

# BULLETINS

OF THE

## Aerial Experiment Association

Bulletin No. XXIX

Issued MONDAY, JAN. 25, 1909

MR. McCURDY'S COPY.

BEINN BHREAGH, NEAR BADDECK, NOVA SCOTIA

BULLETIN STAFF.

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Bulletins of the Acrid Experiment Association.

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Beinn Bhreagh, Near Baddeck, Nova Scotia.

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The Antoinette V.

Jan. 21, 1909:- The new aerodrome Antoinette V reported in the Outlook is remarkable in this, that its framework seems to be constructed throughout upon the tetrahedral plan. In L'Aerophile Jan. 1, 1909 p.7, the author says:-

"Dans cette construction basée sur le triangle et la pyramide, (Tetrahedral construction) les matériaux ne travaillent qu'à la traction et à la compression, sans qu'il puisse jamais y avoir flambement.

C'est le principe même de la construction des ponts métalliques et de la Tour Eiffel. Son application à la construction des ailes d'aéroplane, a permis d'obtenir une rigidité et une solidité absolues, alliées à la plus grande légèreté possible".

A.G.B.

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**ACTION OF CITIZENS OF BADDECK RESPECTING THE FREE ENTRY OF THE "SILVER-DART":** Reported by Wm. F. Hedwin, Supt. of Beinn Bhreagh Laboratory.

Baddeck, N.S., Jan. 21, 1909:- The citizens of Baddeck realizing the importance of Dr. Bell's experimental work to this community felt that it would be a mark of appreciation to use their influence, as a Town, with the Minister of Customs to admit free of duty the flying machine "Silver-Dart" which is being transferred from the Aerial Experiment Association's Plant at Hammondsport, N.Y., to Dr. Bell's Estate at Beinn Bhreagh, near Baddeck. The following telegram was therefore sent to the Minister of Customs:-

Baddeck, Jan. 16, 1909

To Hon. Mr. Patterson,  
Minister of Customs,  
Ottawa, Canada.

Citizens Baddeck very anxious that you allow free entry on experimental flying machine and apparatus for Dr. Graham Bell which arrived last night.

(Signed) K.J. McKay.

To this the following reply was received:-

Ottawa, Jan. 16, 1909.

To K.J. McKay,  
Baddeck, N.S.

Have written Collector Baddeck respecting admission flying machine.

(Signed) J.W. McDougall,  
Commissioner Customs.

I could not get a copy of the letter to the Collector of Customs referred to in the above telegram, but have been informed that it says in substance, that there shall be no duty charged if machine is returned within two years.

(Signed) Wm. F. Hedwin.

Chanute to Bell.

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

Chicago, Ill., Dec. 18, 1908:- I herewith return the Late Lieut. Selfridge's paper, which displays great research and industry and is sure to win him great honor. I therefore decidedly advise its publication.

I have accordingly gone over it with much care to verify the statements and figures given and do not believe that many mistakes now remain.

I note that you propose to illustrate the paper with numerous photographs, illustrating the various forms of apparatus alluded to, and if I can be of service in indicating where they are to be found I beg that you will command me.

Mr. Herring had evidently given Lieut. Selfridge an erroneous account of the evolution of the "two-surface" machine. I have rectified this in the paper and herewith add a copy of a paper of my own which I have ample evidence to support if required.

I had occasion myself, a month ago, to prepare a list of "First Steps in Aviation" for "Aeronautics" which you will find to differ but little from those selected by Selfridge.

(Signed) O. Chanute.



Chanute to Bell.

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

Chicago, Ill., Dec. 18, 1908:- Answering your enquiry of October 29, I now enclose a translation of the answer of my Russian correspondent, who is, I believe, a surgeon attached to the Aeronautical Park, to my request for details as to the screw propeller of Col. Ochtcheuny.

He does not answer the question which I put as to the thrust per horse-power and pressure on the blades, and I have written again for them.

You may, however, obtain some hints from the present letter as to the design of screws.

(Signed) O. Chanute.

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Berthenson to Chanute.

St. Petersburg, Russia, Nov. 16, 1908:- It was Otto Lilienthal who first prepared the wing-like propelling screw. The idea is perfectly sound because the action of the birds wing corresponds to that of the screw; the flapping of the wing being analogous to the rotating of the screw. But it is generally ignored that this analogy must be perfect. When the ends of the primary feathers are clipped off, the bird can no longer fly. The ends of the primaries, through their elasticity produce the regulation of the stroke so that the trajectory of the wing tip describes a regular undulatory line, and hence the thrust is continuous without interruption; there are no irregularities in the movement to absorb motive power. Hence the wing-like screw must be flexible and elastic at the end. For this we must consider that elasticity of steel and of other material is inversely proportioned to the dimensions, whence it results that a wing-like screw should not exceed certain dimensions in order to be perfectly analogous to the wing of the bird.

I therefore suggest that experiments be made with a wing-like screw, elastic at the tips. This will also be done at the Aeronautic Park at St. Petersburg and the results may be compared.

I believe that speed is the only guarantee of stability both for the bird and the aeroplane. Birds attain a speed of 30 meters per second.

There are aviators who hope to obtain stability by a mixed system of construction, but the following fact militates against it. Lilienthal proved that the force which pushes a surface of one square meter vertically in the air sustains one kilo, while the modern aeroplane sustains ten kilos per square meter.

(Signed) G. Berthenson.

PS. In another letter Mr. Berthenson suggests that the beetle may indicate a good type for an aeroplane, the thin membranous wings producing a partial vacuum so as to increase the lift under the concave upper wings. O.C.

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CLAUDY TO BELL.

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

523 10th St., Washington, D.C., Jan. 4, 1909:- I have your letter of December 31 in regard to the airship pictures. The enlargements which have been made for you were done by Mr. George Eastman of the Eastman Kodak Company. I heard him personally give instructions to Mr. Cline, of his finishing department, to spare no expense or effort to make these pictures the very best which the Eastman Kodak Company could turn out, and the results certainly bear out his instructions. They are, with no exceptions, the most beautiful prints possible to conceive of as coming from my negatives. Had these enlargements been made from my negatives as a commercial piece of work, the Eastman Kodak Company would have sent in a bill for something between \$150.00 and \$200.00 on account of the large size of the pictures and the great care used in making them. Mr. George Eastman, however, as a matter of patriotism, declines to make any charge for the work and wishes to donate them, through you, to the Museum, as part of the collection the Aerial Experiment Association is making. It was on this account that I asked you if you would mind writing to him personally and thanking him for what he has done.

I note all that you say about the date of presentation of the collection and of the medals being as yet unsettled, and wish to say that I am at your service at any time

in the future if you wish to show these pictures at one of your Wednesday evenings, as you suggest, with such simple explanations of them as might be interesting.

It occurs to me that, while what Mr. Wright has done is so thoroughly a matter of history that every one is more or less familiar with it, there is comparatively little known about Mr. Wright himself. Several of the newspaper men became very well acquainted with him indeed, and had opportunities for association with him denied to the general public. I was among these newspaper men; and it seems to me that, in speaking of the pictures as they are shown, I could probably arouse more interest by talking of Wright as I know him than by merely going over the history which the newspapers and the magazines have made familiar to everyone.

Personally I am anticipating a great deal of pleasure in showing these pictures to you. You enjoyed the little originals so much that I am sure you will be very enthusiastic over the truly magnificent results which the Eastman Kodak Company has secured from the negatives.

Kindly remember me to Mr. McCurdy, Mr. Baldwin and Mr. Curtiss.

(Signed) C.H. Claudy.

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Means to Bell.

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

Boston, Mass., Jan. 7, 1909:— It seems to me that if the word aerodrome is defined so as to include the dirigible balloon it will not be as useful a word as it might be.

We should still lack a word to precisely describe what we are now compelled (if we wish to be understood) to call a motor-propelled aeroplane.

(Signed) James Means

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Jones to Bell.

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

New York, Dec. 31, 1908:- I enclose some stuff dug out of the dictionary and have sent a copy to Mr. Means also.

(Signed) E.L. Jones.

Quotations from Century Dictionary and Cyclopedia

Copyrighted 1902.

Aerial Car:- A car used for traveling in the air; specifically the basket of a balloon or a car designed for an aerial railway.

Navigate:- (1) To move from place to place in a ship; sail. (2) To steer, direct, or manage in sailing, direct the course of. (Also used by extension in all its senses, of balloons and their use).

Navigation:- By extension, the act of sailing through the air in a balloon.

Airship:- Not given.

Aeronaut:- One who sails or floats in the air; an aerial navigator; a balloonist.

Aeronautic, Aeronautical:- The doctrine, science, or art of floating in the air, or of aerial navigation, as by means of a balloon.

Aeronautism:- The practice of ascending and floating in the atmosphere as in balloons.

Aerophobia:- A dread of air, that is, of a current of air.

Also Aer Phoby.

**Aerial Navigation**:- The sailing or floating in the air by means of balloons or airships; particularly, the principles, problems, and practice involved in the attempt to pass from place to place through the air by means of balloons or flying machines capable of being propelled or steered. (Note by E.L.J:- Words "Aerial Navigation" by latter definition could not be applied to floating in a balloon as a balloon is not steered. Definition contradictory).

**Aerodynamic**:- Relating or pertaining to the force of air and gases in motion.

**Aerodynamics**:- The science which treats of the motion of the air and other gases, or of their properties and mechanical effects when in motion.

**Aerohydrodynamic**:- Acting by the power of air in water. (Note by E.L.J:- Dhommas Beag an aerohydrodynamic machine).

**Aereology also Aeromeasy (rare)**:- Branch of physics that treats of air, properties and phenomena.

**Aeroplane**:- A light framework, either plane or somewhat concave, covered on its under side with a fabric, used in flying machines and aerostatical experiments. **Aeroplane**:- A flying machine invented by Victor Tatin \*\*\* consisted of cylindrical reservoir for compressed air used to drive two air propellers, two laterally extended wings and a tail for steering. Velocity obtained, 8 meters per second at Chalais-Meudon in 1879.

**Aerodrome**:- Not given.

**Aerodromics**:- Not given.



Aerostat:- (1) A machine or vessel sustaining weight in the air; a balloon; a flying machine. (Science IV 330).

(2) An aeronaut; a balloonist. (rare and incorrect).

Aerostatic:- Pertaining to aerostatics, aerostation, or the art of aerial navigation.

Aerostatics:- Science which treats of the weight, pressure, and equilibrium of air and other elastic fluids, and of the equilibrium of bodies sustained in them.

Aerostation:- Art or practice of aerial navigation; science of raising, suspending, and guiding machines in the air, or of ascending in balloons. Science of aerostatics.

Aviation:- The art or act of flying (rare).

Aviator:- A flying machine employing the principle of the aeroplane (recent).

Flying machine:- Mechanism designed to enable its user to fly or float through the air by the use of steam, electricity, or other motive power. (2) A machine designed to float in and propel itself through the air.

Helicopter:- Not given.

Ornithopter:- Not given.

Ornithopterous:- Having wings or fore limbs like those of a bird; bird-winged.

Ornithon:- A building in which birds are kept.

Aerebate:- To walk on air.

Aeronat:- Not given.

Aeronef:- Not given.

Velacious:- Apt or fit to fly.

Volant:- Flying.

Volation:- Faculty or power of flight.

Volitation:- Faculty or power of flight.

Volater:- That which flies.

Velery:- A place of flying.

FROM BRITISH "AERONAUTICS" for NOVEMBER, 1908.

\* Aeronautics:- In the first place, comprises aerial navigation in its entirety, without special reference to any of its branches. It may be divided into:-

Aerostatics:- the science of aerial navigation by means lighter-than-air, and

Aviatics:- The science of aerial navigation by means heavier-than-air. \*Aerostation and \*Aviation refer respectively to the practice of these two branches.

Aerodronics:- Is equivalent to Aviatics. (see Aerodrome)

\* Aerostat:- Refers to an ordinary spherical balloon.

\* Aeronat:- Is a dirigible, motor driven balloon or airship.

\* Aeroplane:- Denotes a dynamic flying machine sustained by the reaction of the air on one or more planes, propelled by propellers or similar means. The term is an unfortunate one, as it is sometimes, and justifiably, used to denote the sustaining surface alone, and as the so-called aeroplane usually comprises curved surfaces. The name has, however, become hallowed by popular use.

**\*Helicopter:-** Denotes a flying machine consisting of one or more lifting screws with a more or less vertical axis.

**\*Ornithopter:-** Denotes a machine in which the means of sustentation and propulsion consist of beating wings. (Orthopter is misleading and should not be employed.

**Aerodrome:-** (an air runner), first used by Professor Langley, is the most suitable and comprehensive word to denote a flying machine of any kind. It should never be used in the meaning of a balloon shed. The word Aerodromics, derived hence, may be applied to the whole science of free flight.

**Aerofoil:-** Proposed by the same authority to denote a motorless flying machine, a glider.

(Note:- An "airship" should never refer to a flying machine, a contrivance heavier-than the air.

#### NOTES BY E.L. JONES.

**Drome:-** The definition of "hippedrome" in Century is as follows:- "Hippos, "horse; "dromes", a course, running. A race-course. In classical antiquity, a place in which horse races and chariot races were run and horses exercised. "Dramine", to run.

Hippedrome is also used as a verb as "to hippedrome", run a race in which the result is known secretly in advance by collusion. Dromedary also comes from same word. Why not an aerodrome as a place where races in the air are held.

\*Adopted by Federation of Aero Club.

Also my preference for word aerodrome as meaning any kind of gasless apparatus.

Can we do anything to have the dictionaries take up the matter and change the obsolete definitions.

A Balloon:- is anything from a football to the state barge of Siam.

Balloonist:- is one who goes up in a balloon. Balloonery is the practice of going up in balloons.

The word "motor" is now applied to the whole automobile, or its engine alone. A possible reason, this, for aviator as the machine. A motorist is the man who meters, why not an aviatorist as the man who goes in an aviator. This is certainly funny. Is there any such word as aviate, meaning to fly in a gasless machine. E.L.J.

**SHIP CRIPPLED BY OTHER'S SUCTION.**

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**Professor Reeve Describes Phenomenon  
by Which the Princess Irene Drove the  
Parina Ashore.**

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**\$46,000 Damage claimed. Mariners much  
interested in Accident to One Vessel  
Laid to Another two Hundred feet Away.**

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New York Herald, Jan. 15, 1909;- What probably will go on record as a notable case in Admiralty practice was closed yesterday before Judge Adams in the United States District Court for the Southern District. It is unusual because while there was no collision between the two vessels concerned, one, it was asserted was run aground by the other when there was at least two hundred feet of water between them.

The result is ascribed by the libellant to suction, both vessels being bound out to sea at the time.

The case was that of the Quebec Steamship Company, owner of the Parina, against the North German Lloyd Company, owner of the Princess Irene. A.G. Thatcher, of Wallace, Butler & Brown, appeared for the Quebec Company and Mr. Laroque, of Cheate & Laroque, on behalf of the Princess Irene's owners. The incident occurred last April in the lower bay. The Princess was steaming for Europe, and the Parina for the West Indies.

Just above the cage or junction buoy the Princess Irene, much the larger vessel, began to lap upon the stern of the Parina. Testimony was given that the Parina suddenly was drawn to starboard, her bow fell off to port, her helm

and engines became useless and she ran aground. The Princess Irene proceeded, the Parina getting off in a few hours, leaking and needing repairs costing \$40,000 on her return to New York. This sum with \$6,000 for loss of time, was the total amount claimed.

Professor Sidney Arner Reeve, of New Haven, who has made a study of the sea phenomenon known as suction, said in part:-

"When one vessel overtakes another on the same course she laps her stem over the other's stern slowly. As the overlapping continues the bow pile of the overtaking ship comes abreast of the mid-length depression of the overtaking ship and fills up. At the same time the mid-length depression of the overtaking ship comes abreast of the stern of the overtaken and draws away its water.

"The results of this is that the mid-length portion of the overtaken vessel is sucked away from the overtaking, by the depression existing in the sea level outside, while the stern of the overtaken vessel is sucked toward the overtaking, by the depression of sea level between the two at that point. This action, when once set going, deflects the course of the overtaken vessel with forces which are very great in comparison with those of rudder control. Manipulation of neither helm nor engines can then be effective for good. The ship is then like a locomotive under full speed, but off the rails. Its driver may then be able to slightly mitigate ultimate destruction, but he cannot avert it. The deflection of the vessel, too, makes the situation worse. Once

deflected, she can find equilibrium only when she reaches a heading at right angles to her original course, unless her headway may have meantime shot her outside the sphere of effective influence.

\*In order to understand the situation fully it must be noted that the action described is not due to the bow wave of the overtaking vessel, nor to the lateral motion of the water near the stern (by half the vessel's beam) which is necessary in order to fill in behind the vessel. It is due to the longitudinal motion of the water aft along the mid-length.\*

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**THE OUTLOOK ON AVIATION: By the Asst. Editor.**

(The following has been translated from L'Aerophile).

The Michelin Aviation Cup. The new world records of distance, duration, and height:- On the 18th of December at

8 A.M. although quite a strong wind was blowing Wright telephoned to the Aero Club of Sarthe his intention of contesting for the Michelin Cup.

At 9 o'clock, the members for the Commission of Aviation of the Club, were at Auvours. At 11 minutes past ten Wright took the air, staying there one hour and 54'.

The course measured for the Michelin Cup is 99 K which distance he made in 1 hour, 53', 59" 2/5.

Wilbur Wright made each turn with the ease of a skilled aviator.

Wright also contested, the evening of the same day for the high prize of the Aero Club of Sarthe. This prize necessitated a height of 100 m being reached. The prize was won in the face of a strong wind and in the glow of a beautiful sunset over the plains. After some preliminary manoeuvres Wright shot 10 meters above the captive balloons which marked the height of 100 m.

Orville Wright in France:- Orville Wright, whose recovery is no more than a question of days, will leave America the second week in January to join his brother in France. He will help his brother to construct and experiment with new machines in all the countries of Europe.



Henri Farman's Aeroplane:- With the admirable tenacity which characterises him Henri Farman defended to the end his chance for the Michelin Cup.

After having received the visit, at Bouy, of the delegates of the Aeroplane Club of England, Farman executed on the 16th of December some fine flights.

He has now brought the machine back to its primitive form of biplane and supplied it with an aerial Renault motor.

Robert Aeroplane:- An aviator of the first order, M. Henri Robert, is going to commence at Amiens the trials of a monoplane of 50 m<sup>2</sup> supplied with an 8 cylinder 50 H.P. Antoinette motor driving two wooden propellers.

Guyot Aeroplane:- M. Guyot is constructing a biplane having a front control and rear stabilizing tail which will be driven by a 2 cylinder 40 H.P. motor.

Deschamps and Blondeau Aeroplane:- MM. Deschamps and Blondeau, the well known constructors of motor boats have put in the field, in view of the aviation meeting at Monaco, two aeroplanes of different types.

Hornust Plane:- M. Hornust is trying at Saint-Piat, near Maintenon, a plane of 12 meters in length by 3 m 30 in width in the form of a bird with unfolded wings. At the extremity and at the rear of the wings are some small wings governed by wires passing over return pulleys which can be controlled by hand.

Santos-Dumont's Aeroplane XX:- This machine which had been taken to Issy for the continuation of the trials, has been brought back to the aerodrome shed of Neuilly-Saint-James

where Santos-Dumont had some changes made which he judged necessary.

The Trial of the "Zipfel" biplane:- On the 25th of November the Zipfel biplane made four flights of 100 to 300 meters at a height of 3 m.

On the 26th of November, at 9 o'clock in the morning it flew 300 m in 15" at 6 to 8 m height. Supplied with a 50 H.P. Antoinette motor, the Zipfel biplane, made on the 1st of December, at Lyon, two flights of 800 and 1000 m in a straight line and half circle. On the 9th of December it flew 1500 m. On the 17th of December it flew 500 m. and on the 18th of that month a wing was damaged.

The Grade Triplane:- The inventor Grade has increased the carrying surface of his triplane.

The Flugel Aeroplane:- At Styrum-Mulheim, a machanicist, H. Flugel has invented an aeroplane which has been bought by the cosmographic observatory at Breslau, where the construction has already been commenced.

German Bureau for Aeroplanes:- At Berlin, the inventor Ruppel has opened a Bureau of Studies for Projects and Ideas on Aviation.

The R. Schnell Monoplane:- At Lindau, the inventor R. Schnell is completing a monoplane with very large and convex wings and a stabilizing tail. The model of this aeroplane was exhibited at the exhibition at Munich last winter.

Several other machines are being constructed in Germany. All their inventors think they are in possession of the definite "solution".

An Aviation Chair:- The superior polytechnic School of Charlottenburg, near Berlin, has been given a chair for the study of Aeronautics and particularly of Aviation.

The Wright Patents in Germany:- It is announced that Wright's German patent has been bought by the Loeve and Cie fabrique d'armes.

The Roe Aeroplane:- H. A.V. Roe, who has, in London, made some very successful experiments in a monoplane with a 24 H.P. Antoinette, has just finished the construction of a triplane of 35 H.P., with warping wings, which he proposes to try in the month of April.

Russia's grant to an Inventor:-Russia's superior War Council allowed 50,000 roubles to M. Tatarinoff for his aeronautical experiments.

The Aeroplanes in the American Marines:- The marine department of the United States has put in a grant for the construction of 4 aeroplanes, the first to be delivered 5 months after the signature of the contract, the three others to be furnished in 8 months. Speed required: 40 miles an hour with an aviator and a passenger on board. The machine must be able to fly 4 hours and carry enough gasoline to cover 200 miles, and be able to rise from the surface of the sea without special launching apparatus.

The Caters Biplane:- On the 30th of November, at Anvers, Baron de Caters flew 200 m at a height of 4 m on his biplane constructed by the Voisin Brothers. It is their classic type of biplane.

### Aeroplans Antoinette V.

We learn from L'Aerophile that the Antoinette Aeroplans has made at least one successful flight at Issy, France. This is very important news as the machine is entirely different from those machines which have successfully flown thus far. It might almost be said that it is the beginning of a new era in the construction of flying machines. The Antoinette Company are probably the most successful light motor builders in the world and it is this Company which is responsible for the Antoinette V. The following is a description of the machine.

#### Description of Machine.

After having given to the aviators of France the famous light motor which has enabled them to succeed so well in the progress of aviation, the Antoinette Society has undertaken to put in the field an aeroplans upon very original lines.

After serious preparatory researches and demonstrations of practical flight with the Gastambide-Mengin, the Company finally built the Antoinette V, a monoplane. In this type they have found advantages in the simplicity of form, natural stability, and minimized head resistance in its progression through the air.

The Antoinette V Aeroplans, through the rational conditions in which it has been studied, is worthy of a detailed description.

Wings:- The wings or supporting surfaces which are symmetrical in form and two in number maintain a trapezoidal

form throughout. The wings or supporting surfaces are pitched at a slight angle describing a shallow V. They are about 12 m 80 in breadth. The total surface of each is 25 m<sup>2</sup> their angle of attack about 4°. Their frame consists of many longitudinal and transverse skeleton struts which intersect one another and which are triangular. The surface of each wing or supporting surface is warped so as to prevent a symmetrical curve to the wind of advance.

The framework of the wings or supporting surface weighs but 1 kg to the sq. meter without the cloth. In the construction used for the wings or supporting surfaces based on the principle of the triangle and the pyramid the materials work for tension and compression. This is the same principle as the construction of the metallic trusses of the Eiffel Tower. Its application to the construction of the wings of an aeroplane has enabled it to obtain a rigidity and solidity in conjunction with the greatest possible lightness.



Body:- The body of the Antoinette Aeroplane has the form of a shell with transversal triangular sections (tetrahedral by the way). The whole body insures a fair form. The bow coming to a well shaped point and the stern tapering.

Cloth:- The body and the wings are covered with a many times varnished and polished cloth giving them a remarkable polish admirable for gliding through the air.

Tail:- The posterior extremity of the body carries horizontal and vertical surfaces which form the tail. Furthermore, there is a vertical control in two segments and a horizontal control which are placed one, in prolongation of the horizontal appendage, the other in prolongation of the vertical appendage. The appendages of the tail have considerable efficiency on account of their great distance from the center of gravity. Also by their position at the rear they insure the stability of the machine for there is advantage in placing all resistance at the rear, so that the machine tends to maintain stability.

Small Wings (Wing tips):- Also to insure transversal stability in gusts of wind, two small wings or wing tips are set at the rear of the supporting surfaces and at their extremity. The operator by the moving of a lever elevates one and depresses the other. This uniformity produces the same effect as warping but with more energy.

Controls:- The controls, insuring the direction and stability of the aeroplane are under the hands of the operator. One control placed to the right, governing the vertical control, the other placed to the left, governing the small wing-tips, and also the horizontal control. They can be operated together or separately by the same hand. This very ingenious system which allows for all the combinations of movements makes the control an easy feature. Two small handles placed forward serve to regulate the advance of the spark and the flow of gasoline. A pedal clutch allows a motor to run free momentarily and a second clutch, convenient for the hand, allows the operator to completely disconnect the motor.

Supporting frames:- The machine is supported on the ground by two crutches under the supporting surfaces, and one under the rear. The shock of impact on landing is greatly lessened by<sup>a</sup> compressed air device which acts as a spring. These shock absorbers are very simple devices. The uprights are composed of two tubes one telescoping the other, one tube forming the body of the pump the other tube the piston. L'Aerophile tells us that this unique device for absorbing the shock of landing works perfectly. The supporting frames are constructed in such a way as to permit the machine to strike the earth at an angle of 45° without serious consequences.

Motor and Propeller:- The motor installed is an Antoinette 50 H.P. 8 cylinder. It is in the extreme front of the machine just behind the propeller. The propeller is of light metal and is composed of two blades. The motor now installed is of 1908 type. This motor will soon be replaced by one of this year's type.

The 1909 Antoinette Motor:- The new motor develops 55 H.P. and has eight cylinders. In the old Antoinette motors the cylinders and the cylinder head were in two pieces. This former arrangement was supposed to give the greatest possible lightness but it had its disadvantages. In the 1909 model the cylinder and its accompanying valves is forged in a single piece of steel and there is no joint in the internal part where the explosion takes place. After laborious researches the Antoinette Society hit upon a forge which guaranteed to stamp these cylinders.

It is only through the perfecting of machinery and the use of sharp tools that the Antoinette Company have been able to forge these cylinders. The cylinders represent a real carving inside and out, made from blocks of steel.

The cylinder is worked all through so as to do away with useless weight. The machine is 700 grams per cylinder lighter than the old model, making more than 5 kgr less weight when the 8 cylinders are taken into consideration. The water tank is red copper obtained by electrolysis.

A word about the radiator. It is composed of tubes with thin partition and great surface for cooling. These tubular radiators are grouped in the form of a panel, following the lines of the body of the machine. The weight of the radiator is about 12 Kgr, surface  $12 \text{ m}^2$ . Radiation is made by connecting the motor with a reservoir placed between the cylinders and serving to separate the water from vapor. This constitutes a closed circuit. The circulation of the water can be made by the principle of the motor siphon or by means of an additional pump.

The radiator or rather radio-condenser is put in communication with the top of the reservoir which contains the vapor. This vapor liquifies in the radio-condenser. The condensed water is immediately sent into the reservoir, the result is that the vapor which has a less density than the air can only be lightened. The total quantity of water for cooling carried aside is 12 <sup>liters</sup>. The quantity of water vaporized by the 50 H.P. motor is 1 liter per minute. The quantity of vapor carried in the radiator is only a few cubic decimeters, its weight therefore is quite unimportant.



As for the water which is in circulation in the machine it weighs less than a half liter. It may be seen then that with the Antoinette radiator the water necessary for cooling is composed simply of the water which is in the motor.

Propellers:- The propeller placed in advance of the machine is an Antoinette of two blades being of very light and very strong construction. A steel pipe is run from tip to tip of the propeller and on this the two blades are made fast. The propeller is run direct, the engine turns over 1100 revolutions; diameter of the propeller is 2 m 20. The total carrying surface of the machine is 50 m<sup>2</sup>. The length between perpendiculars 11 m 50 with a width of 12 m 80.

The Aviator's Position:- The flights thus far have been made by M. Welfringer of the Antoinette establishment who came into prominence in connection with the Gastambide-Mengin machine. The best precautions have been taken for the convenience and security of the aviator. The seat has been constructed with much care back of the wing at quite a distance from the propeller and the motor. It is placed well inside the body of the machine. In case of accident everything would be broken before the aviator was reached.

G.H.B.

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