The PRESIDENT: The Honorary Secretary will now read the minutes of the last meeting.

The HON. SECRETARY (Mr. Eric Stuart Bruce) read the minutes.

The HON. SECRETARY: I have received a telegram from Capt. Scott, the Commander of the Antarctic Expedition, expressing his very great regret that he could not be present at the opening meeting of the Session to say something about the use of the balloon in the Antarctic regions. But I am very glad to say that in the telegram he holds out a prospect of giving us a paper on the subject when he can manage to do so, and is free from his many lecturing engagements all over the country. I also received a telegram from Dr. Shaw, who wished very much to be here to-night, and who we hoped would speak on Dr. Hergesell's paper. I am sorry to say that at the last moment it has been rendered impossible for him to come, and he has expressed his very great regret.

The Aëronautical Competitions at the St. Louis Exhibition.

BY MAJOR B. BADEN-POWELL.

Having only quite lately got back from the World's Fair Exposition at St. Louis, I feel that some short account of what has been going on there will not be out of place. Our Society was well represented there. Colonel Capper and Mr. Walter Reid both took a prominent part in the meetings of the Aëronautic Conference, and also on the jury in the Kite Competition. It seems very unfortunate that we have not more interesting results to record. The Administration offered numerous large prizes in hopes of attracting inventors and being able to show some startling novelties. But these were not forthcoming. It is with much regret that I feel bound now to refer to this method of offering prizes. The Council of the Aëronautical Society was requested by the Administration of the Exposition to bring the matter forward in England, and we did all we could to encourage competitors to go over and compete. I myself entered for many of the competitions, but I do not now wish to refer to personal matters. I was well treated by the authorities, and only bring forward the subject of the prizes on public grounds.

The sum of 200,000 dollars, or £40,000, was officially said to be set aside for the Aëronautical Competition, of which £10,000 was for expenses and £30,000 to be offered as prizes. I need not now repeat the various conditions laid down, but will merely say that for one reason or another every one of the prizes was withdrawn with the exception of £100 for the Kite Competition. Among the prizes was one of £500, with a second of £200, for a light motor suitable for airships. I took over such a machine and duly entered it, but, after considerable delay, was informed that the prize would be withdrawn, though no good reason was given me for this course being taken. I much fear that such action will have a deterring influence on would-be competitors in similar exhibitions in the future.

As regards the Kite Competition. The first was for the best angle and greatest stability with 800 feet of line. For this there were 12 starters. My own, the only English entry, unfortunately broke its line after being up only half an hour. But, I may be allowed to say, the judges reported very well of it while up. Eventually the first prize was awarded to Dr. Wardwell's son for a beautifully-constructed box kite, the average of seven observations giving an angle of 64°, and nine marks out of a possible 10 given for stability.

The high-flight competition of not less than one mile high was unfortunately a failure, as the very light winds prevailing did not admit of any rising beyond 3700 ft. My special novel form of kite was shown, although some days later Professor G. Bell's tetrahedron kite was flown most successfully.

In the Gliding Machine class there was only one entry, Mr. Chanute's machine, manned by Mr. Avery. The grounds not being suitable for a proper downhill glide, the contest was withdrawn. But on several occasions an exhibition was given, in which the apparatus was towed by a long string which was wound in by an electric winch. This unfortunately ended in rather a nasty fall, in which Mr. Avery sprained his ankle.

As regards Airships, three vessels put in an appearance. The most promising looking was the Francois-Lambert. This consisted of a large elliptical balloon of 40,000 cubic feet, supporting a car of woodwork with a 25,000 horse-power petrol engine. The chief feature was the method of propulsion. Four screws were employed. Two shafts were arranged, one on each side of the car, and on each end of them a pro-

PELLER was fixed, the rear screws being much larger in diameter than the front ones. However, here again was misfortune, for owing to accidents to the hydrogen generator the balloon was never filled.

Mr. Baldwin's airship made several ascents. It was of the now usual form with a triangular girder wooden frame and a screw propeller, 10 ft. diameter, in front, rotated by a 5 horse-power petrol engine. On the first occasion (when it was piloted by Mr. Knabenschue, Mr. Baldwin being too heavy), though the wind was very light, it drifted away, making large circles in the air as it went, which seemed to indicate that it was to some extent under control. On a later occasion, when very calm, it returned to the shed.

Mr. Benbow's was a balloon of 16,000 cubic feet, well constructed, and having a more powerful engine of 10 horse-power. It was propelled by a pair of four-bladed feathering paddle-wheels, ingeniously constructed, but evidently wasteful of power. One day this was tried in a practical calm, when it manœuvred up and down the grounds. It was thus possible to get a very accurate idea of its speed, which, from walking alongside the machine, I estimated to be just about three miles per hour. On another occasion much the same result was obtained, but the lift of the balloon was unfortunately not quite sufficient, and it several times came to the ground. It will be gathered from this very brief account that no startling advance has been made in aerial navigation at St. Louis. But at the same time these trials were most interesting to watch; and if one has not learnt exactly how to navigate the air, at all events we have learnt some lessons as to what *not* to do.

Col. CAPPER: Mr. President, Ladies and Gentlemen,—I do not think I have very much to add to what Major Baden-Powell has told us with regard to the St. Louis Exhibition. As an aeronautical show I think it was not a success, the chief faults being, I think, that the prizes were very big, the conditions were very onerous which had to be fulfilled to gain any particular prize, and the expenses of taking an airship of any sort to St. Louis and staying there were very heavy, so that, even though one machine might have won the big prize, the owners of all the others would have been very much out of pocket. We should have liked very much to have seen M. Santos-Dumont there, but we know he gave up the idea of having his

balloon there. We should also very much liked to have seen the Messrs. Wright Bros., and see what progress they had made with their machine. I think at the same time from the experience we gained there we can all do a great deal more in the way of experimenting with gliding machines in this country than has been done. I do not know whether the President would agree with me, but I think we are distinctly behind in the actual manufacture of gliding machines. I shall be very much surprised if we do not hear from America before long of a gliding machine driven through the air by a motor. I am not at liberty to give any details on the subject, but I shall not be surprised if we hear of that being practically done. It seems to me it is rather bad for us to allow the Americans to lead us in that direction. If people who had the ground and the time would make some experiments in gliding machines, I think they would be doing useful work; in fact, much more so than by devoting time and money to those expensive machines that have a gas bag attached. I do not think it necessary that a machine should be in any way very large in order to get, say, a pace of 30 miles an hour. I understand that with a small machine a weight of 2 lbs. per square foot has been supported, and that is very good, because to take a comparatively light machine with a motor and a man would make the whole thing about 800 lbs. or less, and then you need not study the extreme lightness, which we have all been aiming after in the construction of a machine, to the detriment of strength and efficiency.

Mr. WALTER REID: Mr. President,—There is little I can add to what you have already said with regard to what took place at St. Louis and the apparatus we had there. But I think we ought not to be discouraged even if there were not any very brilliant successes. The science of aeronautics has been built on failures, and the more we have, the better the foundation. One often learns more from a failure than from a partial success; in fact, I think that the partial success that has attended ballooning has done more to retard aerial navigation than anything else. At the same time, I think the authorities of the Exhibition, although they imposed rather onerous conditions on those who contended for the prizes, are to be commended in having done what they did to further the science of aeronautics. They went to a great expenditure, not only in the place which they prepared for these

contests, but also in the apparatus—the hydrogen apparatus—and they did a very great deal to further the science of aëronautics in the way they thought best. Perhaps with the experience gained there we shall know better what to do in any future international contests that may be arranged. I think we learnt a great deal from the kite contests. We did not attain such altitudes as last year, but at the same time, having regard to the conditions of the wind and the general conditions, I think we certainly did learn something with regard to soaring. Referring to the gliding machine, I think we ought to recognise the way in which that apparatus was placed at the disposal of anyone who wished to use it. I think that is a point we ought to place on record. Anyone who liked could have the use of that apparatus; it was not protected by a patent, and other people were not prevented from using it. I think that is one of the reasons why it was tried so well. It is quite true we in this country have not done what we ought in that particular line, and I really think if a few gentlemen, who have had experience in the matter, were to unite and get up a small fund for the purpose of making experiments of that kind, it would be very much easier for anyone to carry on experiments than it is now with a number of people trying individually to make separate machines, and perhaps each with some little error. I therefore think that if we were to unite and get up a small fund to make a soaring machine, approved by all of us, and that should be at the disposal of other members, I believe that would prove a practical step in the way of making progress.

On Kites, Kite Flying, and Aëroplanes.

By W. H. DINES,

Vice-President, Royal Meteorological Society.

At the present time kites are used to obtain information about the temperature and humidity of the air above us, and efforts are being made to construct a flying machine capable of carrying one or more persons.

At first sight it might appear as though there were no relation between these two matters, but they are, in reality, very closely connected. The kite is held by a string or wire, and the wind passing over the kite

supports it and at the same time causes it to exert an upward pull upon the wire. To fly a kite in the ordinary way the first requisite is sufficient wind, but if the lower end of the string to which the kite is attached can be moved forward with sufficient rapidity, by fastening it, for example, to a fast steamer or motor car, the kite can be flown when there is no wind. The problem of the flying machine consists in replacing the steamer or motor car by an engine and aërial screw, so light that they may be lifted by the kite, and yet so powerful that they may be able to draw it forward with sufficient velocity. In this case the kite is called an aëroplane, and the motor and screw are placed in it or close to it; but these are only matters of detail.

To make a good kite and a good aëroplane is not precisely the same thing; both should be light, and it is most important that both should be stable; both also should be simple, since the more complicated they are, the more liable to damage and derangement; but while a kite should be incapable of exerting more than a limited pull, this point is of no consequence for the aëroplane.

My own experience has been solely with kites, and it is of them only that I am entitled to speak, but there can be no doubt that information about the flying power and steadiness of a kite may be most useful to the maker of a flying machine.

Kites have been used as playthings for many centuries, and it may be stated broadly that in a steady wind of moderate velocity almost any kite will fly. But the flat kites are hardly stable when the wind is strong, and Hargreave made a long step forward by his invention of the box kite, a form which, so far as I know, is embodied in every kite that is stable in really strong winds.

The ideal kite for meteorological purposes should be stable in any wind, and should be incapable of putting more than a certain definite strain upon the wire that holds it. An engineering structure, such as a bridge, is so designed that no part of it shall be subjected to more than one-third or one-quarter of the strain that the metal will bear without breaking, but the kite flyer, if he desires to reach any considerable height, has to be content with a much smaller margin of safety. If a kite could be obtained that always exerted the same pull upon the wire, provided, of course, that the wind surpassed a certain velocity, kite flying would be a