

Here is St. Paul's from a height. You can even see the pigeons on the steps.

I must say that I think aerial photography ought to be used more in peace time from the point of view of technical photographs and generally to exploit places, because it gives a very graphic view. It should certainly be exploited commercially.

This is the last photograph, which I thought a picturesque one, of a Bristol Fighter flying along, and I thought it best to come back to show you the actual pilot, because the photographs which were taken during the war were at great personal risk. The loss of life was very, very high, and the work was done for the sake of the man in the trenches. That was the primary work of photography in the Flying Corps—to help the poor man sitting in discomfort in the trenches. I am sure that is why all those pilots went out with a willing heart, some of them never to return.

#### DISCUSSION.

CHAIRMAN.—I have listened with very great interest to the excellent lecture given by our President. He has given us the early history of aerial photography, and he has told us in graphic language the evolution of the modern aerial camera, very modestly referring to his own genius.

I will not detain you further, because the time is getting on, but I will remark that we have all enjoyed the lecture immensely. It has taken me into quite new fields. The evening is getting on, and I therefore now invite you to commence the discussion.

MR. H. B. MOLESWORTH.—This is a subject of which I know nothing. I have been extremely interested, but it is not a subject on which I can start any discussion whatever.

MR. HOWARD-FLANDERS.—The only thing I wish to ask is whether most of the photographs were taken at sunrise or sunset.

THE LECTURER.—They were only taken when the light was best: midday if possible. Many were taken in the early morning, but at that time, and later on at night, the light becomes yellow. Although we had faster lenses at the end of the war, some were not so quick as we should have liked, and we therefore had to take most of the photographs at midday.

COLONEL BELAIEW.—As one of the many people who had the honour of standing some few months in the trenches, I should like to say that from our point of view such photographs as we have seen are, of course, of the greatest use and benefit. The part I spent in the trenches (1914 and 1915) was, of course, at a time when we were without the pleasure and privilege of having these photographs. As the O.i/c of an Artillery Battery I understand perfectly well what immense personal risks and what immense difficulties we

were always faced with in order to get the slightest information about the enemy batteries and all such things.

I should like to say that every evening I had to take out two or three of my men and expose them to some risks by taking them as close as possible to the German trenches, and then wait for them the whole night until sunrise, in order to be able to get some small picture which would help us during the day in locating the German batteries. The first photographs which were taken from our aircraft could not be compared with the really beautiful ones we have seen to-night, but we all considered them as a godsend. I was very much struck with the remarks of our President that all these photographs were taken, not for the sake of the man who was flying, but for the sake of the men who were lying in the mud.

THE LECTURER : I should like to say that just as we had difficulty in getting the Army to use photographs for other purposes, so, strangely enough, there was great difficulty in getting the Artillery to use them.

MAJOR C. C. TURNER.—I have taken many photographs from the air with ordinary cameras, and I have always had great difficulty in estimating the amount of exposure necessary. The textbooks say you might have too brief an exposure, but my experience has been that I get bad results. Possibly our President can reply to this.

I do not remember him saying anything about the information which the people carrying photographic reconnaissance gained from shadows; that is to say, efforts were made by people on the ground to camouflage by means of spreading about boughs of trees and so forth, and I have an idea that the only way that was determined was by observing the different directions of shadows at different times of the day. If there was no difference in the direction of the shadow they knew it was camouflage, but if there was a difference they knew otherwise. I think the lecturer might have dwelt rather more on that point. I could very well have listened to a lecture of much greater length on this subject.

THE LECTURER.—The question of camouflage is a subject entirely by itself. The speaker is quite correct in saying that by studying two photographs taken at different times of the day the direction of the shadows showed whether an area was camouflaged or not. I do not know if you remember that towards the end of the war a gentleman named Solomon J. Solomon started an agitation about what he said were enormous concentration camps on the German side. When you look at a photograph of a field and very little else, you can very rapidly get into your head a sort of idea that really the thing is a tent built up, and we had great trouble with Mr. Solomon, who went to the Secretary of State and the Chief of Staff, and said, "These photographs are proved to be wrong." He seemed to have forgotten that if it was a tent it was one of about forty acres, and when you remonstrated with him he said, "This is not a road; this is a tube." Then we dropped some bombs on these fields to prove that they were fields. Even now he still maintains that the Germans took away this thing—a tent of some fifty acres!

With regard to camouflage, however, that is really a most interesting and important subject, but I should not be the one to deal with it. I could get someone to come and give a long lecture on it, but I butted off it as soon as we had imposed upon the General Staff the interpretation of their operations.

What should be the exposure? You must remember that at first we wanted very great contrast. You got this by using a very slow plate and carrying the development rather far. The exposure would be a ninetieth to a hundredth per second.

MR. LE PAGE.—I am afraid I know very little about photography of any sort, but my experience of flying reminds me that there was always a very thick mist over the earth, and in the photographs that we have seen to-night it struck me rather forcibly that this mist seems to be practically absent. I should like to ask whether there was any serious trouble with this mist. Before sitting down I must tender my thanks for a most interesting lecture.

THE LECTURER.—That mist was a big thing to contend with at first, but by the use of deep filters (K. 3 and 4) this blue light was cut out and you got right through it to the earth quite well enough to always get a tremendous contrast. If you cut through the blue mist you got your results, but not the flat results that were wanted at the end of the war.

One thing you cannot get over is a trouble known as "dither," due to the varying heats in the air, which gives different refractive indices to the air. Looking down, the varying temperatures did not matter, but when you got on to a high angle it was very difficult for you to cut sideways through the layers of air of varying temperatures. Nothing can get this right, and good obliques have to be taken early in the morning or late at night.

MR. DOUGLAS SHAW.—As one who took photographs in 1916 I was very interested to hear that oblique photos were made use of in the latter part of the war. In 1916 I believe there was no demand for them at all. At that time photography was about the most nerve-racking job we had to do. I remember during a certain three weeks having nothing else but photography to do, and at the end of that time I got shot down on the job. After a fortnight I was sent back to it again, and I then found that in dodging the "Archies" I took so many oblique photos that I had to go on to another job.

THE LECTURER.—I quite agree. I think there was no more nerve-racking work than taking photos, and it never brought the credit that those who did the work deserved. There was always in England a great disinclination to give away the names of those pilots who brought down German machines. The reason was, that the work of the Flying Corps was really work to help the Army in the field. It was not just a personal duel between enemy aircraft, and if we had made heroes, as the French did, of those who brought down enemy aircraft, we should have to a certain extent discounted the tremendous value of the work of taking photos—dull work which did not bring all the excitement

and imagination to bear as with the bringing down of enemy aircraft. That was why that policy was followed in the Flying Corps.

CAPTAIN SAYERS.—This is certainly one of the most interesting lectures I have ever listened to, and I wish our President had gone on further. I think it ought to be emphasised that there was a great amount of what was really engineering work in the development of these cameras. I do not speak with any particular knowledge of aeroplane photography, but from a fair acquaintance with the seriousness of vibration in some other branches of photography. It is astonishing how difficult it is to avoid vibration where you think there is none. I have had cases where a motor-car driving along the road 20 yards away has caused enough vibration to spoil a photograph taken on a cellar concrete floor. The experiments taken to avoid vibration are extremely interesting from an engineering point of view. There have been many books of French and German origin written on this matter, and it would be very interesting to have some comparison as to how the various countries have dealt with the problem.

Regarding Major Turner's query on exposure, I have found great difficulty in getting over this matter. I once used a screened lens on one camera and an unscreened lens on the other. All the photographs taken with the K.2 screen were good, and those taken with the unscreened lens were very flat indeed.

I think that the average amateur who takes photographs from the air in bright weather gets violent over-exposure, largely due to the blue haze.

THE LECTURER.—I think the use of a filter to cut out the blue haze is almost imperative, and I think the panchromatic is even better. The Ilford one is also very good.

There is one little question with regard to technique. When I was under General Trenchard he allowed me to do as I liked. One of the things I had to do was to go to Paris. When there I always got to the Section Technique, and I do not think General Trenchard appreciated the importance of my doing this until one day he came down to our squadron when the French were going to inspect them. The French found a fitting to one of our planes that they fell in love with. General Trenchard said they wanted to adopt it, and asked me where it was found. "I found it in the Section Technique!"

I thank you all very much for listening with such patience to a subject which always interested me, because for four years I talked of nothing but photography; but it is curious that we as a nation always run ourselves down from the point of view of technical capacity. Looking through, and trying to remember everything as it occurred right through the war, I really do not believe that at any time during the war we were technically behind any other nation. Photography was one of those things which we started at, and I do not believe that at any time we were behind, but the whole thing was built up from no experience by the most devoted lot of men, who were gathered together from every walk of life—press, photographic, amateurs, etc. Mr. Simms referred to my part in inventing cameras, but I assure you I played no part except to

co-ordinate the amazing genius which we found spread throughout the Flying Corps. We started a very small section and ended a very big family, but it was a very happy family, and contributed as much as possible to the success of the Flying Corps.

CHAIRMAN.—I propose a very hearty vote of thanks to our President. I note Major Turner's idea of another hour, but I think he overlooks the fact that the President has already given us one hour solid. We shall carry away with us much food for reflection. I conclude with a very hearty vote of thanks.

COLONEL MOORE-BRABAZON.—Perhaps some other time we will deal with another branch of photography, that is, the interpretation of aerial photographs. Perhaps I could deliver such a lecture, but I think it would be better from the mouth of someone else.

A hearty vote of thanks to the President having been passed with acclamation, the meeting then closed.

