FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 206. (No. 49. Vol. IV.) DECEMBER 7, 1912. [Registered at the G.P.O. as a Newspaper.] [Weekly, Price 3d. Post Free, 3½d.

Flight.

Editorial Office: 44, ST. MARTIN'S LANE, LONDON, W.C.

Telegrams: Truditur, Westrand, London. Telephone: Gerrard 1828.

Annual Subscription Rates, Post Free.

United Kingdom ... 15*s. od.* Abroad ... ... 20*s. od.*

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EDITORIAL COMMENT.

Gun *versus* Aeroplane.

"It is impossible to carry on warfare unless we have the mastery of the air."

Thus spoke General Sir James Grierson at the Aeronautical Society's meeting last Wednesday week. And when so distinguished an officer as Sir James Grierson starts plain speaking of this sort it is high time that everyone else should sit up and take notice. When the above expression has been read and re-read so as thoroughly to impress itself upon the mind, its magnitude is staggering and the very transparency of its truth is staggering and the very transparency of its truth is overwhelming. For ourselves, we have always believed as much, but then we do not profess to be soldiers, and in any case it needs an officer of General Grierson's rank to crystallise the situation in a single sentence that is unimpeachable. We hope that Sir James Grierson's words will, metaphorically speaking, be woven on a flag and run up to the masthead in every aerodrome; for they deserve to go down to history as the nation's motto in aeronautics. They constitute by far the most clear-sighted statement that any prominent man has yet made on the subject, and we doubt very much whether anyone will find words better suited to express the truth, the whole truth and nothing but the truth. Let everyone remember them, and above all let the Government see to it that the nation does not lack means to put them into effect before it is too late to try.

Perhaps those who were at the Aeronautical Society's meeting may have been in a better position fully to appreciate the significance of Sir James Grierson's words than are those who merely read them at the commencement of a page of print. The occasion on which they were spoken was a memorable one. There have been no discussions at the Aeronautical Society's meetings equal to those that have dealt with the aeroplane in war; and when General Stone broached the subject of aeroplanes as targets for the artillery, it was a foregone conclusion that the evening was to be full of interest. Everyone has been very anxious to know what the gunners think of aircraft as targets, and if we may judge from the remarks of General Stone and other speakers who were qualified to express an opinion, we should say that, from their point of view, the aerial machine is a pretty bad lot altogether. As far as we could gather, artillery officers have the smallest possible opinion of their chances of hitting aeroplanes or dirigibles; and for the moment, at any rate, it would look as if it would be more by accident than design that any man-bird is likely to get winged in flight during war.

Following, as it has done, upon previous meetings of the Society, in which war aeroplanes have been the subject of discussion, it cannot be denied that General Stone's evening carried the subject a real stage further. Speaking from the layman's point of view, the one thing we wanted cleared up was just this question as to how much danger the military aeroplane might expect to find in the land artillery. On the answer to that question depends the significance of guns on aircraft themselves, and when Major Sykes, who commands the military wing of the Royal Flying Corps, advanced the opinion that the best plan would be not to spend money on elaborate air-targets for the artillery, but to spend it on flying machines that could carry guns up into the air with them, he struck the right nail on the head very hard; we hope everyone else in the room agreed with him.

Opinion on this aspect of the case is all the more significant inasmuch as General Stone purposely approached the problem from the other side by assuming that it was the work of the artillery to fire at the enemy's aeroplanes, and by drawing attention to the main fact that the artillery, as at present constituted, had had

absolutely no practice worth speaking of at firing at anything in the air. Moreover, General Stone pointed out that this question of lack of practice resolved itself into a very real difficulty in securing suitable targets. Artillery practice is not by way of being a drawing-room entertainment, and the places where it can be carried out with any degree of safety are strictly limited, and the best arrangement is, of course, to fire out over the sea, but General Stone showed very clearly that it is by no means easy to get a moving air target high enough up over the sea to be of any real use to artillery on land. This is due, in the main, to the common geological formation of the shore. On a shelving beach, shallow water renders it necessary that any boat capable of towing a sufficiently large target should be so far away that the angle of elevation of the gun is reduced far below the value at which practice is really desired. When deep water is to be found close in shore, the edge of the land is usually precipitous and the gun is already at an altitude of perhaps two or three hundred feet above sea level, which again brings the angle of elevation to much the same value as it was before.

The suggestion of using a model dirigible controlled by wireless was put forward, and criticised on the score of expense; various schemes with kites were also mooted, and General Stone suggested that it might be possible to do something with the painted fish-like aerosacs that the Japanese use on gala occasions for decorative purposes. One way and another, however, it appeared to us that much of the argument relating to the trouble involved in providing a sufficiently *difficult* moving target, lost considerable weight from the absence of any evidence that artillery could readily hit even a stationary object in the air.

If we have read one of the lessons of the present war correctly, it is that successful artillery operations in the field depend primarily upon the extra *rapidity* and ease with which guns can be laid and fired, rather than on their superior hitting power or their longer range, and it seems to us that if the artilleryman could demonstrate his ability to bring down a captive balloon on the word "go," it would then be time enough to talk about the necessity of providing some more advanced form of practice. If the artillery want practice at high angle elevation, we would suggest the use of hot-air balloons. They are very cheap to make and we should imagine that they might prove very effective. They can be made of considerable size, and the theoretical limit to their altitude, according to a calculation in "Flight Manual," is in the order of 8,000 feet, so they ought to provide all the scope for elevation that is needed.

According to another reference in the same book, by the way, there is a statement, on the authority of Major Hildebrandt, that a stationary balloon should be hit within ten *minutes*.' In ten minutes, forsooth! Why, a miss would be as good as about ten miles, when firing at a modern aeroplane, if that is the present state of affairs. Indeed, from an observation made by Col. Cook during the course of the discussion—who remarked that an aeroplane travels its own length in less than a second—it is very clear that the artillery, both man and gun, have got to be extraordinarily smart in action if they are to hit even so much as the tail.

Another reason why we venture to assert our opinion that the need for exceptional rapid sighting and firing is still likely to prove an unsolved problem when other difficulties have been overcome, is because it is by no means easy to see an aeroplane when it is far off or at a great altitude. Even when the machine is pointed out in the sky, clear-sighted people are very often quite unable to detect it for a long time. Obviously, therefore, the conditions may often demand shooting at sight, if shooting at all is to be of the least use whatever.

Yet another consideration, of still greater importance, which General Grierson emphasised as a matter of his own practical experience during the recent manœuvres, was to the effect that no one on land could tell whether an aeroplane was friend or foe. If they carried an identification mark for the guidance of their own people, it would equally be visible to the other side, and so it was really impossible to tell whether a machine flying overhead ought to be shot at, or whether it was bringing back comforting despatches as to the disposition of the enemy's forces. Of one thing, at any rate, there was some certainty, namely, that it would never do to shoot at an aeroplane over your own lines, for although a projectile disappears from sight in the air it comes back to earth again sooner or later, and is then apt to have unpleasant consequences where least intended.

These different details are interesting in themselves; their real value lies in their power to help one to fix ideas. The general impression they convey at the moment is that the pilot has little or nothing to fear from any serious attempt on his life by land artillery. Very possibly a stray shot may wreck a machine here or there, but people who fly over the theatre of war will scarcely expect to be altogether immune from accident.

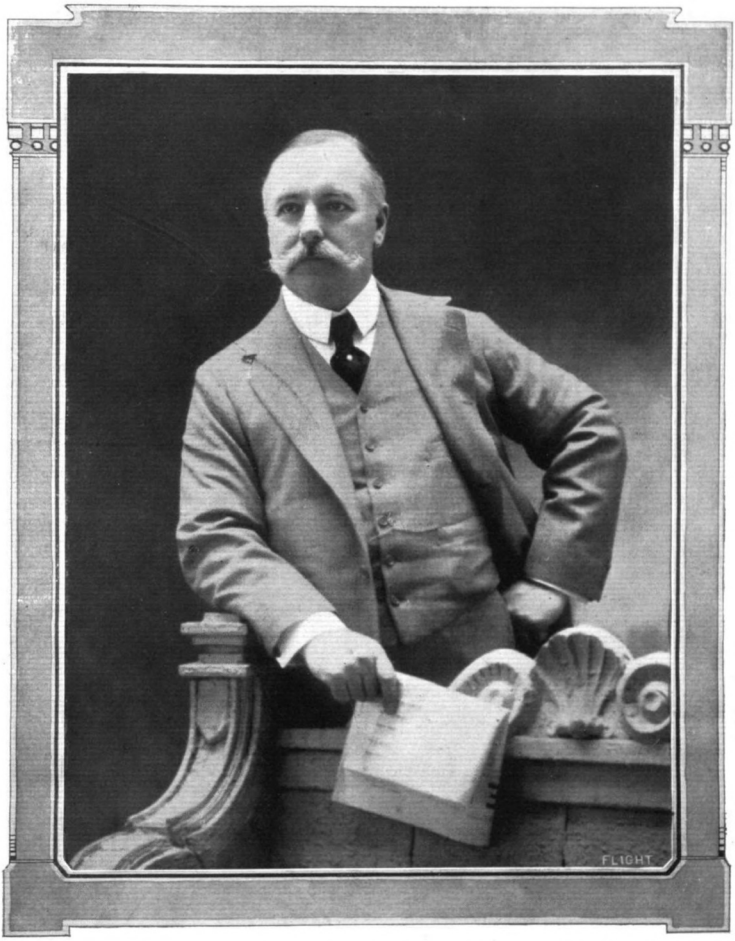
Of the importance of this general conclusion there can be no shadow of doubt. In the face of General Grierson's remark, it should be impossible, in fact, for doubters any longer to exist. If the conditions outlined above represent the true relationship of artillery and aeroplane—and we have endeavoured to present no more than a moderate expression of the argument—then it is quite on the cards that the general instructions to artillery will be to leave aeroplanes alone in time of actual war. In this case, it certainly becomes, as General Grierson says, "impossible to carry on warfare unless we have the mastery of the air." The enemy's aeroplane flies overhead and observes the position of our guns and promptly reports the same to headquarters, which means the speedy annihilation of the battery.

Such being the case, the fighting aeroplane enters into the arena as a machine of first class importance. Not only so, but, having regard to the immense difference between the relative speed of the areoplane and of the army on march, it seems very clear that severe fighting in the air must essentially be a prelude to any decisive land battle, and it is at least conceivable that such fighting may determine the whole issue.

Each army will send out air scouts to reconnoitre the country as far ahead as possible, and the distance to which they will proceed in advance of the main body essentially depends on their capacity for remaining aloft on a single supply of fuel. The machines in the Military Trials, for instance, had to carry fuel and oil for $4\frac{1}{2}$ hours and, roughly speaking, most of them would have been able to accomplish a total journey of 300 miles on that supply. It is not inconceivable, therefore, that an air scout might get 100 miles ahead of the main army, and about the time that the opposing forces are, say 150 miles apart, the serious overlapping of the dual reconnaissance is sure to have commenced.

To what extent the air scouts, as such, may take to fighting amongst themselves is not altogether clear at present, but the idea of such action appears to be

MEN OF MOMENT IN THE WORLD OF FLIGHT.



SIR GEORGE WHITE, Bart., LL.D., J.P., Founder and Chairman of the British and Colonial Aeroplane Co., Ltd., President of the Bristol and West of England Aero Club.

opposed to the best principles of military reconnaissance. The accomplishment of the *return* journey is the only criterion of the scout's success; the amount of his information is merely a question of relative merit. He who sees everything and stays too long is useless, while he who sees something and flies back in time may win the fight. The onus of opposing air scouts must therefore devolve upon another class of machine, which is, as General Henderson described it in a former meeting of the Society, the "destroyer." The aerial destroyer will carry a gun, and the man in charge of that gun must be reasonably sure of putting any air scout within sight out of action if he attempts to cross the line.

That it will all work out this way is, of course, a matter of pure conjecture. It may be that the fast scout will get the better of any slower speed machine, whether it has a gun or not. But even this assumed difference of speed depends on how far the difference between the design of one type and the other is found necessary to effect their respective qualities in the air. These things the future can alone decide, but what the present has to make sure of is that obvious future contingencies are provided against. In this matter the phrase used by Sir James Grierson speaks for itself: "it is impossible to carry on warfare unless we have the mastery of the air."

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Types of Aircraft.

And now we come to the sequel, which is the development of the aerial fighting force. Anyone who cursorily reviews the state of international aeronautics will naturally come to the conclusion that France leads with aeroplanes, while Germany is ahead of other nations in the matter of dirigibles. Replying to Mr. Eyres-Monsell in Parliament last week, Mr. Churchill said "there is no doubt that in this branch of aeronautics Germany has won a great pre-eminence." When the First Lord of the Admiralty makes a statement like this it is time that a community of islanders such as we are should take action.

We have pointed out above how General Grierson's comment essentially led to the necessity of developing some form of aircraft capable of taking the offensive in the air. It is necessary to assume, in the absence of any contrary experience, that the chief weapon of offence will be a gun. Future developments may prove otherwise, but it is necessary at any rate to develop along this line at present. Now the question of carrying a gun resolves itself into the question of being able to carry a considerable amount of weight, of being able to afford a sufficiently steady platform wherefrom to use that gun effectively, and, more important than all, of providing a sufficiently wide angle of uninterrupted attack such as will ensure that gun being operated effectively against the enemy without doing damage to its own ship.

It is notorious that anyone with an eye on a sight will shoot through anything the moment he gets into line, and it is a foregone conclusion that no man in charge of a gun in the air will be able to make effective use of it if he has to be particular how he shoots. The gun will have its range of angular movement, and anything that curtails that range is just by so much at a disadvantage.

Propellers, elevators and other essential organs of an aeroplane must be out of the way, there is absolutely no other alternative. That this is also the official view may be seen from the fact that the Judges, in their Report of the Military Trials, went out of their way to refer especially to the ill-fated Mersey monoplane as the only endeavour that had been made to fit the design to the requirements of actual war. Now this is surely of the very utmost importance to designers and constructors, for it is quite clear that now is the time for enterprising firms to evolve something along new lines. Individual ideas of how to carry the general scheme into effect will vary, of course, and many of them will doubtless involve considerable departure from what is now regarded as orthodox.

Very possibly a few of the present machines could be modified to suit the requirements. Quite recently, Mr. F. Strickland, whose views on these subjects are always interesting, was speaking to us about the possibility of adapting the Avro biplane to this class of work, by rigging a pair of propellers behind the main planes and giving the gunner the whole nose of the enclosed body, with a hole in the roof for his outlook. It appears to us that something of this sort might be extremely useful, at any rate we put forward the suggestion for what it is worth. The Cody and the Farman machines, both of which are big enough to carry guns, are both liable, so far as we can see at the present time, to have their elevators shot away by their own gunners at any moment, for, as we have already observed, a man with his eye along the sight is blind to everything else but the target.

But, the fighting aeroplane of the destroyer class is only one aspect of this side of military aeronautics. The dirigible, which might well prove to have very considerable merits in this direction, is far too apt to be ignored. It is scarcely our fault if the dirigible has been put into the mental background, because there has been so little money to spend in this country that it has seemed to us essential to advocate the development of aeroplanes in the first instance. It has always seemed clear to us that any adequate establishment for the use of this form of aircraft must necessarily involve an organisation of just such a kind as has at last been realised in the creation of the R.F.C. That having been settled, however, and the germ of efficiency having been so well sown, it behoves us to bring the dirigible into the light of day.

Happily, the airship has been less neglected in England than some people think, for although we have nothing to compare with the German mammoths, experiments at the Royal Aircraft Factory have at least been productive of important data relating to the design and use of small airships, such as *might* quite well prove of equal if not superior utility in the long run. No one knows which type will prove the better of the two, but both will doubtless have their uses and, in the matter of small airships, we venture to think that as successful a type could be built immediately in this country as could be provided by any other nation: it is merely a question of having sufficient money to build them in numbers.

In the matter of large airships, of which class the Zeppelin is pre-eminently first, England has no experience beyond the one regrettable incident of last year. A large airship, however, is so costly, not only to build but to use, that one such vessel can quite easily absorb the whole of the moderate sum hitherto available for aeronautics in England, and from the first we have opposed any mixing up of the research into this class of aircraft with that devoted to the development of aeroplanes and small dirigibles, which are relatively inexpensive. We still incline to the opinion that any development of mammoth dirigibles should essentially be carried out at the expense of a separate fund, devoted specifically to that purpose and having no relation to nor influence upon the magnitude of the sum allocated for aeroplane work.

A view of the Royal Aircraft Factory and the Aldershot Camp taken from Mr. S. F. Cody's biplane from a height of 2,000 ft.

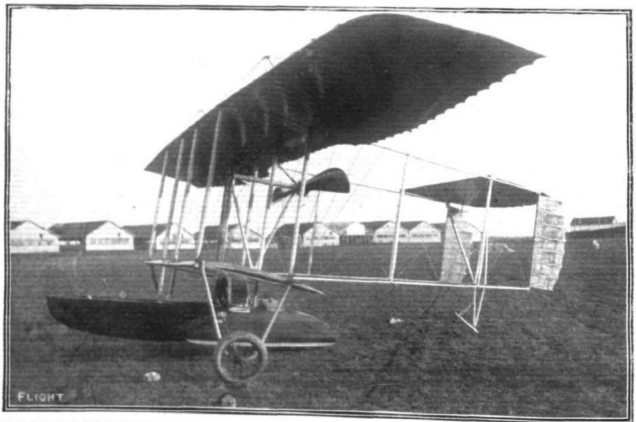
It is all very well to clap applause at Germany's recent accomplishments, but anyone who has followed the past history of German aeronautics as closely as we have of necessity done during a period that extends back to days long preceding the foundation of FLIGHT will have realised that it was not always such plain sailing as it appears to be now. Count Zeppelin is a man who deserves to stand on the highest pinnacle of fame for his sheer perseverance in the face of successive disasters. Time after time his airships have been wrecked, but he and his assistants have never lost heart, and Germany, to her everlasting credit, has always backed him up in his efforts. Others have done very much in Germany, too, besides Zeppelin, and their names equally deserve mention, but surely it was to the indomitable pluck of this one pioneer in particular that Germany owes her supremacy in dirigibles of this class to day.

If England is to keep abreast of Germany in the matter of airships, and with France in the matter of flying machines, and is, in addition, to take a pioneer lead in the development of the real fighting aeroplane, then there is the utmost necessity for concentrating every possible source of energy on the problem. When one realises how suddenly the troubles in the Near East came to a head, it is impossible to rest quiet in the ill-founded belief that modern civilisation is too dignified to do things in a hurry. No one can possibly pretend that it is any longer safe to be content to let other nations pay the cost of experiment. The Englishman has always been a slow starter, but just now this is rather a dangerous policy in the preparation of defence against war.

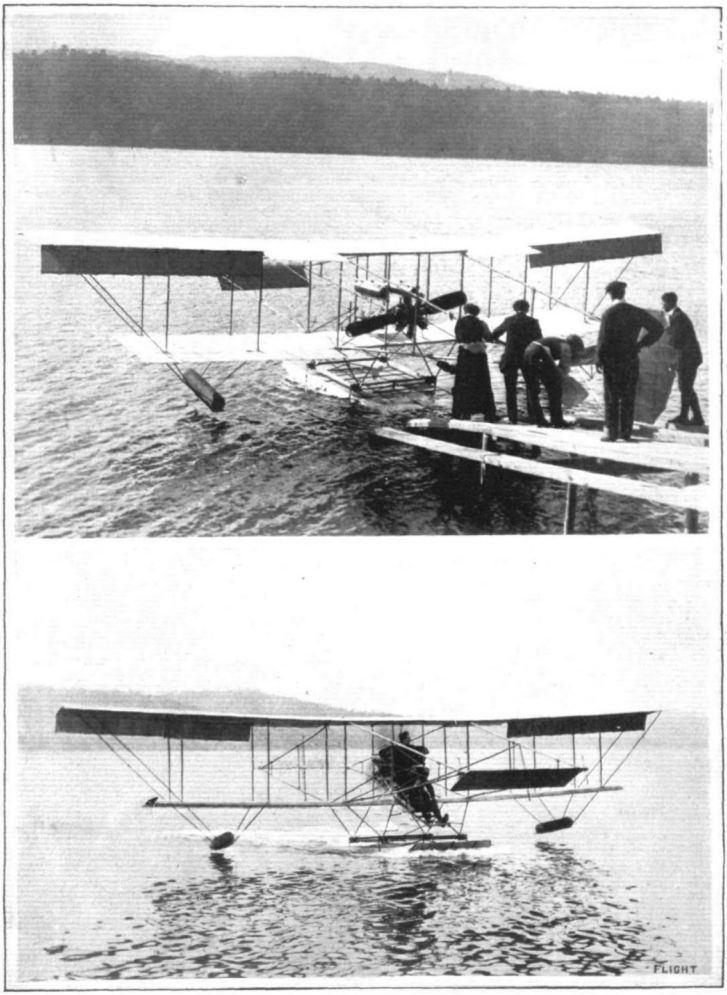
General Grierson's remark on the effect of aerial reconnaissance on armies in the field, is of such an altogether serious character that it seems to place every other consideration in the shade. So far as England, as an island, is concerned, the main interest in aerial reconnaissance relates to its effect on naval warfare, but it may well be that some equally eminent naval officer considers General Grierson's remarks to be applicable to fighting at sea. If the artillery on land is unable to stop the approach of an aeroplane, there is no reason to suppose that the guns of a ship will be able to do any better, and when it comes to the point, we can quite well imagine some hero of the hour trying to do a *vol piqué* down the smokestack of a battleship with a good big charge of nitro-glycerine beside him. So far as we can understand the present situation, the reason for big ships is in order that they may carry big guns capable of projecting a large amount of explosive across an enormous distance. If there were any other means of conveying the explosive, the necessity for the very big ship would cease; in fact, its very size would be a handicap. So, it appears to us, that the ultimate development of naval warfare will also end in translating the scene of operations into the air.

Military Aviation in Australia.

THE organisation of the Australian Flying Corps is now well under way, and it is announced that the complete *personnel* of the aeroplane squadron will consist of 4 officers, 7 warrant officers and sergeants, and 32 mechanics. The corps will form part of the citizen forces, and enlistment, which will be voluntary, is to commence from January, 1913. Lieut. Harry Busteed, having resigned his position, Mr. Harrison has been appointed as an instructor, and will have Lieut. H. Petre as an assistant. Further reference is made to these two pilots under "Air Eddies" on page 1143. The work of preparing the aerodrome and school at Duntroon is being pushed on as much as possible, and it is hoped to commence tuition work at the school early in the New Year. Apart from actual flying, the course of instruction will include mechanics of aeroplane, motor, &c., meteorology, aerial navigation by compass, observation and photography from aircraft, signalling, &c. About £5,600 is to be spent on the flying branch of the Australian defence forces this financial year.



THE LATEST PRODUCT OF THE HENRY FARMAN WORKS.—A new type of hydro-biplane which can be used from the land as well as from water. It is driven by an 80-h.p. Gnome motor mounted on the *coque*, driving the propeller by chain transmission.



Photos by Herbert and Son, Bowness.

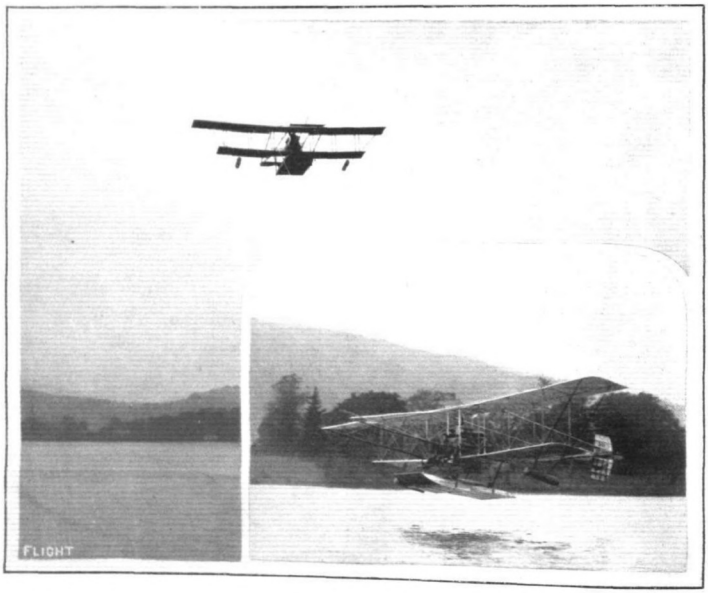
THE "WATER HEN" ON LAKE WINDERMERE.—Above, the machine being launched from the slipway that leads down to the water from the hangar. Below may be seen the machine, with a passenger up, just about to leave the water.

THE "WATER HEN."

THIS interesting hydro-biplane, which has been flying almost daily throughout the past year over Lake Windermere, may be said to have originated at Blackpool way back in 1909. This, perhaps, seems rather curious, since as far as our mind takes us back, power-driven flying machines to rise from water were scarcely even dreamt of at that time. It happened in this way. Most of those who now constitute the Lakes Flying Company were present at that memorable meeting. One of their number, Mr. E. W. Wakefield was more than usually struck by the amount of damage that was done through a machine, its pilot, or both, hitting solid ground. It occurred to him that if a machine could be made to rise from and alight on water and remain for the whole time over that liquid element, the chances of fatalities arising from accidents could be most effectively and materially reduced.

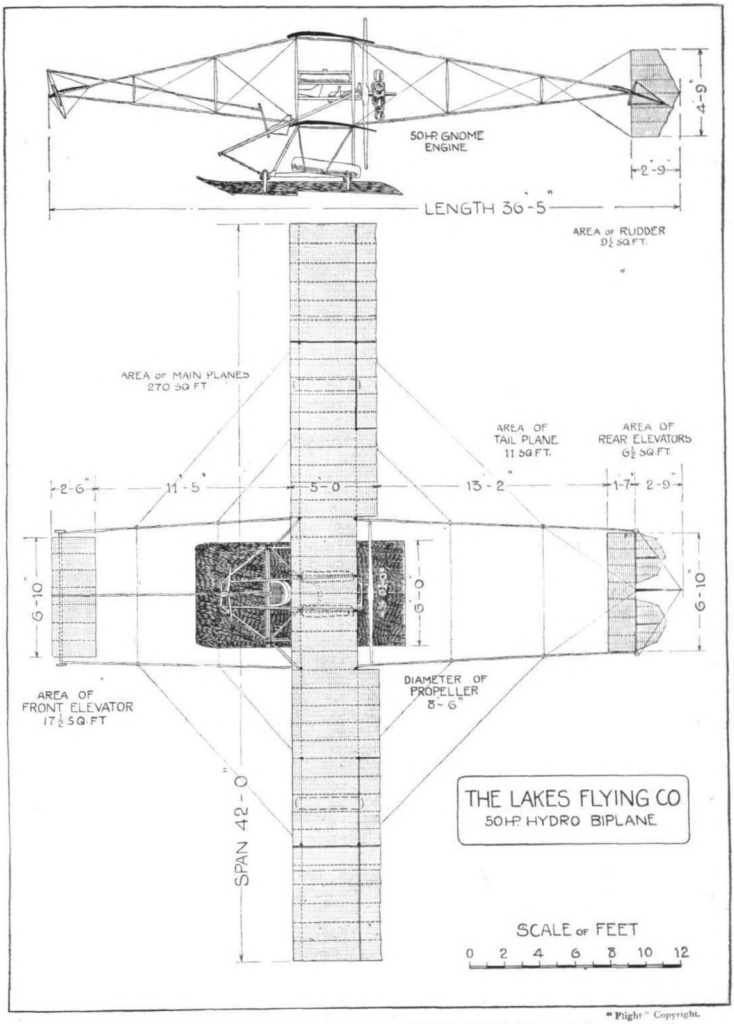
But at that time everyone was sceptical. The whole thing was impossible! It stood to reason that the friction and resistance of a hydroplane-float skimming over water would be infinitely greater than that of wheels running over ground. Further than that, as soon as the motor was started, would not the thrust of the propeller, necessarily high up between the planes threaten to push the nose of the float under water?

But, nothing daunted by general adversity of opinion, Mr. Wakefield and a few of his personal friends decided, at any rate, to make a sporting effort at producing a successful water flying-machine. The experiments of M. Henri Fabre, at Monaco, with his extraordinary hydro-monoplane, and those of Glen Curtiss, in the United States of America, with his float-equipped biplane, were closely followed, and they taught many lessons. Then, again, Mr. Oscar Grosspelius had constructed a Blériot-type monoplane on a broad float, which, being underpowered, had not, at that time, been successful in getting off the water. From it also many invaluable lessons were learnt, and so, having collected and tabulated a goodly collection of data by the summer of 1911, Mr. Wakefield commissioned Messrs. A. V. Roe and Co. to build for him a biplane of the Curtiss type. This was fitted with a single narrow float, much after the same style and shape as that fitted to the Curtiss machines in America. It, however, embodied several improvements that had resulted from the independent experiment.



Photos by Herbert and Son, Bowness.

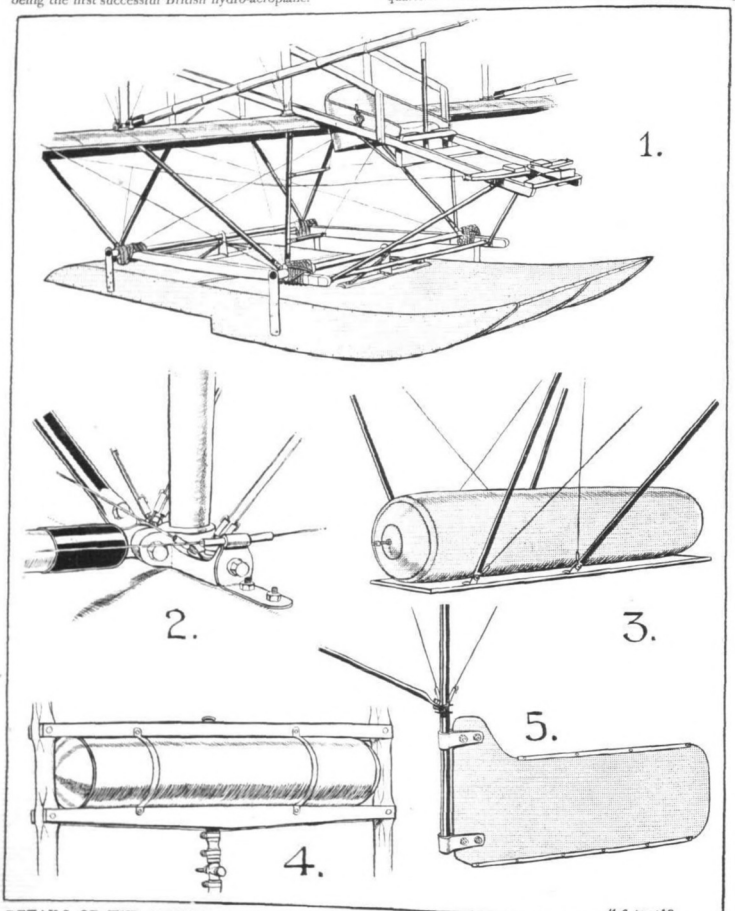
THE "WATER HEN" WELL UP OVER LAKE WINDERMERE.—Inset, the machine just after leaving the water.



THE LAKES FLYING CO.'S HYDRO-BIPLANE "WATER HEN."—Plan and elevation to scale.

Although, unfortunately, the machine itself was not quite as efficient a flyer as it was hoped, it nevertheless succeeded admirably as far as things went. It was flying freely during November, 1911, and had the distinction of being the first successful British hydro-aeroplane.

Meantime, representatives of the Company had been studying how things went on at Brooklands and Hendon, and, having picked up as many tips in construction as they could assimilate in the time, they returned to headquarters. As a result the biplane that we are describing



DETAILS OF THE "WATER HEN."—(1) The front section of the machine, showing the float and its flexible connection to the *cellule*. (2) One of the outrigger fittings. (3) A balancer, an air sack mounted on a spring board. (4) Mounting of the oil tank. (5) Water rudder, working in conjunction with the air rudder so that the biplane may be readily steered at slow speeds on water.

in this issue came into existence. It was purposely designed to be a slow-flying machine in order that it might lift from the water at a low speed and be more comfortable for passenger carrying. The float fitted was of a new type, much broader and was stepped. The intended results were achieved at the first trial, and the machine has remained practically unaltered from that day to this.

During the seven odd months it has been in use over Windermere, it has made about 250 flights, and has carried over 100 different passengers.

As can be remarked from the photographs and sketches that accompany this brief description, the machine does not depart, in any great respect, from what is nowadays considered conventional practice. It has a Farman type of *cellule*, but the camber of its wings is considerably more marked than in that machine in order that it may lift all the more readily at slow speeds. The tail at the rear and the elevator in front are supported by triangular bamboo outriggers, and these surfaces are controlled from the pilot's seat by a typically Farman universal lever. Balancing is also carried out by the Farman system of aileron flaps.

The biplane has a speed range of from 33 miles to 45 miles per hour.

Undoubtedly the most interesting part of the whole machine is the gear that enables it to land and start off from water, for it must be remembered that at the time the machine was constructed, very little exterior knowledge of the subject was available. Unlike most water flying machines of to-day a flexible suspension is provided so that the float itself will not form too solid an abutment against the hammering of the waves. One of our sketches shows this point clearly. The float is built upon a latticed skeleton of silver spruce having three longitudinal bulkheads. Aluminium covers the bottom of the float, duralumin the sides, and Willesden canvas the top.

It may fairly be asked whether this type of float and undercarriage is equally well adaptable to aeroplanes other than of the type that it was originally designed for.

The Lakes Flying Company maintain that, excepting for minor modifications, their design of undercarriage can in every case be successfully used to convert a land flying machine into a water flyer. This, to some extent, they have themselves proved, for similar floats fitted to a monoplane and a tractor biplane have given every satisfaction in use. They had a share in producing, we believe, the first hydro-monoplane to lift passengers.

With a single float, balance naturally became necessary. Following on numerous tests, the "Water Hen" was fitted with simple air sacks mounted on springboards, and they have proved so serviceable that there has been no reason to change them.

Mr. Wakefield is characteristically modest when talking about the machine he has developed throughout these past three years. He claims that if the machine has done nothing else, it has at least proved his contention that it is better to get a ducking than to get badly smashed up. But, although he does not make a song about it, we know he has gone considerably farther than that.

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AVIATION PEN PICTURES FROM THE SEAT OF WAR.

MR. BENNET BURLEIGH in the *Daily Telegraph*, November 28th :—

Aviators Under Fire.

Mustafa Pasha, Saturday (11 a.m.).

A couple of Bulgarian aviators late yesterday afternoon had a thrilling experience in a biplane over Adrianople. They told me they flew purposely at an elevation of only about 1,700 yards. They could see the city, and the movements of the Turks in the streets and forts quite clearly. The Bulgarian batteries were heavily shelling the enemy. The Turks proceeded to fire upon the aviators. All the shells burst at least 350 to 450 yards below machine. For half an hour the aviators flew about, taking note of everything. They saw that the Selim Mosque was intact, and that most of the other important buildings were undamaged.

A startling surprise, however, was in store for them. The Turks had sunk a gun in a pit, and fired as they passed overhead—a bow drawn at a venture, so to speak. My two Bulgarian friends heard a loud, hurtling roar of shell ascending direct towards them, and their ears were filled with its screech, which drowned the noise of the engine and the humming wires, as the missile passed upward. It burst, but they had by that time gone a long distance forward, and none of the fragments came near them. They returned, landing safely at Mustafa Pasha.

I witnessed this incident. A lieutenant aeronaut, before taking his seat in his machine, hastily stuffed his magazine pistol into his coat pocket. Asked why he did so, he replied, in English, "A Bulgarian cannot be taken alive by a Turk. In case of accident I must sell my life dearly, and always be prepared to do my duty."

MR. A. Beaumont in the *Daily Telegraph*, December 3rd:—

Aeroplane Adventures.

Chorlu, November 22nd.

As I came in sight of Chorlu I had the pleasure of seeing the first aeroplane tent with an aeroplane in it that I have come across in this war, and, what was a greater satisfaction still, it was that of the daring Bulgarian aviator, Petroff, whose exploits in Paris I had mentioned at the beginning of this year. I stopped my motor and went up to the tent. A businesslike young officer came out and shook hands with me. He told me I was welcome to look at his machine, and said he had come only two days before from Adrianople. He had covered a distance of 100 miles in one hour and a half in his monoplane. It had taken my motor to negotiate hills, ravines, and ditches more than four days' actual travelling.

I asked him some questions about the difficulties of aviation in time of war, and said I had often heard of a famous Bulgarian aviator named Petroff, whom I had hoped to meet before the war was over. He said to me, smiling, "I am Petroff," so that I had the pleasure at once of having my desire satisfied.

He explained to me that in fact aviation in time of war was not mere child's play. He had been flying regularly twice a day over Adrianople since the siege was complete, and on two occasions shrapnel exploded very close to his machine, when he was flying at a height of about 3,500 ft.

The Turkish batteries at Adrianople seem to have anticipated his daily flights, and to have carefully regulated their guns in the hope of bringing him down. He said: "I usually flew at a height of about 1,300 metres. At that height I am fairly safe, but if I get the least bit lower shells become a trifle annoying.

"One day," he added, "a shell burst just above my aeroplane, and on another day a similar shell burst just below me." However, he did not mind. "A la guerre comme, à la guerre," he said, smiling. It is an expression I have heard from officers hundreds of times, and it is really affecting to see the pleasant simplicity with which they say it, and face every danger.

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ROYAL FLYING CORPS.

THE following appointment was announced by the Admiralty on the 29th ult. :—

P. A. Shepherd, to the "Actæon," additional, for Royal Flying Corps, to date December 5th.

The following appointment was announced by the Admiralty on the 2nd inst. :—

Assistant Paymaster A. A. E. Robinson, to the "Actæon," additional, for Air Department duties, to date December 5th.

FLYING AT HENDON.

IT was much too cold last Saturday for a crowd of people to visit the aerodrome, and after all, one cannot very well blame those who stuck to their fires, for standing about in the open with the temperature below freezing point is not a thing that everyone can go through with impunity, and the sight of some poor chap at the helm of an aeroplane in the very thick of it does not make one feel any the warmer. There were a good many, however, who could not keep away from their favourite haunt, and on their arrival received their reward in the shape of two very good flights and some very welcome fire buckets. Besides being very cold, there was a strong, gusty north-easterly wind—bordering 35 m.p.h.—which made flying by no means an easy matter. This was especially so in the case of a trip from Hendon to Brooklands made by the Handley Page monoplane in the morning, for the engine was in trouble nearly all the way—it was only running some 900 r.p.m.—and there was a passenger aboard as well. Anyhow, the trip was accomplished without accident and in about 16 minutes, but it was decided to postpone the return journey until a better day.

A few minutes before four o'clock, Louis Noel—well wrapped up, and in white jersey and cap, looking very 'Xmasy indeed—went up on the 80-h.p. Gnome-Henry Farman biplane. He made repeated circuits of the aerodrome at a height of several hundred feet. The speed of the biplane when going with the wind appeared to be terrific. After about eight minutes he came down, and a few minutes after Marcel Desoutter ascended on the 50-h.p. Gnome-Blériot monoplane. His "get-off" was quite like one of Hamel's, and he was soon well over 200 ft. high. He did not stop there, however, but went on climbing higher and higher for about ten minutes. By this time he was about 1,000 ft. or more high, and over Hendon town; from this position he made a splendid glide back into the aerodrome. When he landed he was so numbed with the cold that he could not move from his seat, and had to be lifted out. This brought the proceedings of the day, as far as flying was concerned, to a close, but later on in the evening some interesting tests with a powerful military search-light were made by the 34th Company of Territorial Engineers.

The huge search-light, some three feet in diameter, was mounted on a separate carriage drawn by a motor lorry, the engine of which was utilized for driving a dynamo that supplied current for the powerful arc-light employed. Unless we are mistaken, we believe that we recognised the above-mentioned lorry as one of the chassis of those interesting "A B C" 'buses which were running in London a few years ago.

Sunday turned out just as cold as the day before, but, perhaps, not quite so windy, and several flights were made in the afternoon. M. D. Manton put up several circuits on the Grahame-White biplane, Louis Noel made several flights—some with passengers—on the 80-h.p. Henry Farman biplane, and Desoutter also went out on the Blériot monoplane.

These flights on Saturday and Sunday emphasise how the sporting side of aviation has progressed, for this time a year ago, under similar weather conditions, one would be looked upon as mad if it were suggested paying admission to an aerodrome to see exhibition flights and to go for a passenger flight, and now folk—and quite ordinary folk too—take it as a matter of course, and would be vastly disappointed if they were informed there was to be no show and that therefore the aerodrome was closed—we wonder what it will be five years hence.

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FROM THE BRITISH FLYING GROUNDS.

Brooklands Aerodrome.

SATURDAY, last week, gusty winds prevented the holding of the Quick-starting and Alighting Competition, which is therefore postponed until to-day (Saturday). But Mr. Petre, on the Martin-Handasyde monoplane, did some excellent circuits; whilst Mr. Raynham was out testing the new Flanders monoplane.

During the morning the Handley Page monoplane arrived from Hendon, but was unable to return owing to engine troubles; the machine was therefore placed in one of the sheds and left there over the week-end.

On Sunday Mr. Bendall made a number of circuits on the Bristol biplane, followed by Mr. Merriam. Capt. Wood was out testing the Vickers biplane, followed by Mr. Barnwell. Mr. Raynham, on the new Flanders monoplane, made some good circuits, as did Mr. Petre on the Martin-Handasyde monoplane, and Mr. Hawker was also out on the Sopwith biplane, but just on the time for commencing the Bomb-Dropping and Alighting Competition heavy rain commenced to fall, with the result that all the machines were hurriedly put away in their respective sheds, and no more flying was possible.

This competition will therefore take place to-morrow (Sunday) afternoon at 3.30 p.m. sharp.

Ducrocq School.—Wednesday, last week, J. Alcock was making circuits and putting in some cross-country work. McAndrew was also flying circuits in brilliant style.

On Sunday J. Alcock flew some circuits in the afternoon.

Bristol School.—Wind and rain all day Monday, no flying possible.

Tuesday, no improvement in previous day's weather, and all work confined to the hangars.

Bendall made a trial on Wednesday, and then took Lieut. Todd twice, and Mr. Featherstone—Merriam ascending as passenger behind this latter pupil on straights—who then went up and made four good straights alone, landing well each time. Lieut. Mills was up for a solo, completing two circuits, flying extremely well; Merriam up in the meantime with Lieut. Todd in pilot's seat for straights, this pupil afterwards going out alone. Lieut. Mills meanwhile up for another solo, making several circuits in fine style, and landing perfectly. Merriam was testing a new machine then with Lieut. Shekleton. Merriam was out again later in the morning with Lieut. Shekleton, but wind was too bad for school work.

Capt. Rickard was the first taken up in the afternoon, ascending for a tuition trip with Merriam, whilst Mr. Featherstone was up for several straights. Merriam was testing biplane No. 69, but wind caused suspension of flying.

On Thursday, after the usual trial, Mr. Ewing was up on a biplane with Merriam in passenger's seat, Lieut. Mills being in another machine for solo, describing several figures of eight, and landing well. Lieut. Todd and Mr. Featherstone were both out for straights, and are showing signs of improvement. Bendall made a solo to test the engine of one of the biplanes, and Lieut. Mills was then out for solo on same machine. This pupil has only been at the school a week, but is flying with such confidence that he should have no difficulty in obtaining his certificate. Merriam went as passenger to Mr. Ewing, to whom he was giving instruction in landing practice. Lieut. Mills made a short solo, this bringing the morning's work to a close.

Bendall was first up in the afternoon, Lieuts. Empson, Todd, and Mr. Featherstone all away for straights. Merriam was up as passenger to Capt. Rickard, and Mr. Ewing for straights; darkness prevented further work.

Rain first thing Friday morning delayed start. Merriam out later for a test, rain again preventing further attempts. Later in the morning Merriam was up as passenger to Lieut. Shekleton on straights.

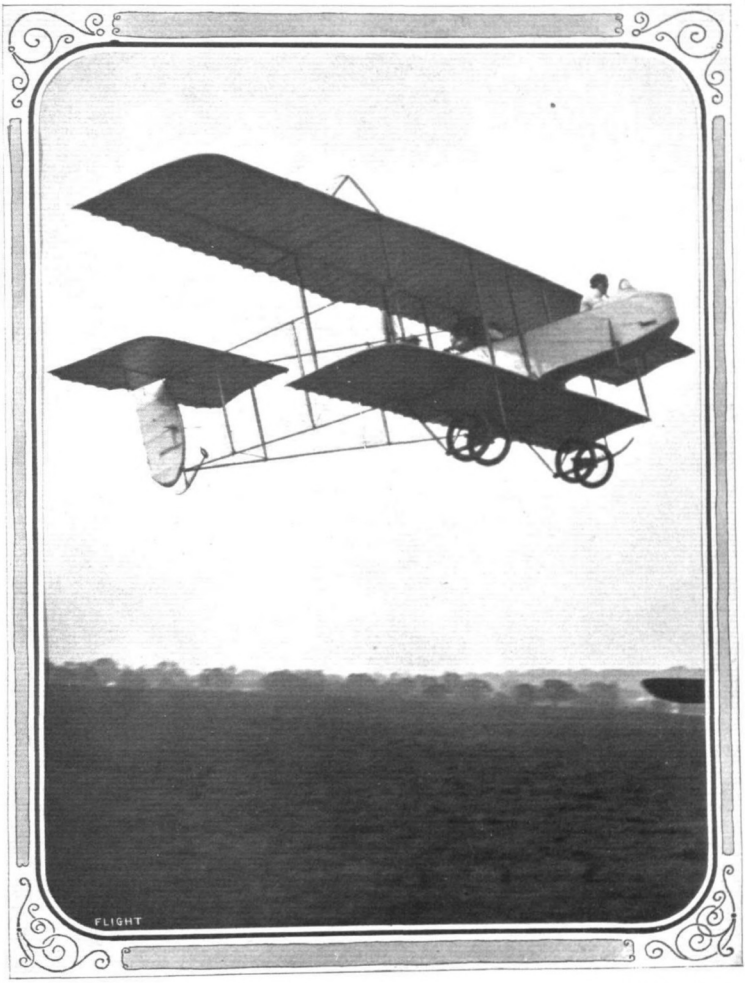
Sunday, Merriam for a trial, then with Capt. Powell, a new pupil, for his first trip. Lieut. Todd was out in the meantime for a short flight, after which he completed two circuits in fine style with good landing. Bendall was occupied in giving tuition to Capt. Powell, afterwards making a solo and then up with Mr. Featherstone. This latter pupil went out and made a remarkably fine trip, his landing being also very good. Merriam was up behind Mr. Ewing for a trip, the pupil then making four straight flights alone in quite good style. Bendall took Capt. Powell for another trip, Mr. Ewing going up for a couple of short straights, Merriam winding up the morning's work with a solo.

Bendall tested in the afternoon, after which Lieut. Mills completed two good circuits, his landing being very neat. Merriam took Lieut. Thompson for his first flight, but rain stopped further flying.

Howard-Flanders School.—Saturday last week was very windy. Raynham took out new military monoplane, F4, No. 2, for first trial, and did two straights in 20-mile wind. On Sunday at 8.30, Rayuham flying circuits with and without passengers for about an hour. Out again at 11.30 with and without passenger, testing air-speed indicator for half-an-hour. In afternoon he was up with passenger for half-an-hour. Flying stopped by rain.

Tuesday last, after a few solo circuits, Raynham started for Farnborough, with Mr. W. E. de B. Whittaker as passenger. During the day he put his machine through its tests for the War Office.

Vickers School.—Wind and rain made flying impossible Monday and Tuesday last week. On Wednesday morning, after test by Barnwell, Mr. Corballis did several circuits on Farman, getting bumped about considerably. Knight also made a flight to test new propeller. In the afternoon, Capt. Stott took the remaining half of his *brevet* on No. 5, making a very fine flight at an average height of 400 ft. and landing close to the mark. Meanwhile Mr. Pollok was doing straights on No. 3, flying very well, and Mr. Corballis



"Flight" Copyright.

Mr. L. Noel on the Henry Farman at the Hendon Aerodrome.

making several circuits and eights on Farman. He can take his *brevet* at any time. Barnwell made a short flight on No. 5 just before dark.

After test by Knight on Thursday, Mr. Pollok flew a number of good straights on No. 3. Mr. Corballis meanwhile was flying the Farman very well, followed by Major Cameron with Barnwell in passenger seat. Major Cameron later did several good straights solo, but had the bad luck to damage his chassis on landing. Later Mr. Pollok did further straights on No. 3, most of his landings being good, but one or two illustrating the advantage of the all-steel construction and the Vicker's sprung chassis.

No flying Friday or Saturday owing to rain and wind. On Sunday morning Mr. Pollok, doing straights on No. 3, had the ill-luck to break his propeller. In the afternoon the new Vickers-Farman was brought out and Capt. Wood made several short flights on it to test adjustment.

Eastbourne Aerodrome.

WEDNESDAY last week was too rough for outdoor work, but on Thursday afternoon the weather improved considerably. Mr. Hammond had the Bristol out by 2.30 p.m., and made a solo, during which he caused some amusement by racing a train. The occupants were very excited as he dived down alongside the carriages, and flew past them about 10 ft. up. On returning, he gave Lieut. Brown several instruction flights.

Friday was again fine, and Hammond was busy in the morning with Lieut. Brown. On one of his flights he took up a 12-bore gun, and fired several shots at a flock of plover which he put up and chased. One bird was bagged, and brought back in triumph. Lieut. Brown took charge of the machine while Hammond was shooting.

Saturday, Sunday and Monday last were blank days as far as flying was concerned. On Tuesday Hammond was out early giving instruction to Lieut. Brown and Messrs. Thompson and Cookson. Lieut. Brown took his first turn at the pilot's seat and handled the machine very well. On one occasion he had to do a *vol plané* from about 250 ft., owing to the engine giving out.

About 10.30 a.m., Mr. Lovely, proprietor of one of the local garages, arrived on the ground and wanted to be taken over to Lewes, where he had to appear at the police court to answer a charge of exceeding the speed limit. By this time there was rather too much wind for pupils so Mr. Hammond agreed to take him. Starting at 10.50 they arrived at Lewes at 11.25, apart from the cold they had a very pleasant journey. Mr. Lovely stayed at Lewes and Lieut. Brown, who had motored over, returned in the machine with Hammond. After a short rest, Mr. Hammond started school work again. Messrs. Fowler and Gasler were also out trying the new 35-h.p. Anzani. Mr. Thornlea has joined the school and intends going in for the biplane course.

Farnborough.

Royal Aircraft Factory.—Saturday last Mr. de Havilland was up on BE 2, afterwards testing Henry Farman machine, damaging undercarriage on landing. On Tuesday out on BE 2 and 417 (BE staggered plane 70 Gnome machine). Mr. Raynham testing on Flanders prior to handing over to officials.

1st Squadron.—H.M.A. "Gamma" out on Monday. On Tuesday "Beta" out from 10.30 a.m. to 4 p.m. on cross-country trip.

Royal Flying Corps.—BE Flight. On Thursday last week Capt. Webb-Bowen left for Upavon on 206, arriving safely, landing *en route* at Amesbury. On Tuesday Capt. Longcroft, with Major Maitland as passenger, left for Birmingham on 201, but was forced to land at Oxford, damaging the undercarriage and breaking a wing strut.

Breguet Flight 213. On Wednesday last week, Lieuts. Wanklyn, Playfair, and Shepherd doing circuits. Lieut. Shepherd in afternoon doing straights on 210 (100-h.p. Gnome-Breguet).

Thursday, Lieut. Shepherd circuits on 211, and Lieut. Playfair on 211 (same type as 210). Thursday afternoon, Lieut. Shepherd on 210 with Lieut. Playfair on 211 left for Upavon, arriving without incident. On Monday, Lieut. Playfair left on 211 for Farnborough, but was forced to descend near Basingstoke owing to the petrol pipe breaking. Leaving Basingstoke Tuesday morning he arrived without further mishap, afterwards flying 210 from Upavon back to Farnborough.

Farman Flight 215. Wednesday, Lieut. Herbert out 5 mins., then handing machine over to Lieut. Carmichael who was up for 5 mins., being followed by Capt. Brabazon, with a flight of 10 mins. Lieut. Herbert up again for 5 mins. Capt. Pigot then up for 5 mins. Lieut. Herbert with A. M. Smith as passenger for 15 mins. Capt. Becke with Lieut. Herbert piloting, left for Oxford at 10.21, arriving at 11.46. Thursday, Capt. Becke out for 5 mins., then left Oxford with Lieut. Herbert at 12.40, arriving at Farnborough 1.45. On Tuesday, Capt. Becke and Lieut. Herbert left for Plymouth.

Mr. Cody handed over this machine to R.F.C. on Thursday, taking out Lieut. Harrison for instruction on Tuesday morning.

Deperdussin School.—There was practically no practice put in by the pupils during the whole of last week on account of the bad weather. Sunday morning, however, was exceptionally fine when the pupils on the ground took full advantage of the opportunity, and put in some good work. Lieuts. Mapplebeck, Hooper and Hawker were making good straight flights on No. 3 *brevet* machine, landings being very neat. Lieut. Hooper also flew two circuits and a figure eight, and Lieut. Mapplebeck did one circuit. Both pupils making good progress.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Owing to the exceptionally bad weather prevailing during the whole of the past week no school work was done until December 1st, when Mr. Carr was out on the No. 7 Grahame-White biplane doing straight flights, accompanied by Instructor Manton, being followed at 9.45 by Lieut. R. S. D. Small, also doing straights on the same machine.

During the week some exhibition flights have been made. Mr. Louis Noel was out for ten minutes, in spite of very strong wind, on Saturday, on 80-h.p. Farman biplane, followed by Mr. Marcel Desoutter on No. 6 Blériot monoplane. On Sunday at 2.45 p.m. Mr. Manton was on No. 5 Grahame-White biplane doing circuits, followed by Mr. Louis Noel on 80-h.p. Farman biplane. Weather very cold and misty. Mr. Marcel Desoutter on No. 6 Blériot monoplane. During the afternoon Mr. Noel took up several passengers.

Blackburn School.—Monday last week Messrs. Buss, Glew and Laurence Spink had half an hour's practice each in straight flights and landings. The horrible weather kept things quiet until Sunday when there came an ideal flying morning and a lot of good work was got in. Mr. H. Blackburn commenced at 7.30 with a short test flight on the rolling machine, followed by Dr. Christie. Messrs. Laurence Spink and Glew all 20 minutes each, after which Dr. Christie had two turns of 15 minutes each, several times reaching a height of 30 or 40 ft. in the length of the aerodrome and landing very cleanly.

Blériot School.—Monday and Tuesday last week were blank owing to bad weather, but on Wednesday Lieut. Loftus Bryan and Messrs. Gandillon and R. Desoutter were all out practising. M. Gandillon was doing very good straights on L.B. 3, prior to doing circuits and figure eights, and Lieut. Loftus Byran was rolling on L.B. 1. M. R. Desoutter was also on No. 1 and rolling with the tail well up.

On Thursday morning as soon as the early morning fog lifted, Lieut. Loftus Bryan and M. R. Desoutter were out rolling on No. 1, but were unable to do much work as the fog soon covered the ground again, preventing any further work being done.

W. H. Ewen School.—The weather during the past week has been rather unpropitious for the usual school flying. However, every available opportunity has been taken advantage of, and the pupils at the school have put in a fair amount of practice.

The first nice spell was on Wednesday afternoon, the 27th, and M. Baumann and Mr. Sydney Pickles had the pupils hard at work nearly all the afternoon. On monoplanes 1 and 2, Messrs. Prosser, McGregor and Zubiaga were making capital progress in their rolls and straight flights. Messrs. L. Russell and W. Warren each made several straight flights and half circuits on the 35 h.p. Caudron biplane, both handling the biplane well and making nice landings. Thereafter some fine exhibition flying was put up on the same machine by Messrs. Pickles and Lewis W. F. Turner. Although Mr. Turner only joined the school last week he is already perfectly at home with his new mounts, and is flying the Caudron splendidly.

On Friday afternoon, M. Baumann was quick to make use of a short spell of favourable weather. Messrs. M. Zubiaga and R. S. McGregor were out on No. 1 monoplane and put in a little rolling practice before the wind again rose.

Under the instruction of M. Baumann, the pupils were out at 8 a.m. on Sunday, when Lieut. M. W. Noel made several nice straight flights at 20 ft. on monoplane No. 2. Mr. E. T. Prosser put in some good practice on monoplane No. 1. After school work was finished Messrs. Sydney Pickles, M. Baumann and Lewis Turner were out in turn putting up some splendid exhibition flights on the little 35-h.p. Caudron biplane.

Salisbury Plain.

Bristol School.—Flying impossible all day Monday last week, weather too bad, and again on Tuesday all work had to be confined to hangars.

On Wednesday England was out for a test quite early, afterwards taking Lieuts. Chiscaneanu and Parvelescu on side-by-side monoplane, and Lieut. Rees on one of the biplanes. Lieut. Negrescu made a long flight on the side-by-side machine, finishing with a good landing. Sippe was out with Lieut. Rees on a biplane giving pupil landing practice.

England was again out in the afternoon first, on one of the tandem machines, and then on side-by-side with Lieuts. Parvelescu and Chiscaneanu. Lieut. Negrescu made a really fine solo on the side-by-side monoplane, his landing also being quite good. Lieut. Wall was up for the tests for his certificate, but unfortunately landed rather heavily after the first series, doing slight damage to the machine.

Pizey was first out on Thursday on side-by-side machine with Lieuts. Parvelescu and Chiscaneanu, after which Lieut. Parvelescu went for his first solo followed by Lieut. Chiscaneanu. Both these officers made exceedingly good flights and landed well. Lieut. Negrescu out in the meantime in one of the tandem machines, making three flights reaching 800 ft. and landing extremely well with engine cut off. Pizey flew over to Upavon with a parcel for the military authorities. Busteed went up for a test of the modified 50-h.p. Bristol monoplane and found the machine a splendid flyer. Sippe and Pizey both tried same machine, flying across to Fargo and back.

On Friday the wind was far too strong for flying. Work of erecting new machine was busily carried on in the hangars.

Wind still too bad on Saturday, and work was resumed in the hangars. Two machines were erected Friday and Saturday, all pupils taking part in this very useful instructional work.

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QUESTIONS IN PARLIAMENT.

A REGULAR fusillade of questions in the House of Commons on Wednesday of last week drew from the First Lord of the Admiralty, Mr. Churchill, the important admission that the position of this nation as regards airships, at any rate, was inferior to that of Germany. The discussion was started by a question as to the reported visit of an airship to Sheerness, and Mr. Churchill repeated the information as to a noise being heard and the flares being lighted at Eastchurch on October 14th. They were lighted he said, that they might give assistance to aerial travellers in difficulties. He did not know whether the craft was an airship or an aeroplane, but he did know that it was not one of the Government airships. No answer was returned to the question "Was it anything"? or to another as to whether the sound of a motor was distinctly heard at the time, and lights seen which are not carried by aeroplanes. It was Mr. Eyres-Monsell who asked Mr. Churchill whether he proposed to use aeroplanes with a view of preventing an airship from proceeding to London or elsewhere, and what would be the relative position of Great Britain and Germany with regard to fighting airships (rigid) at the end of 1912, 1914 and 1915, also if it was the policy of the Admiralty to employ non-rigid airships for engaging rigid airships. Mr. Churchill replied that he was informed that Germany had the following rigid airships:—One Naval, one Military, two Passenger, and one Experimental.

There was no doubt that in this branch of aeronautics Germany had won a great pre-eminence. As to the fighting value of such vessels, when compared to aeroplanes, opinions differ and experience is lacking. This also applied to the question of engaging rigid with non-rigid airships. He did not wish to make any statements at present on Admiralty policy, but the whole subject is receiving the attention which its undoubted importance demands.

A question as to whether our dockyards and repairing docks were provided with searchlights and howitzers capable of repelling aerial night attacks drew from Mr. Churchill the reply that he could see no advantage in discussing such a subject, the importance of which was naturally recognised by the Admiralty. As to a comparison from the point of view of armament, equipment, speed, &c., of the latest British and German naval airships, Mr. Churchill said it was not desirable to publish the details asked for of the latest British airships. It was sufficient to say that they were at present mainly in the experimental stage. The Admiralty had no official information about the dimensions of the latest German naval airship. A rigid airship took about eighteen months to construct.

Further questions drew from the First Lord of the Admiralty, the admission that we had not an airship equivalent in size and power to a Zeppelin or one capable of travelling at 60 miles, although Mr. Churchill refused to be drawn as to the speed of the British airships.

The discussion then turned to aeroplanes, and while Mr. Churchill thought it was not in the public interest to give information as to how many machines belonging to the Navy were capable of a speed of 70 miles an hour he said we had many naval officers who could fly over sea or across country at speeds of 70 miles an hour and upwards. A question was then put to Col. Seely, Secretary for War and elicited the information that the Army had five aeroplanes which could fly at 70 miles per hour and fifteen more were on order which would be capable of similar speeds; several of these were overdue from the contractors. There were twenty-six trained military pilots capable of flying these very fast machines.

He also said it would not be in the interests of the country to state whether we had any guns capable of hitting an aircraft 6,000 ft. high.

The Prime Minister was also questioned and said the Defence Committee had considered the effect of the development of aeroplanes and airships upon the defences of the country. As to whether we had a sufficient number of aircraft of both descriptions, Mr. Asquith said that the policy recommended by the Committee of Imperial Defence was explained by the Secretary for War on the introduction of the Army Estimates. That policy was being carried into effect. The Air Committee, which was a permanent Sub-Committee of the Committee of Imperial Defence, of which the Secretary for War was Chairman, kept the question of aerial navigation constantly under review.

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Wintry Cross-Channel Trip.

MR. J. B. MANIO's crossing of the English Channel on his Blériot monoplane on Sunday last was made under exceptionally trying conditions, and the pilot met with a full measure of adventure. Accompanied by his faithful wire-haired fox terrier, "Jim," who was made comfortable in a basket behind the pilot's seat, Mr. Manio left Boulogne at 12.55, intending to fly to Folkestone and then on to Hendon. A strong south-westerly wind which was blowing at the start, however, upset calculations, as the pilot found it increased in strength in mid-Channel. In consequence, he was carried off his course towards the North Sea, but after a time he turned and got over the land, eventually finding himself at Kingsgate, near Margate, where he landed at 2.35 p.m. Mr. Manio came on to London by train, but hoped, if the weather was favourable, to fly his machine to Hendon. He started from Margate on Wednesday morning, but was brought down at Sittingbourne with motor trouble and slightly damaged his machine in landing in a ploughed field.

Mr. Wilson Over Kilkenny.

IN the course of a circular trip from his home, which is near Kilkenny, Mr. D. Corbett Wilson, on the 27th ult., piloted his machine round the city at a height of 1,000 ft. The flight aroused a good deal of enthusiasm in the city and immediate neighbourhood.

A Progressive Education Committee.

EVIDENTLY there are some open minded members on the Middlesex Education Committee, as they have approved of the boys who have an inclination towards aviation at the Fox Lane School at Southgate being formed into a class, and after ordinary school hours receiving practical instruction in the designing and building of model aeroplanes. The boys have the use of the school workshops, and are very keenly interested in the work. They have already built over a dozen models, from which excellent results have been obtained.

A Complete Model Aeroplane Catalogue.

ONE of the most complete catalogues of materials and fittings for model aeroplanes is that just issued by Messrs. J. Bonn and Co., Ltd., 97, New Oxford Street, London, W.C., and we would advise all model aeroplanists to obtain a copy, for which a charge of twopence is made.

A Change of Address.

MESSRS. WHITEMAN AND MOSS, who are well known for the splendid assortment of fittings for aeroplanes, such as lugs, eyebolts, wire strainers, &c., which they stock, have, in consequence of the increase of their business, been obliged to seek larger quarters, and are now settled at 15, Bateman Street, Queen Street, Soho, W., where they have ample room for a full display of their various specialities.

An Album of Famous Aviators.

AMONG the many publications of Messrs. Burroughs, Wellcome and Co., of "Tabloid" fame, we should imagine one of the most popular would be a brochure, entitled "Famous Airmen and their Equipments." It is instructive to notice that practically all the leading aviators agree that their equipment is only complete when it includes a Tabloid "first aid" outfit. In the book in question there are a large number of portraits of the better-known pilots, and a good many have given their opinion on these outfits. Apart from its interest, the book also has a useful side, as it contains a number of valuable hints on first aid, illustrated with diagrams, &c. Copie can be obtained from Messrs. Burroughs, Wellcome and Co., Snow Hill, London, E.C.

EDDIES.

A FLYING exhibition manager turning novelist!

On the face of it it does not seem the sort of thing to expect, especially when one happens to know the gentleman in question, but nevertheless it is a fact. Unfortunately I am not yet allowed to give any definite news, but this much I may say, that one of our old friends who looked after things for a considerable while in England for one of our two most popular aviators, and who, afterwards, took in hand the management of the tour of the other most popular aviator the other side of the Atlantic, has spent the last few months in turning out a novel. Its plot is written around the intricacies of the character of an extraordinary woman, and in its working out, an aviator and an aeroplane play their respective parts, as one would only naturally suppose. I am looking forward, when the novel is published, to reading its little flying episodes, for they will at least bear the imprint of technical accuracy.

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Most extraordinary things happen in the usual romance, where aviation is dragged in to give it the zest of being up to date. Why ever the authors don't spend sixpence in getting up to Hendon and badgering some obliging pilot into telling them what would be likely to happen I can't think. For instance, in motoring stories this sort of thing will occur: "His nerves were strung to bursting point (thank goodness they had a conveniently high factor of safety) as he accelerated his clutch-lever, and sped forward at a hundred miles an hour into the murk." The general run of aviation stories to-day include a jovial sort of incident such as this: "He pulled a handle, the clattering of the motor died away with a sickening sob, and his white wings (technical details, Continental fabric, Emaillite dope) hung motionless in space." We may feel relieved that nothing like this will happen in this new book, for the author has seen as much flying as anyone, and a good deal more than most.

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I have been told it is rather interesting, when turning on an aeroplane to watch the speed recorder. On most machines the needle of the indicator varies its position according to the pressure detected by a Pitot tube, mounted on one of the wing tips. Taking as an instance the ordinary comfortable aerodrome turn, the needle, when the Pitot tube is on the inner wing in turning, will show a decrease in speed of about six miles per hour. Conversely when it is on the outer wing it will show a corresponding increase of speed. Further, with those anemometers that gauge the speed by means of a metal cup arranged normally to the wind, it has been noticed that during a *vol plané*, the speed of the machine will apparently, according to the indicator, decrease. It does not do so, of course, in the ordinary case. The inaccuracy is due to the weight of the cup and its fittings dropping forward, the machine being inclined downwards.

* * *

Sidney V. Sippe who, as I mentioned some time since, is and has been for some time flying for the Bristol people, will probably have started for Italy by the time these lines appear. There he will demonstrate the well-known Bristol monoplane to the military authorities. The machine he is taking with him is the one that was on exhibition in the gallery at the Grand Palais during the Paris Aero Salon. It is of the Coanda type, but fitted with a Gnome of only 50-h.p. Even with that relatively low power he has, during recent tests on Salisbury Plain, got something like 70 miles per hour out of the machine. Just now the monoplane has been sent back to the Bristol works to receive a thorough overhauling and cleaning up preparatory to its being sent away with him.

* * *

The Handley Page monoplane is adding to its successes almost every day. Just to show what it would do in a wind, it was flown, on Saturday last, from Hendon to Brooklands under conditions which were none to comfortable, for the engine was not pulling any too well, and the anemometer on the Hendon ground, sheltered as it is, was registering a wind velocity varying from 15 to 30 miles an hour. Up higher, the wind was probably doing something nearer 40, for although the temporarily sulky engine could not have been pulling the machine along at a speed of more than 60 miles an hour relative to the wind, yet the trip from aerodrome to aerodrome, over the 23-mile course taken, took under 14 minutes to accomplish, corresponding to a speed of 98 miles per hour. In spite of difficulties all round, with the wind and with the engine, the pilot had practically nothing to do with his controls. In a word—stability.

* * *

Looking through the foreign papers just now, one cannot help noticing the extent to which our sketches illustrating the exhibits of the Paris Salon have been reproduced in other journals. The most authoritative French aviation organ has made use of several, disguising them to a point with presumably the object of concealing their origin. Others have been kind enough to acknowledge to whom they are indebted for the pictures. The old adage has it that imitation is the sincerest form of flattery, and so I take this opportunity of throwing a bouquet at the paper I serve.

* * *

A veritable enthusiast is Miss Trehawke Davies. Readers will remember one of her first flights, when she flew from Hendon to Brighton, and some few days afterwards returned as a passenger with Mr. Barber on a two-seater Valkyrie monoplane. They will also remember how, afterwards, she determined to enter whole heartedly into the sport of flying, and bought a machine, a two-seater Blériot, on which, Hamel piloting, she made many extensive cross-country excursions. Her flight with Hamel around the circuit of London is still fresh in our minds, and, for that matter, so is her attempt to fly from Paris to Berlin as a passenger behind poor Astley. But the unfortunate accident that put an end to this last flight has not by any means deterred Miss Davies from taking such an active part in the sport, for she has put on order with Blériot another passenger-carrying monoplane, similar to her last one, with which she may be able to continue her periodic trips *en plein air*.

* * *

Matters aeronautic are developing rapidly in the Argentine Republic, and the activity that is noticeable there must, in a large measure, be credited to the enthusiastic President of the Argentine Aero Club, Mr. George Newberry. Mr. Newberry himself is both an aeronaut and an aviator of no mean repute, with apparently a thirst for altitude, for, back in the beginning of October, he ascended on a Blériot monoplane to a

height of nearly 8,000 ft., improving considerably on the height record of that Republic, that had till then been held by Castalbert with 3,300 ft. About a month ago, early in November, he created somewhat of a sensation by ascending to a height of nearly 17,000 ft. in a balloon. Through his energies a national subscription fund has been formed, and already with the proceeds three Blériot monoplanes have been acquired, while three more machines, a Nieuport, an Antoinette, and a Henry Farman biplane, have been promised to the Government by wealthy private firms. Mr. Newberry, by the way, is a pupil of the Italian aviator, Cattaneo, whose magnificent flying of his Blériot did much to create the initial enthusiasm out there.

* * *

I was extremely interested in what Mr. John G. Barron had to tell of the prospects for the manufacturer out in the Argentine. Mr. Barron was, some time back, connected with the Wolseley Motor Car Co., at Crayford, and for the past three years he has been in business with Messrs. L. R. Bobbitt and Co., one of the largest firms of motor car engineers in Buenos Aires. He has come back to England convinced of the possibilities of good business in that Republic, with the object of learning to fly, and taking back with him, later, a machine or two. As the subscription fund for the purchase of aeroplanes is, I understand, still on the increase, it seems a likely opportunity for some enterprising British firm to step in and capture at least a part of what business there is to be done out there.

* * *

Harrison, the well-known Bristol pilot, is back again in England, after spending a fortnight or so at that firm's private flying ground at Halberstadt for the purpose of putting through four German officers for their superior *brevets*. This particular *brevet* test is, perhaps, not so difficult as the one which is imposed in France and England, for it does not include a cross-country trip. To earn it one has but to remain at an altitude of 1,500 ft. for an hour, and to show one's ability to make a landing from 300 ft. without the use of the engine. The Germans have a separate *brevet* for cross-country flying. Mr. Harrison was sent over there during the absence of Mr. Ronald C. Kemp, who has charge of the Bristol school at Halberstadt.

* * *

In about a fortnight's time Mr. Harrison terminates his engagement with the Bristol Company, and transfers his energies to the service of the Australian Commonwealth. He, and Mr. H. Petre—the Monk—were, as is well known, appointed the official instructors of the Military Aviation School that is in formation in Australia. Petre sailed yesterday (Friday) taking with him the sincere wishes for success that his extensive experience in aviation merits. Harrison will probably remain in England till the early part of next year, keeping an eye on the construction of the two biplanes of the BE type that are being built in the Bristol works, as well as the two monoplanes that the Deperdussin Highgate works have in hand, and eventually testing them in flight.

* * *

Australians seem to have done pretty well in England. To start with, there is that little trio that came over on the boat together in April, 1911—Messrs. Busteed, Harrison, and Hawker. They have all distinguished themselves in flying:—Busteed and Harrison as highly capable flyers and thorough instructors, and Hawker—well, does he not hold the British duration record? Then we have Pickles, who went through his tuition at Salisbury Plain and Brooklands in a dashing style—too dashing, in fact, to please his instructors—but who since has sobered down into one of the most reliable and steady flying men we have. His performances on the Caudron have undoubtedly set a hall-mark on his ability as a pilot, as well as it has shown up the inherent qualities of that machine.

* * *

There is, too, J. J. Hammond—not an Australian, but very near to it, for he was born in New Zealand. He learnt in England, and did a lot of useful flying on behalf of the Bristol Co. in Australia. He is now down at the Eastbourne Aerodrome helping Mr. Fowler in the instruction of pupils at the latter's school down there. Chief characteristics: Thoroughly sound pilot and instructor, with an occasional leaning towards "stunts," and an extremely cheery soul withal.

* * *

Last, but not by any means least, we have Mr. Vincent P. Taylor, whose professional name of "Captain Penfold" is as well known in Australia in connection with balloons and parachutes as the name of Spencer is in England. He succeeded in getting his *brevet* at the Salisbury Plain Bristol School on Tuesday morning, observed by Major Higgins and Capt. Connor. Before he returns to Australia, where he intends to get an aerodrome in operation and run a series of exhibition flights, he has his eyes on a flight which, if he is successful in performing it, and there is no reason why he should not, will considerably enhance his reputation.

"OISEAU BLEU."

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A Military Aeroplane at Plymouth.

APPRISED of the intended visit by telegram, a large number of officers and men of the Sherwood Foresters, stationed at Crownhill, Plymouth, assembled on the Plymouth polo ground on Tuesday to witness the arrival of an Army aeroplane piloted by two fellow officers, Capt. H. W. Becke—who, by the way, has just been selected as a Flight Commander of the R.F.C.—and Lieut. Herbert. The distance from Farnborough to Plymouth is 160 miles, and the flight was made with one stop, at Sherborne, for petrol.

"Beta II" Over Portsmouth.

SOME little excitement was caused in Portsmouth on Tuesday last by the appearance overhead of an airship, until it was noticed that the vessel was flying the white ensign and was recognised as one of the British craft—as a fact it was "Beta II," with Lieut. Usborne in charge. The dirigible carried a crew of four naval officers, and sailed from Aldershot to Portsmouth at a height of 500 ft. Over the harbour the dirigible elevated to 2,000 ft., then returning to her station at Aldershot.

Unveiling the Hamilton-Stuart Memorial.

IT was estimated that some 7,000 people attended the ceremony, to which we referred last week, of unveiling the memorial to Capt. Hamilton and Lieut. Wyness Stuart at Willian, near Hitchin, on Wednesday week. The memorial takes the form of a granite needle about 6 feet high, and, after being dedicated by the Rev. J. D. Gainsford, Chaplain to the Forces, it was unveiled by Major Brooke-Popham.

Mr. Hamel Journeys to Loughborough.

A FINE flight from Leicester to Loughborough was made by Mr. Hamel last Saturday morning, he, on the way, distributing from his Blériot monoplane a special aviation edition of the *Leicester Daily Post*. He left the Old County Ground at Aylestone at a quarter past eleven, and in a few minutes had arrived at Loughborough, twelve miles away, having had to pass through several banks of fog and to make his way against a 30 mile-an-hour wind. In the afternoon, in spite of the intense cold, he made a couple of exhibition flights.

ARTIFICIAL WING FLIGHT.

SOME EARLY EXPERIMENTS.

So fascinated are a large number of those interested in the progress of flight with the possibilities and prospects of flapping flight, that we feel it may be of considerable interest to a large section of our readers if we recall to mind those experiments which were conducted by Messrs. E. P. Frost, F. W. Hutchinson, and C. R. D'Esterre, some years ago. The results of their latest work were embodied in a paper which Dr. Hutchinson read before the Cambridge University Engineering Society in 1905, an account of which appeared in *The Automotor Journal* of that date, and it is from that article that the following illustrations and text are abstracted.

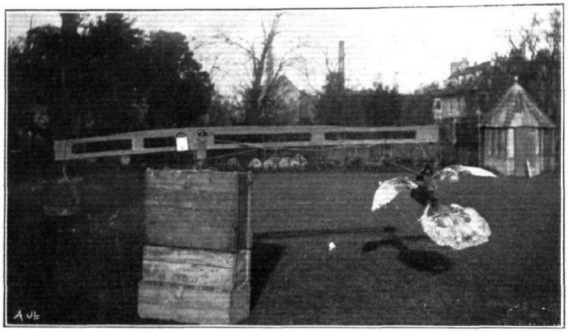

Fig. 1.—Goose's wings and tail arranged to be actuated by an electric motor, and to demonstrate the fact that up-and-down flapping flight produces forward motion at the same time, as proved by rotation of the balanced lever-arm from which the mechanism is suspended, round its centre.

The object of the experimenters was to ascertain what practical results could be obtained from this mode of aerial propulsion. The first experiments of the series were carried out in 1887 by Mr. Frost, who used a pair of artificial wings connected to another pair superimposed, both pairs being designed to be flapped synchronously. An aerocurve and aeroplane were fitted in front, and there was an extension behind. The front aerocurve was formed by two wings joined continuously at their inner ends, and the curvature of the wings followed that of the wings of a swift. The motive power consisted of a steam engine, and this, not unnaturally, proved inadequate for the work, so that these experiments gave no practical confirmation of Mr. Frost's theory that a bird flies mainly by flapping its wings at right angles to its line of flight.

The later experiments were made by Messrs. Frost, Hutchinson, and D'Esterre, with a pair of wings as shown in Fig. 1. These were dried natural (goose) wings, their total area being about 3 sq. ft. The wings were connected with a small electric motor, and a reduction gear arranged to flap them up and down, the whole arrangement being suspended by a spring balance from a balanced lever adapted to move round in a large circle. What is the most interesting feature of the machine is that this up and down flapping of the goose's wings occasioned not merely a vibratory up-and-down motion in which the "bird," formed by the two wings, rose and fell, but also produced a forward movement as well, causing the balanced lever to rotate about its centre. In the first

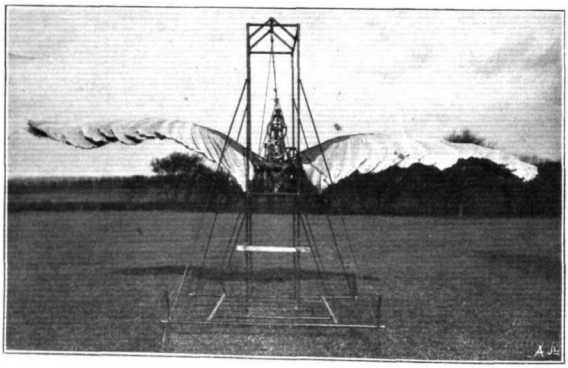

Fig. 2.—Rear view of artificial feathered wings, 20 feet from tip to tip, arranged to be flapped up and down by a 3-h.p. petrol motor, to demonstrate both the lift and forward movement obtainable.

experiment, up-and-down oscillation was very noticeable, but after the tail (shown in the illustration) was fitted, the up-and-down oscillations were largely diminished, and practically steady flight accomplished. The best results were obtained when the estimated power applied to the wings was $\frac{1}{6}$-h.p., and the number of flaps per minute was from 350 to 400. The maximum lift under these conditions was found to be 5 lbs., so that the ratio of horse-power to lift under the circumstances was 1-h.p. to 50 lbs. The apparatus weighed about 27 lbs. and its speed was equivalent to about 4 or 5 miles per hour.

After making these experiments with the goose's wings and tail worked by an electric motor, the experimenters proceeded to construct a large pair of wings covered with feathers, resembling as far as possible the actual pair of wings employed by a bird. These are shown in Figs. 2, 3, and 4, and the wings were designed for up-and-down flapping flight. They were mounted on a vertical car, which was adjusted to show both the lift and the forward movement, and was designed to run on a track of special construction. The total stretch of the wings was about 20 ft., and they were constructed with artificial feathers arranged so as to resemble the actual feathers in a bird's wing. The total area of the wings was as near as possible twenty times that of the first model referred to above, *i.e.*, about 60 sq. ft., and the wings were flapped up and down by a nominal 3–3½-h.p. petrol motor. The transmission was by cone-friction-clutch and chain to connecting-rods working the wings. Elastic bands—"pectoral cords"—were attached to the brackets, which will be noticed below the wings, their object being to store up energy on the up stroke and so tend to steady the load on the engine. The crank-throw and position of crank-shaft were adjustable for altering the direction and angle of the flap. The transmission mechanism for the large wings, comprising the friction-clutch, chain, and connecting-rods is shown in detail in Fig. 4. The results of this flapping flight with the large machine were, according to the experimenters, very promising. The machine, which was susceptible of considerable lightening, weighed 232 lbs., and, on the downward stroke of the wings, was lifted bodily up in the air and pushed forward. It rose about 2 ft. at each stroke and looked like a gigantic bird trying to fly under similar conditions. At the down strokes, the suspending rope left the vertical position and became markedly inclined forward, thus indicating, on a large scale, the principle which the inventors had established on a small one, namely, that up-and-down flapping flight with suitably-shaped wings produces, or tends to produce, forward movement. Under these circumstances, it appeared that the wings were capable (at 100 flaps per min.) of evoking about 100 lbs. lift each, and of raising the whole machine (weighing 232 lbs.) about

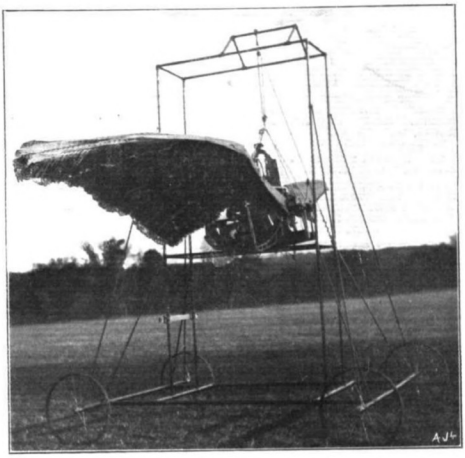

Fig. 3.—The same mechanism seen from the side, giving a clearer view of the structure of one of the feathered wings.

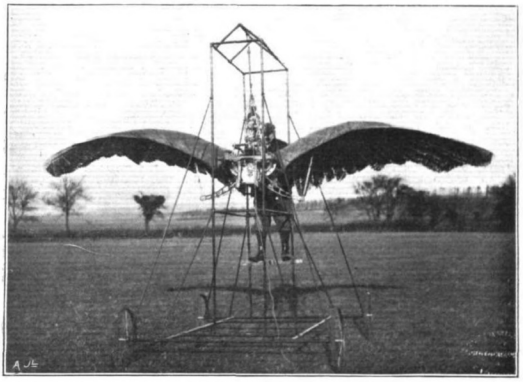

Fig. 4.—The artificial feathered wings viewed from the front, with experimenter testing the lifting power.

2 ft. at each stroke. The experimenters believed that the employment of feathers, particularly what are called the primary feathers of a wing, was distinctly beneficial, as the feathers work on the air like a series of stepped aeroplanes, each one acting on the air from a different level, and on air which has not had a downward velocity imparted to it by having had to sustain the weight of a previously-acting lifting surface.

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WHERE AEROPLANES ARE BUILT.

A Visit to the Works of Messrs. Hewlett and Blondeau.

YOU enter, and there, at the nearer end of the main shop, which covers a floor space of, roughly speaking, 150 ft. by 60 ft., is a magnificent specimen of a 50-h.p. single-seater Hanriot monoplane, standing fully assembled and completed, and waiting simply for the attention of the dismantler and packer to see it away on its journey to Rheims. Once there it will be tested in flight, and then handed over to a foreign government. For the French Hanriot firm have so many orders on hand that they have a difficulty in keeping pace with the demand for their machines. Three aeroplanes altogether have they instructed Messrs. Hewlett and Blondeau to build for them, this Gnome-engined single-seater, another single-seater with a 45-50 h.p. Rosel-Peugeot motor, and a 80-h.p. Gnome two-seater. And what better tribute to British workmanship, and more particularly to the workmanship of the firm we are considering at the moment, could be paid, than by the mere fact that these machines are being constructed to the order of a concern that has such a high international reputation for excellence in every branch of its work.

Down to the smallest detail, with the exception of some few of a special type of wire strainer that are obtained from France, these machines are entirely British built. But let us turn to the works itself, and to the system under which the turning of the crude materials into complete aeroplanes proceeds.

In dealing with aeroplanes the raw material falls into three classifications—wood, fabric and metal.

So we find that three sections of Messrs. Hewlett and Blondeau's works have been set apart for dealing solely with these three materials. At the near end the wing covering is done. All the wood working machinery is arranged to the left, the metal working machine tools to the right, and in the open space between, the assembling of the finished parts is carried on. Let us trace the works system, beginning with the assumption that the blue prints for the machine to be built have arrived. They are first scrutinised by the works manager who notes the materials and the quantities of it that are required to see the work safely through. Orders are written for the material that does not happen to be in stock, and the blue prints are sent on to the pattern shop where all the jigs, patterns and special tools that will be required for the work in hand are made. These are probably completed by the time the material ordered has been delivered. As delivery takes place so the material is sorted. Raw material, such as sheet steel and planks of wood, passes into the general store; finished material, such as piano wire, nuts, bolts, and wire strainers being sent to the finished-parts store. From the pattern shop, the blue prints are handed back to the works manager, who passes them on to the foreman who has charge of the various departments in which the work appropriate to the several drawings is carried out. They in their turn pass them on to their workmen, and the actual work of construction commences.

Material is obtained from the stores, which are presided over by one whose duty it is to keep an account of every scrap of metal, wood, or fabric that leaves his department. To facilitate his work, every part that goes to make up a complete aeroplane is allotted a number, and whatever materials are "requisitioned" from the store for the making of that part are booked down to that number. Thus the storekeeper can tell, from reference to his books, the exact cost of the material that has been used in the production of any one part.

But this does not give the total cost of the part, for labour must be taken into account. The manner adopted by Messrs. Hewlett and Blondeau is to send out with the drawings for each fitting a card which bears the same number as the fitting, and which always accompanies it, no matter whose hands it passes through in the process of manufacture. On this card all those men who have anything to do with the manufacture of that part write down the time they have spent on it. Take, for example, the case of a gross of welded steel strut sockets to be manufactured. The material has already been taken from the store and with it a time card. The first operation is to stamp out the steel base-plates and he who carries this out makes a note on the card to the effect that workman such and such a number—every workman bears a number, as well as each fitting—has spent so much time on that part. While this is being done, we will say that three lads are busy cutting off short lengths of streamline steel tubing for the sockets. They, too, make a note on the same card as to how long they have taken over their section of the job. Then comes the welder, and after him the finisher. By the time the gross of sockets is completed, the cards bears the numbers of all those who have worked on the job, and the respective times they have spent on it. Thus the total cost for labour in the production of that particular gross of sockets is established.

But even that, added to the cost of material, does not give the total cost, for a proportion of the general works and office expenses, such as rent, rates, lighting, &c., must be added.

When the part is finished, it is taken into stock in the finished-part store. In this manner the whole of the parts that go to the making of the complete aeroplane, or the batch of them, are finished and stocked away in their proper place.

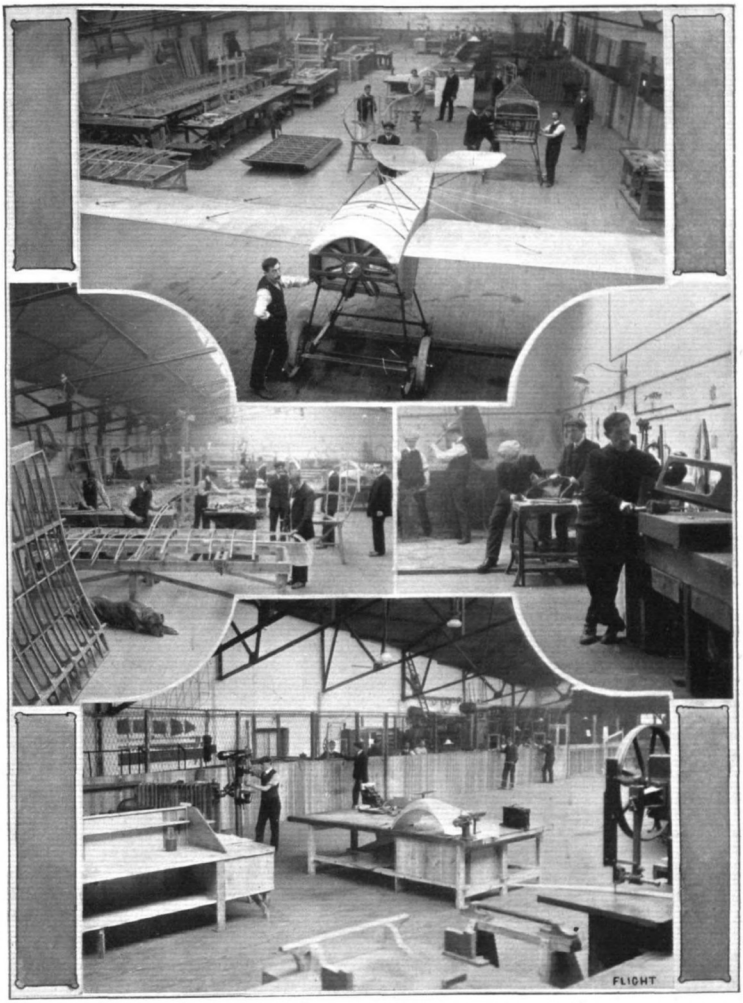
When all the parts are ready, assembling is commenced. In assembling, too, a similar system of material and labour recording is observed, so that by the time the machine is ready for the aerodrome its total cost, even down to the last nut, may be determined.

Such then, in its broad outlines, is the system governing aeroplane construction in the works of Mrs. Maurice Hewlett, our first British airwoman, and her partner, Mr. Blondeau, also a certified pilot. They have established a works wherein they may, unoccupied by the consideration of any machine of their own type, construct aeroplanes on a large scale at a correspondingly low cost, to the designs of their clients. And their example is one that should be a lesson in many ways, and should dispose of much misconception as to the real source of profit in aeroplane construction. This firm is certainly exceptionally well placed for doing well for themselves, as their plant is most complete, their workmen thoroughly experienced and well chosen, and their stores well stocked with everything that could possibly be required in aeroplane construction. In their finished-part store we saw an enormous stock of Gnome engine spare parts, for in these, we understand, Messrs. Hewlett and Blondeau do a considerable trade.

One of their chief features is oxy-acetylene welding work, not only for steel but for all metals. Mr. Blondeau told us that he had no fewer than ten men on probation before he decided which one to select to place in charge of that department.

"Remember you have a man's life depending on how you do your work" runs the shop's motto. The men have the seriousness of their work at heart.

VIEWS AT MESSRS. HEWLETT AND BLONDEAU'S WORKS.—On the left, where the metal working, on the right, where the wood working is done.



MESSRS. HEWLETT AND BLONDEAU'S WORKS AT CLAPHAM JUNCTION.—Above, the main assembly shop; in the centre, to the left, where the wings are made, covered, and doped; to the right, a section of the metal working shop. Below, a section of the works, showing the pattern shop and the store.

FOREIGN AVIATION NEWS.

A New Breguet School.

THE French Breguet firm have now joined the Colony of constructors in the neighbourhood of Versailles and are arranging an aerodrome at Velizy-Villacoublay which they are equipping with repair works, a house for the pupils and a dozen school machines.

At the Farman School.

ONE of the visitors to the Farman School at Buc on the 26th ult., was Mr. Holt Thomas of the Aircraft Co., the British agents for the Farman machines. He witnessed trials by Henry Farman on his new type machine, while Maurice Farman was testing one of his brother's ordinary type biplanes. Flights were also made by nine of the pupils and Bernard and Fourny were busy putting military machines through their paces.

Military Flying on a Borel.

LIEUT. RONIN, on a Borel monoplane, started from Buc on the 26th ult., with orders to fly to Belfort and visit the frontier towns. He landed at Troyes for the night and then went on the next day to Vesoul where he was detained by bad weather until Saturday when he was able to complete the flight to Belfort.

New Deperdussin Superior Pilots.

CAPT. FABRE and Lieut. Redelsberger having finished their course at the Deperdussin School at Rheims commenced their qualifying tests for their superior certificates on the 26th ult. On 50-h.p. Gnome-Deperdussins each officer made a flight of an hour and a half at a height of 500 metres.

A Good Flight by Fischer.

ON the 26th ult. Fischer was testing the Henry Farman machine, fitted with a Rhone 9-cyl. engine, with which he hopes to make a record flight shortly. The machine carried a very heavy load, and flew for two hours in splendid style.

Excursions on R.E.Ps.

ON the 27th ult., Lieut. Precardin and Campagne, on their R.E.P. monoplanes, made a long flight in company over the country round Buc, while Molla carried a passenger over Versailles and Paris, and, after returning to Buc, did a little trick flying, finishing up with a fine spiral *vol plané*.

Heavy Weights on a Sommer.

ON the 28th ult., at Mourmelon, Tetard carried out some weight lifting tests with one of the new Sommer biplanes. A fine flight was made with two passengers, and a full supply of fuel and oil and ballast, to make up a total weight of 400 kilogs.

A Fine High Flight.

AN extraordinary performance was made at Villacoublay on the 28th ult., when Sergt. de St. Andre, on a Nieuport monoplane, fitted with a 2-cylinder Nieuport motor, got up to a height of 3,700 metres during a flight of 46 minutes, surely a record altitude for such a low-powered machine.

A Cold Trip on Caudrons.

LIEUTS. Gerard and Peralda on Saturday started from Crotoy with the intention of flying to Beauvais and Amiens and back. On account of the strong wind and the intense cold, they landed at Beauvais, and stayed there for two hours before attempting to go on to Amiens, where they eventually landed safely.

Brindejonc a Superior Pilot.

ON the 23rd ult., Brindejonc des Moulinais made the first of the qualifying tests for a superior *brevet* on his Morane monoplane. He started from Villacoublay at 11 a.m., made a stop for lunch at Chartres, and then went on to Cercottes Camp. He arrived back at Villacoublay at 3.50 p.m.

Flying Over the French Fleet.

FLYING on his Breguet machine from the French aeroplane's mother ship "Foudre," Montalent, accompanied by a French naval officer, flew over Nice and Mentone on Monday. He also passed over the fleet and along the Villefranche channel, finally alighting on the deck of the "Foudre."

Week-ends on Farman.

ON Monday, Barbaroux made one of his usual trips from Buc to Chartres, being accompanied by Mme. Renaux. Maurice Farman also went over with Senouque as a passenger, but made a detour to Dreux. Renaux flew Barbaroux's machine back to Buc, while Maurice Farman returned with Mme. Bouchet as passenger.

Two British Officers at Etampes.

AMONG the new arrivals at the Farman School at Etampes are two British Officers, Col. Everett and Commander Masterman, who were given their *baptême de l'air* by Gougenheim on Monday.

Long Trial by Baron Pasquier.

ON Monday, at the Blériot school at Buc, Baron Pasquier was testing his new Blériot monoplane, and made one flight of just on two hours' duration.

Good Work at Pau.

SOME very fine flying is seen at Pau now that the Blériot winter school is in full swing again. On Monday, Deneau was flying very high over Pau, and Lieut. Brule went to Dax and back, a distance of about 100 kiloms.

Another Superior Farman Pilot.

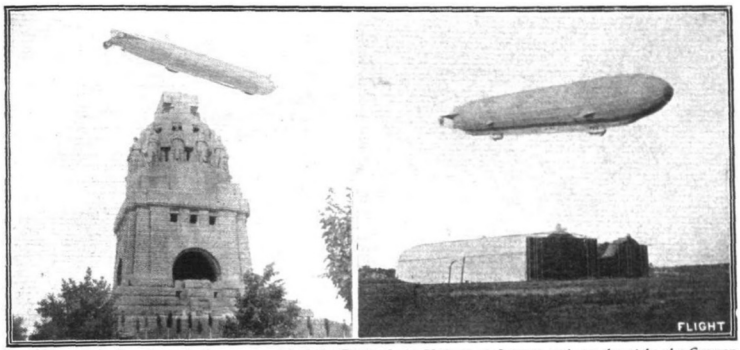
FLYING for his superior *brevet*, Adjt. Soularisse, on the 29th ult., on his Henry Farman biplane, flew from Villacoublay to Chalons Camp, doing the distance of 200 kiloms. in 1 hour 35 mins. He returned later in the day to Villacoublay.

Flying Through the Fog.

WITH the thermometer standing below freezing point, Maurice Chevillard, with a passenger, on his Henry Farman biplane, with 80-h.p. Gnome motor, started from Buc at 8.30 on Sunday morning and flew to Rheims in 1 hr. 20 mins. It was very foggy, but the pilot was able to find his way with the aid of his compass.

Wind and Cold Baulk Fischer.

AT the Villesauvage Aerodrome, on the 28th ult., Fischer made another attempt to beat the world's duration and distance records on his Henry Farman. In two hours he covered 163 kilometres, and was then going strong. Soon after he had been in the air for four hours, however, the cold began to tell upon him, while the wind also gave him a good deal of trouble, so that he landed after covering 350 kilometres, his time for this distance being 4 hours 40 mins.



The "Hansa" circling above the huge memorial of the Battle of the Nations, at Leipzig, and on the right the German Navy's Zeppelin L1 floating over its shed at Johannisthal.

Fatal Accident to Arondel.

THE competition for the round Paris prize of 5,000 francs offered by the Seine General Council ended in a catastrophe on Saturday last. Arondel, on a monoplane of his own design, had made a start on the previous day, but had been stopped at Vincennes by a snowstorm and had to return to his starting point at Juvisy. He started for a fresh trial on Saturday afternoon, and, after making a circuit of the aerodrome, when making a very sharp turn the machine appeared to have overbanked, as it simply slipped to the ground from a height of a hundred metres, the pilot meeting with instant death.

The Prize Goes to Daucourt.

THE round Paris prize of 5,000 francs, offered by the Seine General Council, was awarded to Daucourt in respect of his flight on his Borel monoplane on September 26th last, when he encircled the French capital seven times, making a total distance of 800 kilomts., a landing being effected each round at Juvisy.

The Woman's Height Record.

AT Johannisthal, on the 22nd ult., the Russian aviatress, Mdlle. Galanschikoff, took a Fokker monoplane up to a height of 2,400 metres, which, it is claimed, is a record for a lady pilot.

A Long Flight in Germany.

LIEUT. JOLY, accompanied by Lieut. Heinz, started from Doeberitz on the 29th ult., and flew to Thorn, where he landed at mid-day. The distance between the two towns is 390 kilomts.

German Navy and Hydro-Aeroplanes.

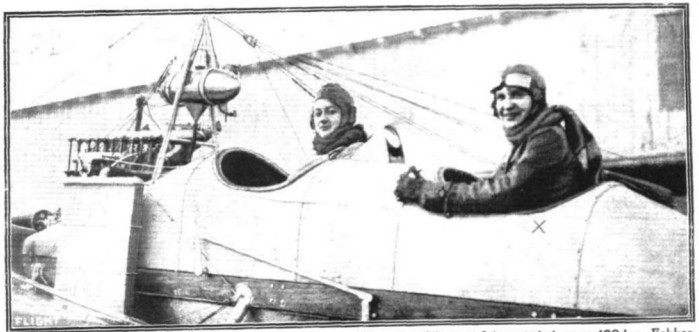
THE German Naval authorities are still giving their attention to hydro-aeroplanes at Putzig in the Dantzig Bay. On the 20th ult., Lieut. Bertram was testing a monoplane fitted with three floats, and, in turning, the machine capsized. The pilot fortunately was rescued by a motor boat, little the worse for his adventure.

An American Height Record.

AT Los Angeles, on the 20th ult., John Gilpatric improved on the American passenger height record, getting up to 5,400 ft.

Another Fine Argentine Flight.

SOME splendid work on Blériots is now being reported from Argentina. Last Monday, Corporal Fels, of the Argentine Army, started from Buenos Ayres and flew on a Blériot monoplane to Monte Video, in Uruguay, a distance of 150 miles, the time taken being 2 hrs. 22 mins. He made the return journey to Buenos Ayres on Tuesday.



Miss L. Galanschikoff (X), the Russian aviatress who, on November 22nd, at Johannisthal, on a 100-h.p. Fokker monoplane, made a world's altitude record for lady flyers with 2,400 metres. The previous record was to the credit of Miss Melly Beese with 820 metres.

Models

Edited by V. E. JOHNSON, M.A.

Aero Exhibition, Olympia, Model Section.

Class III. Hydro-Aeroplane Models.

IN this class the minimum weight is 8 ozs., but the qualifying duration of flight is only 15 secs. instead of 30 secs. as in the case of Class II. The allotment of the marks is the same—the prizes £5 and £2. A tank will be provided at Olympia in which the models will float during the exhibition.

In view of the immense importance of hydro-aeroplanes from a naval point of view, also their novelty and the abundant scope yet offered for experiment and invention, we should not be at all surprised to see this class very largely represented, not only in this section but in Section or Class IV as well. The prizes, £5 and £2, we scarcely consider adequate in themselves—but, as we have already said, Class IV is eminently suited for such—so that one may really consider that inventors and experimenters in this type of model have a chance of winning prizes amounting to £17.

Now there are many important points to be considered in designing a hydro-aeroplane in model form. One can design it as a model only, *i.e.*, in a form, say, which has proved itself successful in open competition at the Welsh Harp or elsewhere; or, what is much better, one can study the results so far obtained with full-sized machines and endeavour to design a machine (in model form) which shall (when built full size) be successful where the full-sized prototype has failed. The question then which at once arises is where or when has it succeeded, and when has it failed? There is no difficulty whatever in answering this question. It has (as a class) succeeded under favourable conditions—failed under adverse. If you do not agree with this point of view, then read an unbiassed account of the Monaco, the St. Malo, the Heiligendamm, &c., meetings, taking careful note of the atmospherical conditions stated to be prevalent at the time. The next question which the reader will naturally ask is, although as a class the hydro-aeroplane may not be a success on rough water, which type has, or is likely to prove itself, the best under such conditions? All that we can do to answer it is by stating the chief difficulties met with, and leave it to the ingenuity of our readers to devise the solution. One of the greatest difficulties is to overcome the low centre of gravity necessary for flotational stability, and the high centre of gravity requisite for stability whilst flying.

It would appear at first sight that the difficulty with respect to the low centre of gravity can be overcome by increasing the width of the flotational base; the difficulty which is then met with is that one float may be on the top of a wave whilst the other is in a hollow, and *vice versa*, a state of things which not only precludes rising but is very detrimental to the solidity of the machine. For, comparatively speaking, smooth water such a flotational base can be used with advantage. Long floats with pointed, slightly upturned prows are best suited for rough water; one can either employ two floats as in the Borel type, one float and "balancers" as in the Wakefield, or one boat-like float (which serves the purpose of the fuselage as well) as in the Donnet-Lévèque and Curtiss (latest type); in both these auxiliary "wing-tip," egg-shaped or cylindrical floats are used as well. In the case of a full-sized hydro-aeroplane the machine should alight on the surface of the water in exactly the same manner in which it rose from it (*vide* FLIGHT, January 27th, 1912, p. 84), *i.e.*, the *rear* part of the float alighting first—the machine then skimming, hydroplaning—finally floating or resting.

Now with a model this is almost impossible unless the machine were fitted with some automatic device to cause it to flatten out at the end of the glide—practically this appears out of the question, so all that can be achieved in this way is to make the gliding angle of the model good so that it will alight on the nose of the front float or floats as gently as possible.

The model can of course be made to pancake on to the surface of the water (more than one did so at the "Welsh Harp"), but this is one of the very worst kind of alightings for a full-sized machine.

It follows from the foregoing that since a model cannot be made to alight in a similar manner to a full-sized machine, this is not a matter to which any great attention need be paid.

Floating and flying stability and an ability to rise quickly from the surface of rough water and battle successfully with air-gusts are by far the most important factors.

As to the particular type to adopt, that is a matter which we must leave to the reader. We take this opportunity, however, of pointing out that the loaded elevator type of machine with one or more floats in front has not been successful in the case of full-sized machines or even power-driven models—when either alight at all steeply—a knocked off float or a broken back has been the invariable result. The natural flotational attitude of a tractor machine makes it specially suitable for rising quickly from the surface; the great difficulty to be overcome in this case is that the floats (if of the usual type) act as aeroplane surfaces and tend to make the model rise at too steep an angle and then dive.

In our opinion, on no account should a tail float be omitted—the tail of more than one full-sized tractor has dragged the whole machine backwards under the water when this has been omitted. The tail float should be pivoted to work in conjunction with the rudder. We no longer advise the use of floats in pterygoid, *i.e.*, broadside on, aspect, because we have found the same unsuitable for rough water, the float tending to jump (and bump) from wave to wave; in smooth water this type is most efficacious, and a model can be got to rise from the surface with such a type even when launched with the wind. But a smooth-water machine is not what is wanted; we have quite a number of that type already. Again, whilst a float broadside on is most efficacious as a hydroplane *when it is really hydroplaning*, a certain speed or velocity through the water must be reached *before* this can be brought about, and it is just this speed which cannot be obtained when the model is other than a very light one, because far too much power is required to drive it (broadside on) *through* the water. The draught of a light model is so insignificant that it (practically speaking) "skims" from the commencement.

In this class a really well-designed tractor hydro-aeroplane with either single or twin propellers capable of making, say, a flight of 20 seconds duration, and showing good flying and flotational stability would, in our opinion, stand a very good chance. The present type of full-sized hydro-aeroplanes are but pygmies to what the future has in store. It may seem an absurd thing to prophesy, but I personally have no hesitation in saying that within three years we shall have machines carrying engines of *not less than* a thousand horse-power.

Mr. Gordon Jones's Model Hydro-Aeroplane.

We give this week an illustration of what is undoubtedly a very good type of model hydro-aeroplane. It is built entirely of steel save the motor-rod and floats; the model is naturally extremely strong, and this effect is increased by its biplane form. Being well surfaced, *i.e.*, lightly loaded and correctly designed, it had no difficulty in rising from the surface of the water at the first attempt, and

Mr. Gordon Jones and his model, second in the competition at the Welsh Harp. V.E.J.-type float. The model had not been tried previous to the competition.

in making a high and steady flight right away. The floats are the type recommended by us some time ago in FLIGHT and, as will be seen, are three in number, one in front and two behind, the latter being fixed to the lower plane. If we remember correctly, the propellers used were of the Centrale type.

A Power-driven Model Hydro-Aeroplane.

The accompanying illustration is from a photograph of a power-

Mr. V. E. Johnson's latest model hydro-aeroplane—the first power-driven model hydro-aeroplane (so far as we know) to rise from the surface of the water solely under its own power (*i.e.*, without push). Weight, 3 lbs. 4 ozs. Power plant by Mr. H. H. Groves.

driven model, which, after a good deal of experiment and readjustment, I have at length succeeded in getting off the water entirely under its own power. As the photograph shows, there is strictly speaking no front float, but one long central float and two balancers or wing-tip floats—these are fastened to the *rear* edge of the lower plane and can be set at any desired angle. It was not until the central float (which is fastened by two rubber bands) was placed some way further forward than originally designed that the model could be got to hydroplane—(*i.e.*, not dig the nose of the central float *into* the water). As soon as this was accomplished the machine rose without the least difficulty, but the shifting forward of the central float had also brought forward the centre of gravity of the machine, and in the descent the elevator was broken. The model (save the floats) was constructed entirely of magnalium and steel with brass sockets (supplied by Messrs. J. Bonn and Co.). The elevator was of magnalium—one made of steel has since been fitted. Loading, 8 oz. per sq. ft. The floats are constructed similarly to those fitted to Mr. Goodall's model and described a short time ago in FLIGHT. It will be noticed that both resistance and weight have been kept down as much as possible and that the position of the propeller is such that the "wash" is perfectly clear of every part of the machine. The flotational stability is perfectly satisfactory, the model showing no tendency to upset either laterally or longitudinally. The rear floats carry part of the weight and do not *quite* clear the water when skimming. Propeller, Chauvière type.

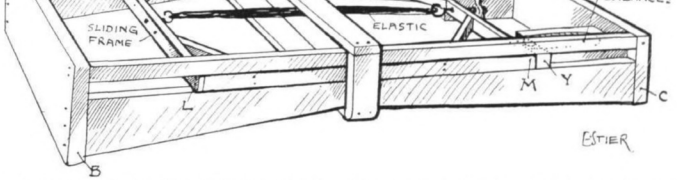
Messrs. J. Bonn and Co.'s New Catalogue.

We have received from the above firm a copy of their new catalogue of model aeroplane accessories and materials. We have no hesitation in recommending every aeromodellist to obtain a copy of it. Amongst the latest types of wood stocked are not only U, T and H shaped sections but hollow spars and birch and satin walnut blocks for making propellers. No less than fifteen types of ball-bearing brackets are listed and illustrated, and amongst other items we may mention brass and aluminium sockets and lugs, propellers, aluminium sheeting; a strong and really serviceable combined propeller winder and hand drill, magnalium tubing of various diameters, gear and bevel wheels, as well as model aero wheels, rubber, wire strainers, &c. The three kinds of wood stocked are silver spruce, ash and birch.

A Device for Testing the Thrusts of Propellers.

A B C D is a strong girdered frame. A D and B C are grooved to allow the inner framework, K L M N, to slide through them. The grooves in A D and B C, also the sides of the sliding frame, are stained and highly polished to give rise to as little friction as possible when in action. Two light, accurate spring-balances are screwed down to the blocks of wood, as per sketch, and the hooks are attached to rings in the frame, K L M N. The side, M N, of the sliding frame is brought to bear against the stops, X and Y, in such a manner that there is no strain upon the balances. The elastic is then wound a definite number of times, the thrust of the propeller being known from the weight registered by the balances, due to the pushing forward of the sliding frame by the propeller.

[If the sliding frame was mounted on light runners or light, well-oiled tubing substituted for the wooden groove, the friction would be less. A light pen or pencil point attached to the pointers of the spring-balance and a light uniformly revolving cylinder fitted, to automatically record the result would be a great improvement.—V. E. J.]



Replies in Brief.

PHEROZE E. J. MINVALLA.—Your questions are not easy to answer, unless one could see the models in actual flight; apparently the first-named is due to your elevator; try a much smaller one, and report results. As to your other, are we to understand the model always flew straight or circled without apparent banking in that sense which one would expect from the torque, also what did you do to try and make it bank? In view of certain reported results from Germany, your second model is decidedly interesting. Try some experiments with a very small elevator.

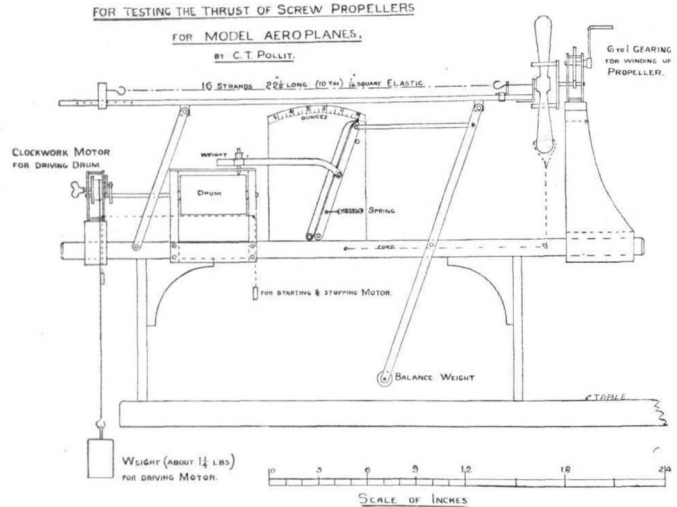
H. T. HOLMAN.—You should not use ash in a model of this size, it is too heavy; use silver spruce. Don't double surface if this is your first model hydro-aeroplane, keep everything as light as possible, using white wood and varnished Jap silk for floats. Place one float in front nearly under elevator, and two others somewhat in advance of the main (*vide* the Gordon Jones model); use steel wire 18 s.w.g. to fix floats. The above gives you three similar floats—if one main and two auxiliary use as on my steam model. The c.g. of main float must be well ahead of c.g. of machine. Yours being rubber-driven renders this system more difficult, as your c.g. would naturally be further forward. I should therefore advise the first-named. You must either provide ample lifting surface or ample flotation (both are best) or your model will not rise.

TESTING THE THRUST OF SCREW-PROPELLERS FOR MODEL AEROPLANES.

By C. T. POLLIT.

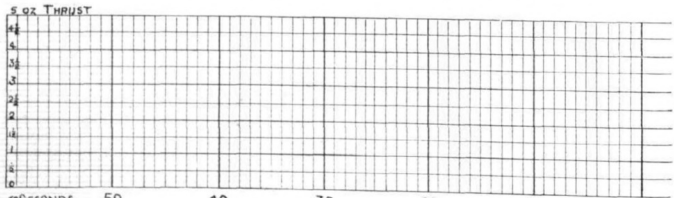
THE accompanying drawings and description relate to a small machine that I designed and constructed for the purpose of testing the thrust and efficiency of various sizes and shapes of elastic-driven propellers for model aeroplanes. Although I have not done much with it so far, it may be of interest to the readers of FLIGHT, and perhaps useful to some who wish to make similar experiments. It is capable of taking propellers up to 1 ft. or more in diameter, and a length of elastic up to 2 ft.; the thrust limit is up to 5 ozs. as at present constructed.

MACHINE FOR TESTING THE THRUST OF SCREW PROPELLERS FOR MODEL AEROPLANES. BY C.T. POLLIT.



A connecting-rod conveys the thrust of the screw to the lever with spring attached to it near the bottom; the amount of thrust being indicated in ounces on the scale at the top.

RULED PAPER FOR TAKING DIAGRAMS OF THRUST AND DURATION OF REVOLUTIONS OF SCREW PROPELLERS FOR MODEL AEROPLANES. BY C.T. POLLIT.



The drawing is an elevation of the machine, from which the construction will be easily understood. The ¾ in. square rod, 2 ft. 4 ins. long, is fitted with a brass angle-plate screwed on to one end, for carrying one end of propeller-shaft, and a loose one secured with a sleeve for carrying the other end. The other end of the rod is fitted with a sliding head with hook and can be adjusted for various lengths of elastic. This rod is supported on two pairs of rocking levers; the rear ones being extended below the point of support to take a balance weight, which is approximately equal to the weight supported by the levers.

There is also a loose lever which remains where it has been pushed to, showing the maximum amount of thrust. This was all I had at first. I wound up the motor with the finger, which not only took time, but was very tiring work. So I

added the winding-up gear made out of some old clock works; this is not only easier but quicker, as one turn of the handle gives six to the propeller, and after winding up, the screw is held up by a loop of string, and the bracket with winding-gear attached slipped off the end of the frame.

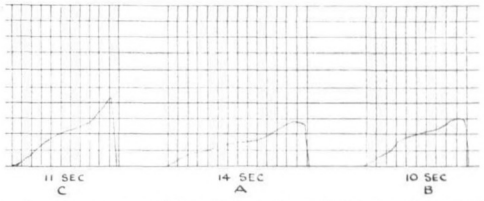
The time it took the elastic motor to run down was taken by a watch held in the hand.

The self-registering arrangement was added later. This consists of a drum driven by a motor; the drum is made 2⅜ in. diameter, or 7½ in. in circumference, and is made to revolve once in a minute, so that ⅛ in. is equal to 1 second of time, the paper on which the diagrams are recorded being ruled as per enclosed sample.

The motor is made of clockwork, the spring being removed and a drum fixed in its place to drive by a weight in order to give constant and even motion. A catch for starting and stopping was also arranged as shown.

An arm carrying a pencil conveys the thrust of the screw—from the index lever with spring attached—to the paper on the drum. The pencil works in a slot formed by two parallel bars so as to prevent side movement, and a small weight (about ½ oz.) on the top of the pencil gives the necessary pressure.

The machine is made chiefly of wood, with small brass screws working in brass plates attached to the levers for bearings; and all is made to work as easily as possible.



The motor can be slipped off the end of the frame and the drum lifted off to fix the paper if necessary.

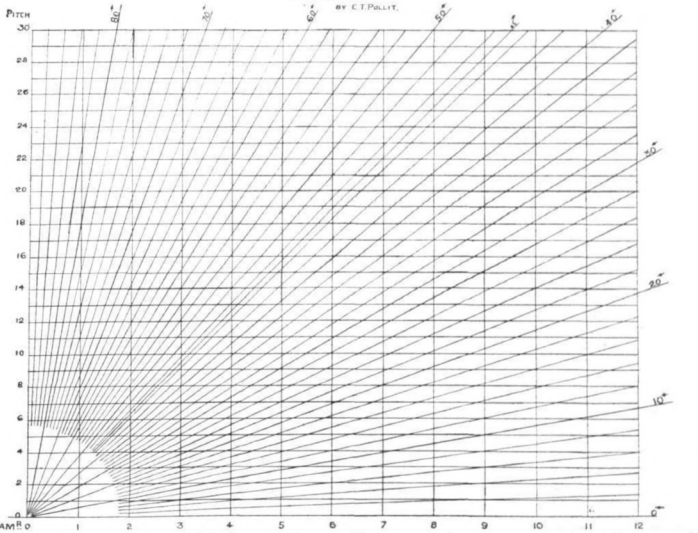
Having fixed a paper on the drum, so that the pencil coincides with the zero line. Before commencing the tests I see that the drum makes one revolution in a minute; then wind up the propeller the desired number of revolutions, slip the cord over one of the blades, and remove the bracket with winding-up gear attached so as to be out of the way. Wind up the motor, see that the loose arm is close up to the one with spring attached, and all is ready. Start the motor driving the drum (by pulling down the weight shown for that purpose, which releases a catch), pull the cord until the propeller is released, note the time it takes to run down, by a watch, and compare it with the time shown on the diagram, also note where the finger has been pushed to, showing maximum thrust. Each experiment should be numbered and all the particulars put down in a tabulated form with dimensions of the propeller attached.

The diagram will show how the thrust decreases as the propeller runs down.

DIAGRAM

FOR FINDING THE PITCH OF SCREW PROPELLERS FROM DIAMETER AND ANGLE AT TIP OF BLADE, AND VICE VERSA.

BY C.T. POLLIT.



The accompanying diagram was taken and corresponds with the following particulars:—

In order to find the pitch of a propeller, it is necessary to multiply the circumference of the circle described by the

tip of the blade, by the tangent of the angle formed at the tip with the plane of revolution. It can, however, be more easily ascertained from the accompanying diagram which I have constructed.

I need scarcely add that if it were desired to test propellers having a greater thrust than 5 oz. it would only be necessary to substitute a stronger spring and graduate the index and rule paper to suit.

I may add that the graduating of the index was done by attaching one end of a cord to the rod carrying the propeller, and—after passing it over a pulley temporarily fixed off the end of the machine—applying weights to the other end and marking the position of the pointer as each weight was applied.

KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Hand-launched	Distance	...	A. E. Woollard	... 477 yards.
	Duration	...	A. F. Houlberg	... 89 secs.
Off ground	Distance	...	G. Rowlands...	... 232 yards.
	Duration	...	A. F. Houlberg	... 51 secs.
Hydro, off water	Duration	...	G. P. Bragg-Smith	... 25 secs.
Single-tractor screw, hand-launched	Distance	...	H. R. Weston	... 84 yards.
	Duration	...	F. W. Jannaway	... 22 secs.

Official Trials.—Members and friends wishing to visit the Aero Models (Northern Section) Flying Ground on December 14th are advised that the best way to ground is by tube to Highgate, thence by motor 'bus or tram to Bishop's Avenue, just this side of East Finchley station. Turn up Bishop's Avenue and take iron gate on right-hand side about 200 yards up, follow path till second gate is reached and then follow footpath to the square field in hollow. Another route is tube or District to King's Cross, thence by G.N.R. train to East Finchley station. A member of the Aero Models Association will be at the bottom of Bishop's Avenue at 2.30 to conduct party.

Aero Exhibition, Olympia.—All clubs and members should have had the full particulars of the Model section by this time. Should, however, any club or anyone interested not have received copies will they please send a postcard to the hon. secretary, who will at once forward same.

27, Victory Road, Wimbledon. W. H. AKEHURST, Hon. Sec.

Diagram.	Propeller. Diameter.	Pitch.	No. of blades.	No. of strands.	Elastic. Length.	Size.	No. of turns.	Thrust.	Time.
	in.	in.			in.	sq. in.		oz.	sec
A	$8\frac{3}{4}$	—	2	12	22	$\frac{1}{8}$	200	$1\frac{3}{4}$	14
B	8	13	2	12	22	$\frac{1}{8}$	200	$1\frac{1}{2}$	10
C	8	10	2	12	22	$\frac{1}{8}$	200	$2\frac{1}{2}$	11

MODEL CLUB DIARY AND REPORTS.

Aero-Models Assoc. (N. Branch) (15, HIGHGATE AVENUE, N.).
DEC. 7TH. At Finchley as usual, and tests for K. and M.A.A. trials for records to be held Dec. 14th. Entry forms on application, to be returned to K. and M.A.A. duly filled up.

Ecclesall and District (247, SPRINGVALE ROAD, SHEFFIELD).
Dec. 7th. Flying, Gleadless. Meet Heeley Picture Palace, 2.15. Dec. 9th. Whist drive and social evening at 32, Edgedale Road. Tickets 1s. each.

8th Hampstead Scouts Model Aeroplane Club (8A, MONTAGUE ROAD, HENDON, N.W.).
DEC. 12TH. Meeting (Hendon Section), local quarters, 8.30 p.m. Dec. 17th. Meeting (Kilburn Section), Headquarters, 7 p.m. Dec. 28th. R.o.g. models, tests, Hendon, 3 p.m.

Leytonstone and Districts Aero Club (64, LEYSPRING ROAD).
DEC. 6TH, 3 p.m. (opposite brickfields). Dec. 7th. Special display of tractors and r.o.g.s, 10 a.m., near Bushwood Avenues.

Reigate, Redhill and District (8, BRIGHTON ROAD, REDHILL).
DEC. 7TH. Tractor trials and duration competition. Dec. 21st. Rawson Cup.

S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).
DEC. 7TH. At Kidbrooke, 2.30 to 4 p.m. Dec. 8th. At Blackheath, 8 to 10 a.m. Dec. 8th. At Woolwich Common, 10.15 a.m. to 12.15 p.m. Dec. 14th. At Blackheath, 7.30 p.m., illuminated flying.

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

Air *v.* Water Cooling.

[1683] The Italian Government having given preference to air-cooled engines by allowing an extra half kilog. per horse-power to the water-cooled motors competing in the coming Military Trials, it surely behoves us to look into the whole question, for undoubtedly weight, though of less importance to day than at one time, certainly does count.

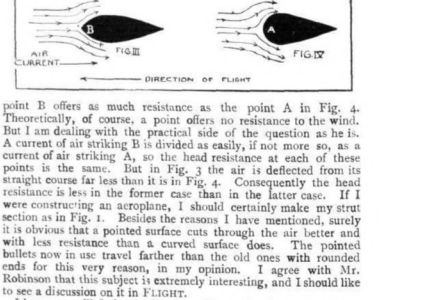
As a user of A.C. motors since before the advent of the magneto, I can see with Anzani that a knowledge of them does not induce to any great admiration for those of the rotary type. So great, however, is the lack of understanding of the whole theme that I have actually read in a review devoted to aviation that a rotary A.C. motor is at a disadvantage on a bench test, and that because of its, so to speak, stationary position. Surely in theory, the traction of any heavy body through the air, together with its own extra head resistance should cause such an engine more suffering! A recently published report gives the head resistance as enormous. As a student of things aeriel, my keenest wish is to be able to raise an intense interest in, and hence a burning discussion on, the comparative merits of water- and air-cooling, sure of the beneficial effect of such probing. I fear that the gyroscopic question would have to be dragged in, unless the rotaries were considered as a class apart. Let us, however, requisition all that science and practice can tell us, neither suffocating those who speak from the heart nor those who grind axes, and let the discussion rage.

For my own part, even in respect of the gyroscopic effect—sometimes beneficial, sometimes fatal to stability—I am of opinion that the complete enclosing of all air-cooled motors, with fan-cooling for those stationary, would be a distinct gain in the general efficiency of the aeroplane. An air-cooled motor, judged by its actual performances, if well tuned and its properties understood, appears all sufficient, even as matters are. Water-cooling, though detracting from the efficiency of our aircraft, is still worth employing, given the present treatment and manner of fitting its rival. I cannot see that it can last. The tendency at present is to overload and mislubricate the air-cooled engine, while the carburation question has not been tackled sufficiently seriously. In fact the A.C. engine is the last thing to give over to the tender mercies of the beginner.

T. S. HARVEY.

Stream-Line Bodies.

[1684] In reply to Mr. Robinson's letter (1671) on stream-line bodies, may I point out the following facts. He says that in Fig. 1, the point of the structure offers resistance to the wind, apparently thinking that Fig. 2 offers no similar resistance. In Fig. 3, the



point B offers as much resistance as the point A in Fig. 4. Theoretically, of course, a point offers no resistance to the wind. But I am dealing with the practical side of the question as he is. A current of air striking B is divided as easily, if not more so, as a current of air striking A, so the head resistance at each of these points is the same. But in Fig. 3 the air is deflected from its straight course far less than it is in Fig. 4. Consequently the head resistance is less in the former case than in the latter case. If I were constructing an aeroplane, I should certainly make my strut section as in Fig. 1. Besides the reasons I have mentioned, surely it is obvious that a pointed surface cuts through the air better and with less resistance than a curved surface does. The pointed bullets now in use travel farther than the old ones with rounded ends for this very reason, in my opinion. I agree with Mr. Robinson that this subject is extremely interesting, and I should like to see a discussion on it in FLIGHT.

I hope you will find room in your columns for this contribution, and I congratulate you heartily on the success of your excellent paper.

Mill Hill School. A. C. FERGUSON.

[1685] We were greatly interested in your correspondent's (Mr. M. L. Robinson, 1671) letter. He favours curved stream-line

bodies. We regret that we are quite unable to agree with his arguments.

If a curved front offers less wind resistance, why should not battleships have curved bows? It is obvious that water offers more resistance than air, therefore a pointed front, which has been proved to offer less resistance to water, would therefore offer still less to air. Mr. Robinson states that a point in itself offers resistance. How much greater therefore is the resistance offered by a curve, which is, after all, but a blunt point?

Having had considerable experience in racing on Brooklands Track (both on cars and motor cycles), we would like to point out that even the starting-handle of Mr. Percy Lambert's Vauxhall, which won the O'Gorman Trophy, is finished in a point. The front of the springs, which in the ordinary course of events are curved, had a piece of light metal placed over them tapering into a fine point, thereby gaining more speed through less wind resistance than would have been attained with the ordinary springs, even taking into account the extra weight of the metal.

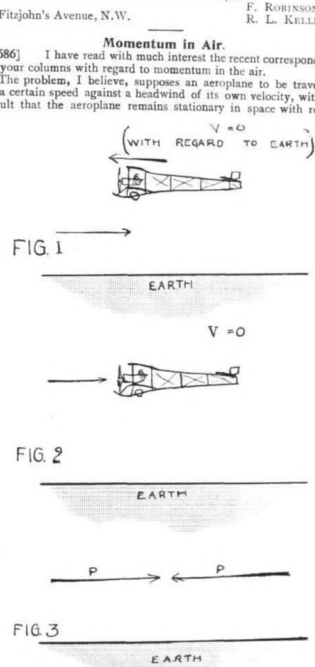
Consequently, according to your correspondent, it would be better to make a pin with a curved end instead of a point.

F. ROBINSON.
Fitzjohn's Avenue, N.W. R. L. KELLER.

Momentum in Air.

[1686] I have read with much interest the recent correspondence in your columns with regard to momentum in the air.

The problem, I believe, supposes an aeroplane to be travelling at a certain speed against a headwind of its own velocity, with the result that the aeroplane remains stationary in space with regard



to the earth. The question is that if the wind drop to zero instantaneously, and at the same moment power be cut off, what will happen to the aeroplane?

The whole question is really a simple problem in statics.

The wind exerts a pressure of say p lbs. per sq. in. upon the planes in a horizontal direction.

The deflection of this force by the planes produces the upward reaction which neutralises the gravitational force.

The deflection and reaction, however, do not concern us, but we know from consideration of the laws of fluids that we may replace the pressure of p lbs. per sq. in. by a single force P acting through the centre of pressure of the planes.

Now the engine is exerting power which just equalises this force P, and must of necessity act in the same straight line as P or else there would be a turning couple, which we know is not present. So we have a very simple system of forces in equilibrium: two equal and opposite forces acting in the same straight line.

The result of eliminating both these forces simultaneously is surely obvious.

The aeroplane will have only the force of gravity acting upon it, and a fall will be inevitable.

I think that Mr. Paul Williams (No. 1635) is labouring under a misapprehension when he says that the machine possesses momentum.

Momentum is a quantity directly connected with the force of the earth's gravity, and it follows that nothing which is stationary with regard to the earth can have momentum with regard to the earth, whatever forces are acting upon it.

It might be argued that there is kinetic energy somewhere, and for that reason the aeroplane would shoot forward when the wind dropped.

But this is quite an erroneous notion, for the kinetic energy is possessed by the wind, and is absorbed by the unknown power which reduces the velocity of the wind from the primary speed to zero.

I trust that this explanation will be of use to your readers who are interested in the subject, and that it may help to convert those who hold an opinion contrary to the editorial chair, the which I congratulate heartily upon holding what I am certain is the correct view.

Lincoln. H. DEAKIN LILEY (B.A. Cantab.).

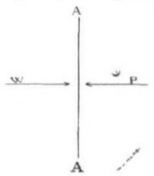
[1687] With reference to your article on the above, may I venture to offer an opinion.

Your correspondent Mr. Williams (letter No. 1635) states that a machine flying against a wind of its own speed, and therefore at rest relatively to the earth, possesses momentum, and, assuming that the wind and the engine be cut off at the same instant, would show it by instantly rushing forward into the calm at a speed equivalent to the wind which had disappeared.

To this I beg to take exception.

I will endeavour to illustrate my point by the accompanying diagram.

Let W be a force, acting normally to a plane surface, AA, which force is exactly counterbalanced by the equal and opposite reaction, P. Thus, AA will remain at rest. Substitute for W the wind resistance, for AA the machine, and for P its engine. When P is the greater force, AA will accelerate to the left. Similarly when W is the greater, AA will be negatively accelerated to the right. Also when W equals P, or in other words, when the speed of the machine equals that of the wind blowing against it, the machine will remain at rest relatively to the earth.



Now suppose both W and P to be cut off at the same instant.

Obviously, as AA is at rest with regard to the earth, it has no momentum, therefore no kinetic energy.

The result is that it falls under gravity.

To change the potential energy which the machine possesses while it is in the air, to kinetic energy, requires a certain force. Now if both the wind and the engine are cut off together, there is only one force left, viz., gravitational force.

This force acts downwards, and as there is no upward or horizontal components to counterbalance its effect, the machine must fall.

Let us take another view of the case.

Let the machine remain stationary against a 40 miles per hour wind.

Assuming that the wind only is cut off *then* the machine would shoot forward into the calm at an equivalent speed to the wind, which had just dropped, viz., 40 miles per hour.

Taking the alternate view, if the engine stops, the machine will immediately have a negative acceleration equal to that of the wind.

According to letters 1635 and 1651, the machine would shoot forward into the calm at 40 miles per hour with the engine *stopped*.

If all the surplus energy of the engine is used up in maintaining the relative position of the machine to the earth, from where shall we get the force to bring about this change of energy from potential to kinetic?

Also assuming Mr. Williams to be correct, what would be the speed of the machine, in the calm, supposing the engine were left running?

Truly, as the writer of the original article remarks, mechanics are apt to become elusive when seen through the mysterious glamour of flight.

Wolverhampton. W. H. MARSH.

[1683] I do not follow Mr. C. Parry Williams in letter 1664. In the experiment described by me, the condition of the air becoming calm suddenly is reproduced, so far as the dummy aeroplane is concerned, by the belt being drawn suddenly away from the dummy. It is, of course, impossible suddenly to stop the belt, and this difficulty is overcome by suddenly withdrawing the belt, which is equivalent to suddenly removing the "air" resistance—*i.e.*, instituting a sudden calm.

Purley. H. E. VON HOLTORF.

Inventors and the Aeroplane Industry.

[1689] I venture to refer to my early experiments, a brief account of which was published in FLIGHT of June 24th, 1911, and to mention that I believe I hold effective patents covering means for preventing the drag of wing warping occurring on the depressed side of the machine, which tends to promote side-slip under some circumstances at present. I wish to say that, being desirous of avoiding entering into agreements with monopolists who might, by the purchase of my inventions, actually prevent the latter, by means of high royalties, from coming into general use for some time at least, and assuming and believing that the ideas involved will be found to have some value in the evolution of the safe aeroplane, I wish to deliberately tie my own hands by offering the use of any or all of my present or future inventions in any country in which they have been or will be patented at the uniform royalty of £10 per aeroplane in advance or £20 in arrears, provided that the latter extra charge shall not come into operation till January 1st, 1913. In order to encourage experiments with models, which I look on as very important, and from which I gained much of the information I have acquired, I am willing to reduce the royalty to one shilling in advance and two shillings in arrears. Considering my expenditure of time and money up to date, and the fact that I am continuing to spend money and to devote all my spare time to the work, I could hardly be expected to offer my patents at smaller royalties. In making this offer I believe myself to be acting in the best interests of the industry. Whether in so doing I am acting in my own best interests I am doubtful, but this is a side issue, which time alone can decide. I prefer to play the game with all the cards on the table and I presume that manufacturers have the same preference. If other inventors will be content to offer their inventions to the public at low royalties, instead of aiming at becoming suddenly enriched by the offers of monopolists, they will help forward the rapid evolution of the safe aeroplane and the extension of the industry, and if the industry is to prosper the reasonably safe aeroplane *must* be produced as speedily as possible, In this way each invention will stand or fall on its merits, and the undesirable complications often introduced by the formation of companies and monopolies will be avoided. I am aware that in publishing this letter I lay myself open to the possible accusation of seeking an advertisement for my own wares, and I am at a loss to know how to answer this except to say that my intention is to offer the result of my work to the industry on the easiest possible terms, with the object of helping forward a science in which I am keenly interested, and of saving any unnecessary sacrifice of life if I possibly can. The patents already acquired by me are numbers 6642, 11334 and 23645 of 1910 in England, 428925 of 1911 in France, and 220 of 1911 in India, and applications have been made in Germany and the United States. The more important claims are :—

(1) Balancing planes, which lie normally in the direction of flight and in such position that their efficiency will not appreciably be interfered with by the main planes, worked independently and so that their angle of incidence is always below and never above the direction of flight.

(2) Automatic lateral balancing planes situated on both sides of an aeroplane and having their outer edges rigid and the planes being otherwise flexible or movable in both upward and downward direction to a limited extent.

(3) In an aeroplane having wings with tips trailing towards the rear of the machine, vertical rudders placed at or near the wing tips.

Meerut, India, November 13th, 1912. H. S. WILDEBLOOD, M.I.C.E., Indian Public Works.

AIRSHIP NEWS.

"Victoria Louise" Out of Commission.

THE Zeppelin liner "Victoria Louise" made her last voyage of the year on Saturday, and it is stated that it was the 225th trip she has made since being put into service. Her last cruise was of four hours' duration, in the course of which an altitude of 1,100 metres was reached.

With the Italian Airships.

Two of the Italian military dirigibles, P1 and P4, were flying over Lake Eracciano on the 28th ult., the former carrying out some bomb-dropping tests over the military ground at Vigna di Valle. The other dirigible was being tested for altitude, and in the first trial got up to 800 metres, but nearly doubled this in the second attempt, when the height attained was 1,500 metres.

Italy's List of Aviators.

A LIST just published shows that Italy has now 175 certificated pilot-aviators, so that she ranks fourth among the European countries, following after France, Great Britain and Germany.

Hydro-Aeroplane Station at Calais.

CALAIS should soon be very well equipped to accommodate aerial visitors, as the Mayor has now received from the French Government Department of Bridges and Roads authority to proceed with the installation of a station for *aero-marins* or hydro-aeroplanes.

PUBLICATIONS RECEIVED.

The "Daily News and Leader" Year-Book, 1913. London: The *Daily News and Leader*. Price 6*d.* net.

La Theorie de l'Aviation; son application à l'Aeroplane. By Robert Gastou. Paris: F. Louis Vivien, 48, rue des Ecoles. Price 1 fr. 50.

Vol de l'Aeroplane en Hautier. By Commandant Faraud. Paris: F. Louis Vivien, 48, rue des Ecoles. Price 1 fr.

The Boys' Book of Aeroplanes. By T. O'B. Hubbard and C. C. Turner. London: Grant Richards, Ltd. Price 6*s.*

Famous Airmen and their Equipments. Burroughs, Wellcome and Co., London, E.C.

The Dark for Winter Sports. By Harry Maitland. London: John Ouseley, Ltd., Fleet Lane, E.C. Price 2*s.* 6*d.* net.

The "Wellcome" Photographic Exposure Record and Diary, 1913. London: Burroughs, Wellcome and Co., E.C.

Catalogue.

Model Aeroplane Accessories and Materials. J. Bonn and Co., Ltd., 97, New Oxford Street, London, W.C. Price 2*d.*

Aeronautical Patents Published.

Applied for in 1911.

Published December 5th, 1912.

25,094. L. B. GOLDMAN. Aerial machines.
25,363. F. W. WILES, T. MACLROD AND W. F. WILES. Aeroplane.
25,695. A. C. M. AND J. G. J. MEUGNIOT. Aerial machines.

Applied for in 1912.

Published December 5th, 1912.

2,754. SOC. ANON. ASTRA. Dirigible balloons.
9,479. N. B. CONVERSE. Balancing device.
11,102. M. F. SUETER, F. L. M. BOOTHBY AND N. G. PATERSON. Aeroplanes.

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