

### AEROPLANE EXPERIMENTS.

BY MAJOR B. BADEN-POWELL.

I recently published a description of the apparatus which I have erected at the Crystal Palace for giving initial impulse to a man-carrying aeroplane in order to test the balance and steering arrangements. Since this account appeared many more experiments have been conducted, although we have learned what a vast amount of small details need alteration and adjustment before good results can be obtained. Repeated trials showed that the boat sliding down between the inclined rails did not nearly attain the speed which it should have accomplished according to theory, and it was only after many days that one cause of this was discovered. Although the gage of the track had been carefully tested on completion, and though the inside of the rails appeared to be perfectly straight, a subsequent measurement of the gage, after the structure had been subjected to many days' alternate sunshine and rain, proved that the wood had swollen and warped so that there was a slight contraction about half-way down. This was just sufficient to cause the boat, in its descent, to become slightly jammed between the rails,

of very rough usage, and scarcely suffered at all from its plunges into the water. The aeroplanes were of thin cambric, stretched on bamboos of about  $1\frac{1}{2}$  inches diameter at the butt ends. These were fixed to the boat, but otherwise not stayed or trussed in any way; and though they bent upward considerably during the descent through the air, proved to be amply strong for the work. By constructing the wings on this principle, instead of so staying them as to be rigidly horizontal, an advantage was gained in that while on the track the ends were not caught by any side wind, yet, while supported in the air, a considerable dihedral angle was formed which gave the desired transverse stability. On June 13 some larger aeroplanes were fitted. These were of hexagonal shape (being, in fact, constructed of old man-lifting kites), and were each of 118 square feet area. The arrangement may be seen in the last photograph. The lower end of the track had now been altered by removing the end support so as to allow the ends to droop. This is shown in the two photographs of the apparatus in the air, the boards having sprung back into the horizontal position after having been de-

square feet, and it then seems probable that we may be able to make some useful glides, full accounts of which I hope to send in for the next number.—Knowledge and Scientific News.

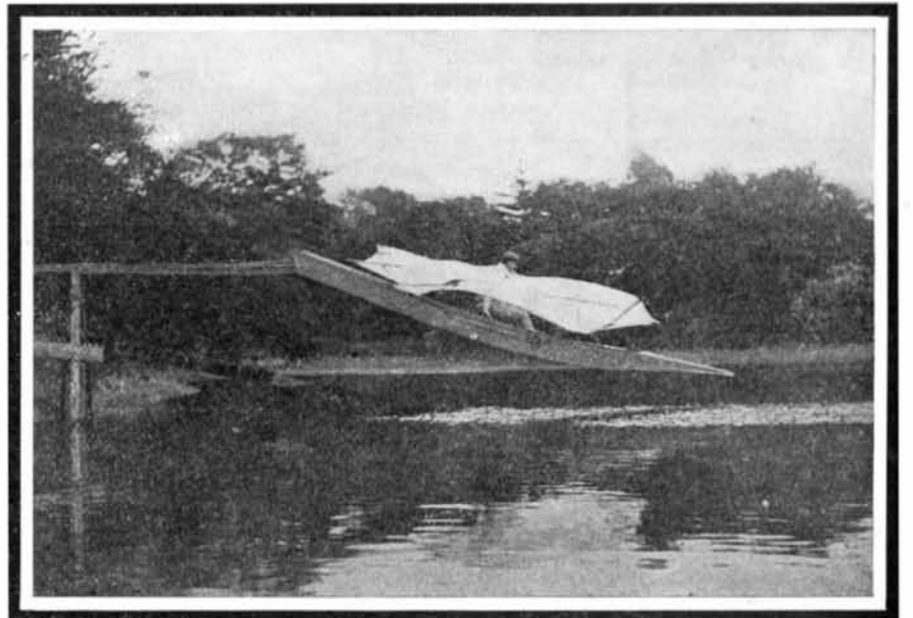
#### An Important Invention in Textile Machinery.

An invention has just been perfected that will, without doubt, attract the attention of the textile manufacturing world. It is a warp-twisting machine that fastens the ends of two warps by twisting the single threads together. It is designed to do away with the present method of twisting by hand, which is necessary in order to fasten the ends of the warp in the loom to those of the new warp without taking the former out of the shafts.

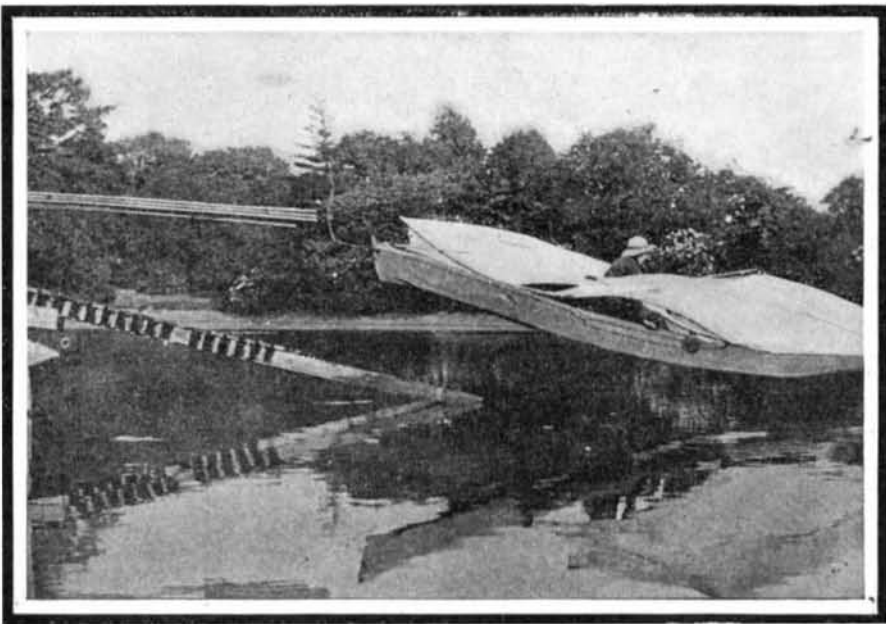
The inventor is Mr. Gustav Hiller, of Zittau, a prominent manufacturer. The machine represents six years of patient labor, and has become an accomplished fact after repeated failures. I am informed by manufacturers and experts thoroughly conversant with this branch of manufacturing industry that there is at present no such machine in use, or at least none that has proved entirely practical. The history of many



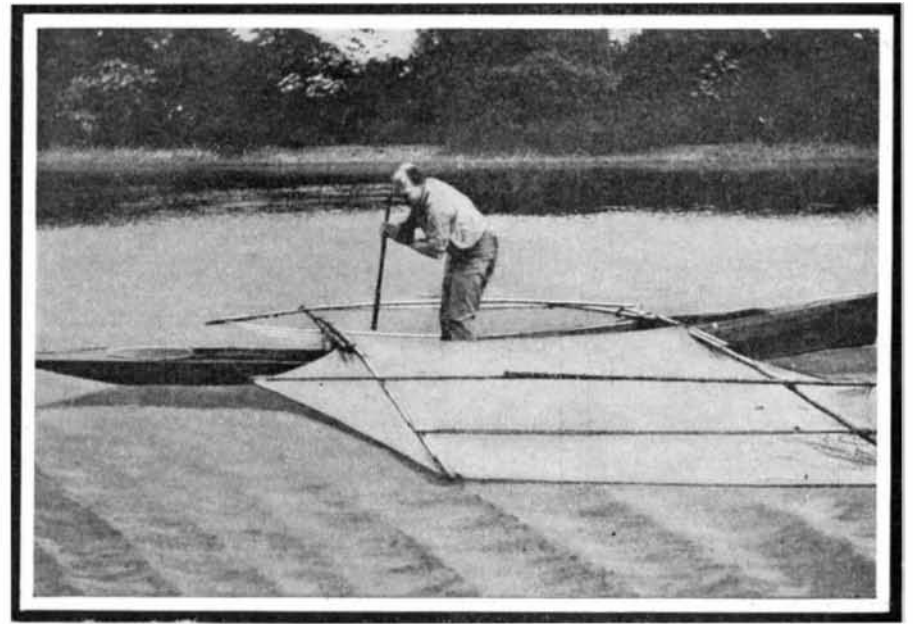
Ready to Start.



The Aeroplane in Mid-Air.



Gliding Along.



Paddling Ashore After Descent.

#### MAJOR BADEN-POWELL'S AEROPLANE EXPERIMENTS.

but not sufficient to stop its way, so that to all appearances the apparatus simply ran very slowly. This difficulty was, of course, soon overcome by planing away about  $\frac{1}{4}$  inch from the inside of the rails. Then various trials with different forms of lubrication for the runners showed difficulties with this method, and resulted in the application of small wheels to the sides of the boat in place of the oak runners. The track itself was also altered, as it was found that the "take off" at the lower end was rather too steeply inclined and detracted from the speed. On June 8 the first trials were made with a man in the boat, and several fairly successful descents were made, both by Mr. J. T. C. Moore Brabazon (who has kindly given me most valuable assistance in these trials) and by myself. The size of the aeroplanes used on this occasion was insufficient to make a good glide, the total weight of the apparatus amounting to some 270 pounds, and the area of the aeroplanes (each 12 feet by 5 feet 6 inches) to only 132 square feet. It was considered desirable to try the apparatus with this small aeroplane, with the object of testing the strength of all parts, and in this respect the results were most satisfactory. The boat, consisting of rough boards and battens screwed and nailed together, covered with canvas, stood a lot

pressed by the weight of the boat. As the boat left the track, it was canted forward so that it shot downward into the water too abruptly to make a good glide. There was, moreover, on this occasion a considerable head wind, which often interfered to some extent with the apparatus attaining a good speed, but which was not found to be so serious as might be thought. The usual time of descent from the top of the track to the take-off was just 3 seconds, being sometimes extended to  $3\frac{1}{2}$  seconds. On June 18 further trials were made, after a number of minor improvements had been effected. The lower end of the track was now rigidly supported and set so as to be exactly horizontal. A triangular "beak" of 18 square feet was spread in front of the same hexagonal aeroplanes, and some fairly successful glides were made, although, of course, the weight per area (1.24 pounds per square foot) was still very excessive when compared to the proportions which previous experimenters with aeroplanes have applied.

Now that the general arrangement and practical working of the apparatus has been well tested, it will be possible to make more exact trials. It is proposed to fit on an upper aeroplane and other additions to make the total supporting surface up to some 430

patents on machines designed to perform this work seems to be a history of failures.

Both warps are put into the machine with cross rods so that they are directly opposite each other, and the ends are held together by a press, which is lifted by the machine, in order to slacken the warp, at the moment that the two threads which are about to be fastened together are taken into the twisting apparatus. The machine works automatically—takes a single thread from each warp, cuts them, and twists them firmly together.

This machine is applicable to all classes of yarns, be they cotton, wool, linen, or silk. It is able to twist about 2,500 ends in an hour, whereas a good hour's work for an expert twister is 800 to 1,000.

Considering that the machine does the work of about three experienced twisters and can be operated by an inexperienced workman, the advantage of its use is very perceptible, and it will no doubt quickly supersede the old method, especially where plain and dobby looms are largely used.

An olive tree containing 1,000 incandescent electric lights is a part of an olive oil display in the Agriculture building at the World's Fair.