The increase of velocity here given is the increase in metres per second between each successive 200 metres, and is found by comparison of cloud and wind velocities. The slight decrease in velocity found between 1,000 and 1,400 metres is probably caused by the ascending slower moving currents from a lower level by which the cumulus clouds at that level are formed. The mean of the first six of the numbers in this table give a mean rate of increase of 0.28 metres per second per 100 metres, as does also the mean of the second six and the mean of all. This would make the formula for the rate of increase in summer $dv = dh \times 0.0028$, which agrees very closely with that previously given for summer.

The extreme velocities which are likely to be encountered at each altitude are indicated by the following mean and maximum velocities of cloud forms which float at different altitudes :

Mean height in metres........................	8,884	6,633	3,856	1,614	508
Mean velocity in metres per second........	38.5	32.5	15.7	11.3	8.7
Maximum velocity in metres per second...	102.6	66.9	33.0	30.8	18.0

The maximum wind velocity for five minutes found in ten years' continuous record on top of Blue Hill, which is 202 metres above sea-level, and about 6 miles from the sea-coast, is 39.4 metres per second ; but this is probably at least 20 per cent. too high, since it is well known that the anemometers now in use in the United States and elsewhere record velocities considerably too high when the wind is above 10 miles an hour.

H. H. CLAYTON.

PILCHER'S SOARING MACHINE.

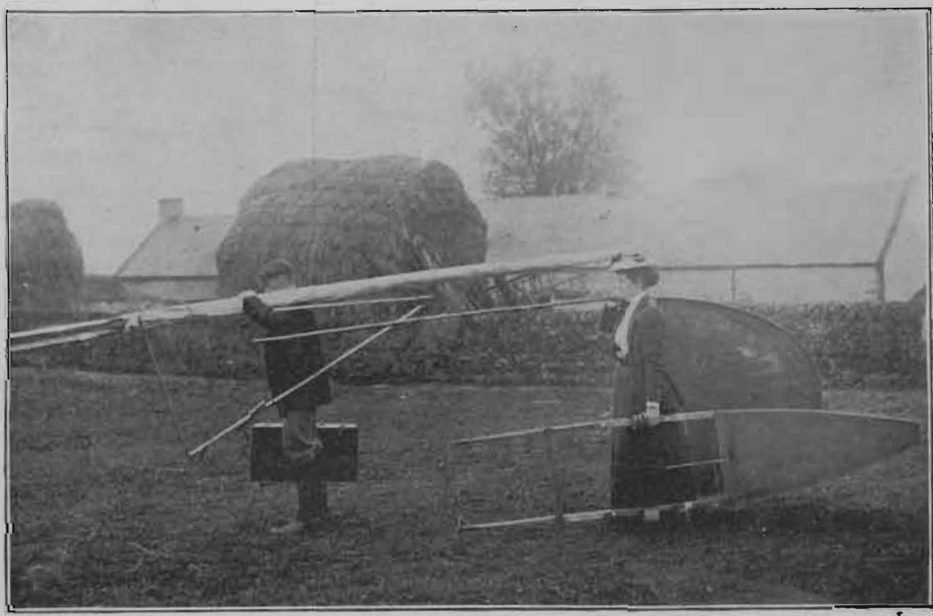
THE engravings which we give herewith illustrate a soaring machine made by Percy I. Pilcher, Esq., Assistant Lecturer to the Naval Architecture and Marine Engineering Class at the Glasgow University, and Draftsman in the shipbuilding firm of Messrs. J. & G. Thomson, Clydebank. The machine was made to try to repeat the very successful experiments made by Herr Lilienthal, of Berlin. It consists of five parts—*i.e.*, a body piece, a triangle, wings, and a rudder.

The body piece forms the centre of the machine ; on it the experimenter rests ; the back half of this is canvased in, while at the front the spars project like two bowsprits.

The triangle is fixed on to the body piece at the front of the machine, and each side of it passes through a quadrant-shaped steel plate, which is screwed to the body piece and also to the front spars of each wing.

The wings are made of nainsook, the most suitable material to be had at a moderate price. Their shape can be clearly seen in the pictures ; their area is 150 sq. ft. The extreme point of each sail is elevated 4 ft. above the body piece, to the spars of which their inner edges are laced. The sails are kept quite rigid by piano-wire bracings, which come from the apex of the triangle to three points on the upper side of each rib, while the same number of wires are drawn from the under side of each rib to each side of the base of the triangle.

The front spars of the sails cross each other in front of the triangle, and their extremities are lashed to the opposite sides of the triangle, while the inner end of each of the ribs, which are much lighter than the front spars, is finished with a small steel plate, which is fastened by means of a bolt to the quadrant-shaped steel plate on the triangle. The machine is made entirely of white pine, and its total weight, including sails and rudder, is 44 lbs. Mr. Pilcher has permission to practise on a hill at Wallaceton Farm, Cardross. This hill has a fairly steep slope toward the prevailing wind.



PILCHER'S SOARING MACHINE FOLDED FOR TRANSPORTATION.

The first two days of practice there was an absolute calm, when he simply ran down the hill with the machine, the air taking the entire weight off his feet—*i.e.*, his own weight and that of the machine. He found it necessary to make some slight alterations in the balance of the machine, and also to substitute a vertical and horizontal rudder, as shown in the last two pictures, for the original one, which was vertical only and much smaller.

On the third day's trial there was a wind of 15 miles an hour, unfortunately rather puffy, blowing up the hill from which Mr. Pilcher experiments.

Having rigged at the foot of the hill, he cautiously and with some difficulty proceeded up the hill backward, the wind taking all the weight of the machine ; then, slightly elevating the front edge of his wings, he was taken up 4 ft. into the air, and remained there poised for ten seconds, when, throwing his weight slightly forward, he came down on exactly the same spot as he went up from.

Afterward he ran down the hill several times, taking, without any effort, leaps of up to 60 ft. in length at about 2 to 3 ft. from the ground. Being caught by a side puff, the machine was blown over, and the front starboard spar was too much broken to mend on the field. The following week Mr. Pilcher repeated these experiments with much the same success, but again broke one of the spars. He attributes these accidents to the fact of his wings being so much elevated at the points that a puff of wind from the side can get under one wing and raise it while the other is sheltered. Therefore, before mending the machine described above, he has determined to build another on the same principles, but of entirely different structure, and with the wings very much less elevated. With this machine he hopes to obtain better results. The machine weighs slightly more, but has a correspondingly larger sail area. This machine Mr. Pilcher hopes will be ready for trial in a few weeks.

AERONAUTICAL NOTES.

Observatory Balloons.—At the recent races between the sloop yachts *Vigilant* and *Defender*, Professor Carl Myers managed a captive balloon for the New York *Evening World*, in the car of which a reporter was stationed to telegraph the positions and manœuvres of the boats to the office of the paper. With the exception of a trifling difficulty on the part of the reporter in properly focusing his glasses, the scheme was eminently successful, and will probably be repeated at the races of the present month.

A WRITER in the *Deutsche Bauzeitung* has some ideas in regard to the method of propelling the air-ships of the future, which have a certain interest, although they are not altogether new. Regarding as necessary conditions of flight through the air the employment of sustaining planes, and of some propelling force, he says that, instead of the revolving helix commonly used, it would be, in many respects, advantageous to employ a simple jet of air to produce the reaction necessary for driving the craft in any desired direction. The water-jet has already been applied to the propulsion of steamers, with