strengthen the family ties and early sow the seeds of industry and self-reliance.



Capt. Ferber's Experimental Apparatus for Testing the Efficiency of Screw Propellers.

The apparatus is driven by a 9-horse-power Buchet motor which drives two 4-foot propellers mounted on a single shaft. Speeds of 56 miles an hour have been made with this apparatus.