

BULLETINS

OF THE

Aerial Experiment Association

Bulletin No. **XXX**

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MR. McCURDY'S COPY.

BEINN BHREAGH, NEAR BADDECK, NOVA SCOTIA

BULLETIN STAFF.

ALEXANDER GRAHAM BELL.....Editor
GARDINER H. BELL.....Assistant Editor
CHARLES R. COX.....Typewriter
MABEL B. McCURDY.....Stenographer

Bulletin of the Aerial Experiment Association.

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BULLETIN NO. XXX ISSUED MONDAY 27th, I. 1909.

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Belton Bursnath, Rear Baddock, Nora Scottie.

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McCurdy's Water-Spout.

Jan. 27, 1909:-Attention is called to the interesting water-spout phenomenon described in this Bulletin by Mr. McCurdy. It demonstrates the presence of a partial vacuum underneath a rotating propeller. It suggests the feasibility of increasing the lift of a flying machine by placing a surface impermeable to air below our propeller at places where it is known that a partial vacuum exists.

This recalls to my mind experiments made in Beinn Bhreagh Laboratory some years ago in testing the lift of aeroplanes set at different angles upon a whirling-frame. The whirling-frame was suspended from one arm of a beam and balanced by weights carried by a scale pan on the other arm. The rotation of the whirling-frame was caused by small electric fan-propellers which were set upon the whirling-frame, the electric current being led to them from a dynamo through a frictional contact at the rotary point of suspension.

When the whirling-frame, fitted with aeroplanes, tilted up at a specific angle, was caused to rotate by the action of the fan-propellers, it went up and weights had to be removed from the scale pan at the other end of the beam in order to restore the balance. The amount of weight thus removed was taken as a measure of the lift of the aeroplanes when traveling through the air at the observed speed. Hundreds and even thousands of experiments were made with this whirling-frame and the results are preserved among the Laboratory records. Though made many years ago they have never been published and I think it would be of value to the members

of the A.E.A. to have some detailed account of them in the Bulletins. The records are so voluminous, however, that it will take considerable time to prepare a resume of them for the Association.

In making these experiments it was important that no part of the lift accredited to the aeroplanes should have been caused by the propellers themselves, for if the propellers were not arranged to push horizontally their thrust would yield a lift plus if pushing upwards, minus if pushing downwards. It was therefore my custom, before attaching the aeroplanes to the whirling-frame, to start the motors so as to be sure that the operation of the motors themselves did not disturb the balance when the frame rotated without aeroplanes.

I then made the discovery that, when the motors were pushing perfectly horizontally, the presence of a horizontal strip of tin underneath the propeller produced a lift.

I attributed this, at the time, to the action of the propeller in shovelling off the air from the upper side of the tin surface, leaving atmospheric pressure practically undisturbed below.

I found the lifting effect much improved by bending the strip of tin into a semi-circle surrounding the lower half of the propeller.

I made many experiments to ascertain the most efficient form of surface to be placed beneath the propeller; and these resulted in a model which has been preserved in the Laboratory Museum, and which should be hunted up.

The records of the experiments also should be examined to ascertain the quantitative effects produced.

The propellers employed were the ordinary brass fans used for cooling rooms. It is obvious that with such propellers as we use in our aerodrome experiments very much more powerful effects should be produced. McCurdy's observation that the water under the propeller of the "Loon" rose to a height of from 12 to 18 inches above the general surface, when the edge of the propeller was at a distance of 3 feet from the water level, indicates a very powerful action.

Suppose the vacuum caused by the rotation of the propeller to be sufficient to sustain a column of water one foot high, this would indicate that a surface impermeable to air, placed two or three feet below the lowest edge of the propeller, would experience an unbalanced upward pressure of about $1/2$ lb. per square inch, or 72 lbs. per square foot.

This is a very considerable pressure; and if it could be utilized in the support of the machine, it would save an enormous extent of supporting surface.

A strip of metal or wood, bent into an arc of a circle, and fitted underneath the propeller, would not only serve as a guard to the propeller, but would probably yield a very considerable lift.

Suppose its surface to be resolved into an equivalent horizontal surface equal to 6 square feet (6ft. long 1 ft. wide) this would yield a lift of 432 lbs. upon the assumption of $1/2$ lb. per square inch.

I would suggest looking into this matter experimentally; for, should it turn out to be the case that we are neglecting to utilize a considerable lift by not placing a surface underneath our propeller, a new and useful invention will result of a distinctly patentable kind, that would necessarily be employed in every future flying-machine having a rotatory propeller. A.G.B.

ARRIVAL OF THE "SILVER-DART".

Jan. 28, 1909:- Seven cases containing portions of the "Silver-Dart" are now at Beinn Bhreagh Laboratory; and two other cases have arrived at Iona where they are held awaiting the settlement of a charge for \$425.00 for the special car in which they came. See report relating to the shipment of the "Silver-Dart" in this Bulletin by the Secretary. The engine for the "Silver-Dart" is now on its way from Hammondsport but has not reached here yet. A.G.B.

SELFRIDGE.

Jan. 28, 1909:- The committee of the Aero Club of America having in charge the erection of a monument to Selfridge, finding that a monument would not be permitted at the spot where the disaster happened as it would interfere with the movements of the troops on the parade ground, have been corresponding with Mr. E.A. Selfridge concerning the erection of a monument at the grave.

Mr. Selfridge desires that the monument there should be erected exclusively by the family; but suggests that a bronze tablet might be placed by the Aero Club on the monument he is erecting. It is probable that this proposition will be acted upon favorably by the Committee.

Mr. Chanute has returned the manuscript of Lieut. Selfridge's paper concerning Progress in the Art of Aviation which forms the subject of our Bulletin No. II. He expresses high appreciation of the paper. He thinks it well worthy of

publication; and believes that it will reflect honor upon Lieut. Selfridge. He very kindly offers to aid us in obtaining photographs to illustrate the proposed memorial volume to Selfridge.

The Secretary has received biographical notes concerning Lieut. Selfridge from his father Mr. H.A. Selfridge; and Maj. Squier has promised biographical material relating to Selfridge's life in the Army. The Secretary will now get the work ready for publication. A.G.B.

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Medals for the Wright Bros.

Jan. 28, 1909:--When the Wright Bros. return from Europe they will find America prepared to do them honor for the great work they have accomplished in promoting the art of Aviation.

The medal of the Aero Club of America will be presented to them by the President of the United States.

The Smithsonian Institution will award them a medal.

Senator Foraker has introduced a resolution in Congress authorizing the Secretary of War to give gold medals to each of the Wrights. The resolution has been adopted by the Senate of the United States without debate; and the newspapers have announced that

*Gold medals are to be awarded to Orville and Wilbur Wright by Congress in recognition of their services in the advancement of aerial navigation, if the House of Representatives approves a resolution by the Senate to-day, (Jan. 25). A.G.B.

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Curtiss to McCurdy.

To J.A.D. McCurdy,
Badeck, N.S.

Hammondsport, N.Y., Jan. 7, 1909:- The machine got held up in Bath by being too big for the express car. It was forwarded on to Niagara Falls by freight, and will go from there by express if it will go in the car, otherwise, freight. We are getting ready to work out the 8 cylinder and will give it a brake test before shipping.

Since you left I had a wire from Mr. Bell to come at once, but we must have our Directors' meeting so as to make a report to the State before the 15th and, therefore, would have to be back by the 14th, and wired that I could come if necessary but would have to come back by that time. Since reading the last Bulletin, I am sure it would be wise to make a brake test of the engine before shipping it.

(Signed) G.H. Curtiss.

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Curtis to Bell.

To A.G. Bell,
Baddeck, N.S.

Hammondsport, N.Y., Jan. 15, 1909:— I have your message and have wired as follows:

"Message received. Am securing transmission and getting engine ready to come without delay".

I have a letter from McCurdy, probably written before he received mine, also a message from Baldwin about the transmission for No. 5. I am getting everything ready to forward by express, and I shall come as soon as the engine is tested. We have put new jackets on to replace the ones which had burst in freezing, also made new connections for the water pipes to avoid further trouble. The brake test will be made in a day or two, and I shall then be free to come to Baddeck, the engine following at once by express.

I appreciate the importance of the patent matters, but I am sure it is also important to get the power plant of tetrahedral aerodrome No. 5 ready to ship so that there will not be any delay when we are ready to take her out on the ice.

Our stockholders' meeting was postponed until tomorrow (Saturday) when we shall elect directors to fill the vacancies, and this matter will be off our hands.

I enclose a picture of a four belt transmission from France which has a striking resemblance to ours.

We are building the sprockets and chains to be used on the No. 5.

(Signed) G.H. Curtis.

Curtiss to McCurdy.

To J. A. D. McCurdy,
Baddeck, N.S.

Hammondsport, N.Y., Jan. 15, 1909:- I was more than pleased to get your letter of the 11th. It is the first word I have had, except Baldwin's message, in regard to what is wanted and to use Mr. Bell's expression, "I was powerless to act" in making the transmission. Baldwin's message calls for:

20 ft. of countershaft, hollow preferred.
1 doz. roller bearings.
1/2 doz. thrust bearings.

I think we had better ship a length of 1 3/8-11 galvanized tubing with some Hess-Brights to fit. These are combined radial and thrust bearings. The largest bearing we make is for 1 inch shaft only.***

In regard to the transmission will say that the chain we ordered has come; it weighs 1 1/2 lbs. to the foot. It will make a very heavy transmission, but it will hold.

I just mailed a picture of a four belt transmission from abroad. It is near enough like ours to be a twin. We have put new jackets on the engine with a new style coupling, and are working night and day to get it ready to test and ship. We have also fitted a flange on both ends of the shaft ^{is} as per Baldwin's message; I don't know what this for, however.

(Signed) G. H. Curtiss.

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Curtiss to Bell.

To A.S. Bell,
Haddock, N.S.

Hammondsport, N.Y., Jan. 18, 1909:- Our long delayed stockholders' meeting has been held and all matters demanding attention settled. The big eight cylinder is being set up to test. As I wrote you, we fitted new jackets in place of the ones which had burst by freezing. On the new ones we have made an improved fitting for the water-connection which took a little time; we also had some delay caused by a bad casting for the pony brake outfit which is being made water-cooled to withstand the heat of long continued tests.

In regard to the test, I am pleased to report that our Mr. Pfitzner has secured from Germany a manograph which will be used on the motor to determine the mean effective pressure and action with and without the ports, and various other data of value in construction of engines for flying-machines. I am told there are but two or three instruments of this kind in America. The records are made by the use of a sensitive film and a reflected light. Charts will be sent with our report.

We have made every arrangement to leave as soon as we are through trying the engine, leaving that to come on by express. Mrs. Curtiss will come with me for a short stay.

Just had a letter from Baldwin in regard to shafting, transmission etc. I think we will have accumulated everything needed for this work by the time the engine arrives. I expect we will be on the road by the time this letter reaches you. We are thinking of going via Montreal. (Signed) G.H. Curtiss

BRINN HUBBARD EXPERIMENTS: Reported by the Editor.**Preliminary Experiments relating to the apparatus to test the lift and drift of Drome No. 5 on the ice.**

Jan. 6, 1909:- Experiments were made to-day in a very high wind with a quarter sized model of Drome No. 5 to test whether a kite could be flown by two or more very short cords only about one or two meters long as proposed for measuring lift and drift and angle of incidence on the ice. The experiments were made in the kite field. Wind-velocity:- minimum over 26, maximum over 28 miles per hour.

The kite flew very well by short lines and even when held by hand without any lines at all. When held by hand and the angle of incidence gradually changed gradations of lift were perfectly manifest to the sense of touch.

As a general result we came to the conclusion that it is practicable to obtain measurements of lift and drift and angle of incidence upon the ice with the kite attached to a moveable cradle something like the arms of the "Ugly Duckling" without flying the kite at all, so that there would be no danger to the kite of thrashing about in the wind. It can be attached firmly to the moveable cradle, and the pull in various directions measured by spring balances. A.G.B.

BRIEN HERRACH EXPERIMENTS: Reported by the Editor.

Drome No. 6

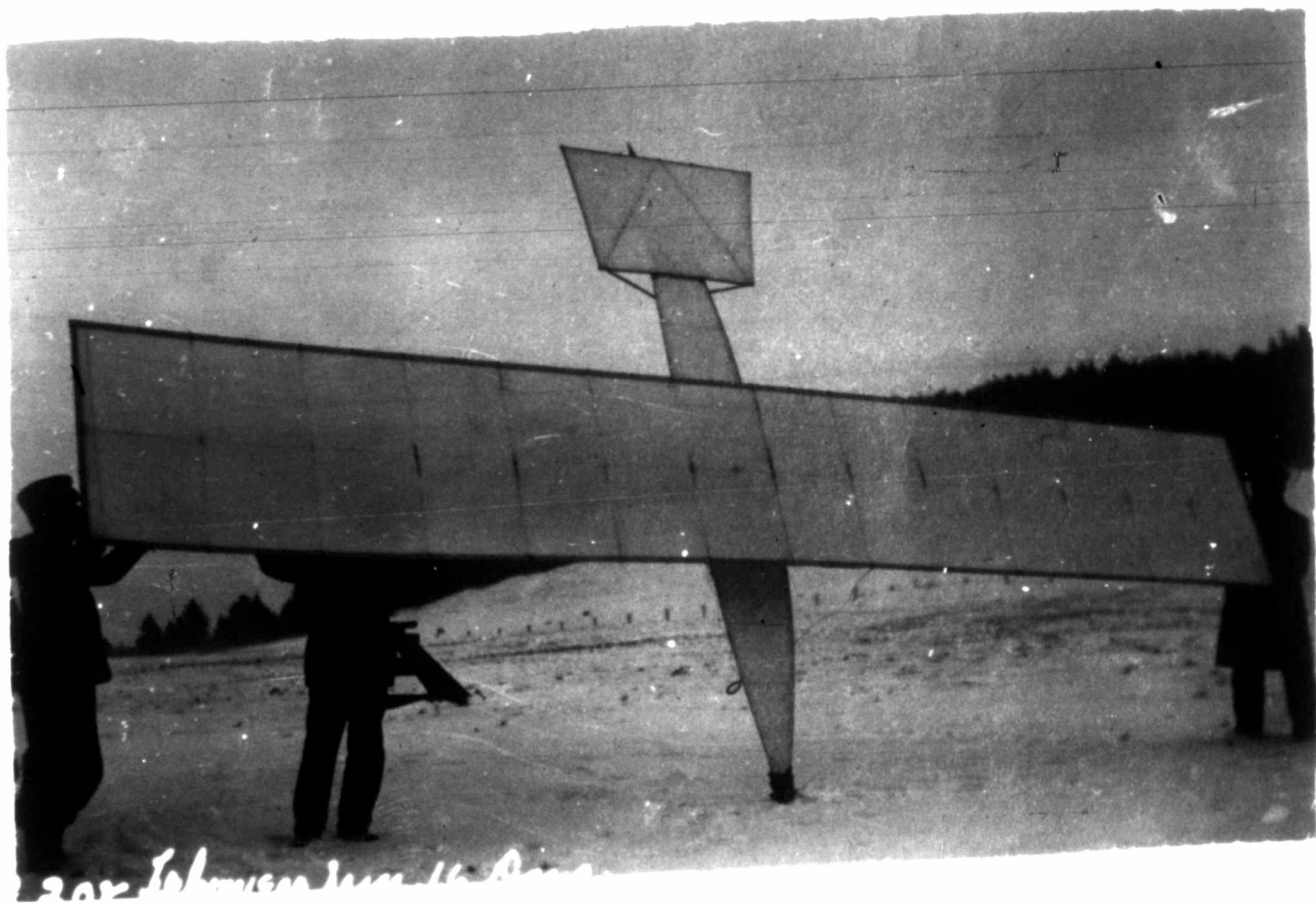
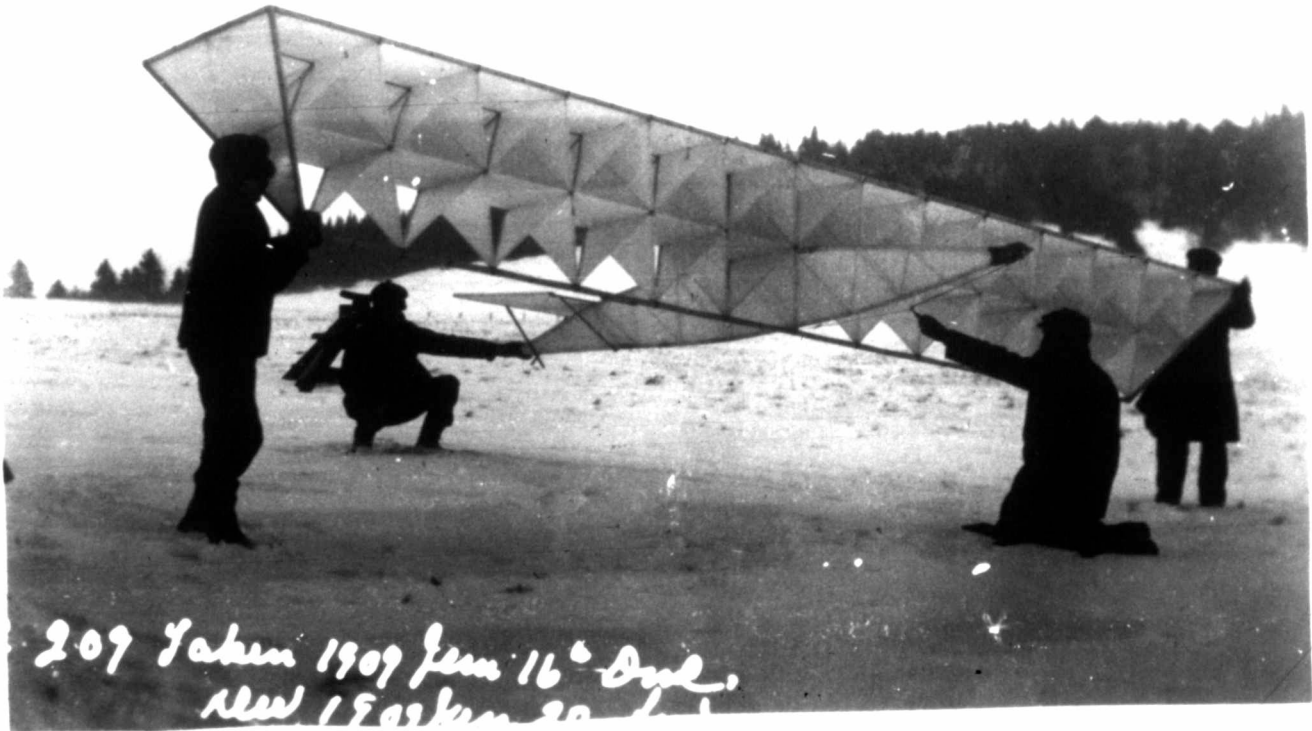
Jan. 16, 1909:- A copy of the Oionos Kite shown in Bulletin XX, pp. 33-34 has been made crudely of sticks or slats having a cross-section of about 10 mm by 5 mm tacked together at the junctions and tied. No special care had been taken, as in the case of kite shown in Bulletin XX p. 33 to reduce the head resistance excepting that the sticks were enclosed in the cloth covering, which was composed of ordinary cotton sheeting. The kite was tried this afternoon and a series of observations were made to determine the lift, drift and efficiency.

Dimensions:- Length from fore to aft 1 meter (top plane); width from side to side 7 meters (top plane); depth (oblique) 1 meter.

Body 415 cm long. Triangular in cross-section; oblique section at the middle point forms an equilateral triangle of 50 cm side body tapers to a point at either end. The body was pushed through the lower center cell of the kite as far as it would go and then fastened in place. It projected further behind than in front. The length from the middle of the kite to the extreme rear was 252 cm and the head was 163 cm in front of the middle of the kite.

Upon the body at the rear was fitted a flat tail inclined upwards at the rear so as to make an angle of 10° with the horizontal planes of the kite. The front edge of this tail was 147 cm behind the center of the kite. The rear edge of the tail was wider than the front edge; front 102 cm; rear 126 cm; oblique side edges 76.5 cm; distance from front to rear of tail measured along a line vertical to both edges was 75 cm.

As body protruded further at the rear than at the front and carried a tail, a weight of lead was attached to the bow to restore the balance of the kite and to make it slightly head-heavy.



Weight:- The head load of lead weighed 1986 gms. The total weight of kite (including lead) was 37 lbs, or 16798 gms.

Surface:- The horizontal surfaces amounted to 10.2500 sq. m, and the oblique surfaces to 11.9075 sq. m.

This refers to the wing piece alone and does not include the surface of the tail or body. The surface of the tail may be ignored as not constituting any portion of the supporting surface of the kite; for, on account of its being inclined upwards at the rear, the air-pressure was always upon its upper surface.

We should however include in the supporting surface the V shaped bottom of the body. This is estimated at about 2 sq. m oblique.

It is difficult to estimate the total amount of surface as some of the surfaces were horizontal and others oblique, and it becomes necessary to reduce all to their horizontal equivalents or all to their oblique equivalents so as to get the total in one or the other kind of surface.

In making the calculation I have estimated the area of the horizontal projection of the oblique surfaces and taken this as the horizontal equivalent of the oblique surfaces.

In a similar manner I have considered the horizontal surfaces as the horizontal projection of a certain amount of oblique surface and considered this as the oblique equivalent of the horizontal surface. The following forms the basis of the calculation.

1 sq. m oblique = .5774 sq. m hor.
 1 sq. m horizontal = 1.7320 sq. m obl.

With this as a basis I find the total surface as in the following table:-

	Horizontal sq. m	Oblique sq. m
Horizontal surfaces.....	10.2500 actual	17.7530 estimated
Oblique surfaces.....	6.8750 estimated	11.9075 actual
Bottom of Body.....	1.1548 estimated	2.0000 actual
Total supporting surface.....	18.2798 esti.	31.6605 esti.

Flying weight:- Weight 16798 gms. Surface 31.6605 sq. m oblique. Ratio 530 gms. per sq. m oblique. Weight 16798 gms. Surface 18.2798 sq. m horizontal. Ratio 918 gms. per sq. m horizontal.

There was quite a heavy wind this morning (Jan. 16) from the northeast; in fact a storm wind which died down considerably in the afternoon when the experiments were made. The Oienes Kite was flown by means of a quarter inch Manila rope 100 m long weighing 10 lbs, attached at a point 86 cm in front of the center of the kite. Five series of observations of wind velocity, altitude, and pull were then made with the following results:-

Exp. 1. Wind 11.25 mph.

	Alt.	Pull
	40	20
	38	10
	33	25
	32	30
	30	40
	31	10
	31	20
	33	70
	41	10
	36	20
10 Obs.	<u>345</u>	<u>255</u>
Aver.	34°.5	25.5 lbs

Exp. 2 Wind 12.40 mph.

	Alt.	Pull
	32	10
	35	40
	35	20
	32	30
	38	50
	29	40
	30	35
	30	50
	30	40
	28	20
10 Obs.	<u>319</u>	<u>335</u>
Aver.	31°.9	33.5 lbs.

Exp. 3 Wind 11.20 mph.

	Alt.	Pull
	27	30
	26	10
	25	30
	17	20
	35	30
	40	50
	33	55
	30	30
	30	30
	30	30
	30	35
10 Obs	<u>293</u>	<u>320</u>
Aver.	29°.3	32.0

Exp. 4 Wind 10.50 mph.

	Alt.	PULL
	28	10
	24	23
	28	20
	27	10
	20	5
	20	10
	21	10
	20	5
	20	20
	22	10
10 Obs.	<u>230</u>	<u>123</u>
ver.	23°.0	12.3 lbs.
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Exp. 5 Wind 9.08 mph.

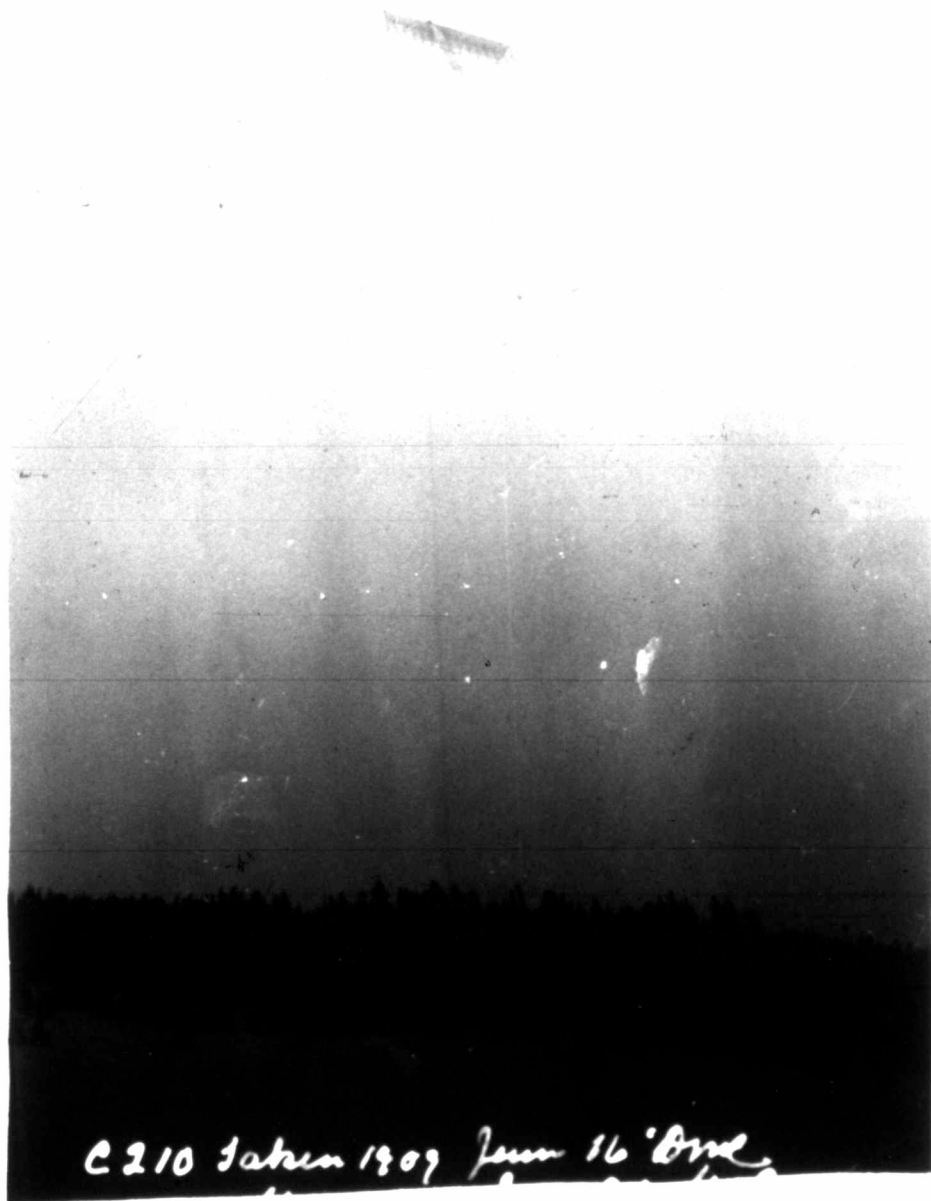
	Alt	Pull
	21	20
	25	30
	26	30
	26	20
	27	20
	26	20
	26	20
	27	15
	25	10
	22	10
10 Obs	<u>251</u>	<u>195</u>
Aver	25°.1	19.5 lbs.

Summary

	Obs	Alt	Pull	Obs	Wind
Exp. 1	10	345	255	1	11.25
Exp. 2	10	319	335	1	12.40
Exp. 3	10	293	320	1	11.20
Exp. 4	10	230	123	1	10.50
Exp. 5	10	251	195	1	9.08
	<u>50</u>	<u>1438</u>	<u>1228</u>	<u>5</u>	<u>54.43</u>
Aver		28°.76	24.56 lbs		10.886 mph

Remarks:- The kite flew very steadily in spite of considerable fluctuations in the force of the wind as indicated by the fluctuations in the pull. During experiment 4 when the wind diminished the kite began to turn on one side coming slowly down but recovered itself. On one occasion the wing piece seemed to actually touch the ground at one end, the other end being almost vertically in the air. The kite recovered itself however without any damage and the five series of observations were successfully concluded.

Efficiency:- The average angle of altitude was 28°.76 which I have taken as 28° 45'. The following are the sine and cosine of this angle:-



C 210 taken 1909 Jan 16 '09

$$\begin{aligned}\sin &= .48099 \text{ say } .481 \\ \cos &= .87673 \text{ say } .877\end{aligned}$$

The average pull was 24.6 lbs at the above angle from which I calculate,

$$\begin{aligned}\text{Vert. pull} &= 11.8326 \text{ lbs, say } 11.8 \text{ lbs.} \\ \text{Hor. pull} &= 21.5742 \text{ lbs, say } 21.6 \text{ lbs.}\end{aligned}$$

The lift is equivalent to the load sustained in the air plus the vertical pull. The drift is equivalent to the horizontal pull.

Lift.Drift

Weight of kite 37 lbs	
Weight of rope 10 lbs	Horizontal pull 21.6 lbs
Vertical pull 11.8 lbs	

$$\text{Efficiency} = \frac{\text{lift}}{\text{drift}} = \frac{58.8}{21.6} = 2.7$$

At the conclusion of Exp. 5 the kite was taken down and the flying-line attached to a point 50 cm in advance of the center of the kite. The following experiment was then made:-

Exp. 6 Wind 9.00 mph.

Alt	Pull
36°	70 lbs
45°	50 lbs
60°+	10 lbs
60°+	30 lbs

Remarks:- After the last observation noted the front part of the kite caved in while flying and the kite gradually turned over sideways and landed upside down. This was due to the way in which the flying-line had been attached. It was not fastened around the body but to a cord running from the middle of the kite at the bottom to the nose and supported where the strain came by guy wires to the front

edge of the top aeroplane. This brought the cell sticks of the front of the kite under compressional strain and these not being reinforced by beading gave way. The kite at the time was flying at a great altitude quite above the limit of measurement of the inclinometer employed which could not register a greater angle than 60° . A.G.B.

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WATER-SPOUT CAUSED BY ROTATING PROPELLER:**By J.A.D. McCurdy.**

Jan. 16, 1909:- During one of the experiments with the "Loon" at Hammondsport a curious phenomenon manifested itself while tuning up the engine at the head of Lake Keuka. The "Loon" had been placed in the water between the deck and held there by four men while the propeller was rotated rapidly by the engine; the idea being to have the engine in the best possible running order before letting the "Loon" go. No sooner had the propeller begun to rotate when it was noticed by those present including Mr. Curtiss and myself that a small water-spout was formed substantially directly under the plane of rotation of the propeller. It may have been a little bit behind this plane and my impression is that such was the case, although I could not say so definitely. This water-spout in the shape of a pyramid rose to a height varying between 10 and 18 inches, rising and falling between these limits according as the speed of the engine was accelerated or retarded. J.A.D. McC.

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PROPOSED ICE-BOAT FOR MEASURING EFFICIENCIES OF PROPELLERS: By J.A.D. McCurdy.

Jan. 16, 1909:- There have been many experiments made to test the efficiencies of propellers by those interested in the subject, but in almost all cases these tests have been performed under conditions which differ from those in the case of the flying-machine, or in other words when the propeller is free to advance along the line of its thrust. Maxim performed a series of tests with propellers moving along the line of their thrust by their reaction on the air taking advantage of his small railway over which his flying-machine was run in its preliminary trials. He announced to the world that the push of his propeller was substantially the same when advancing as when restricted to rotate in its original plane. These results however are not accepted absolutely by the Aeronautical world. It took us about two weeks to arrive, in an experimental way, at the proper design of propellers to be used on the "June Bug" and we also spent considerable time in trying to arrive at the proper form of propeller to be used in the "Silver-Dart", a machine of greater flying weight and with a more powerful engine.

If we determine the value of the two elements necessary for a propeller to drive a certain machine namely, push and theoretical pitch speed, we would know at once the diameter of propeller required and the pitch angle and the combination of these elements would determine for us the most economical H.P. with which to drive this propeller, hence we would immediately know the engine required.

It seems as though a very good way to obtain these data would be to mount engine and propeller on an ice-boat. The counter-shaft for propeller could be arranged to come in contact with a spiral spring so that the thrust of the propeller would compress the spring and being proportional to the amount of compression the thrust for different speeds of rotation or for different diameters of propellers could be readily observed by a pointer so arranged as to read directly in pounds on a graduated scale.

A propeller test would be gone through in this manner. The engine having already been subjected to a brake test, the horse-power of the engine would be determined absolutely for speeds of rotation varying by 50 revolutions from say 400 to 1200 revolutions per minute. The ice-boat first being held so as not to be allowed to advance, the propeller would be revolved at say the lowest number of revolutions consistent with the brake horse-power readings of the engine. In such a case we would have a hundred per cent slip. The thrust would be read directly off the graduated scale and the revolutions being known we would know the following:- Mass of air displaced by propeller and the velocity with which the unit mass (amount displaced at each rotation) would be displaced, or in other words the MV of air displaced by the propeller. We would also know the horse-power of engine necessary to produce this MV of the air. Readings would be taken varying the speed by 50 rotations. The ice-boat would now be let go and in virtue of the push of propeller would advance over the ice along the line of

thrust of propeller. As before the rotations of the propeller would be taken and the push observed for these rotations and the speed of advance of the ice-boat relatively to the air determined. In this case we would have conditions similar to those of a flying-machine. From these data we can determine exactly what our propeller can be relied upon to do in a flying-machine. It is a question whether the push will be the same, greater or less as recorded in the case with similar speed of rotation when the ice-boat was prevented from advancing. We can use here propellers in which the variable points are diameter and pitch and the best combination of these two elements consistent with the horsepower they would require can be determined to suit the case of a flying-machine of certain mass and head resistance to be driven at a certain speed.

It seems as though such a series of experiments would be invaluable to those interested in Aeronautical work and would save considerable work and expense in that the cut and try method would be almost eliminated.

J.A.D. McC.

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REPORT CONCERNING SHIPMENT OF THE "SILVER-DART": By J. A.D. McCurdy, Secretary of the A.E.A.

Beinn Bhreagh, Jan. 28, 1909:— On Jan. 15, 1909 the following bill was received from A.S. MacDonald, Secretary of the Victoria Steamship Co. Ltd.

Baddeck, C.B.,
Jan. 15, 1909.

Mr. J.A.D. McCurdy,
Treas. Aerial Association.

4 boxes and crates (in bond)....\$93.45

The following letter was also enclosed:—

Baddeck, C.B.,
Jan. 15, 1909.

J.A.D. McCurdy, Esq.,
Beinn Bhreagh.

Dear Sir:—

You will please find enclosed freight and express charges on cases from the U.S. Kindly send me a cheque for the amount as the Station Master wants the funds.

Yours truly,
(Signed) A.S. MacDonald, Sec'y,
Vic. S.S. Co.

The shipment we received at Baddeck consisted of seven pieces which were immediately taken over to Beinn Bhreagh Laboratory.

It seemed as though the crate containing the wings was stalled somewhere either at the border, or at Montreal and so on January 16 the following telegram was sent to Mr. Curtiss:—

McCurdy to Curtiss.

Baddeck, Jan. 16, 1909:— Mrs. Bell here till February. Bring Mrs. Curtiss sure. Large crate "Silver-Dart" stalled either at border or at Montreal. Locate en route. Don't forget fly-wheel.

(Signed) J.A.D. McCurdy.

On January 29 I was notified over the telephone by

Capt. Dan Higgins of the Mine Hill that the rest of the fly-

ing with the boxes or crates had arrived at Iowa. This part

of the shipment consisting of two pieces had come from Sus-

pension Bridge to Iowa in a special express car attached to

the regular mail train. For this shipment the Company had

an extra charge against us of \$425.00 being the regular rate

charged for a special express car from Suspension Bridge to

Iowa. As this seemed to him to be a large amount for expres-

sage, he thought it better to get orders from us (the com-

panies) before taking shipment out of the hands of the Ex-

press Co. and bringing it over to Buddock as was the usual

custom. I told him that there must be some mistake somewhere

and to leave shipment in charge of the Company until we could

arrange the price satisfactorily. I therefore sent the fol-

lowing telegram:-

McCurdy to Curtis.

Buddock, U.S., Jan. 29, 1909: Large crate
arrived Iowa to-day. Expressage special car
\$425.00. Can you locate mistake from that
and if so have Express Co. wire Agent Iowa
to deliver at regular rate.

(Signed) J.A.D. McCurdy.

The following is the reply received:-

Curtis to McCurdy.

Wassonport, N.Y., Jan. 29, 1909: Do not
accept shipment till charges are corrected.
Doing everything possible, strictly their
mistake. Intended leaving to-day but will
wait till Monday. Will wire you again. Right
cylinder testing satisfactory.

(Signed) G.H. Curtis.

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I had McKay telephone Mr. MacDonald, Express Agent at Iona to forward us bill of charges for the two shipments so that we might have it in black and white.

The following bill was received in a McKay and MacAskill & Co. envelope, it having been addressed to us by McKay who received it from Dave Dunlop, the mail-man who in turn received it from McDonald at Iona.

Canadian Express Co.,
Iona Station,
Jan. 19, 1909.

Prof. A.G. Bell,

To Canadian Express Co.....Dr.

For transportation of freight from Harvard-
sport, N.Y.

2 racks in Express Special Car.....\$425.00

This bill was made out on blank form of the Inter-Colonial Railway.

On January 26, I went over to town for the purpose of telephoning MacDonald from McKay's store. I wanted to find out what he had done in the matter and in fact how things stood in reference to the Company. He informed me that he had received a telegram from the Canadian Express Company's Manager, Montreal, in reference to our consignment of goods, and that he had sent this telegram to me by the afore mentioned, Dave Dunlop. A few minutes after my talk with him I met Mr. Dunlop in J.P. McLeod's store and he handed me the following telegram:-

J. Price to Agent Iona.

Montreal, Jan. 25, 1909:- Graham Bell should pay car load rate Suspension Bridge to Iona, account special car used all the way through, boxes being too large for regular car. What charges will he pay on account and take delivery and we will submit question of charges to Railway Commission, Bell to agree to pay what

Curtiss to McCurdy.

Hammondsport, N.Y., Jan. 25, 1909:- Large box and all billed together from Suspension Bridge direct to destination as merchandise. Regular rate. Charges added your end. Investigate there at once before Agents report. Mrs. Curtiss and I leaving to-day.

(Signed) G.H. Curtiss.

On Jan. 27 the following letter and bill were received:-

Dunlap to McCurdy.

Baddeck, C.B., Jan. 27, 1909:- I enclose you memo of charges on flying machine. I was in the car at Iona to-day and the crate on the wings is broken. They will have to be taken out one by one as the crate is of no use now. When you get ready to move them, and you want me to do it, would like to have you go over yourself.

(Signed) D. Dunlap.

(Bill enclosed - a postal card notice).

MacDonald to Bell.

To Dr. Alexander Graham Bell,
Baddeck, N.S.

Iona, N.S.,
Jan. 15, 1909.

Sir:-

I have this day received per express to your address 4 box - *5 crates which remain entirely at the risk of the owner and will be delivered on payment of the following charges:-

Charges advanced.....	\$6.77
Express freight.....	60.14
Cash paid customs duty.....	-----
Warehouse.....	-----
Broker's Commission for entry..	-----
Collection.....	-----
Total.....	\$86.91

(Signed) M.A.J. MacDonald Agt.

Forwarded to Baddeck per S.S. Blue Hill.

* 2 crates to follow. Could not get into car at Suspension Bridge. Too large for ordinary car.

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amount they decide as right. Answer quickly.

(Signed) J. Price.

Mr. MacDonald had suggested that we not only write him what we decided to do in the matter, but telegraph our answer direct to Mr. Price. Accordingly, as soon as I returned to Beinn Bhreagh and consulted with Mr. Bell, the following telegram was sent:-

Bell to Price.

Baddeck, N.S., Jan. 26, 1909:- Have seen your telegram Jan. 25 to Agent Iona, and will say that while we are prepared to pay regular rate on consignment of goods we will not pay for special car which was unauthorized and we will not refer matter to Railway Commission.

(Signed) Alexander Graham Bell
Chairman Aerial Experiment Association.

The following letter was also forwarded to Mr. MacDonald at Iona:-

McCurdy to MacDonald.

Beinn Bhreagh, Jan. 26, 1909:-I am in receipt of your telegram from Price, Montreal, and after consultation with Mr. Bell and other members of the Aerial Experiment Association, will say that we will pay the regular rate on consignment of goods (flying machine material) from Hammondsport, N.Y. to Iona, N.S., and will not under any condition pay charge of special car which was unauthorized. We will not submit the matter before Railway Commission as suggested in the telegram.

I hope that the whole business will be settled satisfactorily to all parties in as short a time as possible.

(Signed) J.A.D. McCurdy
Sec. Aerial Exp. Assoc.

Later in the day the following telegram was received:-

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All this correspondence concerning the shipment of the "Silver-Dart" from Hammondsport, N.Y., to Iona, N.S., I respectfully submit.

(Signed) J.A.D. McCurdy,

Sec. of Aerial Exp. Association.

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McCURDY'S REPORT (CONTINUED).

Beinn Bhreagh, Jan. 28, 1909:-Since submitting the above report it was decided this afternoon at the regular daily Conference of the Association held at Headquarters, to make out a cheque, payable to the Canadian Express Co. for the amount of regular express charges for the 4 boxes and 5 crates as per their bill recorded in the above report under the date of Jan. 15, for \$86.91.

This cheque was made out and forwarded to Mr. A.J. MacDonald, Express Agent at Iona, with the following letter. The request was made that he sign the receipt enclosed and return to us. The form of the receipt also follows:-

Jan. 28, 1909.

Mr. A.J. MacDonald,
Agt. Canadian Exp. Co.
Iona, N.S.

Dear Mr. MacDonald:-

I am enclosing cheque for eighty-six dollars and ninety-one cents, being amount due the Canadian Express Co. for expressage on consignment of flying machine material, as per your bill of charges of Jan. 15, 1909. Please sign enclosed receipt and return same to me here,

(Signed) J.A.D. McCurdy

Jan. 28, 1909.

\$86.91

Received from the Aerial Experiment Association the sum of eighty-six dollars and ninety-one cents being amount in full due the Canadian Express Company for consignment of merchandise consisting of four boxes and five crates containing material relating to flying machine, in which Dr. Alexander Graham Bell is named as consignee.

Signed-----

Agent for the Canadian Express Co.

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We are now awaiting to see what the express agent will do in the matter.

(Signed) J.A.D. McCurdy,

Sec. A.E.A.

THE OUTLOOK ON AVIATION: By The Asst. Editor.

The Wright Brothers have a new steering device. The patent papers describing the patent say:- "In a mechanism of the character described, the combination, with a plurality of supports, and a rudder comprising upper and lower planes pivotally mounted on said supports, of a bracket carried by each of said supports, a shaft journaled in said brackets, a plurality of levers rigidly secured to said shaft extending transversely of said planes, links connecting the adjacent ends of said levers to the front and rear edges, respectively, of said upper and lower planes, and means for actuating said shaft.

With a rudder having forward and rearward portions normally in a single plane, of means for positively moving both the front and rear portions of said rudder at different angular velocities with reference to the pivotal center of said rudder, to present the rear portion at a greater angle of incidence than the forward portion.

With a rudder having its front and rear edges normally in substantially the same plane with the body portion thereof, of means for positively actuating both the front and rear edges of said rudder to adjust the rudder at an angle to its normal position and to flex said rudder".

Cortlandt Field Bishop, President of the Aero Club of America, has presented \$1000 to the Club which will constitute a fund to be divided into four prizes of a sum of \$250 each to be called "The President's Aviation Fund". They are

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to be awarded in 1909 to the pilots of the first four aeroplanes which will accomplish for the first time continuous flight of 1 kilometer or more without touching the earth. In addition to the cash prize the winner will receive a medal from the Aero Club of America.

An Aeronautics Congress was summoned some time ago by the French Government and will meet soon again in Paris. There has also been held an International Conference in London discussing questions bearing upon the future of the art, science, and business of flying. Laws for governing right-of-way for aerial machines are really a serious consideration. In a few years they will be a positive necessity.

Vertain French experts in International Law have suggested that a "zone of isolation" be established, above which traffic shall be free, while below the zone, air craft shall comply with fixed rules and signals for right of way, place of descent, and so on, and public craft shall obtain the diplomatic consent of the local State.

Forty delegates representing all the important countries of the world met in London, January 11, making the first International Aerial Congress. The purpose of this Congress was to establish rules for navigating the air.

Considerable progress has been made in the plans of the committee in charge of the Hudson-Fulton Celebration which is to be held next September and the Aero Club and the Aeronautic Society have appointed committees which are working with the celebration committee. Assurances have come from Brigadier General Allen that the Government will exhibit the

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results of its aerial experiments, at this exhibition. It is expected that appropriations will be made by Congress so that the Signal Corps of the Army will be able to build airships which may manœuvre in conjunction with the Atlantic Fleet. The celebration will be held to commemorate Robert Fulton's revolution in steam navigation, and will be augmented by demonstrations of American progress in Aerial Navigation.

Orville Wright said:- "The report that we are forming a syndicate in this country is not true. While we have had several propositions we have not seriously considered any of them.

It has been suggested that a Congress on Aviation be incorporated at Annapolis.

The Aero Club of St. Louis is arranging to hold an International Indoor Aeronautic Exhibition probably the last week in May. Aeronauts from all over the world will be invited to exhibit. Prizes are to be offered and contests for flying models are being planned.

Monte Carlo has fixed a race for aeroplanes that is to take place in about three months time. In this race competitors will fly from Monte Carlo round a bay and back to Monte Carlo for a prize of 100,000 francs.

An Aero Club is being formed in Washington. The objects of the Club are as follows:-

"To foster interest in the principles and developments of Aeronautics.

To arrange for lectures and demonstrations.

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To extend honors and hospitalities to eminent aeronauts.

To encourage and arrange for national and international competitions, conventions, congresses and exhibitions.

To co-ordinate the interests, efforts and achievements of the various governmental and civilian investigators in the field of aeronautics in the city of Washington.

To raise funds for the encouragement of aeronautics and to be the custodian thereof.

To offer such medals, trophies and prizes as may be from time to time deemed expedient.

To arrange for trial grounds for demonstrations and experiments.

To encourage the independent foundation of a laboratory of aerostatics and aerodynamics in the city of Washington.

To make collections and keep records^o.

P.E. Newman, of San Antonio, Texas, has offered to build for the Government an aeroplane to be completed in 60 days. If the machine comes up to the requirements the Government is to pay all expenses and a bonus of \$25,000.

On Tuesday, December 24, the President of the French Republic opened the second half of the annual automobile salon at the Grand Palace, and incidentally inaugurated the first real exhibition of practical flying-machines that has ever been held in any country. Among other machines exhibited was the Breguet helicopter aeroplane. The supporting surfaces of this machine are inclined at a great angle, 15 or 20° or perhaps greater. The propellers which are four-bladed, two in number, are also tilted up at an angle which gives both forward thrust and lift. Single-surface machines seem to have had a distinct superiority in numbers over the double triple

surface of the aeronautical salon this year.

Perhaps the following table of machines exhibited at the aeronautical salon may be of value for reference purposes.

Machine	Exhibitor	Details			
		spread	surf	weight	engine
<u>MONOPLANES</u>					
		m.	sq. m.	kgs.	h.p.
Ader's Avion (No.3)	Arts et Metiers Museum	16	56	258	40 steam
R.E.P. (No.2 bis)	Etab. R.E. Pal- terie	9.6	15.7	360	35 7-cyl. R.E.P.
Bleriot (No.9)	Sec. Bleriot	9	24	410	50 16-cyl. Antoinette
Bleriot (No.11)	Sec. Bleriot	7	13	160	35 7-cyl. R.E.P.
Antoinette	Sec. Antoinette	12	40	500	50 8-cyl. Antoinette
La Demois- elle	Santos Dumont	----	9	67	2-cyl.
Pischoff	Pischoff and Keschlin	----	23	----	17 2-cyl.
Vendome (No.2)	R. Vendome	9	26	305	50 3-cyl. Anzani
Clement- Bayard	Clement- Bayard	12.5	23	400	50 7 cyl. B.-C.
<u>DOUBLE MONOPLANES.</u>					
Astra (Kapferer)	Sec. Sureouf	10	40	----	35 7-cyl. R.E.P.

(Table continued on next page).

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Machine	Exhibitor	Details			
		spread	surf	weight	engine
<u>BIPLANES.</u>					
		m.	sq. m.	kgs.	h.p.
Wright (Model)	Cie. Navigation Aerienne	12.5	450	22	4-cyl. B.M.
Farman (No.1)	Voisin Freres	10.2	52	500	50 8-cyl. Antoinette
Delagrangé (No.3)	Sec. d'Encourage- ment	10.5	40	450	50 8-cyl. Antoinette
Bleriot (No.10) (3- seater).	Bleriot	13	65	480	50 8-cyl. Antoinette
Lajune (No.1)	Lajune	6.5	23	150	12 3-cyl. Buchet
<u>SPECIAL.</u>					
Breguet heli- copter-aero- plane.	Breguet	14	60	550	50 8-cyl. Antoinette

A Frenchman by the name of Vaniman has constructed a triple-surface machine with which he has made, at least, one successful flight. The vertical horizontal rudders are in front, the moveable wing-tips at the end, and a good sized stabilizing tail at the rear.

Bleriot's new biplane seems to have attracted much attention at the salon. Bleriot is using a triple surface vertical rudder in front. His horizontal rudders are affixed at the apex of two triangular vertical surfaces, one to port and one to starboard. The function of these triangular surfaces is to keep the machine from sliding in the act of turning. Judging from the size of the radiator employed, Bleriot cer-