



# FLIGHT



**First Aero Weekly in the World.**

Founder and Editor: **STANLEY SPOONER.**

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. 360. (No. 47, Vol. VII.)

NOVEMBER 19, 1915.

[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; Truditor, Westrand, London. Telephone: Gerrard 1828.*

*Annual Subscription Rates, Post Free.*

*United Kingdom ... 15s. 6d. Abroad ... 20s. 6d.*

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## EDITORIAL COMMENT.

**Who Said Party Politics were Dead?**

There is a theory around that for Great Britain and its Government, politics are for the time but a buried memory—interned for the period of the War. With a great proportion of the people of our Empire, and in the case of the majority of the leading politicians, there is little doubt that this truce is being honourably observed. A small minority, unfortunately, appear to take the view that the truce is opportune for subtle but vicious attack of those whom they have reason to think may stand in the path in which their ambitions lead them, with the result that all sorts of underhand machinations are at work to upset this or that personage, with little regard to the ultimate welfare of the nation. In this way it comes about that men who have been and whose services still are most invaluable to their country have to sacrifice themselves or be sacrificed so that the wheels of Imperialism may run along without even the semblance of a faulty cog in their periphery. That there have been mistakes and halting by the way, where instant and masterly decision might have had the most

far-reaching benefits, there is hardly room to doubt. That any such mistakes would necessarily, under all the outstandingly abnormal conditions, have been avoided by others who might have been called upon to make choice at some highly critical moment is not necessarily a foregone conclusion. Showing how the thing *should* have been done after an event has worked itself out, or in city parlance "jobbing back," is one of the most popular forms of criticism which the professional seeker after fame has to his hand. And in most cases he does not scruple to utilise his opportunities with the most destructive effect, seldom having himself the germ of an idea so far as constructive criticism might lead a way out of the tangle which it pleases him to hold up to scorn. He is satisfied if his thrust gets home, especially when the surroundings of the incident preclude any real explanation being at the moment given. In some instances official scruples are thrown to wind, an effective counter-stroke is made, plus resignation, and another good man has gone by the board at the instigation of a set of men who probably know little or nothing of the real facts of the case which have led up to the situation. We, who are unconcerned with all these abominable political strategic moves, can only regard such tactics with disgust. There is at least hope, however, that in the days to come, when the facts as then revealed, full tribute can be paid to those who have endeavoured to uphold the Country's welfare and prestige, the attackers of to-day may be turned into suplicants for re-instatement into public favour for their ill-judged heckling of men of moment whose hands for retaliation have been in the past firmly tied behind their backs by the binding obligations of their office. It is not a matter of single cases. There are, unfortunately, several which have taken effect.

♦ ♦ ♦

**And  
Mr. Winston  
Churchill.**

Although in somewhat a different category to this position, we cannot help but deplore the retirement of Mr. Winston Churchill, who has, without doubt, taken this step in protest to the snarlings of the few malcontents who are ever on the alert to upset men in power who in their mind they probably place in the category of rivals to their own fame and advancement. We regret this secession from the Government irrespective of whether Mr. Churchill can be held responsible for any past unfortunate moves in the War or the reverse. He may or may not have judged consequences rightly. Whoever has been responsible matters little *now*. Any ill results not only *have* to be

but *will be* retrieved by us in the long run, and there will be plenty of time for the apportionment of the blame when the war is a thing of the past. It would have been better, we consider, had Mr. Churchill stuck to his Leader in spite of the attacks upon his actions. His resignation was too great a sacrifice for the obtaining of an opportunity of justifying himself at the present moment in the eyes of the country. Work and very vital work would then have been ready to his hand in the form of taking a hand in the still greater furtherance of our Air Services.

His past activities and support of this our youngest arm is well known to all those who have taken the trouble to follow the at first very slow, but subsequent phenomenal, growth of naval and military aviation. From early days Mr. Churchill took the keenest and most personal interest in the great air power which was then being born, and, supported by a few far-seeing Navy and Army enthusiasts, every effort was put forward by him to bring his colleagues in the Cabinet into line with his own views of the future of this now vital arm of our forces. Not only did he force forward the requirements of Service aviation, but it was largely due to Mr. Churchill's energy that the Armoured Car Squadrons which were linked up with the R.N.A.S. were brought into being. That they have done most admirable work in this present war wherever opportunity has offered is world knowledge now, and when once stale-mate trench warfare takes a vacation, we may confidently look forward to the resumption of their telling work with our armies. It was

but a fitting tribute to the late Minister's great work in this connection, that the officers of the Armoured Car Squadrons should have deemed the occasion of his retirement a suitable opportunity of expressing *their* views of his genius by the presentation of his portrait in oils by Mr. John Lavery to Mr. and Mrs. Churchill in memory of his connection with that force and his devoted efforts on their behalf. Whether it is advisable or practical to create a Minister of the Air, as has been widely suggested from the most varied and mysterious quarters, and nominate Mr. Winston Churchill as the first occupant of that important Cabinet post is an arguable point and for the present beside the question. In like manner to the creation of the Minister of Munitions, Mr. Churchill, however, should be an invaluable national asset just now were he to be joined up in this connection with the Munitions Minister, to take in hand the supply of all things aviatic. There is an ever-increasing field for his energies in this direction in such a helpful way that need not interfere with the present splendid efforts of those in charge. The appointment should be such as to greatly strengthen and consolidate those efforts and enable this country to be, by the spring time, in an even more unassailable position in regard to mastery of the air than we hold at present. The late Minister's heart is in the work, and we sincerely trust that some *modus operandi* may be opened out whereby his great talents may be brought into play Imperially in connection with the ever-spreading fifth arm of our Defences.



**THE ROLL OF HONOUR.**

THE Secretary of the Admiralty has announced the following casualties:—

**Previously reported Missing, now Officially reported a Prisoner of War.**

Flight-Lieutenant Lionel D. McKean, R.N.  
(Assistant Paymaster, R.N.).

**Previously reported Missing, now Unofficially reported Wounded and Prisoner of War.**  
2nd Grade Air-Mechanic H. G. Shields.

Under date October 18th:

**Drowned.**  
Flight Sub-Lieutenant John T. Bone, R.N.

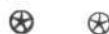
Under date November 7th:

**Injured.**  
Flight-Lieutenant Harold F. Towler, R.N.  
Flight Sub-Lieutenant Frank S. McGill, R.N.

The following casualties in the Expeditionary Force have been officially reported from General Headquarters:—

Under date November 4th:

**Wounded.**  
Second Lieutenant L. J. Bayly, Royal Garrison Artillery, attached R.F.C.  
Second Lieutenant C. C. Miles, Royal Flying Corps.



**The Death of Col. Fulton.**

It is with the greatest possible regret that we have to record the sudden death on the 11th inst. of Lieut.-Col. J. D. B. Fulton, C.B., R.F.A., who, after occupying the position of Chief Inspector in the Aeronautical Inspection Department from its inception, had but a few days before been appointed assistant director of military aeronautics. Col. Fulton's death is a very heavy loss not only to aviation but to the nation, as, apart from his brilliant military career, he fought in South Africa and received both medals and eight clasps; he was a pioneer

**Missing.**

Second Lieutenant A. W. Brown, 3rd Manchester Regt., and R.F.C.  
Second Lieutenant H. W. Medicott, Royal Flying Corps.

Under date November 5th:

**Wounded.**

Captain C. E. Ryan, Royal Field Artillery and R.F.C.

**Missing.**

Second Lieutenant J. B. Robinson, Royal Flying Corps.

Under date November 8th:

**Killed.**

Lieutenant G. F. Harvey, Royal Field Artillery, attached R.F.C.  
Second Lieutenant W. J. McConnochie, Royal Flying Corps.

**Missing.**

Captain T. D. Adams, R.F.A., 1st W. Lancs Brig. (T.F.), attached R.F.C.  
Lieutenant O. V. Le Bas, R. W. Surrey Regt. and R.F.C.

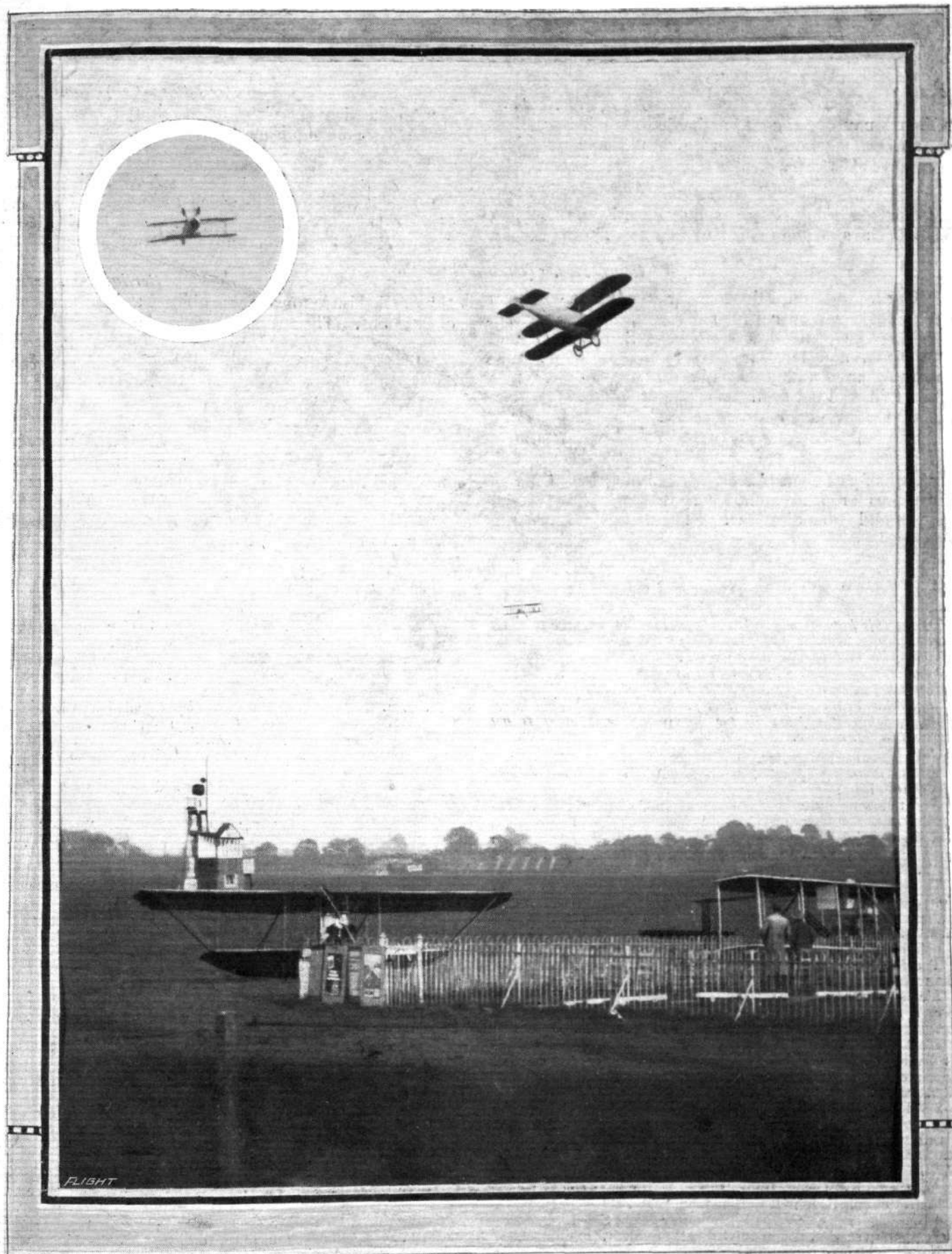
Undated:

**Prisoner of War.**

Second Lieutenant A. L. Burnie, 8th East Kent Regt., attached R.F.C.



in aviation. His pilot's certificate was No. 27, and dated November 15th, 1910, the qualifying tests having been made on a Farman biplane on Salisbury Plain, although Col. Fulton had previously taught himself to fly on a Bleriot monoplane. He served in the original Army Air Battalion, and passed into the Royal Flying Corps on its formation, subsequently going to the Central Flying School as an instructor. Returning to the Royal Flying Corps at the end of 1913, he was appointed chief inspector, and on the establishment of the A.I.D. last year was placed in charge of it.



**AT HENDON—A STRANGER MAKES A "COURTESY" CALL.**—The machines in the air are: top, Vickers scout flown by Mr. Harold Barnwell; and below, a Grabame-White biplane. Inset at the top, left, is the Vickers scout with its chassis heavenwards, during one of the loops which it made upon its "courtesy" call at Hendon, and to which reference was made in "Eddies" and Hendon Notes last week.

**AIRCRAFT WORK AT THE FRONT.**

OFFICIAL INFORMATION.

**Italian.**

*Rome, Nov. 10th.*

"YESTERDAY our aircraft bombarded the railway stations of San Daniele and Nabresina, and other military objectives on the Carso plateau."

*Rome, Nov. 13th.*

"Our aeroplanes were simultaneously bombarding Volano, the seat of an Austrian command."

*Rome, Nov. 14th.*

"Our aviators on Friday under adverse atmospheric conditions made successful raids on the Carso plateau, bombing the stations at Refenberg, San Daniele, and Dottoliano, and long trains standing in them. An enemy Albatros and an Aviatik were met in the course of the raid, and put to flight by the fire of our machine-guns. Our aviators returned safely."

*Rome, Nov. 15th.*

"At half-past eight o'clock this morning two Austrian aeroplanes dropped bombs on Brescia, killing seven people and wounding ten. There was no material damage."

**Montenegrin.**

*Paris (Legation) Nov. 12th.*

"An Austrian aeroplane fell within our lines, and the airmen were made prisoners."

**German.**

*Berlin, Nov. 10th.*

"The Zeppelin airship which ascended at Temesvar with the Duke of Mecklenberg on board has landed in Sofia. King Ferdinand and his Court witnessed the landing."

*Berlin, Nov. 11th.*

"An English aeroplane was obliged to land north-west of Bapaume. The occupants were taken prisoners."

*Berlin, Nov. 12th.*

"In an aerial fight two English biplanes were shot down and a third obliged to land behind our front."

**Austrian.**

*Vienna, Nov. 10th.*

"At Nabresina several civilians, including one woman and two children, were killed by air bombs."

*Vienna, Nov. 15th.*

"One of our aerial squadrons recently bombarded Verona."

**THE BRITISH AIR SERVICES.**

*UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.*

**Royal Naval Air Service.**

THE following appeared among the Admiralty announcements of the 10th inst. :—

The following have been entered as Probationary Flight Sub-Lieutenants, for temporary service, with seniority of Nov. 8th, and all appointed to "President," additional, for R.N.A.S. : O. M. Ayrton, T. C. W. Selby-Lowndes, J. Ree, J. Taylor, and H. T. Jones.

Temporary commissions have been granted as follows : F. V. W. Cook, as Lieutenant (R.N.V.R.) ; C. L. Hains, E. McD. Wright, L. H. Slatter, H. A. Beckenham, and N. W. Frames, as Sub-Lieutenants (R.N.V.R.), all with seniority of Nov. 8th, and appointed to "President," additional, for R.N.A.S.

The following appeared among the Admiralty announcements of the 12th inst. :—

Lieuts., R.N.V.R. (temporary), J. B. Soames and C. N. R. Wright promoted to the rank of Temporary Lieutenant-Commanders (R.N.V.R.), both with seniority of Nov. 10th.

Lieut., R.N.V.R. (temporary), G. G. McHardy entered as Probationary Flight Sub-Lieutenant, for temporary service, and appointed to "President," additional, for R.N.A.S. To date Nov. 11th.

Sub-Lieut. R. M. S. Veal promoted Lieutenant, with seniority Nov. 10th.

Sub-Lieuts. (temporary) T. B. Ross, N. R. Fuller, A. Douglas, R. Verey, A. N. Mansergh, F. M. Michell, W. C. W. Ingle, T. R. Johnson, and S. J. Hanna promoted Temporary Lieutenants, all with seniority of Nov. 10th.

F. J. McConnell, John I. Carlin, John A. B. Ball, John E. Barrs, and L. Whitworth entered as Probationary Flight Sub-Lieutenants, for temporary service, and appointed to "President," additional, for R.N.A.S. To date Nov. 15th.

The following appeared among the Admiralty announcements of the 13th inst. :—

Flight Sub-Lieut. H. F. Fowler promoted to the rank of Flight-Lieutenant, with seniority of Oct. 5th.

Temporary Flight Sub-Lieut. A. J. Whetnall transferred to Permanent List of R.N.A.S.

Temporary Sub-Lieut. (R.N.V.R.) J. G. Currie promoted to Temporary Lieutenant, with seniority of Sept. 1st.

G. B. Taylor entered as Probationary Flight Sub-Lieutenant, for temporary service, with seniority of Nov. 14th, and appointed to "President," additional, for R.N.A.S.

V. A. F. Bellamy granted a temporary commission as Lieutenant (R.N.V.R.), with seniority of Nov. 12th, and appointed to "President," additional, for R.N.A.S.

The following appeared among the Admiralty announcements of the 16th inst. :—

Flight Lieut. E. F. Bray, commission and appointment as Flight Lieutenant, terminated, Nov. 15th, and granted a temporary commission as Lieutenant (R.N.V.R.), with seniority of Nov. 15th, and appointed to "President," additional, for R.N.A.S., for (E.) duties.

H. Rampling, entered as Probationary Flight Sub-Lieutenant, for temporary service, with seniority of Nov. 17th, and appointed to "President," additional, for R.N.A.S.

The following have been granted temporary commissions as Sub-Lieutenants (R.N.V.R.), with seniority of Nov. 15th, and appointed to "President," additional, for R.N.A.S. : G. N. Gawler, G. R. Turner, and A. R. Griggs.

**Royal Flying Corps (Military Wing).**

THE following appeared in a supplement to the *London Gazette* issued on the 10th inst. :—

*Flying Officers.*—Oct. 26th, 1915 : Temporary Lieut. G. H. Hall, Welsh Horse Yeomanry (T.F.) ; Second Lieut. C. H. Jenkins, Royal Sussex Regt., Special Reserve, and to be seconded ; Second Lieut. T. Marburg, Special Reserve.

*Memoranda.*—To be Temporary Second Lieutenants for duty with the Royal Flying Corps : L.-Cpl. Henry B. Stubbs, 19th (Queen Alexandra's Own) Royal Hussars ; Aug. 2nd, 1915. Pte. Reginald F. Wills, A.S.C. ; Aug. 4th, 1915.

*Supplementary to Regular Corps.*—Second Lieutenants (on probation) confirmed in their rank : F. G. M. Williams and Theodore Marburg.

To be Second Lieutenants (on probation) : Martin A. Shepstone ; Oct. 1st, 1915. Ronald True ; Oct. 10th, 1915. Wilfred J. Hewitt ; Oct. 11th, 1915. Wilfred E. Marsden ; Oct. 16th, 1915. Edward G. Landon ; Oct. 17th, 1915. Oct. 18th, 1915 : Rodney W. Heath and John R. B. Savage.

The following appeared in a supplement to the *London Gazette* issued on the 11th inst. :—

*Flying Officers to be Flight-Commanders, and to be Temporary Captains whilst so employed.*—Lieut. H. C. Tower, Special

Reserve; Oct. 19th, 1915. Temporary Second Lieut. E. D. Horsfall, General List; Oct. 28th, 1915.

*Flying Officers.*—Oct. 27th, 1915: Second Lieut. A. W. H. James, 3rd (King's Own) Hussars, and to be seconded; Second Lieut. S. T. Ravenscroft, Lancashire Hussars Yeomanry (T.F.); Second Lieut. F. D. Pemberton, R.A., and to be seconded. Oct. 28th, 1915: Second Lieut. F. Fernihough, R.F.A. (T.F.); Second Lieut. J. S. Castle, Special Reserve; Second Lieut. A. Charig, Special Reserve; Second Lieut. E. H. Pullinger, Special Reserve; Second Lieut. E. A. Cave, Special Reserve.

*Supplementary to Regular Corps.*—Second Lieutenants (on probation) confirmed in their rank: James S. Castle, Arnold Charig, Ernest H. Pullinger, Eric A. Cave, E. Taylor, W. Hart, K. P. MacNamara, B. W. Watts, C. Fergusson, F. Shumaker, E. Powell, A. Heywood, and Idwal O. Griffith.

The following appeared in the *London Gazette* of the 12th inst.:—

*Flight Commanders to be Squadron-Commanders.*—Oct. 27th: Major F. W. Richey, R.A. And to be Temporary Majors whilst so employed: Lieut. (Temporary Capt.) C. W. Wilson, Seaforth Highlanders; Capt. A. E. Borton, D.S.O., Royal H.; Capt. R. M. Rodwell, W. Yorks; Capt. W. R. Freeman, Manchester.

*Wing-Adjutant.*—Temporary Capt. F. C. Shelmerdine, Yorks, and transferred to General List. Nov. 1st.

*Flying Officers.*—Oct. 21st, 1915: Temporary Capt. Right Hon. A. T. Lord Lucas, Hants Yeomanry; Temporary Second Lieut. G. Osmand, Oxford and Bucks L.I., and transferred to General List; Temporary Second Lieut. R. L. Johnston, R.A., and transferred to General List; Temporary Second Lieut. H. R. Hele-Shaw, R.A., and transferred to General List; Second Lieut. E. L. Crowe, E. Kent, S.R., and seconded; Temporary Second Lieut. C. H. R. Johnstone, Yorks, and transferred to General List; Temporary Second Lieut. E. D. Johnson, E. Surrey, and transferred to General List; Temporary Second Lieut. L. E. Eeman, R.F., and transferred to General List; Second Lieut. E. R. Vaisey, Essex, and seconded; Second Lieut. A. F. Brooke, 10th Hussars, and seconded; Second Lieut. G. P. S. Reid, Seaforth Highlanders, and seconded. Oct. 30th: Lieut. E. R. Pretyman, Somerset L.I., and seconded; Second Lieut. E. Cameron, Staff Yeomanry.

*Supplementary to Regular Corps.*—Second Lieutenants (on probation) confirmed in rank: F. W. Day and J. P. Rowell.

The following appeared in a supplement to the *London Gazette* issued on the 13th inst.:—

*Supplementary to Regular Corps.*—To be Second Lieutenants (on probation): William Boag; Oct. 27th, 1915. Harold Jameson; Oct. 30th, 1915. Ernest Bush; Oct. 31st, 1915.

The surname of Second Lieut. (on probation) Idwal O. Griffith is as now described, and not as stated in the *Gazette* of Nov. 11th, 1915.

The following appeared in a supplement to the *London Gazette* issued on the 15th inst.:—

*Flight-Commanders to be Squadron-Commanders, and to be Temporary Majors whilst so employed.*—Oct. 27th, 1915: Lieut. (Temporary Capt.) Eric L. Conran, 21st (Empress of India's) Lancers, and to retain his appointment at the Central Flying School; Lieut. (Temporary Capt.) George F. Pretyman, D.S.O., Prince Albert's (Somerset L.I.), and to retain his appointment at the Central Flying School.

*Flight-Commander.*—Capt. J. Valentine, Special Reserve, from an Equipment Officer, and to retain his temporary rank whilst so employed. Oct. 15th, 1915.

*Flying Officers to be Flight-Commanders.*—Nov. 5th, 1915: Capt. A. C. Boddam-Whetham, Princess Louise's (Argyll and Sutherland Highlanders), Special Reserve; Capt. P. C. Maltby, Royal Welsh Fusiliers; Capt. L. Jenkins, Dorsetshire R.G.A. (T.F.); Lieut. R. R. Smith-Barry, Special Reserve, and to be Temporary Captain whilst so employed; Lieut. E. K. Davies, Special Reserve, and to be Temporary Captain whilst so employed.

*Equipment Officer.*—Capt. Lord R. E. Innes-Ker, Irish Guards, Special Reserve, from a Wing Adjutant. Oct. 15th, 1915.

*Flying Officers.*—Oct. 28th, 1915: Second Lieut. H. Kirby,

Buffs (East Kent Regt.), and to be seconded; Second Lieut. T. M. B. Newton, Princess Charlotte of Wales's (Royal Berkshire Regt.), and to be seconded; Second Lieut. W. A. C. Morgan, Welsh Regt., and to be seconded.

*Assistant Equipment Officers.*—Aug. 13th, 1915: Qrmr. and Hon. Lieuts. J. E. Parkin, J. Mead, and W. J. Waddington, Royal Flying Corps. Aug. 23rd, 1915: Second Lieut. G. Somers-Clarke, Special Reserve; Second Lieut. N. Pellew, Special Reserve. Qrmr. and Hon. Lieut. W. Thomas, Royal Flying Corps; Aug. 29th, 1915. Second Lieut. E. A. Richards, Special Reserve; Aug. 31st, 1915. Second Lieut. I. O. Griffith, Special Reserve; Sept. 6th, 1915. Qrmr. and Hon. Lieut. G. Laing, Royal Flying Corps; Sept. 21st, 1915. Second Lieut. B. May, Special Reserve; Sept. 24th, 1915. Temporary Lieut. C. W. M. Ludgate, General List; Sept. 27th, 1915. Oct. 1st, 1915: Second Lieuts. P. P. Eckersley, P. K. Turner, and T. W. Webb, Special Reserve. Oct. 8th, 1915: Second Lieuts. H. R. Vagg, T. F. Bullen, and R. S. Rumbold, Prince Albert's (Somerset L.I.); Temporary Second Lieut. N. L. Robertson, General List. Second Lieut. Lord H. R. H. Gascoigne-Cecil, Special Reserve; Oct. 15th, 1915. Temporary Lieut. E. G. Toye, Duke of Cornwall's L.I., and to be transferred to the General List; Oct. 16th, 1915. Oct. 20th, 1915: Second Lieut. A. C. Gilling, Special Reserve; Temporary Captain A. G. Parsons, Royal Artillery, and to be transferred to the General List. Temporary Captain H. D. Dryden-Smith, Durham L.I., and to be transferred to the General List; Oct. 21st, 1915. Second Lieut. S. S. Nevill, Special Reserve; Oct. 22nd, 1915. Oct. 23rd, 1915: Capt. C. H. Rowe, Reserve of Officers; Second Lieut. W. J. King, Special Reserve; Second Lieut. W. J. Shields, Essex Regt., Special Reserve, and to be seconded; Second Lieuts. D. Easdale, G. D. Pidgeon, B. V. Grealy, F. S. Creswell, C. St. Noble, F. G. M. Williams, H. M. Fulton, and G. D. Hannay, Special Reserve. Second Lieut. R. Groves, Special Reserve; Oct. 25th, 1915. Oct. 26th, 1915: Second Lieuts. E. Taylor, W. Hart, K. P. MacNamara, E. Powell, F. Shumaker, C. Fergusson, B. W. Watts, and A. Heywood, Special Reserve. Temporary Second Lieut. T. C. Daniell, General List; Oct. 29th, 1915. Oct. 30th, 1915: Second Lieuts. F. W. Day and J. P. Powell, Special Reserve.

*Memoranda.*—Norman F. W. Rockey to be Temporary Second Lieutenant for employment with the Royal Flying Corps. Oct. 14th, 1915.

The following appeared in the *London Gazette* of the 16th inst.:—

*Flying Officers.*—Nov. 2nd, 1915: Temporary Lieut. A. H. Smith, Lincolnshire Regt., and to be transferred to the General List. Temporary Second Lieut. A. M. Miller, Reserve Regiments of Cavalry, and to be transferred to the General List. Second Lieut. J. A. Barraclough, King's Own (Royal Lancaster Regt.), and to be seconded. Second Lieut. W. C. Mortimer-Phelan, Special Reserve. Nov. 3rd, 1915: Temporary Second Lieut. K. N. Pearson, R.E., and to be transferred to the General List. Second Lieut. A. J. Copel, Prince Albert's (Somerset L.I.), and to be seconded. Temporary Second Lieut. E. R. Tempest, King's Own (Yorkshire L.I.), and to be transferred to the General List. Temporary Second Lieut. J. T. Rodwell, Essex Regt., and to be transferred to the General List. Second Lieut. J. L. Chalmers, Special Reserve. Second Lieut. R. W. Nichol, Special Reserve. Nov. 4th, 1915: Lieut. C. A. Brooks, Duke of Edinburgh's (Wiltshire Regt.), Special Reserve, and to be seconded. Second Lieut. T. Maxwell-Scott, Special Reserve. Second Lieut. C. S. Ross, Special Reserve.

*Supplementary to Regular Corps.*—Second Lieutenants (on probation) confirmed in their rank: Robert W. Nichol, Thomas Maxwell-Scott, Clifford S. Ross, William C. Mortimer Phelan, James L. Chalmers.

To be Second Lieutenants (on probation): Kenneth D. G. Collier; Oct. 11th, 1915. Norman S. Percival; Oct. 14th, 1915. Thomas L. F. Burnett; Oct. 15th, 1915. Algernon L. Curtis; Oct. 18th, 1915. Charles G. Smith; Oct. 22nd, 1915. John Elgood, Nov. 4th, 1915.

two others will be called a "Paddy from Ceylon" and a "Devil Bird from Ceylon."

**Two from Johannesburg and One from British Guiana.**

The women of Johannesburg have raised a fund for the provision of two 70 h.p. biplanes for the Imperial Aircraft Flotilla and the inhabitants of British Guiana have also subscribed for one 100 h.p. Gnome-Vickers gun carrier.

**The Raid on the Krupp Works.**

That the raid by Allied aviators on Essen last January was not quite so ineffective as the Wolff Agency endeavoured to make out is indicated by an entry in the annual accounts of Krupps which have recently been published in the German papers. This reads: "Claims and damages due to war, M. 10,000,000" (£500,000).

**Safe Places and Air Raids.**

REPLYING to Sir G. Scott Robinson in the House of Commons last week, Sir John Simon said that, generally speaking, people were safer indoors than in the streets during Zeppelin raids. In analysing statistics it must be remembered that after dark the majority of the population was normally under cover. In spite of this, in the attack on the London district between 9 p.m. and 10 p.m., on October 13th, out of thirty-three persons killed and twenty-six seriously injured all but five were struck when in the open.

**Three Birds from Ceylon.**

THE fund started by the *Times of Ceylon* for the presentation of aeroplanes to the Imperial Aircraft Flotilla has enabled a third machine to be presented. It is a 100 h.p. Gnome-Vickers gun carrier, and will be known as a "Night-jar from Ceylon." The

## CONSTRUCTIONAL DETAILS.—XI.

IN our previous series of undercarriages an attempt was made to classify these, as far as possible, in order to facilitate reference. The three headings under which they were arranged, it may be remembered, were double skid, single skid, no skid types. Having dealt with a number of examples of each type there still remain several very interesting and highly successful makes of undercarriage which are well worthy of notice, but which, owing to their characteristics, cannot be classified under any of the above headings. These form the subjects for our full page of illustrations this week.

Having stood the test of time and being, perhaps, one of the most ingenious undercarriages ever designed, the Blériot chassis will be dealt with first. The chief characteristic of this chassis is that it is fitted with castor wheels that are free to travel, not only upwards, but outwards to either side as well. The upward movement is obtained on the principle of the deformable triangle. Supported on two transverse members made of ash and secured to the fore part of the body are two vertical steel tubes of large diameter. Round the upper part of each of these tubes a collar is free to slide. Attached to this collar with their upper ends are two flattened steel tubes that form a fork round the running wheels which are secured to its lower end. Another fork that forms the third side of the deformable triangle to which reference is made above, runs from the lower end of the vertical tubes to the wheel. An inspection of the accompanying illustration should make the action clear. When the wheel moves upwards, its hub describing a portion of the arc of a circle, having for its centre the lower end of the vertical tube and having the lower, short fork as its radius, the movement is transmitted by the long forks to the sliding collar. The upward motion of this collar along the vertical tube is resisted by the rope-shaped shock absorbers seen in the sketch. These shock absorbers, of which there are two or four to each wheel according to their strength, have their ends fitted into metal caps from which strong steel wires are taken to the lower transverse member and to notched lugs on the sliding collars respectively.

The lower transverse member, or *planche* as it is sometimes called, is supported from the *fuselage* by six streamline wood struts, two of which are vertical whilst two slope forward to the nose of the body and two backward to the lower longitudinals. As the load is taken on the outer ends of the transverse members, these are strengthened by diagonal bracing, which, in the older machines, usually took the form of a steel band or tape, but which is now sometimes made of two stranded steel cables.

When landing with a slight sideways movement in relation to the ground the wheel, it will be seen, can move sideways by pivoting round the vertical tubes. This movement, however, is restricted by connecting the two wheel centres by a thin horizontal strut pivoted to the inner ends of the hubs and by diagonal cross wiring in which is incorporated elastic bands. The function of these bands, apart from restricting the lateral movement of the wheels, is to return the wheels to a central position. Although suffering somewhat from excessive head resistance, the Blériot undercarriage has much to recommend it on account of its extreme flexibility, which allows of making landings that are far from perfection without serious consequences to the machine.

Occasionally M. Blériot has attempted to break away

from his standard type of undercarriage, rarely with success however. At the last Paris Aero Show there was exhibited a "pusher" biplane fitted with a somewhat unusual type of chassis, as shown in our second Blériot sketch, from which the action is fairly evident. The curved channel steel member that carries the wheel is universally pivoted round the lower end of the vertical chassis strut, while to its forward end is attached a shock absorber enclosed in a metal casing. No great amount of success, we believe, attended this design.

Another undercarriage that neither belonged to the skid nor to the "Vee" type was that of the last Deperdussin monoplanes. In this the framework of the chassis consists of two "U" shaped members built up of a number of laminations of wood, and attached with their upper ends to a longitudinal strip of wood running alongside and bolted to the sides of the body. The tubular axle rests on the lower curved portions of the "U," from which it is sprung by simply wrapping rubber cord around it and the bottom of the "U." The attachment of the lift cables is shown in one of the detail sketches, and is mainly interesting on account of the fact that these cables run right across from one wing to the other, being merely gripped by a steel plate where they pass under the ledge-shaped projection on the leading edge of the chassis struts.

Yet a different form of undercarriage was that of the Breguet biplanes, which was of the four-wheeled variety, as shown in one of the accompanying sketches. The main load is taken by two wheels mounted on a tubular axle, which is, in turn, supported on a pair of telescopic steel tubes with which are incorporated coil springs.

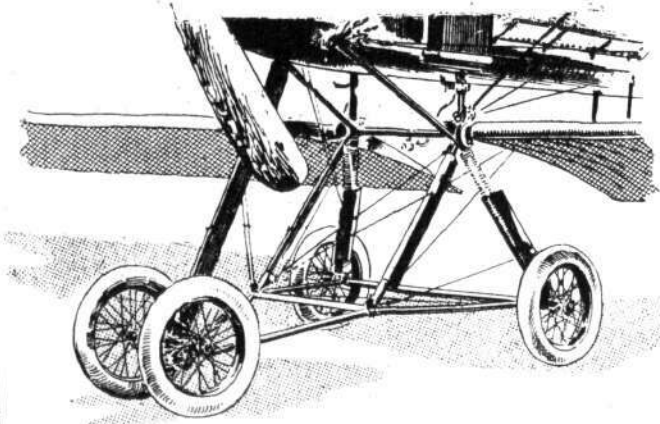
Another pair of wheels is mounted well out in front for the protection of the propeller and to prevent the machine from turning over on its nose in a rough landing. In order to facilitate steering on the ground at low speeds these front wheels are so mounted that their axle can oscillate in a vertical as well as in a horizontal plane. The detail sketch will help to make the exact method clear.

The Breguet chassis as well as the whole machine was, it may be recollected, made entirely of steel, the tubes, in the case of the undercarriage, being given an approximate streamline form by means of aluminium casings.

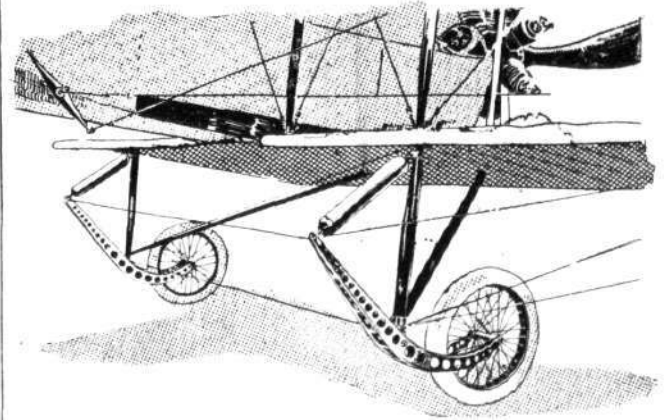
The last of our chassis sketches on this week's full-page illustrations shows the undercarriage of the curious H. Farman "one-and-a-half-plane" that was exhibited at the last Paris Aero Show (1913). The wheel track is very wide—4 metres, to be exact—and the two comparatively long stub axles, which have their inner ends pivoted to the front spar of the lower plane, are given an upward twist at their outer ends in order to bring the wheels into a vertical position. The two struts that support the wheel axle through rubber shock absorbers form a "Vee" as seen from the side, being secured at the top to the front and rear spars of the lower plane and converging to form the angle in which the axle rests. The wide track of this undercarriage, whilst rendering the machine practically immune from turning over sideways, or "cartwheeling" when on the ground, made the machine somewhat difficult to steer on rough ground owing to the long "leverage" of the wheels when encountering an obstacle.

# CONSTRUCTIONAL DETAILS.—XI.

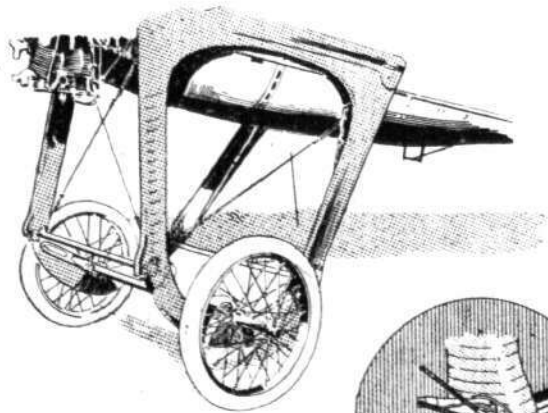
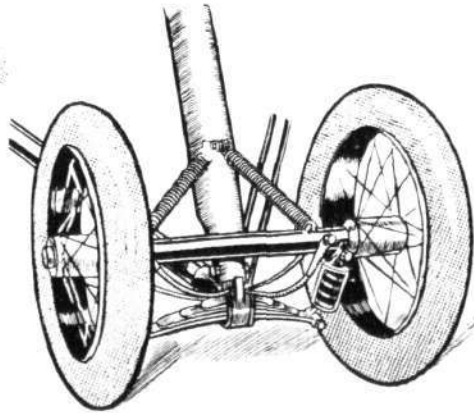
Various French undercarriages. (See text page 892.)



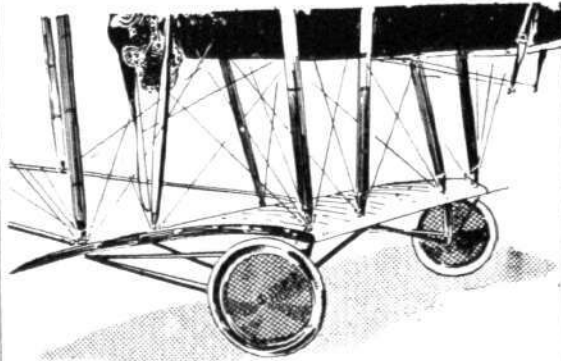
BREGUET.



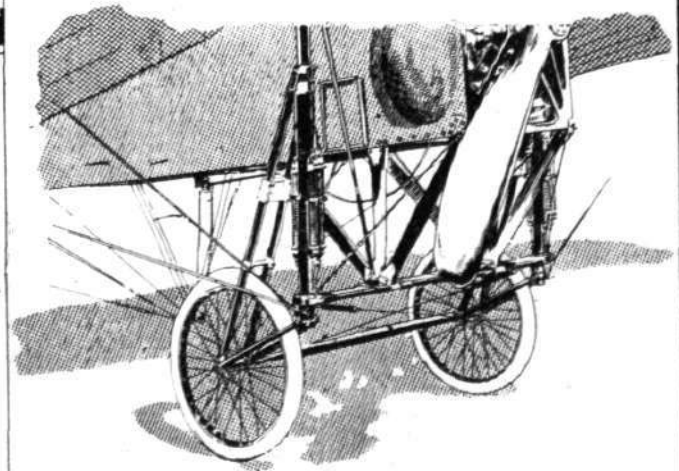
BLÉRIOT.



DEPERDUSSIN.



H. PARDON.



# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

**Aviators' Certificates.**

- The following Aviators' Certificates have been granted :—
- 2023 Flight Sub-Lieut. Cyril Askew Eyre, R.N.A.S. (Maurice Farman Biplane, Royal Naval Flying School, Eastchurch). Aug. 13th, 1915.
  - 2024 Flight Sub-Lieut. Hugh Lawrence Francis, R.N.A.S. (Caudron Biplane, Royal Naval Flying School, Eastchurch). Oct. 2nd, 1915.
  - 2025 Flight Sub-Lieut. Frederick Charles Clement Calder, R.N.A.S. (Caudron Biplane, Royal Naval Flying School, Eastchurch). Oct. 3rd, 1915.
  - 2026 Flight Sub-Lieut. Irwin Napier Colin Clarke, R.N.A.S. (Caudron Biplane, Royal Naval Flying School, Eastchurch). Oct. 3rd, 1915.
  - 2027 Flight Sub-Lieut. Robert John Orton Compston, R.N.A.S. (Caudron Biplane, Royal Naval Flying School, Eastchurch). Oct. 22nd, 1915.
  - 2028 Harold Thomas Mellings (Caudron Biplane, Beatty School, Hendon). Nov. 11th, 1915.
  - 2029 Flight Sub-Lieut. Ernest William Clarence Corry, R.N.A.S. (Maurice Farman Biplane, Central Flying School, Up-avon). Nov. 11th, 1915.
  - 2030 Eric Leslie Pearson (Maurice Farman Biplane, Military School, Brooklands). Nov. 11th, 1915.
  - 2031 John Winckworth Bailey (Caudron Biplane, Ruffey-Baumann School, Hendon). Nov. 14th, 1915.

**Aeronaut's Certificates.**

- The following Aeronauts' certificates have been granted :—
- 49 2nd Lieut. Wilfrid Henry Furlonger, R.F.C. Nov. 15th, 1915.
  - 50 2nd Lieut. Thomas Farquhar Lucas (3rd Royal Warwickshire Regiment). Nov. 15th, 1915.
  - 51 Lieut. Henry Whitaker, R.F.C. Nov. 15th, 1915.

**Extension of the Hours of Opening the Club.**

The Club is now open from 9 a.m. to 10.30 p.m. each day, including Sunday.

**New Members.**

Members are reminded that, according to the Rules, the Annual Subscription of any New Member they may propose, who is elected between November 1st and December 31st of this year, will cover the period up to December 31st, 1916.

## THE FLYING SERVICES FUND administered by THE ROYAL AERO CLUB.

The Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The Fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 166, Piccadilly, London, W.

**Subscriptions.**

	£	s.	d.
Total subscriptions received to Nov. 10th, 1915	10,008	9	11
Employés of A. V. Roe & Co., Ltd., for four weeks ending October 29th, 1915	37	19	8
Collected at the Westland Aircraft Works, Yeovil (Ninth contribution)	0	9	9
<b>Total, November 17th, 1915</b>	<b>10,046</b>	<b>19</b>	<b>4</b>

B. STEVENSON, Assistant Secretary.

166, Piccadilly, W.



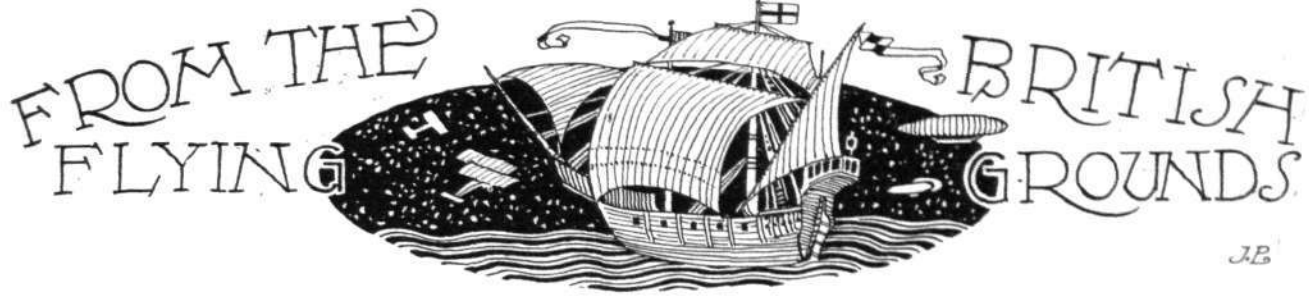
EXCEPT for a fine flight in a high wind by a BE 2c, there was nothing doing on Saturday afternoon last. On Sunday, however, weather conditions were more favourable and a good afternoon's work was put in, consisting of the usual exhibition and passenger flights and school work. The following official log of the afternoon's flying, as announced and recorded by the megaphone man, is typical of the airwork now to be seen at Hendon :—

Pilot.	Biplane.	h.p.	Passen-ger.	Time.		Announced in
				As-cent.	Des-cent.	
Russell ...	305 G.-W.	60	None	3. 5	3.15	Exhibition
Manton ...	303 G.-W.	60	1	3.10	3.30	Passenger
Kenworthy	B.-W. ...	50	None	3.10	3.18	Exhibition
"	B.-W. ...	50	1	3.21	3.30	Passenger
Pashley ...	301 G.-W.	60	1	3.34	3.37	School
Russell ...	305 G.-W.	60	None	3.35	3.45	Exhibition
Winter ...	110 G.-W.	50	—	3.35	3.45	"
Pupil ...	Hall ...	50	—	3.35	3.40	School
Pupil ...	Ruffy-B.	50	—	3.35	3.42	"
Manton ...	G.-W. ...	60	—	3.38	3.47	Exhibition
Pupil ...	Hall ...	50	—	3.45	3.50	School

Winter ...	301 G.-W.	60	1	3.45	3.53	Passenger
Pupil ...	Ruffy-B.	50	None	3.47	3.53	School
Pupil ...	Hall ...	50	—	3.47	3.55	"
Pupil ...	L. & P. ...	45	—	3.50	3.55	"
Pashley ...	G.-W. ...	60	Pupil	3.50	3.57	"
Russell ...	G.-W. ...	60	1	4. 5	4.13	"
Manton ...	G.-W. ...	60	1	4.20	4.30	"
Kenworthy	B.-W. ...	50	1	4.25	4.33	"
Winter ...	G.-W. ...	50	1	4.30	4.39	"
Russell ...	G.-W. ...	60	1	4.35	—	"
Hawker ...	Sopwith ...	Arrived		2.25	(two exhibitions)	
		Departed		4.15		

It will be noticed that according to the official log Friend Russell, who ascended at 4.35, has not yet returned. An intelligent person once enquired of one of our famed pilots what would happen should he be unable to stop his engine when away high in the skies—"I should just have to go on flying until I starved to death, madam," was his ready reply. We sincerely trust that a similar fate has not overtaken Russell. In case of such a catastrophe, and taking into consideration the lapse of time, we suggest that a fast scout be despatched with provisions.





**London Aerodrome, Collindale Avenue, Hendon.**

**Grahame-White Civilian School.**—Pupils doing straights with Instructor last week: Messrs. Franck, Gammon, Halet, Holman, McConnel, and Henshaw. Straights alone: Mr. Horridge. Circuits with Instructor: Messrs. Fraser and Hughes. **Grahame-White School (R.N.A.S.)**—Pupils doing straights with Instructor: Probationary Flight Sub-Lieuts. Armitage, Horniman, Malet, Ovens, and Saint. Circuits and eights with Instructor: Probationary Flight Sub-Lieuts. Aplin, Davenport, and Moody. Circuits and eights alone: Probationary Flight Sub-Lieuts. Graham and Cross.

Instructors during week: Messrs. Manton, Pashley, Russell, and Winter.

Certificates during week: Probationary Flight Sub-Lieuts. Gammon and Sadler.

**Beatty School.**—The following pupils were out during last week: Begg, Bowick, Brown, Byrne, Brynildsen, Barnes, Collier, Cumming, Davison, Edwards, Fawcett, Fellowes, Fry, Godfrey, Hodgson, Jones, Mellings, Podmore, Richard, Samter, Scott, Smith, Summers, Whincup, Willmet, and Williams.

The Instructors were Messrs. G. W. Beatty, W. Roche-Kelly, R. W. Kenworthy, G. Virgilio, A. E. Mitchell, and L. L. King, the machines in use being Beatty-Wright dual-control and single-seater propeller biplanes, and Caudron tractor biplanes.

Four more pupils flew for their certificates this week—Messrs. Brown, Campbell, Fawcett, and Mellings.

Exhibition flights were given on Sunday by R. W. Kenworthy.

**Hall School.**—The following pupils were out receiving flying practice last week:—With H. F. Stevens: Broad. Flying solo circuits, figure eights with practice landings:—With Cecil M. Hill: Messrs. Nicolle, Butterworth, Drew, Stirling, Dodd, Dresser, Shum, Rattray, Manley, Cook, Evans, Wilkins and Lieut. Bell. With Charles Bell: Messrs. Redford, Capt. Grey, Mann, Smith, Arnsby, Bond, Millburn, Cosgrave, Chapman, Thom, Bennett, Niel, Baron Ackroyd, Le Coq Moir and Cumberbirch.

Aeroplanes in use: Hall tractor (Government type) biplanes.

The Royal Aero Club certificate was taken by Broad, who qualified in a highly satisfactory manner.

The following pupils should shortly be qualifying: Messrs. Drew, Cook, Manley, Butterworth, Stirling and Wilkins.

**London and Provincial Aviation Co.**—Pupils doing rolling last week: Messrs. Dawson, Roberts, Lees, Scott, Lambert, Jones, Hunt, and Martin. Doing straights: Messrs. Renton, Knowles, Lewis, Jowett, Woods, Thorpe, Hardy, Braim, Atkinson, Burgess, Heyn, and Summer-skill. Circuits and eights: Messrs. Porter, Franklin, and W. Warren, jun.

Instructors: Messrs. M. G. Smiles, W. T. Warren, and C. M. Jacques.

**Ruffy-Baumann School.**—Very bad weather prevailed again during last week but in spite of the circumstances



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A sextet of pupils who have secured their tickets at the Ruffy-Baumann Flying School at Hendon.—1. 2nd Lieut. R. Clive Gallop (2nd Scottish Rifles); 2. Mr. W. Hughes; 3. Sub-Lieut. W. E. Gardner; 4. 2nd Lieut. P. B. Prothero (4th Argyll and Sutherland Highlanders); 5. 2nd Lieut. W. R. B. McBain (R.F.A.); 6. 2nd Lieut. Albert Ball (N.M.D.C.C., now R.F.C.).

most of the pupils have been enabled to have instruction, and three certificates have been taken. Messrs. W. Hughes, W. G. Stewart, and Bailey successfully secured their tickets, all in good style.

The following students have been out on the 60 and 50 h.p. Gnome-Caudron type and Ruffy-Baumann machines: Lieut. Yiule, Messrs. Cole, Harkness, Vernon, de Grauw, Coppens, Wood, Cuthbertson, Bolton, Liddell, Griffiths, Launoit, Tomson, Laidlaw, Fraser, Cox, Pauli, Hamtiaux, and Sherwood.

Instructors: Edouard Baumann, Felix Ruffy, Ami Baumann, and Clarence Winchester.

## Northern Aircraft Co., Ltd.

**The Seaplane School, Windermere.**—A violent north-easter was raging most of last week. Mr. Rowland Ding was out in the 100 Anzeni monoplane in winds between 35 and 40 miles per hour. It was a fine test of both pilot and machine. Mr. Lankester Parker, too, has taken the 80 Gnome biplane out in winds hitherto thought to be inadvisable. On Sunday he climbed her with full tanks and passenger to 1,000 in 5 min. 30 sec.

With Instructor: Coats (24 mins.), Harvey (31), P. H. Ingham (17), Jeffries (8), Salton (12), Stubbs (10), Shaw (8) and Macrow (7).



## CORRESPONDENCE.

### A Criticised Criticism Re-criticised.

[1913] Under the heading of "Eddies" in your issue of November 5th, you publish a paragraph which compels my reply, a reply permeated with great regret at the attitude taken up by your contributor.

I can only imagine that your correspondent, barren of topics aeronautical upon which to write, wilfully misconstrued this letter of mine to the press on the possibilities of the aeroplane as a weapon of offence and defence against the Zeppelin. My contention, if I may be permitted the courtesy of your columns, in simple language was this:—that the aeroplane can be made the effective reply to the rigid dirigible balloon, and in this contention I think I can modestly contend that I have the support of every sincere worker for the development of aeronautics.

I am tremulous with dismay at the wrath which my letter has aroused in the bosom of your contributor. I had no idea that a common-sense letter on a subject which I have studied since the days when I spent a most interesting *vacance* with Wilbur and Orville Wright in France, when Europe for the first time in history saw a human fly in the air, would have aroused the titanic irony of your writer. Rather had I hoped that I should have met with encouragement from those who are desirous of fostering and developing the science of flight. That I find it otherwise in the pages of "FLIGHT" I ascribe entirely to an oversight of yourself—Sir.

And now let me again repeat for the education of your caustic scribe my contention—it was this:—that it is not impossible for the skilled aeronautical engineers of this country to design a machine which shall patrol the air from dusk to dawn, and which shall be able to carry, beside the load of fuel and lubrication and crew, machine guns, searchlights and wireless installation.

Your contributor in his eagerness to display his own mastery of the technique of aeronautics ridicules the idea of there being an internal combustion motor which shall function for 12 hours—but I said nothing of a single motor. And further he brightly flashes his wit at the expense of my ignorance when I suggest that Mr. Lloyd George could supply the necessary engines. I am sorry that I did not amplify my statement by saying that an ordinary civilian desirous of building aeroplanes must get a permit for the release of engines from the Minister of Munitions (Mr. Lloyd George). And I *know* that the engines I require can be built in two months.

In conclusion, Mr. Editor, may I meekly point out that I did not claim to be the designer of the aeroplane that shall fly from dusk to dawn—I merely said that, given the engines, I would build (not design) the *fuselages* in two months. I have much pleasure in telling you that I have associated with me the gentleman who has built *all* the giant aeroplanes yet constructed, and his designs are so far the very last word in big machines. Had your correspondent real knowledge on the subject—so serious to us all—on which he so cheaply jets he would have swallowed his pen rather than have written those foolish words. Does he really think that the aeroplane cannot be developed beyond an open *nacelle* machine with an engine of say 90 or 125 or even 300 horse power? If this be his attitude he should surely not figure as an authority on flight.

HAMILTON EDWARDS.

20, Cophall Avenue, E.C.

[The quotation on November 5th by "Æolus," of the text of Mr. Edwards' letter speaks for itself, and gives to "think furiously" whether there was any wilful misconstruction on his part. We note that Mr. Edwards claims now to put the idea expressed in his criticised letter into simple language, which process might, we think, have been followed with advantage in the above further communication. We are sorry we cannot trace the smallest sign of the suggested "wrath," in the paragraph in "Eddies," in fact the boot appears to be on the other leg, and we are a little in doubt as to whether our

correspondent's reference to "titanic irony" is to be accepted as a compliment or the reverse. At least "FLIGHT" can claim without much misgiving a desire to encourage the science and art which it represents, but it does not necessarily follow that the claims which are put forward by Mr. Edwards, however good his intentions may be, tend in the same direction. As Mr. Edwards apparently would be so minutely particular in his expert phraseology, it might be as well to point out that he claimed in his original letter he would build 50 *machines* in two months—not as he now suggests *fuselages*—a mere bagatelle in difference. As to what "Æolus" thinks in regard to the development of aeroplanes, this is a fairly big subject, and his views in this respect might, we think, astonish even Mr. Edwards in their optimism, so we can hardly accept as correct our correspondent's guesses as to our contributor's possible opinions.

We appreciate one piece of generous abstention from criticism, viz., the slip of "Æolus" in transposing "sunrise" with "sunset" in his few opening lines.—ED.]



## The Late Mr. Gustav Hamel.

FOR many months, in fact almost from the outbreak of war, the wildest rumours have been bandied about in regard to the fate of Gustav Hamel. We have never placed the smallest reliance upon them, and have never made reference to any of these offensive statements, so that we welcome the following plain denial of these rumours and reminder of the facts sent to the Press, under date November 16th, by Messrs. Oliver Richards and Parker, of 1c, King Street, St. James's, as solicitors on behalf of the family of the late very popular pilot:—

"The persistent rumours that the late Mr. Gustav Hamel is alive and flying for the Germans is giving great pain to his family and to his many friends. Unfortunately the first part of the rumour is untrue; the second is an insult to the memory of one who has done so much for the advancement of aviation in England. Mr. Hamel left Hardelot on May 23rd, 1914, to fly to England and was never seen alive again. His body was found in the sea by the skipper of the French fishing smack "St. Hélène," one Joseph Le Pretre, on July 1st, 1914, about 10 miles off Point Alprecht. It was identified by the description of the clothing and certain contents of the pocket described by a French mechanic, Alexis Longuet, who assisted him when he left Hardelot, and by the inflated indiarubber bicycle tube round the body which Mr. Morane, the eminent aeroplane designer, induced him to wear when he left Paris the same morning. There can be no shadow of doubt as to the identification of the body. On the evidence of Le Pretre and Longuet the Court has granted leave to presume his death and letters of administration to his estate have been taken out. Mr. Hamel came of a Danish family. He was brought up in England and was educated at Westminster School. His father, Dr. Gustav Hamel, M.V.O., who came to England many years ago, is a British subject. He was born in Hamburg, then a free and independent town. Early in life he went to Sweden and later continued his education in Switzerland, where he took his medical degrees. He requalified in England (St. Bartholomew's Hospital) and holds no German degrees or qualifications whatever. Nothing could be more repugnant to the family of the late Mr. Gustav Hamel than the reports that he is now enrolled in the German Flying Corps. May we ask you, as solicitors to the family, to publish this letter and put an end once and for all to baseless rumours?"



It is to a greater or lesser extent expected of me that I write in this page of matters aviatic. Yet as a dreamer, as one whose inclination to write interestingly is stronger than his ability to write instructively, I am graciously allowed a certain licence. To-day I cannot write of aviation. I have written and talked and worked for aviation the whole week, and on this day I cannot.

And you, reader, you also have worked all the week for aviation, and you have read, or will read the other pages of this number where is set down aviatic knowledge of the best obtainable. Can I hope that you will be interested in my page also, though I speak not of aviation do I but try to embody a little thought into it?

There are before me on the wall as I write, two picture frames containing photographs. In the one are three views taken in Ceylon some years ago, the other contains the portrait of a dear friend of mine, these many years gone to his rest. Those pictures have been on my wall a long time, yet only to-day have they, dissimilar as they are, started a train of thought wherein they appear to merge together and point a moral. I shall describe the three views.

The first shows a beached, catamaran surf-boat; three natives are standing in it, and one by the side. Their clothing consists of a sun-hat and a piece of patterned cotton cloth hanging from the waist. They are fine, healthy-looking men, evidently well fed to grow to such stature. They have their boat, and the sea, and the sky, and are happy; they are all laughing. I do not suppose the Savoy Hotel if placed on their native beach would have any great attraction for them beyond curiosity.

The next view was taken in Colombo. It shows a very fine, wide street, in the centre of which is an avenue of thick trees cutting out the fierce glare of the sun, which penetrates to form patches of light the ground over. Natives of all ages, and both sexes are walking about clothed in picturesque array, and on the right are a number of jinrikisha awaiting passengers. It is a peaceful scene, yet the stone-built, European-looking houses seem out of place, the waiting rikisha suggest a certain indolence, and down the middle of the road, pushing their horrid arms among the green leaves, are a row of electric-tram standards, with, in the distance, a tramcar; horrible symbol of the coming of commercial men, men who will work themselves, and make the happy native leave his little boat, and work also, to uphold supposedly necessary adjuncts to happiness.

The third view is a view of Colombo Harbour, taken from the top of the lighthouse. Anchored well out, in two rows, stem to stern, are eight huge battle-ships, five British and three German, emblems of "civilisation." Need I give your thoughts a lead regarding this picture after the other two?

The picture of my old friend shows him as a man getting on in years. It was taken in the "den" in which I have passed so many happy hours in his company. As a compliment to myself, I was allowed to take the only photograph of him ever taken, and that, only on condition

that I printed but one copy for myself, and then destroyed the negative—he did not want, and did not have, a copy.

His was a character the like of which I wish we had more amongst us. He was reputed to be immensely rich, and a miser. He was *not* immensely rich, although his income ran into three figures every week, and he was not a miser. What, then, became of his money? *He gave it all away in charity*, including his post-mortem bequest of five thousand pounds, less expenses; gave it away, almost always anonymously, and when not that, secretly. You are interested in him? I shall tell you of him.

In those days I played a little on the violin—he played magnificently. He possessed a genuine Strad, surely sufficient reason to bring us together. He was a bachelor, although by no means opposed to wedded life—his secret his mine. He lived alone in the West-end of London, with but one aged female servant who came in daily after his departure to the City, and who had strict instructions to be gone before he returned in the evening. I saw her but once during all the years of our friendship; I think he, himself, saw her but a few times a year, yet I doubt not she had an easy job and a good master.

A crank? Not by any means. He was the most lovable man I ever met, and as happy as could be—happy with his music and his books and his pictures. He had but one room, apart from his small sleeping-room, and it was always in a condition that appealed to me as to him, the whole place was littered in glorious untidiness with books and prints and paintings and sheet-music and drawings and writings. Cigars and wines were always ready to be brought forward, though a whole heap of "this rubbish," as he called his miscellanea, had to be roughly thrown aside, or on the floor, to make room for the tray. He had other male friends beside myself, and we used to play whist or talk books, and blow clouds to the ceiling.

When I was alone with him, he would sometimes get out his Strad and make cold water run up and down my back, or emerge scalding hot from my eyes. He dressed soberly, lived soberly, and was as happy without high-faluting things as those natives of Ceylon with their boat.

Last week my business took me the round of the shops in the West-end. Those catering for men were showing sober goods, serviceable goods, mostly in drabs and khaki. The ladies' departments were making a brave endeavour to pretend we were not at war. I saw a lady dressed in furs that must have cost hundreds of pounds. She was loaded up with purchases, and she was looking into a shop window to see what more she could buy, she who was already by ostentatious display far into vulgarity.

Not for the betterment or their own happiness did those natives of Ceylon leave their catamaran, to go and build tramways.

It is the rabid disposition to seize more than is necessary to sustain human life in happiness and comfort, that caused those ships of war to lie off Colombo Harbour. My old friend was an object lesson—would to God the whole world could have known him.

# EDDIES

It seems that I was right in my surmise last week with regard to the identity of the pilot who paid the "lightning" visit to Hendon the Saturday before last. I now have it on good authority that the machine was a Vickers scout and that the man at the stick was Mr. Harold Barnwell, the well-known pilot and designer. It did not really require a Sherlock Holmes' power of deduction to arrive at this conclusion, for when you come to think of it there are not such a stupendous lot of machines knocking about that are capable of the performances put up by the Vickers "streak." And as for the pilot, well, it is not every holder of a *Brevet* that is keen on flying nor yet landing such a 'bus, let alone looping on it and at such low elevations. So there you are, a simple process

the bank steeper and steeper, until I felt perfectly certain that something had gone amiss. While clutching firmly at the nearest strut I looked around to see if I could discover any reason for the 'bus's unseemly behaviour, but the planes, *aileron*s and rudders were all there, as far as I could make out under the bewildering conditions of having the wings and elevators vertical and the rudders horizontal. I happened to look down, or rather across, as we were by then on the same horizontal level, at the pilot, and was somewhat reassured to find him grinning. I have since always been glad that he didn't have a camera! However, just as it looked as if we were going to try Helen's stunt of landing on a wing tip, the machine flattened out and we landed without the engine—not



"Flight" Copyright.

One of the German trophies of war that have been on view for the past week at the Horse Guards' Parade. An Albatros biplane (Mercedes engine) which has been rather severely "strafed" by our boys at the front.

of elimination does the trick. And the 'bus itself is nothing to look at—at a distance, as you may judge by the couple of "snaps" which appear in another page this week.

x x x

Talking about Mr. Barnwell and his wonderful loops on his equally wonderful machine calls to mind an occasion, away back in the dark ages of aviation when looping had not even been thought of, much less attempted, I was paying one of my usual visits to the aerodrome and as one of the Vickers school 'buses was just being brought out Mr. Barnwell invited me to come for a "joy ride." I was unaware of the fact that he had been practising some horrible side-slipping spiral *vol plané*, and in my innocence I gladly accepted the invitation. When we had reached a height of a few hundred feet Barnwell switched off his engine and began the glide without, it seemed to me, getting the nose of the machine down. The turns became shorter and shorter and

literally, of course. Since then I have had a great admiration—not to say respectful awe—for Barnwell's piloting, mingled with a little nervousness when going up with him; not that you do not feel perfectly safe with him, but you never quite know what new stunt he is going to put up against you.

x x x

In connection with the challenge issued by Messrs. Mann and Grimmer, backing the "Mann" biplane against any two-seater "pusher" for speed over a 30-miles course (round pylons excepted), we have received from Mr. Grimmer the following: "I should like to except one machine, and one only, from my recent challenge to pushers. Mr. de Havilland has recently demonstrated to me that the new de Havilland is faster than the 'Mann.' It is only fair to say, however, that this machine was not in existence when the challenge was made. Please note that my claim that the 'Mann' is the fastest pusher in the world is henceforward with-



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**ANOTHER "PRISONER OF WAR."**—A German Albatros scout which was forced to descend, but which appears to have almost entirely escaped damage by our shells.

drawn. It is no disgrace to be beaten by the new de Havilland, which I consider to be the best all-round aeroplane that I have ever seen."

Comment would be superfluous.

x x x

With this cold weather coming along our service aviators are beginning to feel the want of warm clothing—no, this is *not* an advertisement for somebody's knitted caps—and several pilots are reported to have invented some highly original forms of head gear. One of them, I am told, has had a nice wolf skin made up in the form of a cap, similar in a way to those worn by Canadian trappers. The head with its fangs comes over the forehead of the wearer, giving him a somewhat ferocious appearance. I have it on good authority, however, that there is no foundation for the rumour that his commanding officer has absolutely forbidden him to wear the cap when on active service, on the ground that if he were brought

down by the Germans, the famous Bureau, whose name also is reminiscent of the *genus canis*, would immediately spread the report that the treacherous English—Gott strafe them—were now training wild animals for air service.

x x x

I have spent a highly interesting half-hour examining the three German aeroplane trophies which are on view on the Horse Guards Parade. Two of them, the Fokker monoplane and the Albatros scout, do not seem to have suffered very much from our anti-aircraft guns, whilst the third—another Albatros—bears eloquent testimony to the efficacy of our gunners out at the front. Its tanks, radiators, and *fuselage* are peppered with shots and shrapnel, and from the position of some of the holes it would seem that both the occupants must have had a sultry time of it. Whether or not they were wounded I am not in a position to say.



"Flight" Copyright.

**"FETCHED DOWN."**—A Fokker monoplane, of which the Germans employed a considerable number during the earlier part of the war. These machines are now mostly used for school work.

The Fokker monoplane, which, by the way, looks a little worse for wear, has a strong suggestion of the Morane about it. The plan form of the wings is similar although the section is totally different, and the body is of the Morane type with the exception that it appears to be considerably longer. The undercarriage also is entirely different from that of the famous French machine, the stub axles being hinged to a central longitudinal tube, whilst the shock absorbers are situated inside the body, somewhat after the style of the French R.E.P.



**MEASURING THE WIND AT A GERMAN BASE.—**  
A small test balloon is sent up to give an indication of the force and direction of the wind.

monoplanes. The rotary engine, which one at first takes to be an 80 h.p. Gnome, proves on closer examination to be the German version of the Gnome—the Oberursel—and does not look anything like so well made as the original.

x x x

The smaller Albatros is very similar to the machine that was demonstrated over here in the summer of 1914, shortly before the outbreak of war, by Herr Thelen. It has a shorter span, however, and only two pairs of interplane struts on each side in place of the three pairs with which Thelen's machine was fitted. The engines on this as well as on the other Albatros are the well-known Mercedes motors, and also as regards the general arrangement are these two machines very much alike. In the larger one the pilot sits in front and the gunner in the rear cockpit, where is still seen the lug that served as support for the gun. The accompanying photographs will give a general idea of the appearance of the "prisoners," and next week we hope to be able to say something further about them.

x x x

Quite a realistic little game of war was played recently off New London, Conn., U.S.A., the participants in which were two of the U.S. submarines on one side and Mr. Vincent Astor's Burgess-Dunne aeroyacht on the other. According to our New York contemporary, *Aerial Age*, a member of the crew of one of the submarines—the D-4—describes the encounter in the following manner: "We knew in my D boat that Mr. Astor was running a mighty nifty craft, a new sort of catamaran, a hydro-aeroplane if you like to call it that, or a power boat good for thirty-five knots an hour, and that he and Capt. Stirling were under special orders to catch us if they could and drop us, by ramming or by shell, down to Davy Jones—all by the theory of the game, just surprising us and getting close enough to shoot or ram if a fight was on and not war play.

"The D-4 (and she's some boat) snooped around, taking a look through the ceiling now and then, but finally we had to rise to the surface to charge the batteries. We

hadn't any more than come up to daylight when the navigating officer sighted Mr. Astor's submarine chaser. It was a long way off, but it was coming faster than a wild duck, with water shooting up stiff and white as the bow cut ahead. We tried to duck, you bet! But you can't submerge all at once, you understand. It takes a little time; not much, but a few minutes; and there wasn't time enough to be swiped from the clock just then. Zip-bang! Zip-bang! and up came the misses' size destroyer, right alongside, with her one-pounder trained square on the periscope and Capt. Yates Stirling squinting over the sights and laughing to beat the band.

"Of course we were out of the game. The skipper and the navigating officer lost their appetite for supper, but they knew they were caught and ran up the signal. One shot in real sea fighting would have sent the D-4 to the bottom with a big hole through her skin.

"Mr. Astor, Capt. Stirling and the mechanic in the hydro-aeroplane shot away from us and hunted for the G boat (the other submarine), but the G people were too foxy. They must have taken a peek or two while the enemy was putting us out of business, and so beat it while the beating was good. Anyway they escaped and got back to the submarine base here. And believe me," said the submarine man, "if the British are using little speed boats with as much go in them as Astor's, I don't see where the Germans are going to get off."

x x x

Just before going to press we receive news that the "Mann" biplane was taken up to 8,000 ft. by Mr. A. E. Barrs on Tuesday morning. At present we have no information with regard to the time taken for reaching this altitude.



**Corner of a Bavarian aero-park at the West front of the war operations.**

Everybody up at Hendon has got used to Pickles' steep left and right hand banked spirals on the Curtiss machines, and when one of these happen to be more on the wing tips than with the struts pointing skywards the *habitues* merely give one another a knowing look and say "Pickles!" On Wednesday of last week, however, there was a different note to the pronunciation of the name of the well-known pilot, for without any warning Pickles did two beautiful loops on one of the JN3 Curtiss tractors. In the course of the afternoon this loop was followed by twelve others, six of which were made with a passenger on board. As the machine used was one of the standard Curtiss biplanes with a 90 h.p. OX motor and had not been plumped up for this strenuous performance, the critics who have volunteered the opinion that the Curtiss is not endowed with a sufficiently high factor of safety, will perhaps think it over. "ÆOLUS."

## THE R.N.A.S., THE DEFENCE OF LONDON, &c.

IN the debate in the House of Commons on the Vote of Credit on the 11th inst. Mr. Joynson-Hicks called attention to the air services of this country. With regard to the military wing, he urged that it was important to take full advantage of the winter for the construction of larger machines with engines of greater power. Last winter the Germans had stereotyped their machines, a much improved form of Albatross, with 150 or 160 h.p. Mercedes engines, being turned out. Owing to the wonderful skill of our aviators, they had been able to beat the German pilots, but they should not be handicapped by having to use smaller machines of lower horsepower. During the winter preparations should be made so that our aviators, when they could resume offensive flying, could do so with high-powered machines capable of long-distance flights. Turning to the Naval Air Service, an incident of whose work was the defence of London against Zeppelins, Mr. Joynson-Hicks said that there was throughout that service a feeling of great dissatisfaction with regard to the existing organisation. In one case a very eminent member of the Royal Flying Corps who had left that service had been taken over by the Royal Naval Air Service and given a responsible position in the Dardanelles above the heads of two men whose names were household words. It was felt that the men who had helped to make the Naval Air Service were being superseded. There was a very grave feeling with regard to the action the First Lord of the Admiralty had taken with reference to the head of the Naval Air Service. If there was one man who had built up the Royal Naval Air Service it was Commander Sueter, but the right hon. gentleman had brought in to supersede him an admiral of high position in the Navy who knew nothing whatever of the air service. There were some quaint anecdotes going round to illustrate the ignorance of that admiral when he first took up the position. The right hon. gentleman had said the other day that it was impossible to reorganise the air service in time of war, but there could be no greater reorganisation than to bring in an untried man and to teach him his business.

Why should everything have to pass through the hands of the Sea Lords? That process involved considerable delay. It would be better to have a director of the air service; something might be done if the First Lord of the Admiralty himself would take charge of the air service. He was told that two months ago an order was passed in for the building of large aeroplanes, such as many hon. members had been asking for for many months past, and that order, if it had yet gone out, went out only last week. It was of the essence of the building up of an air service during the winter that it should be ready in the spring when the Germans would bring out their new Zeppelins and new aeroplanes. Why had we no Zeppelins to-day? Why had no large airship been built? Why was the work on an English Zeppelin stopped in January last? He believed that the construction of that Zeppelin was to be continued, but why had eight months been lost? We knew what Zeppelin raids were, and at least the Government might have provided one big airship which could have patrolled the East Coast and have tackled at least one of the German Zeppelins. Every air station around England ought to be provided with an ample supply of first-rate aeroplanes to attack the German Zeppelins when they arrived over our shores. He was told that there was no cooperation between the War Office and the Admiralty. In reply to another question of his, the First Lord of the Admiralty said he had a great belief in the organising capacity, energy and resource, and openness to new ideas of Sir Percy Scott, who now had the defence of London under his immediate control.

Mr. Balfour: I meant gunnery.

Mr. Joynson-Hicks said that what the people of London wanted to be assured of was that the responsibility for the defence of London was vested not in two or three separate authorities, but in one man, who would be able to order the aeroplanes to go up, not when the Zeppelins reached London, but when they were sighted in daylight over the North Sea. As for the gunnery defence of London, those who had seen the sort of guns which had deluded London so long into the belief that it was defended did not wonder that they failed to hit the Zeppelins 15,000 ft. high at the last raid. Around certain parts of Paris there was a 75 gun, having a high angle range of 19,000 ft., stationed every 300 yards, with a powerful searchlight. That was why Paris was free from Zeppelins. The Zeppelins knew that if they got within range they would be blinded by the searchlights and that the guns would quickly make an end of them. Was not the capital of the British Empire entitled to the same protection as Paris?

But in his view the defence of London should commence on the East Coast. If powerful guns mounted on motor lorries were stationed at intervals along the East Coast and manned by efficient gunners, the Zeppelins would be caught before it was dark, and

very soon some of them would be brought down. German aeroplanes, which were only from 20 ft. to 30 ft. across, were constantly brought down at the front. A Zeppelin afforded a much larger target. He suggested that some of the expert aerial gunners should be brought over from France to assist in the defence of London. But really the best defence of London was an offensive against the Zeppelins. Let them be bombed out of their sheds. A fleet of aeroplanes, 2,000 in number, costing only the price of a battleship and a half, and able to drop large bombs, would quickly make a change in the whole conduct of the war. These aeroplanes could cross the Rhine. The exact number and position of the Zeppelin sheds were known to the Admiralty. Let them be destroyed, and the menace of the Zeppelins would disappear.

Mr. Balfour, First Lord of the Admiralty, in replying, said: There is no doubt that, as this war has gone on, there have been changes and developments in the machines of all the countries concerned. Now one has got in advance of the other; now again the positions are reversed. I do not think it ought to be assumed, as both the hon. gentlemen appear to have assumed, that now the Germans have got a lead which it will be difficult or impossible for us to overcome.

Mr. Joynson-Hicks: I certainly did not say it was impossible; I hope we shall catch them up.

Mr. Balfour: I understand that my hon. friend desires to see that British industry and inventiveness shall enable us again to take the lead which we had for a short time, but which in his opinion we have now lost. I can assure them, so far as the Admiralty is concerned, there is an earnest desire to improve in every way the construction of aeroplanes. They are improving in strength, speed, engine power, and all the qualities which he desires to see, and rightly desires to see, embodied in our air service. I believe the Army, although on that point I cannot speak with the same authority—but I am confident that the Army are pursuing the same course in generous rivalry with the Navy. The two departments interchange ideas, and I believe that as the war progresses it will be found that we have not fallen behind those against whom we are matched.

It is very difficult, of course, to speak on this point with confidence, because, until a machine is actually in use, you cannot prophesy, whether the machine belongs to your enemy or yourself, what is going to happen. Germany may have some machine under construction of which we know nothing which may produce results we do not anticipate; and we may be producing machines of which the Germans know little. All that must necessarily, in the nature of the case, be a matter of conjecture. I can do no more than assure the House that, so far as the Admiralty is concerned, and I believe, so far as the Army is concerned, broadly speaking, it is fully recognised by both departments that there is no more important and pressing necessity at this moment than to see that the machines used by the air service are kept at least on a level with those with whom they have to contend.

My hon. friend went on to criticise certain dispositions of *personnel* for which the Navy were responsible. He complained that we had sent out an Army man—a man trained in the Army Air Service—to superintend and organise the Naval Air Service in Gallipoli, although there were naval men there, as he said, whose names are household words. It is perfectly true that there are members of the Naval Air Service at Gallipoli whose names are, and deserve to be, household words in this country. They are flyers of supreme skill and of admirable and distinguished courage. But the gentleman to whom he refers, who is now at the head of the Service in Gallipoli, was sent out not as a flyer but as an organiser. He is an admirable flyer; but it was to organise a great air service at Gallipoli that he was sent out. I believe he is doing it very successfully, and I believe the heroic aviators of whom my hon. friend speaks are more distinguished for their great feats of courage and skill than they are for their organising powers. The two things are quite different, they require quite different faculties. I think my hon. friend was not well advised in criticising the Government for not having considered the special aptitudes of the men at their command in determining what places they should fill in the service of their country. All I can say is that I have done my best in this matter. I do not believe that he will find that those who look at the air service in Gallipoli from the outside who consider what it has done, what it is doing, and what we still hope it will do, will consider the choice made by the Admiralty of which my hon. friend complains is otherwise than the choice which experience justifies.

My hon. friend turned from Gallipoli to the organisation of the air service at home. He very rightly, I think, avoided unnecessarily dragging in names in the debates in this House. The essence of his charge was that whereas there was a gentleman at the

Admiralty who, up to the recent reorganisation of the service, had conducted all the departments of the air service with conspicuous ability, the Admiralty had now altered the system, had brought the air service under the ordinary Admiralty practice, put it under the Sea Lord, and had, by that very action, necessarily altered the position of the distinguished gentleman to whom he referred.

The facts are these. When the war broke out, the air service was relatively in its infancy. The very fact that the war broke out expanded it enormously in all directions. The distinguished officer to whom the hon. member refers was, in the first instance, an expert in lighter than air ships. Gradually, as the air service expanded, his duties expanded; to lighter than air were added heavier than air. To the design of aircraft was added the control and command of an ever-increasing and enormous staff—designers, and fliers, pilots, and mechanics. He was made responsible for the most heterogeneous duties until the weight of responsibility thrown upon him was far in excess of what any officer ought to be asked to bear. I came to the conclusion that the time had come when the air service ought to be brought under the ordinary Admiralty practice.

In its early days, Mr. Churchill, to whom the country owes a great debt of gratitude in connection with the air service, kept it under his special personal charge and supervision, and I am not sure that my hon. friend did not suggest that his example should be followed by me, and that I should put all the Naval Lords on one side and assume the sole management and control of the air service. I think that would have been a great error. Much was gained by the personal control, the personal interest, the initiative and the farsightedness of my right hon. friend in the early stage of this air service. But I might as well really keep the submarine service, or the destroyer service, under my own personal control. The air service has come to stay. It is, and it must henceforth always be, part of the Admiralty equipment, and I am confident that I was right in thinking that the time had come when the enormous expansion which it had gone through required it to be treated as other great naval services are treated, and put under the same machinery which experience has shown to be, after all, not a bad machinery for managing the affairs of the country.

I hope I have made it clear to the House that what happened was that the enormous expansion of the air service really absolutely outgrew its primitive organisation, and it had to be put under the accepted organisation of the Admiralty. I believe that has done nothing but good. The information I had before the change was made was that in many cases there was great want of discipline in the air service, which was only natural, because the distinguished officer who was at the head of it really had not disciplinary powers, and the various commanders-in-chief round the coast had no authority over the air service at all. It was quite inevitable in these circumstances that there should be some relaxation of the bonds of discipline. It could not be otherwise, and it was not otherwise. I believe it was really of the greatest possible advantage to the air service that it should be introduced into a system which, whatever else may be said of it, has undoubtedly produced admirable fruits in the way of wise discipline. No one has ever suggested that the Navy of this country is not admirably disciplined, and to bring the air service under that system seems to me to be conferring on it one of the greatest possible advantages.

I turn from the general organisation of the air service under the Board of Admiralty to the particular criticisms passed upon the Zeppelin attacks and the defence of London. I do not speak for the Army, because the representative of the Army will speak for himself directly, but, as far as the Navy is concerned, we are doing our very best to increase both the number of our flyers and the machines which they have to use. It is no use saying how much better off we should be if we had more of the things which it is extremely desirable we should have. We are making them as fast as we can. That is a general observation which deals with some points raised by both the speakers.

When we come to the case of Zeppelins my hon. friend said, "Will the First Lord of the Admiralty explain why Zeppelins were not built before the war, and why a Zeppelin which was being built during the war was not gone on with?" I am not going to discuss the policy of the present Board in connection with lighter-than-air craft, though I may say that we are building no inconsiderable numbers of lighter-than-air craft at this moment, largely for the purpose which my hon. friend refers to—the purpose of scouting. If he asks me why these ships were not built before, he must recognise that the whole policy of Zeppelin *versus* aeroplane is still undecided, and that the most competent people hold the most diverse views upon it. No nation, I do not care what nation it is, could expand equally in every conceivable direction. You have to choose, and there are many persons—I do not say they are right, I have not an opinion—who think that Germany chose wrongly. If Germany chose wrongly in the matter, I hope

the criticism upon the preceding Board of Admiralty will be mitigated in severity. If the Germans were wrong in putting so much energy, money, skill, invention, and manufacturing power into the making of Zeppelins, do not let us criticise the preceding Boards of Admiralty because they did not fall into the same error.

But, passing from this general question as to whether you ought to construct Zeppelins rather than aeroplanes, or aeroplanes rather than Zeppelins, I come to the more particular criticisms my hon. friend made with regard to the defence of London. With some of his observations I am in hearty agreement. I quite agree with him, for example, that no small part of the defence of London or any other place within these islands, should largely, and as far as possible, be a coast defence. It cannot be wholly a coast defence. London must have local defences, as well as coast defences, but I entirely agree that we should extend the circle of our defences as far as possible, and, if you can, and when you can, you should catch your Zeppelin as he approaches your shores, and I doubt not that as we get more and more of the necessary appliances for doing so, we shall more and more succeed in that object.

Let me add something to what the hon. member has said. Our defence against Zeppelins should not be limited by the shore, and they are not limited by the shore. You cannot have a ring of cruisers round the island, of course, but it is undoubtedly the fact that we can use, and should use, and we do use our ships of war as far as possible to anticipate and prevent attacks on the metropolis. But all these questions of defence, or gun power, are limited, just as the aeroplane service is limited. It is limited by what we have got. We are making as hard as we can aeroplanes; we are making pilots, and we are making guns; but we are behindhand. We have always been behindhand in this war. It has never been denied. I am not responsible for it. That is part of what I may call the admitted common places of the situation. We have not had and we still have not all the munitions that we shall have, or that we ought to have. Until we have them it is impossible that we shall have the defences entirely satisfactory in their character or amount. They are improving every day. They are much more formidable now than they were, and they will be much more formidable than they are, and I do not think the House will think it reasonable to ask for any further assurance than that which I can most truthfully give them. We have never been supplied with all the guns we want.

We have taken guns from the less necessary places to more necessary places, and there are positions on ships and on land where I would like to have guns where I cannot have guns, simply because the guns are not yet there, though they will be there. The House must accept that as an unfortunate fact which is being remedied, which has for months been in process of being remedied, is from day to day improving, and will get right, I hope, before a not very long time. I do not pretend that we have at this moment, either in London or out of London, all the guns that are desirable or necessary for its complete protection.

My hon. friend dealt with one other point. He said, "Is not your organisation for the defence of the country against Zeppelins hopelessly complicated and confused; would not everything go on smoother if it was under one authority?" I do not think the organisation is the most perfect organisation that can be devised, but I do not quite see how you could work it with one authority. At any rate, it might not conduce to things going more smoothly. The Navy must be concerned, however you put it, because, as I have just explained, the defence at sea is part of the defence against Zeppelins. Therefore if everything on land were put under the Army, you would still have some of your anti-Zeppelin defences under the Navy, and no conceivable arrangement would get rid of that. When you are dealing with a great area like the metropolis you must bring in the police, the Home Office, the County Council, and the Fire Brigade, as well as the Army and the Navy. That represents a large number of separate Departments, but I do not think, so far as my observation goes, that this produces any real dislocation at moments of action. As regards information, the Army and the Navy are in the closest touch. It is quite true that some of the flying stations near London are under the Army, and others under the Navy.

These stations are in the closest telephonic communication. Each knows exactly what is being done at the other stations. There is no difference of policy or principle, there is no division of authority. There is not, and I think there can hardly be, a collision between one and the other, and in these circumstances I greatly doubt whether any of the ills that my hon. friend seems to think follow the system are really to be found. Nor do I see how he would alter that system at present. These are flying stations where training goes on. I am very much dissatisfied with the division of stations, so far as the Navy is concerned, and I am very anxious to have a much larger training school and to unify the training as far as possible in one place. I believe it will be a great saving of



expenditure, and a great increase in efficiency. That would alter the system no doubt of these flying stations round London, but until the new system can be introduced, the flying stations are there, and they have to be used by the Army and the Navy respectively. If we are to hand over our flying stations to the Army without having any other stations, we cannot carry on our training. I will therefore say that this division is an almost inevitable element in the present system. I hope in some respects the system will improve, but I do not think all its improvements will produce a closer co-operation and a greater harmony than now exists between the Naval and the Army Flying Corps engaged in this particular work.

I will not enter upon the vexed question of whether aeroplanes are the best defence against Zeppelins or whether gunfire is the best defence. I believe the highest authorities on that again differ. It must be remembered that the experience not merely of the British Army or of the Navy but the experience of mankind generally is exceedingly limited upon this point, and it is quite natural that great authorities should have different opinions. But as far as we are concerned we desire to bring both to the highest degree of perfection. We are doing all we can to increase the gun defences of London, and we certainly desire to increase also the aeroplane defences of London. But let the House always remember that we have been brought up constantly by this deficiency of material and of trained men. No fairy waving a wand can put that right. It can only be put right by hard work in the Departments concerned, including, of course, the Munitions Department. That hard work is being undertaken to the best of our ability, and such deficiencies as exist I hope will be soon cured.

My hon. friend concluded with the aspiration, in which I heartily sympathised with him, that the time will come when this country will be able to take the offensive in aerial warfare. I think he rather underrated the difficulty of doing that with aeroplanes. The aeroplane at present has not got the range which would make it possible from these shores to do anything important against our enemy. The time may come when the power of the aeroplane will so increase its length of flight, the load it can carry, and its powers of offence that an aeroplane starting from the shores of Norfolk might become a menace and a terror on the banks of the Rhine. But that time is not yet, and there is no use our pretending that it is. The hon.

gentleman, I think, is under a misapprehension on one point. He seems to think that the raids lately came from Zeppelins housed and having their base in Belgium. That I believe is not the fact. They come from North Germany, and they come from a distance where at present effective attack on our part is not easy. He may rest assured that, easy or difficult, air attack is an operation of war constantly in our thoughts. We desire as ardently as he does that such an attack may take place. It will always be a matter of difficulty and peril.

My hon. friend in the earlier part of his speech dwelt upon the way in which Paris has been made secure by the very large number of 75 centimetre guns ranged around the city. As aeroplanes increase in power, guns increase in precision and increase in numbers and the skill of those who use the guns increases also, and I am not sure that it will ever be possible for one country to have such a fleet of aeroplanes as to allow it to attack successfully such a place as Essen. It might be so, and I live in hopes that it may be so. But if it is impossible to defend Essen I would suggest that it cannot be very easy to defend London. The area of London is 118 square miles. Essen is a great manufacturing centre, but it does not rise to that. If in the hon. gentleman's view it is possible for us to create aircraft to destroy Essen, it cannot be difficult for the Germans to create aircraft which will cause loss and suffering and destruction in London.

We need not look forward to developments which it is impossible to foresee with accuracy. Let us deal to the best of our ability with the problems of the moment. As to the character of those problems, I am in entire harmony with my hon. friend. I think that the duty of the Admiralty is to develop to the utmost the number of our aeroplanes, the power of our aeroplanes, and the number and the skill of the pilots who have control of them. I think it is the duty of the Admiralty to develop to the utmost the gun protection of London, whether at the coast or whether in London itself, or whether on board ship. These problems are obviously complex and not easy of solution, but they are constantly before the Board of Admiralty, and I hope the country may rest assured that whatever can be done by the Board of Admiralty will be done. I am quite certain the energies of that Board will not be wanting in doing all that may be required in the defences of his Majesty's Dominions.

## \* \* \* \* \*

### THE WORK OF THE R.F.C.

THE following interesting story of the work of the Royal Flying Corps written by Mr. Philip Gibbs, from the British General Headquarters, appeared in the *Daily Telegraph* of the 15th inst. :—

"Conditions of this war would be utterly altered if aerial reconnaissance were made impossible. The knowledge we have of our enemy's movements, and their knowledge of ours, would be restricted to an astonishing degree, and something like profound ignorance would reign on each side of the trenches. Our aviators are the eyes of the Army, and it is mainly due to their audacious vigilance that we are able to obtain quick information of the enemy's movements of troops from one part of the line to another, of gun positions, of trench geography, and of our artillery results. Unfortunately the enemy has the same service, carried out with not less valour, so that here, as in most aspects of this war, neither side can claim a supreme advantage.

"This at least can be fairly said. That unless we had had a number of efficient air-pilots at the outbreak of the war who were able to raise and train a large body of young enthusiasts with extraordinary rapidity during the war, the work of our armies in the field would have been sadly handicapped, and our gunners especially would have been like blind men fumbling in the dark compared with the present accuracy of their range-finding. Of the courage of these men of the Royal Flying Corps it is impossible to write too much praise. Scores of times I have seen them in flight above the German lines, with shrapnel bursting all round their planes, so that they seem to be sailing to certain death. They escape, by their own skill, or by just the fluke of luck, time after time, but it is not work which looks more dangerous than it is—a spectacular exhibition with little risk.

"The danger is constant and real, and these men know that every time they get into their saddles for a reconnaissance within range of the enemy's guns they are playing a game of hide-and-seek with death.

#### "German Losses.

"Take the German losses over a period of a few months, and the risks of the air service in war are apparent. The official returns for the air squadrons alone were in June of this year 53 killed, wounded, and missing, in July 43, in August 89, in September 79. I do not know our own figures—I believe they are as nothing compared with the enemy's losses. But the skill of our men in manoeuvring and the cool courage with which they engaged in aerial duels do not eliminate the hazards of their adventures. The number of

hairbreadth escapes, even in one month's work, would make a long and thrilling record.

"A typical episode happened on November 4th. A flight captain and a second lieutenant were engaged in artillery observation when they were attacked by a huge hostile pusher machine—that is, a machine with its engine and propeller behind the wings—closely followed by three tractors—or machines with forward engines and propellers. Our officers immediately opened fire upon them, using one drum containing the cartridges of the Lewis gun. The pusher was hit and flew off at once, followed by two others. The remaining one engaged our aeroplane, chased it in full flight, and then, while it was manoeuvring for position, dived underneath its wings and fired as it passed. The flight captain was wounded in the right arm and the petrol tank was pierced.

"Two other flight officers of ours on patrol duty saw the machine mentioned above closely pursued by a German monoplane, and they made a steep dive towards it like a swooping hawk. The Germans saw their danger, and making a swift turn flew straight beneath the wings of the British aeroplane, passing at about thirty yards below. Half a drum was fired at them, but they turned again and spiralled three times round our men, while both machines were dropping rapidly. Suddenly the Germans decided to make off, and flew away at a great pace, but they were followed at about eighty yards distance by our machine, which fired the remaining cartridges in the drum. Some of these shots were aimed true. The German monoplane turned right-handed and banked steeply, then toppled upside down, and plunged to earth just inside our lines. The pilot and observer were both killed.

#### "A Close Shave.

"On the same day, in a different neighbourhood, two of our flight lieutenants had a very close shave, and in spite of the great spaciousness of the sky, found themselves in a tight corner. They were making a reconnaissance as a matter of ordinary duty, when a German Albatross came out of the clouds and passed them at a range of 200 yards. They were on the *qui vive* for an attack from this particular bird, when suddenly they heard firing behind them. They turned sharply to the right and discovered another Albatross. At the same time, as if two were not enough, a hostile aeroplane bore down swiftly with a continual rattle of bullets from its machine gun. The two flight lieutenants got their Lewis to work and drove off the monoplane, but the Albatross manoeuvred round

and round in a most sinister fashion, and for nearly twenty minutes fired continually at our machine. Fortunately their shooting was not so good as the skill of the British officers in manoeuvring out of the range, and after this long duel the hostile aeroplanes swooped away, leaving the British machine alone, and untouched.

"Two sergeants in one of our flying squadrons had a perilous time when they were dropping hand grenades and flechettes (steel arrows) over a town occupied by the enemy. A German monoplane gave chase, and one of our men was hit in the hand and had his face grazed. When reaching out for his rifle he was wounded in the other hand. The pilot made a steep dive towards our lines, closely followed by the enemy, and at this critical moment he was hit by a bullet in the leg, and another shot put the engine out of action. For a moment or two the situation may have seemed hopeless, and death certain, but with steady nerves the pilot succeeded in landing within our lines, and a British biplane appeared in sight and drove off the enemy.

### "Skill and Daring.

"Out of all the experience of these air combats continual proofs of the stability and apparent safety of the new types of aeroplanes emerge in a most striking way. Often when I watch our military machines setting off from their grounds with the regularity and assurance of motor-cars from a garage, my thoughts go back to the days—only a few years ago—when the first feeble tentative flights were made, and when I saw so many brave pioneers of flight dashed to earth by a sudden slight gust.

"Even now they look such gossamer things up here above the battlefields of Flanders when the wind is moaning and beneath the smoke of artillery bombardments. Yet they make audacious swoops and dives and turns with bird-like grace and ease, and men 3,000 ft. from earth or more clamber upon those thin struts and canvas planes, in moments of peril, as though this insubstantial structure were a racing yacht and the air as buoyant as the wave.

"When, for instance, a corporal in one of our air squadrons was followed by two hostile aeroplanes he shifted his gun from its position in the front to the rear mounting, from which he could fire at his pursuers. This was done in full flight, and when the enemy's machines made a downward swoop upon our own aeroplane from the prodigious height of 1,000 ft. firing through our men's propellers. The handy alteration of the gun position secured a quick result. After firing half a drum of bullets the corporal saw the leading machine tail-glide for a fraction of a second and then plunge to earth in a vertical nose-dive. The pilot watched the machine go down in this way for several thousand feet, and then it fell among some trees, and a cloud of dust was evidence of its fate. The other machine gave up the fight and disappeared.

"One of the most remarkable and gallant examples of changing the weight and balance in a machine happened on October 26th. Two of our flight officers taking photographs over the enemy's ground were attacked by a Fokker at a height of about 7,000 feet. While getting his gun ready the observing officer was hit in

the left hand so that he could not use the weapon. The pilot kept manoeuvring to avoid the fire from the enemy's aircraft, but was hit in the arm and shoulder, and lost consciousness. Greater danger can hardly be imagined. High up, and without a guiding hand, the machine rocked and swayed about in a giddy spiral, which was the first sign to the observing officer that his companion was out of action.

"Seeing the pilot limp and senseless, the other officer climbed over between the two back struts and caught hold of the control lever. He moved this about, but nothing happened. He then tried to close the throttle. This did no good, the wire apparently having been broken. Finally he turned off the petrol, and, getting the machine under control, managed to land it behind the French reserve trenches. It was a rough landing, and the machine was flung over, so that the wounded pilot was thrown out. He lay there in a pool of blood until assistance was brought by the observing officer (who climbed out safely) from the French Red Cross. They were still under fire, however, and another observing officer who happened to be with his machine in the neighbourhood, managed to reach the scene and rescue the Lewis gun and instrument board.

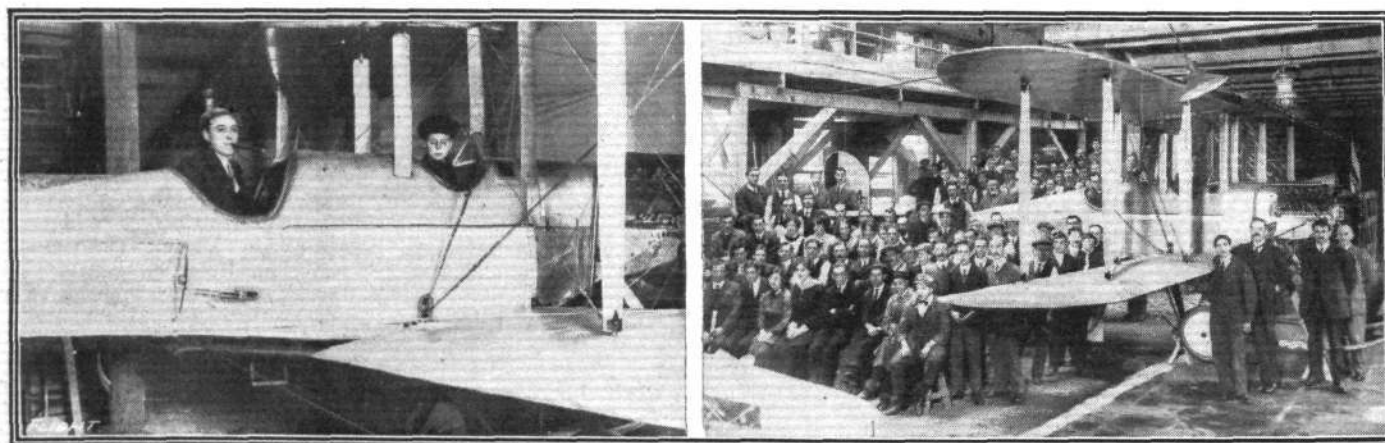
### "No Mercy.

"Although there is no mercy on either side during these acrid combats, the battle of the air is enlivened by some of those little touches of chivalry and gallant humour which belonged to old-fashioned warfare. Most of the German flight officers are young men of good social standing, all the observers having the rank of officer also. There is a great aeronautical school at Berlin through which many of them pass before qualifying for active service. The training consists of flying observation, use of machine-gun, bomb-dropping, photography, wireless telegraphy, and a special course of shooting in the air on hostile aircraft. All observers have to pass a standard test before being sent up on reconnaissance.

"Our men will often fight with two. More than that is too much, even for the most audacious, and certainly few men have had the luck of a certain young officer who on October 28th had a series of combats. Going out in a Morane "Parasol" on escort duty to a photographic reconnaissance, and flying at 10,000 ft., he saw an Aviatik 500 ft. below, and dived towards it as he fired his machine-gun. The German turned towards his own lines, but the Morane was then attacked in the rear by two more Aviatiks, which opened fire at 150 yards. Nothing daunted, our aviator fired at them both and made them beat a quick retreat.

"A fourth Aviatik now opened fire from above and swept past the Morane into its own lines with its propeller stopped. Even this was not the last of that hostile flight of birds, and when the officer was going back to the aerodrome he met still another Aviatik, which he chased for about fifteen minutes until it escaped over its own lines.

"All these adventures happened during the last few weeks. They belong to the daily routine of the Royal Flying Corps, which has done fifteen months of splendid service."



Mr. J. A. Whitehead has been "hustling" at his Richmond factory in connection with the Whitehead Aircraft Co. and the building of aeroplanes, a notice of the christening of the first offspring—"Helène"—being given in "FLIGHT" recently. Above are two postcards of a series which Mr. Whitehead is issuing. On the left is Mr. Whitehead himself in the machine with his little child, and on the right is a snap of the first machine in the factory, with some of the work-people who are associated with the Company.

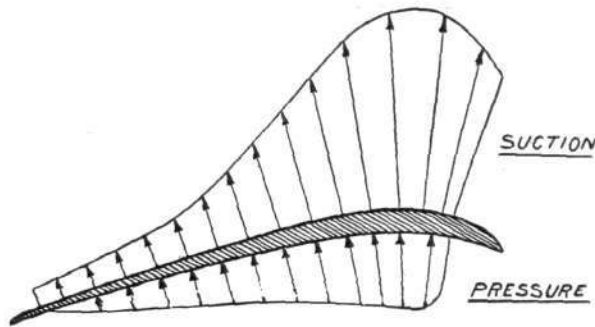
# THE "ARRIVAL" OF THE AEROPLANE.

By ALGERNON E. BERRIMAN, M.I.A.E., A.F.Aë.S., Chief Engineer of the Daimler Co., Coventry, England.

(Continued from page 884).

### The Virtue of a Cambered Wing.

Cambered wings are used instead of flat plates because they are more "efficient";\* that is to say, because the ratio of their lift to their resistance is higher than obtains for a flat plate. The reason



GRAPHIC ILLUSTRATION OF A TYPICAL DISTRIBUTION OF PRESSURE OVER A WING SECTION AT ABOUT SIX DEGREES ANGLE OF INCIDENCE

Fig. 4.—Diagrammatic illustration of the distribution of pressure along the chord of a wing. This distribution varies very much with the angle and the section of the wing. An important point illustrated above is the forward tilt of the suction vectors immediately above the front edge of the wing. These give rise to an up-wind component that materially reduces the resistance to flight, and makes the cambered wing section much more "efficient" than a flat plate.

for this virtue is to be found in the inequality of the pressure distribution, notably over the upper surface,† (See Fig. 4.)

A remarkable fact associated with this distribution is the high intensity of the negative pressure (suction) immediately over the front edge of the wing when it actually faces the wind, and should, therefore, apparently be subjected to a positive force of direct impact.

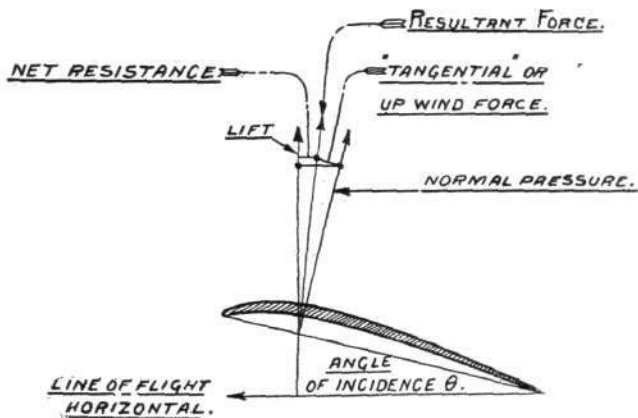


Fig. 5.—Vector diagram illustrating the effect of the up-wind component in reducing the resistance of a cambered wing section. A pressure  $P$ , normal to the chord, would give rise to a resistance  $P \sin \theta$ , but the existence of the up-wind tangential causes the resultant to be inclined forward from the normal, and so reduces the net resistance. This diagram should be compared with Fig. 4, as an alternative method of illustrating the same principle.

Owing, however, to the existence of what Lanchester describes as the "cyclic upcurrent,"‡ the relative wind always approaches the

\* It is difficult to find a better word than "efficiency," although its use is not justified technically.

† For charts of pressure distribution, see "Technical Report of the Advisory Committee for Aeronautics," Vol. 1911-12, p. 60; also Eiffel's "Resistance de l'Air." Particular attention is also directed to the conclusions in the "Technical Report," Vol. 1912-13, p. 101, where it is shown that a remarkable difference in efficiency obtains in the centre and at the tips of a wing.

‡ For an explanation of the nature of this phenomenon, see Lanchester's "Aerodynamics," section 110.

wing with an upward trend, so that the dipping front edge of the cambered section is actually on the lee side and receives the full benefit of a very intense suction that much exceeds the force exerted elsewhere.

The supreme significance of this phenomenon is at once apparent. Although in the lee of the local air flow, the dipping front edge of the wing still faces up wind, and any suction on it is bound to exert a propelling force in the direction of flight. Where the pressure distribution is uniform (as it becomes beyond the critical angle), this up-wind component, which Lilienthal called the "tangential,"§ would be neutralised by the downstream drag on the trailing portion of the wing; but at small angles of incidence the negative pressure predominates on the front edge, and the cambered wing is consequently remarkably meritorious. (See Fig. 5.)

Whether it be a flat plate or a cambered wing, however, it is always the upper surface that contributes the greater part of the lifting effort. In general, it may be said that wing sections, as used on aeroplanes of to-day, derive three-quarters of their lift from the suction on their upper surface. (See Fig. 6.) Arising out of this, it follows that alterations to the lower surface profiles are of relatively small importance; indeed, experiments have shown that the lower surface may be flat without serious detriment to the lift coefficient. There is a great practical advantage in this fact, inasmuch as it enables sufficiently deep spars to be incorporated in

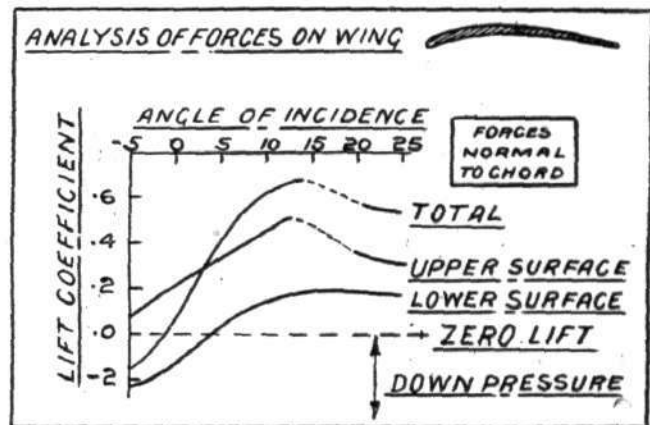


Fig. 6.—Diagram constituting an analysis of the forces on a wing in flight, showing the relationship of the suction on the upper surface and the pressure on the lower surface throughout a range of angles. It will be noticed that there is a down pressure (suction) on the lower surface at angles of incidence less than about  $+5^\circ$ , whereas the upper surface continues to lift when the angle of incidence is as much as  $-5^\circ$ , i.e., below the horizontal. These numerical values will vary widely according to the wing section. The graphs given above are taken from the Technical Report of the Advisory Committee, and relate only to one particular wing section.

the wing structure without destroying the aerodynamic virtues of the section

Just as in the case of the body, so in the case of the wing has an aeroplane designer every reason to study the results of experimental research. Either he must adhere closely to existing forms, or he must institute an elaborate system of experimental investigation in order to establish his data. Such research as is here implied is ordinarily beyond the means of a private firm, and the work of such laboratories as those of the N.P.L.¶ and Eiffel is therefore of invaluable service to general progress.

Having now scanned the chief features of aeroplane resistance, it may be of interest to give a few numerical values, in order to fix ideas, before passing on to an equally brief consideration of the question of stability.

§ See Lilienthal's chapter on "Artificial Flight," in Moedebeck's "Pocket Book of Aeronautics," p. 287

¶ The research of the N.P.L. on Aeronautics is published in the "Technical Report of the Advisory Committee for Aeronautics." The research of M. Eiffel's laboratories is published in Eiffel's "Resistance de l'Air." For the records of M. Riabouchinsky's research, see "Le Bulletin de l'Institut Aérodynamique de Koutchino," published by the Institution at Koutchino. The records of Prof. Prandtl's research at the Göttingen model-testing institution are generally published in the German periodical "Zeit für Flugtechnik und Motorluftschiffahrt."

Taking first the question of wing resistance, this is commonly in the order of 1 lb. for every 12 or 14 lbs. supported in flight; but, according to Lanchester,\* "if it is found practicable to employ a really high aspect ratio,† there is every reason to suppose that a resistance coefficient as low as 6 per cent., or even 5 per cent., may prove to be attainable." In his "James Forrest" Lecture to the Institution of Civil Engineers last year, Mr. Lanchester expresses the aggregate body resistance as an equivalent flat surface measuring, in the case of modern machines, about 5 sq. ft. in area. His remarks on the future are as follows:—

"If we take an aerofoil coefficient of 7 per cent., and a curve representing 3 square feet equivalent normal plane, we find that at 80 miles per hour the gliding angle, or the resistance coefficient, should be approximately 12 per cent., and at 60 miles per hour 10 per cent.; I believe this figure to be in sight, though it may not yet have been actually reached."

"If we try, in the light of present data, to look into the future, it seems probable that the limiting gliding angle, or, rather, the minimum total coefficient of resistance, may even be materially less than 1 in 10; thus, if it is found possible, in spite of structural difficulties, to obtain in an actual machine results equal to those obtained in wind-channel model tests, namely, a coefficient of resistance for the aerofoil approximating to 5 per cent., and if the body area equivalent, for a machine of 1,200 lbs. gross weight, can eventually be reduced to 2 square feet, a total coefficient of resistance as low as 8 per cent. may prove well within reach. Whether the sacrifice necessary in order to achieve such results in practice would be justified, the future alone can decide. The solution of an engineering problem is always to some degree a matter of compromise, and it would be rash to suggest that in the case of the flying-machine there are not considerations of sufficient importance to render it inadvisable to run after the last 1 per cent. reduction in tractive effort."

### The Power Required for Flight.

Taking the case of any particular aeroplane already constructed it is apparent that the nature of the resistances it encounters in flight renders it necessary to plot a graph in order fully to record the conditions. Thus, on the one hand, there will be the resistance of the wings, which will at first decrease with increasing speed as the attitude approaches the speed of least resistance, and afterwards will increase again. On the other hand, there will be the body resistance, which increases rapidly with the speed from first to last. These two resistances form separate and intersecting graphs on the resistance chart, and must be combined to form the total resistance. If the thrust available for the propeller is superimposed, a characteristic chart is thereby constructed, which forms a key to the anticipated speed and climbing qualities of the machine. Graphs of this character were introduced by the Royal Aircraft Factory to express the anticipated and actual results of their machines. (See Fig. 7.)

The two points of intersection between the propeller thrust and aeroplane resistance curves indicate the speed range, and the lower of these two limits is that in which the machine assumes the *cabré* attitude that has been described as so potentially dangerous. At any given speed on the chart the reserve thrust is indicated by that part of the ordinate, measured to scale, which is intercepted by the two curves.

The product of this thrust by the flight speed gives the reserve power available for acceleration. If the attitude of the machine is adjusted to a path of ascent, so that the flight speed through the air remains constant, this reserve power may be utilised for climbing, and the rate of vertical ascent can be estimated from the reserve power available and the total weight to be lifted.

From a mere consideration of two facts, viz., that a machine must be able to fly slowly (40 m.p.h. or thereabouts) in order to alight with safety on indifferent ground and when piloted with very moderate skill, and yet must be able to fly fast in order to make headway through a strong wind or to escape a superior force of its enemy in war, it is apparent that a wide speed range is of fundamental importance in any generally useful aeroplane. This, in turn, as can be seen from the characteristic chart of aeroplane resistance, calls for a reserve of power and accounts for the fact that the engines have steadily tended towards larger sizes, especially of late years.

If we take an imaginary case of an aeroplane weighing 1750 lbs.‡ experiencing a resistance of 1 in 7 at 60 m.p.h., the power necessarily expended on level flight is 40 h.p. If the power available at the propeller is 60 h.p., the reserve at 60 m.p.h. is 20 h.p. and the estimated rate of climbing is nearly 380 ft./min. In the military

\* See Lanchester on "The Flying Machine from an Engineering Point of View," Proceedings of the Institution of Civil Engineers, Vol. CXCVIII, 1913-14.

† Ratio of span to chord in a wing.

‡ The weights of aeroplanes in the Military Aeroplane Trials, 1912, varied from 1,481 lbs. to 2,680 lbs. with pilot and 4½ hours' fuel and oil.

aeroplane trials of 1912,§ the climbing rate ranged from 105 to 365 ft./min. The present climbing value of one of the British Government's aeroplanes|| is from 400 to 450 ft./min.¶

Prior to the war, one of the most used engines was the 80 h.p. Gnome, which develops 64 h.p. on the brake. It is now less widely used, owing to the growing demand for engines capable of giving at least 90 h.p. effectively and continuously. In the near future, engines of over 200 h.p. will undoubtedly be in use on the larger types of aircraft.

As most people are aware, the aeroplane motor, although similar to the motor-car engine in its fundamental principles, is, as a rule, of a very different description. In the early days it was not unknown for sportsmen to take engines out of their cars in order to equip their aeroplanes, but the engine in such cases continued to evince a distinct preference for the support of *terra firma*. Exigencies of weight forced designers of aeroplanes to seek lighter motors, and the

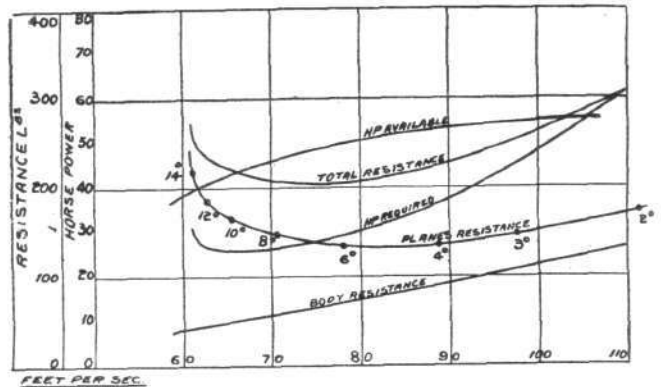


Fig. 7.—Chart serving as an analysis, or synthesis, of aeroplane resistances. The resistance of the body, which comprises also the struts, wires, landing carriage, &c., is shown by its graph to increase rapidly with the speed. The resistance of the wings is shown by its graph to decrease rapidly until an angle of about 5° is reached, beyond which point the resistance increases again as the angle becomes finer. The sum of the two resistances produces the total resistance curve, which is seen to have a minimum value at about 75 m.p.h. The product of the total resistance by the speed produces the graph of horse-power required. The graph of horse-power available at the propeller is superimposed on the chart from known data. The ordinates intercepted between the two horse-power curves, measured to scale, gives the reserve power available for acceleration or climbing. The above chart is for a particular aeroplane and is taken from the Technical Report of the Advisory Committee. The method, however, can be applied to all machines, and is regularly employed at the Royal Aircraft Factory. Particular attention is drawn to the obvious danger of forcing the machine to fly very slowly at very steep angles of incidence. The proximity of the two horse-power curves on the left of the diagram illustrates the absence of reserve power in case of emergency, and Figs. 2 and 6 show that the wing may suddenly pass the critical angle and so lose its lift in this region.

Wrights, it will be remembered, had to build their own engine for their very first machine. Many attempts to produce a satisfactory aeroplane engine was made in different quarters before the Gnome rotary motor was produced. The advent of this remarkable machine gave a great stimulus to practical flying, but its influence on competitive engine design seems rather to have damped than inspired progress. Being a type apart, and having a quality of lightness only readily to be attained by following the basic principles of its design, its success rapidly developed into a virtual monopoly that was somewhat deterrent to new enterprise. Neither its lack of economy in fuel and oil consumption nor its need for frequent attention have much militated against its utility under flying conditions as these have existed hitherto, but it is quite certain that aeroplane engines of the near future must attain in these respects more nearly to the standard of those employed on automobiles. Indeed, fuel and oil economy rapidly attain a greater importance than the actual weight of the engine when long duration flights are considered.

(To be continued.)

§ For an analysis of these trials see "Aviation," p. 272.

|| See "Technical Report of the Advisory Committee for Aeronautics," 1912-13, p. 248.

¶ One of the R.A.F. experimental machines climbed 900 feet in one minute (see "Technical Report," 1912-13, p. 265).

**AIRCRAFT AND THE WAR.**

A REUTER message from Rome on November 14th stated:—

"It is semi-officially announced that hostile aircraft have dropped bombs on the Piazza delle Erbe at Verona, which is nowhere near any military buildings of any kind and is always crowded with people.

"Thirty persons were killed, 29 seriously injured, and 19 slightly injured.

"The raid was made this morning by three Austrian airplanes, which dropped 15 bombs, practically all explosive, on various parts of the town, but it was the Piazza delle Erbe, the chief square of the town, where the market is held, which suffered most and where there were most victims. One bomb alone which fell here killed 19 persons. The damage to property is not important."

A message from its Belgian frontier correspondent published in the *Telegraaf* of the 18th stated:—

"During the bombardment a few days ago by Allied airmen of the

region of Lichtervelde, near Thorout, five bombs fell on a big motor-car shed, destroying ten automobiles and wounding thirty German soldiers. There must also have been some killed, but the number is kept secret."

A Central News message from the Hague on the 15th stated:—

"According to reports received from Frankfort, a Zeppelin airship has been wrecked near Grodno. Flying over Russian positions, the airship was damaged by well-aimed artillery fire. The dirigible then returned over the German positions, where near Grodno an emergency landing had to be effected. During the landing the Zeppelin took fire, and the greater part of it was destroyed. The crew were saved by soldiers."

A Reuter message from Paris on November 15th stated:—

"A German aeroplane to-day dropped several bombs on a suburb of Dunkirk. There were some civilian victims."



**ARMoured CAR SQUADRONS AND MR. CHURCHILL.**

A TRIBUTE to Mr. Winston Churchill's work in the organising of the Armoured Car Squadrons, originally formed in connection with the R.N.A.S., was paid at the House of Commons on Tuesday, when he was presented by officers of the squadrons with his portrait painted by Mr. John Lavery. Among those present at the ceremony, which was quite informal, were Mrs. Churchill, Mr. J. King, M.P., Mr. J. Lynch, M.P., Mr. O'Malley, M.P., Lieut.-Commander Wedgwood, M.P., D.S.O., Commander Locker-Lampson, M.P., Commander Perrin, Commander Bell, Commander Cooper, Commander Gregory, Lieut.-Commander Whittall, Lieut. Hanna, Lieut. Ingle, Lieut. Demuth, Lieut. Woodward, and Assistant Paymaster Sykes.

In making the presentation Lieut.-Commander Wedgwood said they were there as officers of a force which Mr. Churchill established and which had proved invaluable. Early in September, 1914, Mr. Churchill, having set the Royal Naval Air Service on its legs, determined to establish a land force to work in co-operation with it and to assist, according to the intention then held, in keeping the remains of Belgium clear of the German hordes. By October, so great was the speed and energy which he put into the work, the armoured cars were in the field. They were in Lille, Tournai, Douai, Antwerp, and along the Scheldt—in short, wherever there was fighting. Since then they had been used in South Africa, East Africa, West Africa, Gallipoli, and France. In Gallipoli the guns were also used separately and were still being used in the trenches. In France, under the Duke of Westminster, they were

of great service in the battles of Neuve Chapelle and May 9th; on one occasion they filled a gap in the lines and saved a regiment of cavalry which had been left "in the air." Commander Oliver Locker-Lampson had a contingent now working with the Belgian Army.

Commander Locker-Lampson, M.P., thought the D.S.O. conferred on Lieut.-Commander Wedgwood was evidence of the value of armoured cars in the part of the world where he worked.

In accepting the gift, Mr. Churchill said he felt that the armoured-car service had justified its creation. The course of the war in the West had not been of a character to give proper scope to engines of this character. They were devised at a time when the right flank of the German advance was open and exposed to attacks from the sea coast, and to work in conjunction with the aeroplane squadron, which the Admiralty was asked in the beginning of the war to maintain in France and Flanders. Where conditions of manoeuvre prevailed and armies are moving swiftly to and fro the power of the armoured car and its value would be inestimable.

In spite of the conditions which had ruled, the cars had made themselves extremely useful and valuable, and they had played their part. If ever the line should break, either in a favourable or an unfavourable direction to us, the value of the armoured cars would be appreciated even more widely than at present. He added that he would value the portrait for its own sake as an excellent work of art, and because it had been presented to him quite unexpectedly by those who belong to the service which he had the honour to raise.



"Life is a mirror—smile at it and it will smile back; frown at it and it will frown again."

From *Punch's Almanack*, 1916.

INTELLIGENT FEMALE (watching the sausage observation balloon practice, to Observation Balloon Officer): "I wonder you don't have a ladder, or a fire escape, or something of that sort, instead of just that rope to climb up and down."

HOUSEHOLDER (somewhat startled by descent of Service balloon, with disastrous effects upon his precious pergola): "So this is what you Navy aircraft gentlemen do for a living!"

FOREMAN PRINTER (to Sub-Editor): "We can't do with any more air-raid copy, mister. We've used up every 'Z' in the place!"

TODDLING BOY (to Nurse with baby in perambulator, all gazing heavenwards): "What a lucky beggar baby is, Nurse! Never has to strain his neck looking for Zeppelins!"

Zeppelism.

"I MUST have been in bed an hour when I was awakened by an awful crash," wrote the wife of a "Tommy" at the Front—the letter being quoted in the *Daily Dispatch*. "I knew it was them Zepps. There was another terrible bang. I took my clothes off the chair, shoved them on a hook, gripped baby, and ran downstairs to the cellar. Dear —, you must not blame me.

"It was horrible. I wondered why baby didn't cry. I looked at the dear. Dear —, it was a good job he had a strong nightie on, I know you'll forgive me. If you only knew what I went through. I had hung baby upside down on the wall by the hem of his nightie, and was nursing the big pillow with lace frills. The poor kid. . . ."

Aerodrome Proverbs.

It's the last bump that breaks the chassis strut.

A switch off in time saves nine days in the repair shop.

