A Kite-Flying Club.

JUST as yacht and ship designers have learnt a great deal from experiments with models, so students of aeronautics have obtained a great deal of valuable information from the flying of kites, and, as we announced about a month ago, the Kite Flying Association of Great Britain has been formed to bring together all those interested in this form of flight. A meeting is to be held in Caxton Hall, Westminster, on Saturday, the 27th inst., at 2.30 p.m., when the President (Major Baden-Powell) will give an address on the objects of the Association. The annual subscription is 5s., and the Hon. Secretary is Mr. W. H. Akehurst, 27, Victory Road, Wimbledon, S.W.

Gordon-Bennett Balloon Cup.

THE Swiss Aero Club, who were awarded the victory in the last Gordon-Bennett Balloon Race, have specified Zurich as the starting point for this year's event. The date has not yet been definitely fixed, but it will probably be either September 26th, October 1st, or October 10th. The Swiss Aero Club will be represented by two balloons, Germany has entered three balloons, as also has Italy, while the United States has entered one balloon. The French Club have not yet come to a definite decision. In previous years the entries have closed on January 31st, but this year they will be accepted up to March 1st.

MECHANICAL FLIGHT.*

By E. STUART BRUCE, M.A.

(*Concluded from page* 98.)

THE area of the sustaining surfaces is 50 square metres. The weight of the whole machine (with aviator) is about 450 kilogs. Levers under the control of the aviator regulate the various functions of the machine, the flexing of the carrying surfaces, the movements of the horizontal rudders, the vertical rudder, &c.

For starting, the machine runs on rollers along a single wooden rail, but when there is no wind the catapult apparatus has often been used. This consists of a skeleton pylon stand; at the top of this there is a weight attached to a cord passing through a pulley. The free end of the cord is passed through a pulley at the remote end of the line and brought back and attached to the car by a patent catch. When the weight is allowed to fall the machine is shot forward with starting impetus, enabling the flight to commence. The weight is 700 kilogs., and it falls 5 metres.

While the world was waiting for the details of the Wrights' machine, another type of aeroplane machine came into existence in France, which may be described as an unbending type, and which is devoid of the vital principle of movable main surfaces, which would appear to give the Wright machine a great margin of safety in windy weather. The first of these machines was the bird of prey of M. Santos Dumont. Rudely simple was it in its construction. Two box kites for the supporting surface. In the centre is the motor with the screw behind. To attain flight the machine is run upon wheels until a certain speed is attained, when the machine takes flight. Mr. Farman's machine is another example of a machine that does not bend its wings to adapt itself to circumstances, but still we are bound to confess that the feats which Mr. Farman has managed to perform with his machine, which many critics will say is a less perfect type than that of the Brothers Wright, are very much to his credit. Our national sympathies have been very much with Mr. Farman in his experiments, for though they have taken place in France, the experimenter is of British descent.

Amongst the more recent feats of Mr. Farman may be mentioned his town to town journey from Chalons to Rheims. Another example of the same school is M. Delagrange's aeroplane, and this has accomplished no unworthy flights. In fact, at one time, this last summer, M. Delagrange held the officially observed record for duration of flight, 29m. 53⅘s., until this was greatly surpassed by Mr. Orville Wright.

In practical aeroplane travelling there will be two great difficulties to be overcome, one, starting; two, stopping in the air. As has been mentioned above, there are at the present time two methods of starting employed, that of the Brothers Wright, who use starting appliances that are independent of the machine, the other that of the French school, who use wheels which are part of the machine itself. There are disadvantages with either method. It would be hardly practical to carry a huge starting catapult, or even rails, on an aeroplane, and the system of running on the ground on wheels to start would not be practicable in a ploughed field, while the speed required would be prohibited on a public road. For this reason, some think that the heliocoptere, or lifting screw flying machine, will have advantages over the aeroplane, as the lifting horizontal screws will enable it to rise from any place at any time, and also endow it with the power of stopping horizontal motion without descending.

Possibly the future flying machine will consist in the combination of the aeroplane and lifting screw systems. In the way of safety there will be undoubtedly an advantage in retaining the aeroplane surface in case of falls, even though it may not be adjusted to support a certain weight, like a parachute. In the case of Mr. Orville Wright's accident, the spread of canvas to some extent retarded the fall. In the opinion of Mr. Orville Wright, had the accident happened higher up in the air he would have been able to right the machine, and glide safely to earth with it.

Concerning the fall of an aeroplane through accident, such as the collapse of a motor, or even the gliding down purposely without motor action when near to ground, I would like to make a suggestion. If arrangements could be devised to suddenly make the sustaining surfaces convex when about to descend, a safe descent would probably be much facilitated. When I take a flat strip of paper and let it fall, in the majority of cases it will fall revolving rapidly, a fact first pointed out by Maxwell and afterwards commented upon by Lord Rayleigh as a fact that has not been completely explained. But if I curve up the ends of this strip very slightly, the strip generally falls to the floor without turning over. If I let the strip fall ten times in succession, it will probably maintain its stability throughout the test. This is, I think, an experiment worth a practical test.

While on the question of means of securing safety, in may perhaps be suggested that in experimental flights it would be advisable if the operator and his companions provided themselves with parachutes, which probably in the future will come to be regarded as the life-buoys of flying machines. It would be possible for parachutes to be so suspended that the weight of the aviators suddenly thrown on to them would release them. Probably the best form of parachute will be found to be one with a rotary fall, a principle that has yet to be worked out. The sycamore seed in falling affords an example of a rotary parachute.

There are some who say that the experiments of the Brothers Wright show that the conquest of the air is complete. But those who speak thus grasp not the situation. It is true that the Brothers Wright have, this year, shown that mechanical flight is possible in a calm atmosphere, and in slight breezes, and this is in itself a triumph. But before we can say man has mastered the great problem of flight, he must fly not only in tranquil airs and slight breezes, but against strong winds and treacherous gusts. Then only will he have wrested from the sea-gulls their long-guarded secret, when, like them, he can use the swift moving air currents to aid his flight. When the aeroplane has encountered the storm, and sailed in its midst undisturbed, and come back safe to port, then, and then only, can he say that, for everyday practical use, the aeroplane has come.

There will, too, be much to be learnt concerning the tricks and ways of aerial currents, even in more tranquil airs. The following simple experiment may suggest how the balance of an aeroplane may be unexpectedly upset by an uprising current of air.

When the wind blows against a cliff or steep hill there is produced an upward current of air. Now imagine an aeroplane comfortably travelling and maintaining its equilibrium and stability. When it reaches the region of the cliff and the sudden uprising current, there will be a great chance of its equilibrium or stability being upset.

In view of the possibility of man acquiring, like soaring birds, the power of making use of the vertical component of the wind, the internal work of the wind, *i.e.*, its gustiness, and even the non-uniformity of wind, *i.e.*, its different velocities at different levels, it would seem important that every light that can be thrown upon the difficult subject of equilibrium and stability, experimentally and mathematically, should be eagerly sought. In connection with the subject of "longitudinal stability," I should like to call special attention to the remarkable researches of Professor G. H. Bryan and Mr. W. E. Williams.

* Abstract of a paper read before the Royal Society of Arts on Wednesday, December 2nd, 1908.