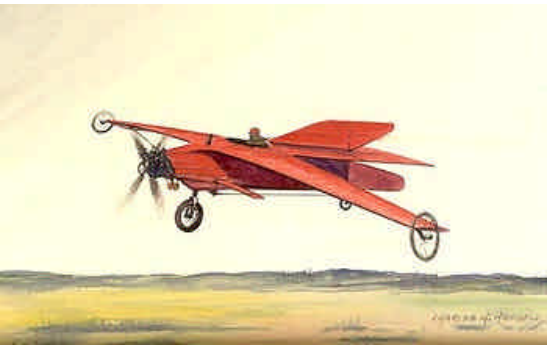
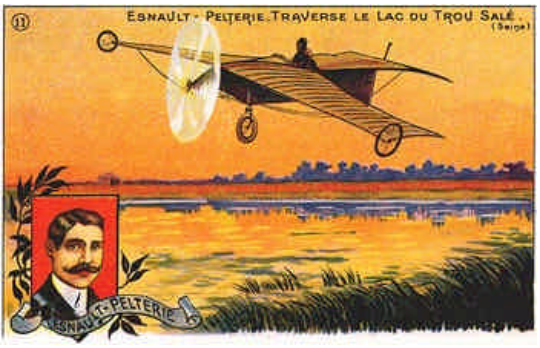
Robert Esnault-Pelterie

1881 - 1957





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HARGRAVE

the PIONEERS

SALUTING THE MEN & WOMEN OF AVIATION HISTORY

Robert Esnault-Pelterie (1881-1957)

Robert Esnault-Pelterie

Robert A. C. Esnault-Pelterie of Geneva, Switzerland, an EB Life Member, passed way in November, 1957.

Mr. Esnault-Pelterie made his first flight in the spring of 1907 at his own Aerodrome Toussus-le-Noble (Seine et Oise).

He held French Pilot License N.4 (1908). Saw military service in Sapeurs-Telegraphistes Mont-Valerien Paris under Commandant Ferrie's command and made an Officer de la Legion d'Honeur.

He was one of the best known early French aircraft designers and had several inventions to his credit.

The Early Birds of Aviation, CHIRP April, 1958, Number 59

Photo : Robert Esnault-Pelterie, Paul Nortz Collection

Robert Esnault-Pelterie
http://airsports.fai.org

On 10th October 1907, Robert Esnault-Pelterie flew his first powered plane, the REP 1, which could stagger into the air for brief stints. But he is better remembered for his innovations and inventions, such as his "joystick" design for the aircraft controls. This innovation would pit him against Louis Bleriot, the inventor of "cloche" controls; the courts ruled in Esnault-Pelterie's favor.

A History of Aeronautics
by E. Charles Vivian
http://www.bookrags.com/books/haero/PART24.htm

which in part says...

During 1907 and 1908 a new type of machine, in the monoplane, began to appear from the

workshops of Louis Bleriot, Robert Esnault-Pelterie, and others, which was destined to give rise to long and bitter controversies on the relative advantages of the two types, into which it is not proposed to enter here; though the rumblings of the conflict are still to be heard by discerning ears.

Bleriot's early monoplanes had certain new features, such as the location of the pilot, and in some cases the engine, below the wing; but in general his monoplanes, particularly the famous No. XI on which the first Channel crossing was made on July 25th, 1909, embodied the main principles of the Wright and Voisin types, except that the propeller was in front of instead of behind the supporting surfaces, and was, therefore, what is called a 'tractor' in place of the then more conventional 'pusher.'

Bleriot aimed at lateral balance by having the tip of each wing pivoted, though he soon fell into line with the Wrights and adopted the warping system. The main features of the design of Esnault-Pelterie's monoplane was the inverted dihedral (or kathedral as this was called in Mr S. F. Cody's British Army Biplane of 1907) on the wings, whereby the tips were considerably lower than the roots at the body.

This was designed to give automatic lateral stability, but, here again, conventional practice was soon adopted and the R.E.P. monoplanes, which became well-known in this country through their adoption in the early days by Messrs Vickers, were of the ordinary monoplane design, consisting of a tractor propeller with wire-stayed wings, the pilot being in an enclosed fuselage containing the engine in front and carrying at its rear extremity fixed horizontal and vertical surfaces combined with movable elevators and rudder.

Constructionally, the R.E.P. monoplane was of extreme interest as the body was constructed of steel.

The REP series
http://ailesfrance.multimania.com/

R.E.P. I 1907 Expérimental France

Monoplace expérimental. Premier vol le 19 octobre 1907. 1 seul exemplaire construit.

Envergure : 9.60 m
Longueur : 6.85 m
Hauteur : m
Surface portante : 18.00 m2
Equipage : 1
Masse à vide : kg
Masse totale : 3500 kg
Motorisation : 1 R.E.P. de 35 ch

R.E.P. II 1908, Expérimental France

Monoplace expérimental. Premier vol le 1er juin 1908. 1 seul exemplaire construit.

Envergure : 9.60 m
Longueur : 6.85 m
Hauteur : m
Surface portante : 18.00 m2
Equipage : 1
Masse à vide : kg
Masse totale : 350 kg
Motorisation : 1 R.E.P. de 35 ch

R.E.P. IIbis 1908, Expérimental France

Monoplace expérimental. Premier vol en novembre 1908.

Envergure : 9.60 m
Longueur : 8.00 m
Hauteur : m
Surface portante : 15.75 m2
Equipage : 1
Masse à vide : kg
Masse totale : 420 kg
Motorisation : 1 R.E.P. de 35 ch

Robert Esnault-Pelterie, France
http://members.tripod.com

Robert Esnault-Pelterie began his experimenting in 1906, making towed flights and on **September 19, 1906** flew 500m. On **October 22, 1907** : Robert Esnault Pelterie made his first 'powered' flight, one of 150m., at Buc. Other flights were as follows :

October 26 : Several of 100m.; **October 27** : Described arcs and damaged machine; 100m.; **November 16** : 'Short flight'.

The Pelterie I was a tractor monoplane, closed fuselage, warping wings, flexible rudder and elevator aft. R.E.P., 30 h.p. air-cooled, seven-cylinder engine.

On **June 8, 1908**, trials began with the Pelterie II, flying 300m., 500m., and 1,200m. at 30m. height, the then record height and distance for monoplanes.

The machine was then altered into the II-bis and in November 1908 flights were continued. On **November 21, 1908**, aat Buc, the machine made 316m. and other flights of 250-300m. flown by M. Chateau, who won the third and last A.C.F. prize for 200m.

The Pelterie machine was flown in the Rheims meet of 1909, but was not prominent thereafter. It was the first machine to have a welded steel fuselage and an oleopneumatic landing gear. Subsequently, Pelterie quit flying and devoted himself to the manufacture of aircraft engines and planes.

Robert Esnault-Pelterie
http://members.tripod.com

Robert Esnault-Pelterie, an early Aero Club enthusiast, was the son of a comfortably well-off cotton industrialist. Born in Paris on November 8, 1881, and educated at the Faculte des Sciences, he began his experiments with a biplane **glider** built using secondhand information of the Wright machines. However, since his data were incomplete, performance was faulty; and this led to erroneous conclusions about the Wright claims.

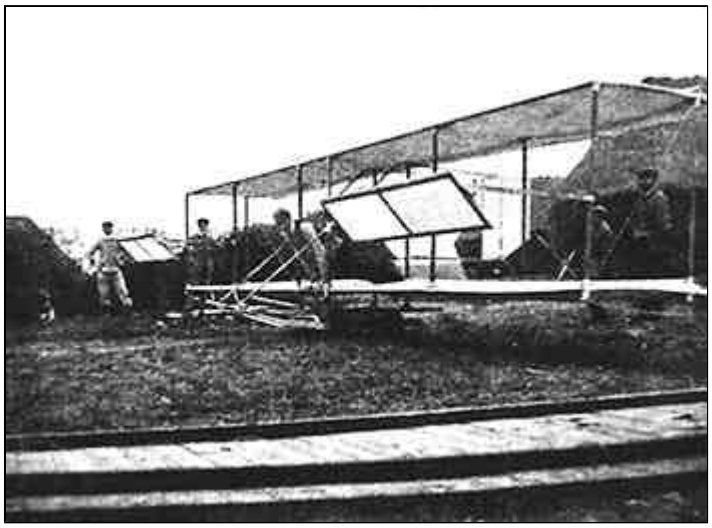
Esnault-Pelterie tried out his gliders on the beach and sand hills of Wissant, in the region of Calais; at one point he took the risk of being towed by an automobile, the better to study the mysteries of air pressure. His progress paralleled the advances of Bleriot.

Robert Esnault Pelterie, A French Glider Pilot Experiments With New Control System

France, October, 1904, Robert Esnault Pelterie, a French glider pilot reports using wing warping to maintain transverse equilibrium on gliders is too dangerous. He further stated "It was possible, in our opinion, to cause

magnified tension on the wires."

Instead, he has invented a new device comprising of two separate horizontal surfaces which are mounted forward of the wings. The pilot has a hand operated wheel to control them. Used symmetrically, they provide longitudinal stability. Used differentially, they control lateral stability.



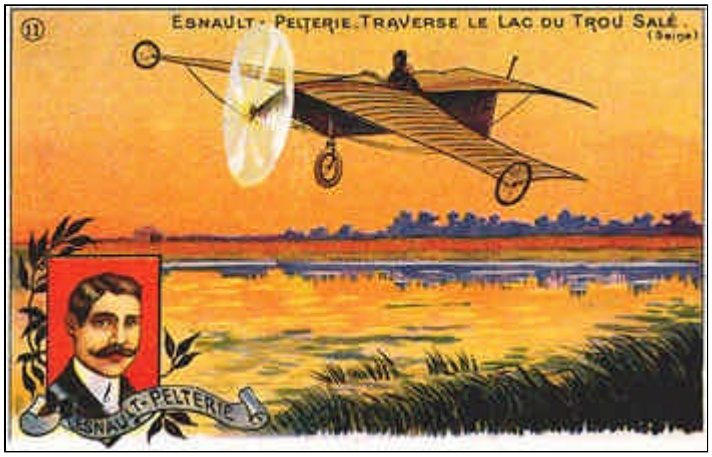
Robert Esnault-Pelterie's Glider, 1904

Download a larger image

This is just the latest modification made to his copy of a 1902 Wright type glider, which he found to be poor in its original form during maiden tests in May. Earlier this month the glider reappeared in modified form for a second series of trials. These too were not successful. The wings had been given less curvature in section, the span reduced to 3 lft 6in and the elevator removed.

Wing-warping had been added, but with down-ward movement only. Pilot weight shift provided pitch control. The "new surfaces" were installed for the present third series of trials. The glider is being towed be-hind a car on a trolley but has so far not achieved.

By October 1907, Esnault-Pelterie was flying his first monoplane - using internally braced wings, instead of a drag-producing system of external wires, and a lightweight engine of his own design. Known as the R.E.P. (after the inventor's initials), this was the first aeroplane with a completely enclosed fuselage of welded-steel tubing - a type well ahead of the times, embodying an engineer's idea of streamlining.



Robert Esnault-Pelterie's 'R.E.P', 1907

"Robert Esnault-Pelterie, 1881-1957 : Esnault-Pelterie followed a visionary path designing monoplanes with many features which would later become standard on modern planes. Esnault-Pelterie built engines as well. In 1904, he began glider research at Calais testing gliders based on the Wright's designs. He also invented the first aileron. He was badly injured flying this R.E.P. No. 1 monoplane in 1908. Thereafter, he had others test his designs for him."

Download a larger image

Source : http://www.mae.org

The R.E.P., ran along the ground on a single large bicycle wheel, with a smaller wheel at the end of each wing to maintain balance as the plane tipped to one side or the other, and a fourth wheel at the tail.

Robert Esnault-Pelterie's 'R.E.P', today

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The designer was, like Delagrange, a man of many talents. He too was a sculptor - and also an engineer and a visionary who peered into the future like Jules Verne. Esnault-Pelterie predicted a rocket voyage to the moon that would take forty-nine days, and he wrote an incredibly farsighted treatise on space travel.

Robert Esnault-Pelterie's 'R.E.P', today

Download a larger image

In addition to contributing a soundly designed monoplane to the early achivements of aviation, this creative birdman devised, as early as 1906, an ingenious means of obtaining greater regularity of motor power - namely, the use of an odd number of cylinders delivering from 30 to 35 hp and weighing only 115 pounds, blazed the way for the development of other eingines combining both power and lightness.

Robert Esnault-Pelterie's 'R.E.P 2'

Download a larger image

In an unpublished book of memoirs written for his son Michel, Robert Esnault-Pelterie tells of the crash that ended his career as a pilot. On June 18, 1908, he set out on a short trial flight; deciding to descend, he failed to realize that he should retard or cut the motor.

Robert Esnault-Pelterie's 'R.E.P 2', 20 Nov.,1908

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The machine hit the ground at full speed. Despite an elastic seat belt the inventor was thrown against the fuel tank with such force that he broke one of its steel supports, while his right hip received a severe gash from another metal section.

Robert Esnault-Pelterie's 'R.E.P 2'

Download a larger image

Suffering from shock and contusions, Esnault-Pelterie was found unconscious by a farmer who had witnessed the accident, and who revived the flyer with a stiff shot of cognac. From then on, the constructor left piloting to others; afflicted for years with the aftereffects of his injuries, which he feared might cause him to make some involuntary movement of the controls, he flew only as a passenger.

Ralph Cooper

Serrano Villard, Henry, Contact: The Story of the Early Birds, Thomas Y. Crowell Company

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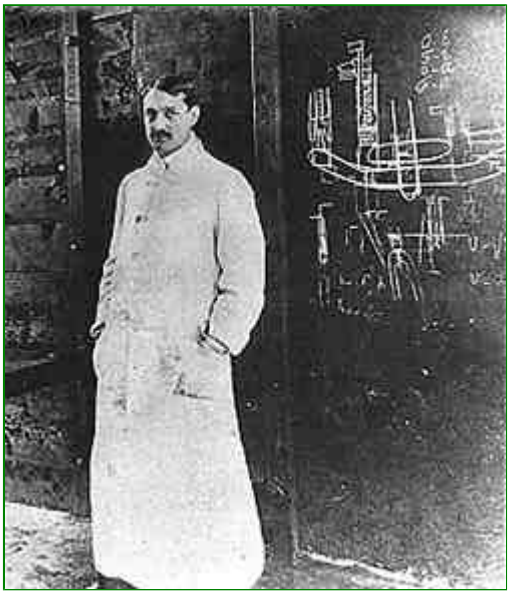
Gordon Bennet Race, 1909



For the Gordon Bennet Race in 1909 lots had been drawn for the order of start and priority had fallen to the R.E.P. extablishment of Robert Esnault-Pelterie.

A dark-haired man of great personal magnetism, he was a graduate of the Sorbonne and a sculptor, engineer, and inventor whose thoughts were often in the clouds.

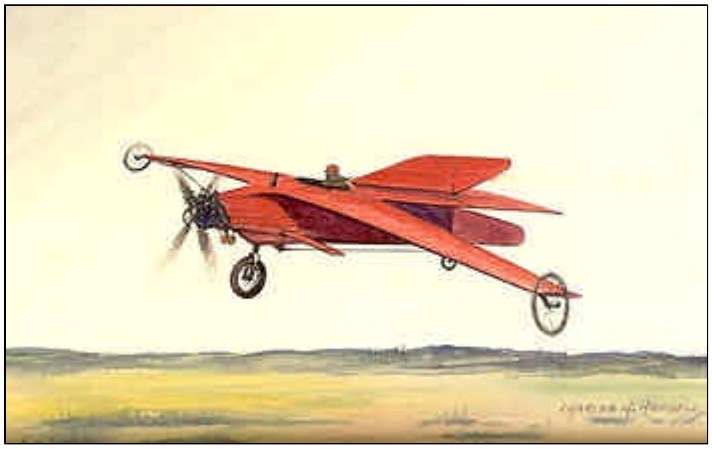
He had been born in Paris on 8 November 1881 and was the fourth person to obtain a pilot's license in France.

Photo : http://www.multimania.com

In 1904 he had started to experiment with gliders, and by late 1907 he was making brief essays on a monoplane of advanced design with internally braced wings and enclosed fuselage of steel tubing.

He had also invented a four-bladed propeller and a lightweight motor whose fan-shaped "magic seven" cylinders delivered from 30 to 35 horsepower.

But Esnault-Pelterie's career as a pilot had ended in a crash on 18 June 1908. After that, fearing the effect of his injuries might cause him to make an involuntary movement of the controls, he flew only as a passenger.



Robert Esnault-Pelterie's 'R.E.P 2'

Illustration : Charles Hubbell

Download a larger image

The red muslin-covered monoplane that was now dragged from its shed hitched to a horse and escorted by a small band of helpers was in the hands of Maurice Guffroy, a company mechanic.

Ralph Cooper

Serrano Villard, Henry, Blue Ribbon of the Air: The Gordon Bennett Races, Smithsonian Institution Press.

Ralph Cooper writes:

"I was privileged to know Henry during several years before his death. He was an fascinating companion and a lifetime friend of aviation. Henry has several more pages of this incident in Esnault-Pelterie's career in his book, I heartily recommend it to you for the complete story of the Gordon Bennett Race"

Robert Esnault-Pelterie's 'R.E.P 2'

Source: http://members.tripod.com

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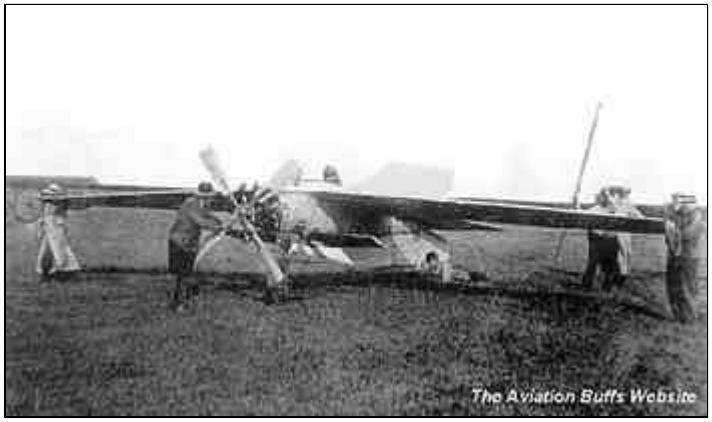


Robert Esnault-Pelterie's 'R.E.P 2'

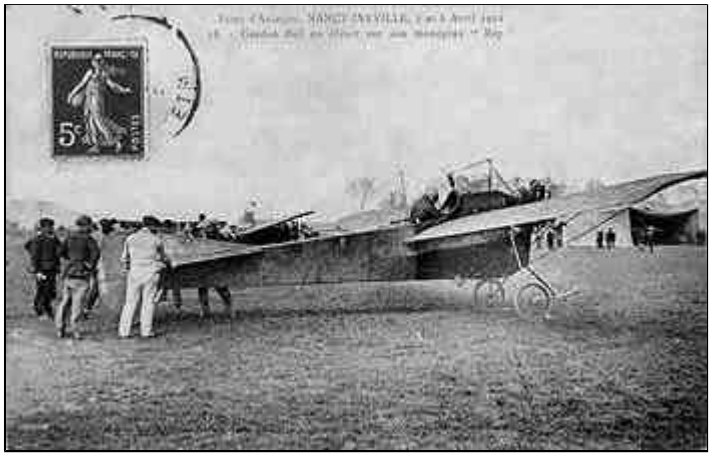
Source: http://members.fortunecity.com

Download a larger image

Robert Esnault-Pelterie's 'R.E.P 2' - Pilot : G. Corriard

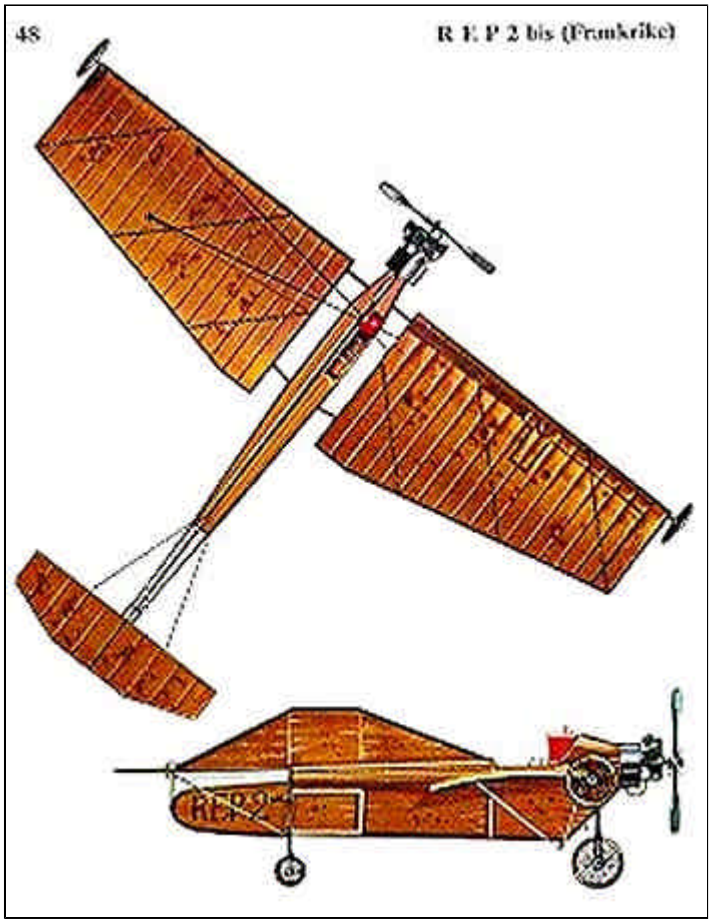
Source: http://members.fortunecity.com

Download a larger image



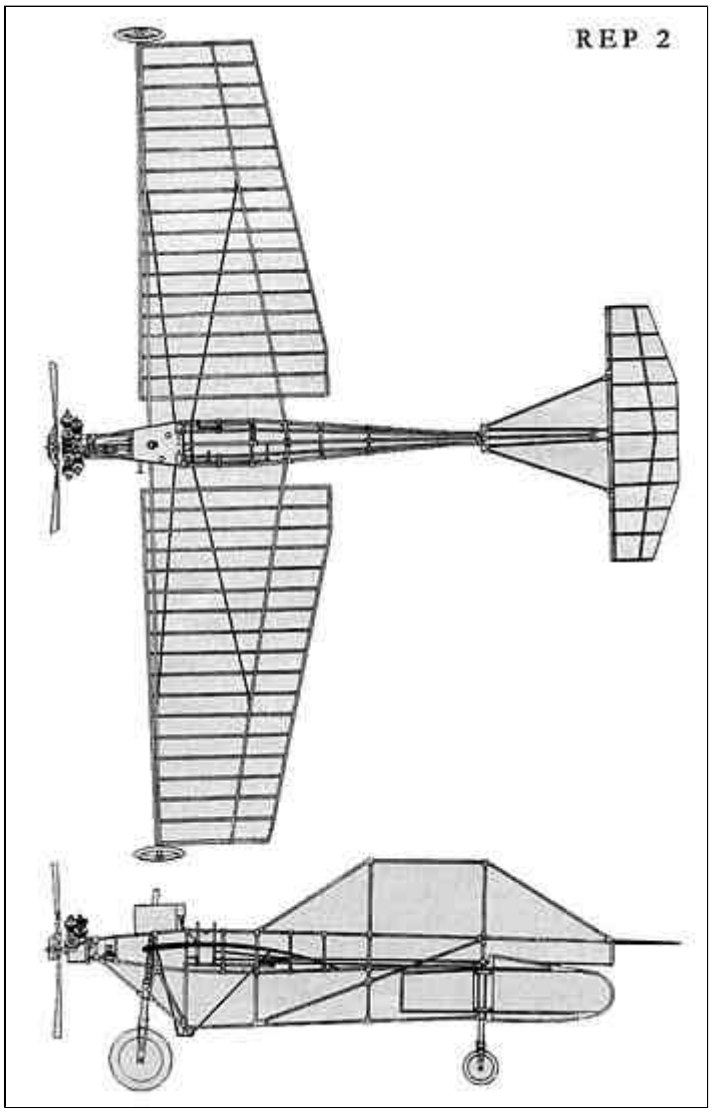
Robert Esnault-Pelterie's 'R.E.P 2' - April 7 or 8, 1912, Pilot : Gordon Bell

Download a larger image



Robert Esnault-Pelterie's 'R.E.P 2', '2 View'

Source : Munson, Kenneth, Pionierzeit. Flugzeuge der Jahre 1903 - 1914, Orell Fussli Verlag, Zurich, Switzerland. This was the German-language edition of Pioneer Aircraft 1903-1914, Blandford Press in 1969 and part of their "Pocket Encyclopaedia of World Aircraft in Colour" series. [Source info, courtesy of Paul Dunlop N.Z.]



Robert Esnault-Pelterie's 'R.E.P 2', '2 View'

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Robert Esnault-Pelterie : The Middle Years

'Dartford, Vickers and Esnault-Pelterie'
http://www.dartfordarchive.org.uk

which says in part...

Dartford played an important role in the early history of a mode of transport which has revolutionised the lives of people throughout the world. Powered flight has transformed our world into a 'global village'.

Dartford Salt Marsh

Following on from Hiram Maxim's experiments with flight, the Crayford based firm of Messrs Vickers Ltd decided, in 1910, to get more actively involved in the pioneering field of aviation. The company purchased land at Dartford Salt Marsh in 1911, with a view to constructing a rudimentary airfield suitable for the testing of prototype aeroplanes.

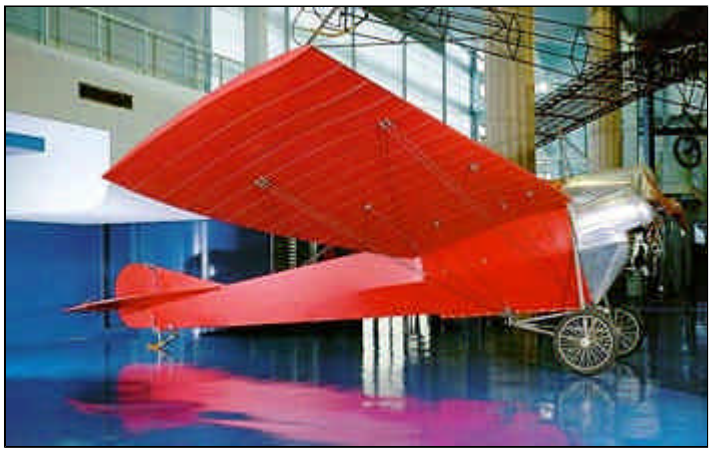
Vickers Advertisement

Download a larger image

Source : http://www.dartfordarchive.org.uk

The site they chose comprised a number of small fields, separated by drainage ditches. It was bounded on the west by the River Darent, and on the east by Joyce Green Lane which led to the embankment of the River Thames and Long Reach Tavern. No proper runway was constructed: instead, aeroplanes were expected to take off from grassy fields. Drainage ditches which constituted dangerous obstacles were boarded over, opening up a large expanse of grassland for take-off and landing.

The first aircraft tested at this river-side airfield was a monoplane (single-winged plane) built under licence at Vicker's Erith works to a design by the French aviation pioneer Robert Esnault-Pelterie. Unlike most aircraft of this period, very little timber was used in its construction; timber was restricted to the skids, which formed part of the undercarriage, and the wings.



Robert Esnault-Pelterie's R.E.P K, 1913

Download a larger image

Source : http://www.mae.org

L'avion du musée, dans sa livrée rouge caractéristique des REP, est entré dans les collections en 1919. Portant le n°ree;58, il aurait servi à la REP.15 mais sa silhouette diffère quelque peu des autres K en service dans l'escadrille (l'empennage en particulier). Donné au musée par

René Esnault-Pelterie lui-même, et non par l'armée, il est possible qu'il ait subi des modifications de remise en état en usine. Son entoilage a été refait en 1955.

This radical design feature proved unpopular with a number of potential customers, including the Admiralty. Vickers offered to supply one Pelterie-type monoplane, at a cost of £1,500, with a framework initially constructed of steel; they intended to substitute a much higher alloy, Duralumin, in subsequent versions. Admiralty chiefs were not impressed with this proposal, and did not place an order. However, Vickers failed to be disheartened and continued to construct aircraft using these 'advanced' methods.

Robert Esnault-Pelterie : The Later Years
Rocketry & Space Travel

en français

Robert Esnault-Pelterie
http://www.fas.org

Although his contributions have been obscured by subsequent developments, Robert Esnault-Pelterie continued in Verne's tradition of French leadership in the interplanetary project. Esnault-Pelterie was one of the pioneers of French aviation, whose contributions include the first all-metal monoplane, which he built in 1907.(4)

REP's work culminated in 1930, with the publication of his Astronautics, which constituted a landmark review of the problems and prospects of space travel. A subsequent edition in 1934 gave considerable attention to interplanetary travel, including the applications of nuclear power.(5)

On 15 November 1912, Esnault-Pelterie presented a paper to the Physics Society of France. In one of the first scientific discussions of the problems of space travel, he suggested that atomic energy would hold the key to solving the problem of reaching the Moon and other celestial bodies.

Although long a proponent of nuclear propulsion, by the early 1930s the work of others on the potential of chemical propulsion had convinced him that nuclear propulsion would not be required to accomplish lunar missions.(6)

" ... I must agree with the opinion of the Germans (who have considered the question): even with an oxygen-hydrogen mix, a trip to the moon and back is at the limit of our possibilities... This formidable realization can be only precarious and subject to the terrible hazard of a prolonged trip outside the field of gravity."

4. Blosset, Lise, "Robert Esnault-Pelterie: Space Pioneer," in Durant, Frederick, editor, First Steps Toward Space, (Washington, Smithsonian Institution Press, 1974), Smithsonian Annals of Flight, Number Ten, Chapter 2, pages 5-31.

5. Somewhat surprisingly, there is no English-language edition of these books, which precludes a more systematic treatment of Esnault-Pelterie's contributions. The excerpts quoted here were translated by Tiffany Tyler for this study.

6. ibid, page 202.

Robert Esnault-Pelterie
http://www.space-talk.com

From History of Rocketry & Space Travel, Third Revised Edition, 1975, Werhner Von Braun & Frederick I. Ordway III, Thomas Y. Crowell Company -- publishers.

(Pg. 74 & 75)

"Esnault-Pelterie launched his public campaign in February 1912 when he delivered a major lecture in St. Petersburg, repeated back home in Paris to the Societe Francaise de Physique in November. The Societe was the most prestigious organization to provide a forum up to that time for what many people still considered a fantastic subject. Only Esnault-Pelterie's reputation in other fields permitted him to lecture, albeit cautiously, on the "Consideratons sur les resultats d'un allegement indefini des moteurs" ("Considerations on the Results of an Unlimited Lightening of Motors"--a title refering to the fact that as a rocket uses up its propellants it becomes progressively lighter).

Fifteen years later, on 8 June 1927, he appeared before the Societe Astronomique de France to tell astronomers about the results of his further theoretical research in astronautics. The Society subsequently published the written text as a 98-page book, L'exploration par fusees de la tres haute atmospher et la possibilite des voyages interplanetaires (Rocket Explosion of the Very High Atmosphere and the Possibility of Interplanetary Travel). This title, more audacious than the 1912 delivery, combines Goddard's conservatism and Oberth's optimism. At the same meeting Esnault-Pelterie revealed that he and a banker friend, Andre Louis-Hirsch, had established a 5,000-franc prize to be awarded annually to the author of the most outstanding work on astronautics. Called the Prix REP-Hirsch (REP-Hirsch Award), it was awarded by the Astronautical Committee of the Societe Astronomique de France. T%he first recipient in 1928 was Hermann Oberth, who was so highly esteemed that the prize was doubled to 10,000 francs.

Esnault-Pelterie's greatest contribution was the pubication in 1930 of a book entitled L'Astronautique (Astronautics), which, together with its 1934 supplement, L'Astronautique-Complement, covered virtually all that was then known of rocketry and space flight.

Although Esnault-Pelterie's major interest was theoretical astronautics, he was well aware of the military implications of rocketry.On 20 May 1929, he proposed to French army general Ferrie a plan for the development of ballistic bombardment missles against which he could imagine no defense. We wrote such weapons could deliver "over several hundreds of kilometers...thousands of tons" of destructive payload, all within a few hours. (He was obviously thinking in terms of salvo firings like the World War II V-1 and V-2 offensives) "Moreover." he added, "the necessary ground installations would not entail great expense and would doubtles be infinitly less burdensome than if it were a question of delivering the same load by aeroplanes."

His proposal resulted in the appointment of ingenieur general J.J. Barre to his laboratories in 1931, which in turn led to work approved by the Commission des Poudres de Guerre at Versailles first on liquid-oxygen-gasoline motors, then on nitrogen peroxide-benzene motors, and one powered by liquid oxygen and tetranitromethane. In October 1931 (during) tests of the last, an accident occured, causing Esnault-Pelterie to lose four fingers.

In 1934 a study contract was let to Esnault-Pelterie by the Direction des Etudes et Fabrications d'Armement under the general supervision of ingenieur general Desmazieres. There, in addition to liquid rocket work, 80-mm solid-fuel rockets were developed whose application was to have been to accelerate bombs. Elsewhere, the Services de l'Armement

Fracaise studied, in 1939, the use of 1,000-pound-thrust JATO units for assisting heavy bombers to take off. Air Liquide, a private concern, worked for a short period of time on a 100-pound-thrust test motor under Air Ministry contract at Champigny and at Seyne. French rocketry continued sporadically, and without conclusive results, until the outbreak of war."

Also, in 1929, Esnault-Pelterie proposed aero-braking: using atmospheric drag to slow a spacecraft for gravitational capture by a planet.

A century of aerospace history
http://www.gifas.asso.fr

Gifas, the French aerospace industries association, has almost 200 members, from major prime contractors and system suppliers to small specialist companies. They cover the full spectrum of skills from the design, development and production of aerospace systems and equipment to maintenance and operation. Activities extend from civil and military aircraft and helicopters to engines, missiles, spacecraft and launch vehicles, plus major systems, equipment, subassemblies and associated software.

The first body representing the French aviation industry was set up on 17 January 1908 when a small group of pioneers, including Louis Blériot, Louis Bréguet, Gabriel Voisin and Robert Esnault-Pelterie, founded the Chambre Syndicale des Industries Aéronautiques. The clearly stated aim was to give an industrial and commercial image to an activity that had, until then, been considered a pastime. In 1958 the body expanded its activities to include space. The current name - GIFAS (Groupement des Industries Françaises Aéronautiques et Spatiales), or French aerospace industries association - was adopted in 1975.

Robert Esnault-Peltrie

1881 -- France

Naissance à Paris de Robert Esnault-Peltrie, le père de líastronautique en France.

La grande aventure de l'espace, tome 1, Editions Rombaldi, 1967

1912 -- France - Russie

Robert Esnault-Peltrie prononce à Saint-Petersbourg une conférence sur "Les considérations sur les résultats d'un allégement indéfini des moteurs".

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

13/11/1912 -- France

Robert Esnault-Peltrie prononce pour la deuxième fois, à Paris à la Société française de physique, une conférence qui est accueillie avec scepticisme mais qui marque une date dans l'histoire de la navigation spatiale : "Les considérations sur les résultats d'un allégement indéfini des moteurs".

La grande aventure de l'espace, tome 1, Editions Rombaldi, 1967

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

01/02/1928 -- France

Robert Esnault-Peltrie et André Hirsch, un banquier, créent le prix international d'astronautique d'une valeur de 5000 francs afin de récompenser chaque année le meilleur

ouvrage scientifique, théorique ou expérimental.

Exploration de l'espace, Editions Bordas, ISBN 0-0401277-1, 1982

01/11/1930 -- France

La collaboration est suffisamment bonne entre Robert Esnault-Peltrie et Jean-Jacques Barré pour qu'en novembre 1930, Esnault-Pelterie qui travaille sous contrat du Ministère de la Guerre demande le détachement de Barré auprès de lui pour travailler à la réalisation d'une fusée aérologique destinée à atteindre cent kilomètres d'altitude.

Ce détachement n'interviendra en fait que le vingt-cinq septembre 1931.

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

Janvier 1931 -- France

Robert Esnault-Peltrie entame la mise au point d'un moteur utilisant de l'oxygène liquide et de l'hydrocarbone en essai statique.

Encyclopédie visuelle de l'exploration de l'espace, Editions Bordas, ISBN 0-0401277-1, 1982

25/09/1931 -- France

Détachement de Jean-Jacques Barré auprès de Robert Esnault-Peltrie.

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

Octobre 1931 -- France

À peine trois semaines après son arrivée au laboratoire de Robert Esnault-Peltrie, situé à Boulogne sur Seine, Jean-Jacques Barré est le témoin d'une explosion résultant d'un essai d'un mélange de pétrole et de tétranitrométhane qui emporte l'extrémité des quatre doigts de la main gauche d'Esnault-Pelterie.

Notons que cet accident est à l'origine directe du choix de l'oxygène liquide jugé moins dangereux pour les essais de moteurs et de fusées qui auront lieu au cours des qinze années suivantes.

Au sein de la petite équipe d'Esnault-Pelterie, Barré poursuit des études théoriques et commence à mettre au point des composants de moteurs.

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

Septembre 1932 -- France

En septembre 1932, le détachement de Jean-Jacques Barré se termine, l'Administration militaire n'estimant pas alors que "l'étude des fusées puisse absorber l'activité d'un officier".

Toutefois, Barré apprend à Robert Esnault-Peltrie que le général Weygand est prêt à doubler voire à tripler la subvention accordée à ses travaux à condition qu'il obtienne des résultats tangibles dans les trois ans.

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

01/12/1936 -- France

En décembre 1936, un moteur-fusée créé par Robert Esnault-Peltrie développe cent ving-cinq kilogrammes durant soixante secondes.

Exploration de l'espace, Editions Bordas, ISBN 0-0401277-1, 1982

06/12/1957 -- France

DÈcËs de Robert Esnault-Peltrie.

Robert Esnault-Pelterie
http://www.geocities.com/CapeCanaveral/4337/rep.htm

Parmi les grands prècurseurs de la conquète de l' espace, Robert Esnault-Pelterie est probablement le seul qui se soit d' abord distinguè par une importante contribution l' aèronautique. Issu d' une famille d' industriels fortunès, il oriente d' abord ses ètudes vers l' histoire naturelle mais rejoint bientùt cette plèiade de jeunes hommes qui, l' aube du XXe siëcle, firent passer le rève du vol humain l' ètat de technique majeure. Mais, alors qu' une carriëre prestigieuse pouvait s' offrir lui, son regard portait dèj plus loin. Les bonds que l' homme venait de rèussir dans l' atmosphëre n' ètaient ses yeux qu' une ètape vers le grand èlan qui l' arracherait un jour sa planëte natale pour le conduire vers d' autres astres...

En 1912, il prèsente la Sociètè franÁaise de physique une communication sous un titre anodin : Considèrations sur les rèsultats d' un allègement indèfini des moteurs, allusion la perte de masse continue d' une fusèe par èpuisement progressif des rèserves de carburants propulsifs. Dans ce travail, il ètudie les possibilitès de voyage interplanètaire qui sont offertes par le principe des fusèes. Mais il aboutit, avec des combustibles usuels, des rapports de masse qui lui paraissent irrèalisables ; il en conclut de de tels voyages ne seront possibles que lorsque sera maitrisèe "l' ènergie interne des atomes". Si ces conclusions ètaient bien pessimistes, il faut noter qu' il envisageait alors un avion spatial monoètage entiërement rècupèrable, qui reste encore un rève aujourd' hui. C' est par une correspondance ultèrieure qu' il aura connaissance du brevet dèposè en 1911 par le belge Andrè Bing sur le principe de la fusèe gigogne, celle-ci ouvrant "la possibilitè d' atteindre une altitude presque indèfinie avec un systëme de fusèes successives dont chacune est abandonnèe aussitùt qu' elle est consumèe".

Dans les annèes qui suivirent la Premiëre Guerre mondiale, Esnault-Pelterie entre en rapport avec Robert Goddard, qui a dèja lancè aux Etats-Unis des fusèes reprenant le principe de Bing, ainsi qu' avec les allemands Hermann Oberth et Walter Hohmann. Soucieux de promouvoir la coopèration internationale, il fonde alors, avec son ami le banquier Andrè-Louis Hirsch, un prix annuel d' astronautique de 5000 francs, dont Hermann Oberth sera, en 1929, le premier laurèat.

Ses idèes ayant suffisamment m°ree;ri, Esnault-Pelterie publie, en 1930, son ouvrage majeure, L' Astronautique, vèritable somme des connaissances de l' èpoque en la matiëre. Une ètude approfondie de la thermodynamique de la propulsion l' amëne confirmer et mème revoir dans un sens lègërement plus optimistes les performances prèvues par Oberth pour le mèlange oxygëne-hydrogëne. Aprës une ètude mècanique dètaillèe, il se rallie finalement l' opinion d' Oberth sur la faisabilitè (limite) d' un voyage aller-retour sur la Lune. Mais les rèticences d' Esnault-Pelterie tiennent au recours au freinage atmosphèrique, proposè par Hohmann, pour recueillir le vèhicule au retour. En effet, la prècision de navigation nècessaire pour que l' atmosphëre soit attaquèe sous le bon angle lui paraissait utopique.

C' est pourtant sur le plan de la navigation que l' apport de l' ouvrage est le plus original et le plus prophètique. L' auteur y dèmontre la possibilitè et dècrit les modalitès de ce qu' on appelle aujourd' hui la navigation inertielle, systëme qui permet de reconstituer bord d' un vèhicule mobiles ses coordonnèes de position, sans aucune liaison avec l' extèrieur, gr,ce la double intègration des mesures d' accèlèration effectuèes par des accèlèromëtres embarquès. Il reconnaót que les accèlèromëtres doivent ètre placès sur une plate-forme stabilisèes par gyroscopes. De plus, il ne lui èchappe pas que la part d' accèlèration due la gravitation n' est pas mesurèe par les accèlèromëtres et qu' il faut donc l' ajouter chaque instant l' accèlèration mesurèe, ce qui est concevable si on la connaót en fonction de la position, c' est-#-dire si on navigue dans un champ de gravitation connu. A l' èpoque de la publication de l' ouvrage, les performances des calculateurs, et particuliërement des calculateurs embarquèes, ne permettaient pas l' application de ces idèes, mais Esnault-Pelterie jetait les bases de tous les

systëmes qui allaient voir le jour avec l' èmergences des calculateurs èlectroniques. Ainsi, les trois principes d' accèlèromëtres intègrateurs qu' il a proposè ont tous ètè employès et les deux modalitès d' application de la navigation inertielle qu' il a imaginèes se font encore concurrence aujourd' hui.

En dèpit de l' attention qu' il portait tous les problëmes annexes, Esnault-Pelterie restait persuadè que la question-clè de l' astronautique ètait la propulsion. Il s' y consacra entre 1930 et 1940, assez chichement soutenu par les autoritès qui ne croyaient guëre l' utilisation militaire des fusèes. Aprës des tentatives sur un monoergol, le tètranitromèthane, et un accident qui le prive de trois doigts, Esnault-Pelterie choisit pour ses essais le couple èther de pètrole / oxygëne liquide. Il parvint dèvelopper un moteur d' environ 100 daN de poussèe (Isp = 230 s). Le point faible en ètait le refroidissement, assurè par l' eau de la ville ; il lui fallait trouver un systëme opèrationnel en vol. Malgrè les possibilitès de refroidissement qu' offrait l' oxygëne liquide, la prèfèrence d' Esnault-Pelterie allait vers un systëme non-refroidi, utilisant des matèriaux rèfractaires. Il se passionna pour l' ètude de tels matèriaux, mais y rencontra beaucoup de dèboires et le problëme n' ètait pas rèsolu quand l' invasion allemande de 1940 mit un terme ses recherches.

Esnault-Pelterie, èlu membre de L'Acadèmie des Sciences en 1936, suivit encore aprës la guerre les progrës des engins auto-propulsès et les dèbuts de la conquète spatiale. Il prononÁa ce sujet plusieurs confèrences, mais ne reprit pas de travaux personnels, portant dèsormais sa rèflexion sur des sujets de philosophie des sciences. Il eut cependant la satisfaction d'assister la mise en orbite du premier satellite artificiel de la Terre, opèration dont il avait eu quelques rèticences admettre l'intèrèt, tant il ètait pressè d'aller plus loin. Il ne vècut pas assez longtemps, en revanche, pour voir l'homme dèbarquer sur la Lune, rève de toute sa vie et confirmation de la pertinence de ses analyses.

November 1998

A Report

It all began with Bleriot, the Wright brothers and Santos-Dumont, and such famous aviatrices as Adrienne Bolland, Amelia Earhart and Helene Boucher. Aviation is one of the decisive developments of the 20th century. The early pilots - Lindbergh, Mermoz and Saint-Exupery, to name but a few - pioneered the skies, while Gagarin and Shepard explored outer space. In August 1998, we pay tribute to these legendary aviators, and to the Aero-Club de France, which celebrates its one hundredth anniversary.

- From 1898 to 1947
- From 1948 to 1998

On 20th October 1898, a few aeronautics buffs launched the Aero-Club to "encourage air transport in every way, shape and form". In 1903, the association officially became the Aero-Club de France.

The 18-minute maiden flight of Court Ferdinand von Zeppelin's airship, built mainly of zinc and aluminum girders, took place over Lake Constance on July 2,1990; 420 feet long and 38.6 feet in diameter, it was equipped with two 15 HP engines.

On 17th December 1903, the Wright brothers flew their Flyer four times at Kitty Hawk, North Carolina. Orville was at the controls first, then Wilbur. The final flight lasted 59 seconds and covered a distance of 852 feet.

The Brazilian aviator Alberto Santos-Dumont made the first flight in Europe, on Nov 12, 1906, in a huge aircraft equipped with a 50 HP Antoinette. It was the first feat officially recorded by the Aero-Club de France and officially sanctioned by the International Aeronautics Federation.

On 10th October 1907, **Robert Esnault-Pelterie** flew his first powered plane, the REP 1, which could stagger into the air for brief stints. But he is better remembered for his innovations and inventions, such as his "joystick" design for the aircraft controls. This innovation would pit him against Louis Bleriot, the inventor of "cloche" controls; the courts ruled in Esnault-Pelterie's favor.

Paul Cornu (1881-1944) is considered to be the first true helicopter pilot for his flight on 13th November 1907, near Lisieux. He had attached two sets of rotor blades to a light weight steel tube airframe, lifted about 1 foot off the ground by a 24 HP Antoinette engine. It went nearly 5 feet off the ground on a second flight, this time carrying a "passenger", his brother, who was clinging to the aircraft.

In a Voisin biplane, Henri Farman flew the first European circular flight at Issy-les-Moulineaux on 13th January 1908.

The Aero-Club de France granted the first "pilot-aviator" licenses on 7th January 1909. Louis Bleriot received license no1, soon followed by Alberto Santos-Dumont and the Wright brothers.

On 25th July 1909, Louis Bleriot left Calais and reached Dover in 48

The Reims Meet of 1909, held from 22 to 29 August, provided a common meeting ground for budding aviation buffs of every stripe - Bleriot, Curtiss, Delagrange, Esnault-Pelterie, Farman and Latham. This was the event that triggered 19-year-old Roland Garros's decision to give up the piano and become a pilot. In addition, there was a 9-year-old present among the participants who was initiated into the

thrills and adventure of aviation. His name was Antoine de Saint-Exupery.

25th September 1909 : French president Fallieres inaugurated the first international aeronautics salon at the Grand Palais in Paris. In only three days, 10,000 visitors flocked to see the exhibit. The Bleriot XI flown in the English Channel crossing was on display at the main entrance.

Henri Fabre's float plane - named the Hydravion - took off at La Mede, near Marseille, on 28th March 1910.

Flying a Bleriot, the young Peruvian Geo Chavez set an altitude record of 8,484 feet on 8th September 1910. On 23rd September, he attempted the first crossing of the Alps, from Brigue, Switzerland to Domodossola, Italy. Unfortunately, the Bleriot nose-dived from only 30 feet. Chavez died four days later.

The first postal delivery service by air was launched on 18th February 1911. Flying from Allahabad to Naini (India), the French pilot Henri Pequet carried 24 pounds of mail on a Sommer biplane. The stamps on the letters read "First Aerial Post".

On 1st March 1912, American Albert Berry "parachuted" from a Benoist biplane flying over Saint Louis, Missouri, at an altitude of 2,475 feet. The first parachute jump, from a hot-air balloon, was completed by Frenchman Andre-Jacques Garnerin, on 22nd October 1797.

At a time when medium- sized aircraft were being built, the Russian engineer Igor Sikorsky designed the first four-engine biplane, dubbed the Grand. It featured four 100-HP Argus engines, with a 16-wheel landing gear (equipped with skis in winter). On 2nd August 1913, it carried 8 passengers on a flight that lasted 1 hour and 54 minutes.

Flying a Morane-Saulniers, Roland Garros left Saint-Raphael on 23 September 1913, crossed the Mediterranean and touched down in Bizerte, Tunisia, covering the 453 miles in 7 hours and 53 minutes.

The brainchild of a local financier, the first regular route from Saint Petersburg to Tampa, Florida, was launched on 1st January 1914. The Benoist 14 float plane could carry a single passenger along the 18-mile route-at a rate of 5 dollars per 145 pounds, and 13 cents for each additional pound and a half.

11th Feb 1914 : Igor Sikorsky's Ilya Mourometz, named for a 10th-century Russian hero, was an improved version of the Grand. Equipped with 125 and 140 HP engines, it also featured electric lighting and central heating and could carry 16 passengers. It was the first plane to be used as a bomber during the impending war.

Jules Vedrines had already made quite a name for himself as one of the best race pilots in Europe. He demonstrated the flexibility of the Caudron G3 and his own flying skills by landing the aircraft on the rooftop of Galeries Lafayette on 19th January 1919.

On 8th February 1919, 12 passengers set out for Kenley, near London, aboard a Farman Goliath piloted by Lucien Bossoutrot. The flight was classified as a military one, as Great Britain had banned all civilian flights to the British isles. Two days later, Farman inaugurated the Paris-Brussels link.

On 14-15 June 1919, John Alcock and Arthur Brown completed the first nonstop flight across the Atlantic in a Vickers-Vimy, flying from Saint John's in Newfoundland to Clifden, Ireland, in 15 hours and 57 minutes.

On 1st September 1919, Didier Daurat, Jean Dombray and Pierre Beaute, flying three Breguet XIVs, officially opened the Toulouse-Rabat line, the first leg in Pierre-Georges Latecoere's grand plan for a regular air link between France and

South America.

At the controls of her Caudron G3, the French aviatrix crossed the Andes cordillera on 1st April 1921. It may have been April Fool's Day, but her flight was no joking matter.

In December 1921, the journalist Louise Faure-Favier published the first guides designed to inform and entertain airline passengers. She was the godmother of in-flight magazines like this one. Never short on ideas, she also demonstrated the efficiency of the wireless telephone by reading her novel, Les Chevaliers de l'air, from an airplane.

The young Spanish engineer Juan de La Cierva invented the autogiro, a hybrid of the helicopter and the airplane, with a tractor propeller and four rotary blades. He reached an altitude of nearly 13 feet on his maiden flight (9th January 1923) and crossed the English Channel in 1928.

The first helicopter flight, of one kilometer, is made on 4th May 1924, by the French engineer Etienne Oehmichen (1884-1955), who had been working on the perfection of rotating wings since the end of World War I. Unable to find financing, he stopped his research in 1937.

Four Douglas World Cruisers left Seattle on 6th April 1924, on the first round-the-world flight. On board were eight pilots from the Army Air Force. Only two of them completed the 27, 494-mile trip 175 days later, after 371 hours and 11 minutes in the air, but they all returned home safe and sound.

On 25th December 1925, after working for Latecoere for a year, Jean Mermoz received a medal from the Aero-Club de France for his performance during the year : he covered 74, 400 miles in 800 hours of flight.

Pierre-Georges Latecoere had nearly achieved his dream when he was forced to sell his company to Marcel Bouilloux-Laffont in April of 1927. Didier Daurat was the boss, and Jean Mermoz, Antoine de Saint-Exupery and Henri Guillaumet were at the controls. The legendary air mail deliveries began.

Charles Nungesser and Francois Coli took off from Le Bourget Airport near Paris for New York on 8th May, 1927, aboard L'Oiseau-blanc. They were never seen again.

On 20-21 May 1927, Charles Lindbergh made the first nonstop New York-Paris flight in 33 hours and 30 minutes aboard the Spirit of Saint Louis.

The French aviators Costes and Le Brix made a nonstop flight between Saint-Louis, Senegal and Natal, Brazil, on 14th October 1927, aboard the Nungesser et Coli, a Breguet XIX.

On 11th June 1928, Fritz Stamer, a German engineer and pilot, flew on a "duck" glider, the Espenlaub 5, equipped with rocket boosters. After a half-mile flight, it

caught fire and broke up on landing. This first flight of a jet-propelled plane was followed by Fritz von Opel's more successful one, on 30 September 1929, although he, too, had landing problems.

On 13th June 1929, the Bernard monoplane Oiseau Canari, piloted by Frenchmen Assollant, Lefevre and Lotti, had trouble taking off in spite of its powerful Hispano Suiza engine. The crew later discovered the cause of the problem : a stowaway on board, the young American Arthur Shreiber. Despite the overload, the plane landed in Spain after 22 hours of flight over 2,410 miles, setting many records: a first for France over the North Atlantic, the longest flight over the ocean and the first stowaway in air history.

Ellen Church, a young nurse, offered her services to United Airlines, and on 15th May 1930, the first eight air hostesses made their debut on the Chicago-San Francisco run.

It was said that no human being could survive the cold and snow of the Andes Cordillera. Henri Guillaumet proved them wrong in June of 1930.

The French pilots Costes and Bellonte left Le Bourget Airport near Paris at 10:55 am on 1st September 1930, aboard their Breguet XIX Point d'interrogation and landed at Curtiss Field in New York 37 hours and 18 minutes later. Charles Lindbergh himself was there to welcome them.

20-21 May 1932 : Five years after Lindbergh's pioneering flight, Amelia Earhart crossed the North Atlantic on a solo flight between Newfoundland and Ireland aboard her Lockheed-Vega.

On 17th August 1933, four French companies (five when they were later joined by Aeropostale) became one. The new company needed a name. A journalist suggested "Air France". The sea horse became its emblem, and Ernest Roume was its first chairman. The merger was the idea of Air Minister Pierre Cot, who presided over the inauguration ceremonies on 7 October at Le Bourget Airport.

On her third attempt, Jean Batten, a young pilot from New Zealand who had given up the piano to take to the air, succeeded in flying from London to Port Darwin on 8-23 May 1934: 9,920 miles in 14 days, 23 hours and 25 minutes.

Helene Boucher's desire to push her Caudron Rafale beyond its limits made her the fastest woman in the world, on 8th August 1934.

On 31st December 1934, in a first, the American pilot Helen Richey was hired by Central Airlines, but opposition from the unions soon forced her to quit.

The Douglas DC-3, the aircraft that revolutionized air

transportation, made its test flight on 17th December 1935.

"… More than once, Mermoz disappeared in the desert, the mountains, the night and the sea. He returned only to leave once again… After 12 years, he radioed from the South Atlantic that he was cutting his rear right engine. And then there was silence". Antoine de Saint-Exupery, describing the disappearance of Jean Mermoz on 7th December 1936, in Terre des hommes (Gallimard).

Amelia Earhart took off on 2nd July 1937, to attempt the longest circumnavigation of the globe ever made, an exploit from which she never returned.

11th July 1938 The eccentric billionaire Howard Hughes was also a pilot. He made a "small" trip around the world in July 1938, starting in New York aboard a Lockheed Cyclone. He broke the New York-Paris speed record and received a hero's welcome at Le Bourget Airport.

The first paying passengers crossed the Atlantic Ocean on 28th June 1939, aboard a Pan Am Boeing 315, a four-engine float plane. The cost of a one-way transatlantic trip between New York (Port Washington) and Marseille: 375 dollars.

2nd Jan 1946 Air France once again became the official name of the newly nationalized airline company. Henri Desbrueres was named Managing Director.

On 1st July 1946, Air France inaugurated the New Yrok-Paris route with the Ciel Ile-de-France. The Minister of Transporation, Jules Moch, was one of the VIPs aboard the DC-4.

An ejection seat was used for the first time on 26 June 1946, when the British pilot Bernard Lynch ejected himself from his Meteor plane, while flying at a speed of 300 mph and an altitude of 8,200 feet.

On 14th October 1947, Chuck Yeager shattered the sound barrier, reaching a speed of Mach 1.05 aboard a Bell X-1 rocket plane, launched from a Bell X-1 rocket plane, launched from a B29 plane.

(Extracted from the AIR FRANCE magazine - August 1998 issue)

II. MULTIPLICITY OF IDEAS

In a review of progress such as this, it is obviously impossible, when a certain stage of development has been reached, owing to the very multiplicity of experimenters, to continue dealing in anything approaching detail with all the different types of machines; and it is proposed, therefore, from this point to deal only with tendencies, and to mention individuals merely as examples of a class of thought rather than as personalities, as it is often difficult fairly to allocate the responsibility for any particular innovation.

During 1907 and 1908 a new type of machine, in the monoplane, began to appear from the workshops of Louis Bleriot, Robert Esnault-Pelterie, and others, which was destined to give rise to long and bitter controversies on the relative advantages of the two types, into which it is not proposed to enter here; though the rumblings of the conflict are still to be heard by discerning ears. Bleriot's early monoplanes had certain new features, such as the location of the pilot, and in some cases the engine, below the wing; but in general his monoplanes, particularly the famous No. XI on which the first Channel crossing was made on July 25th, 1909, embodied the main principles of the Wright and Voisin types, except that the propeller was in front of instead of behind the supporting surfaces, and was, therefore, what is called a 'tractor' in place of the then more conventional 'pusher.' Bleriot aimed at lateral balance by having the tip of each wing pivoted, though he soon fell into line with the Wrights and adopted the warping system. The main features of the design of Esnault-Pelterie's monoplane was the inverted dihedral (or kathedral as this was called in Mr S. F. Cody's British Army Biplane of 1907) on the wings, whereby the tips were considerably lower than the roots at the body. This was designed to give automatic lateral stability, but, here again, conventional practice was soon adopted and the R.E.P. monoplanes, which became well-known in this country through their adoption in the early days by Messrs Vickers, were of the ordinary monoplane design, consisting of a tractor propeller with wire-stayed wings, the pilot being in an enclosed fuselage containing the engine in front and carrying at its rear extremity fixed horizontal and vertical surfaces combined with movable elevators and rudder. Constructionally, the R.E.P.

monoplane was of extreme interest as the body was constructed of steel. The Antoinette monoplane, so ably flown by Latham, was another very famous machine of the 1909-1910 period, though its performance were frequently marred by engine failure; which was indeed the bugbear of all these early experimenters, and it is difficult to say, after this lapse of time, how far in many cases the failures which occurred, both in performances and even in the actual ability to rise from the ground, were due to defects in design or merely faults in the primitive engines available. The Antoinette aroused admiration chiefly through its graceful, birdlike lines, which have probably never been equalled; but its chief interest for our present purpose lies in the novel method of wing-staying which was employed. Contemporary monoplanes practically all had their wings stayed by wires to a post in the centre above the fuselage, and, usually, to the undercarriage below. In the Antoinette, however, a king post was introduced half-way along the wing, from which wires were carried to the ends of the wings and the body. This was intended to give increased strength and permitted of a greater wing-spread and consequently improved aspect ratio. The same system of construction was adopted in the British Martinsyde monoplanes of two or three years later.

This period also saw the production of the first triplane, which was built by A. V. Roe in England and was fitted with a J.A.P. engine of only 9 horse-power--an amazing performance which remains to this day unequalled. Mr Roe's triplane was chiefly interesting otherwise for the method of maintaining longitudinal control, which was achieved by pivoting the whole of the three main planes so that their angle of incidence could be altered. This was the direct converse of the universal practice of elevating by means of a subsidiary surface either in front or rear of the main planes.

Recollection of the various flying meetings and exhibitions which one attended during the years from 1909 to 1911, or even 1912 are chiefly notable for the fact that the first thought on seeing any new type of machine was not as to what its 'performance'--in speed, lift, or what not--would be; but speculation as to whether it would leave the ground at all when eventually tried. This is perhaps the best indication of the outstanding characteristic of that interim period between the time of the first actual flights and the later period, commencing about 1912, when ideas had become settled and it was at last becoming possible to forecast on the drawing-board the performance of the completed machine in the air. Without going into details, for which there is no space here, it is difficult to convey the correct impression of the chaotic state which existed as to even the elementary principles of aeroplane design. All the exhibitions contained large numbers--one had almost written a majority--of machines which embodied the most unusual features and which never could, and in practice never did, leave the ground. At the same time, there were few who were sufficiently hardy to say certainly that this or that innovation was wrong; and consequently dozens of inventors in every country were conducting isolated experiments on both good and bad lines. All kinds of devices, mechanical and otherwise, were claimed as the solution of the problem of stability, and there was even controversy as to whether any measure of stability was not undesirable; one school maintaining that the only safety lay in the pilot having the sole say in the attitude of the machine at any given moment, and fearing danger from the machine having any mind of its own, so to speak. There was, as in most controversies, some right on both sides, and when we come to consider the more settled period from 1912 to the

outbreak of the War in 1914 we shall find how a compromise was gradually effected.

At the same time, however, though it was at the time difficult to pick out, there was very real progress being made, and, though a number of 'freak' machines fell out by the wayside, the pioneer designers of those days learnt by a process of trial and error the right principles to follow and gradually succeeded in getting their ideas crystallised.

In connection with stability mention must be made of a machine which was evolved in the utmost secrecy by Mr J. W. Dunne in a remote part of Scotland under subsidy from the War office. This type, which was constructed in both monoplane and biplane form, showed that it was in fact possible in 1910 and 1911 to design an aeroplane which could definitely be left to fly itself in the air. One of the Dunne machines was, for example flown from Farnborough to Salisbury Plain without any control other than the rudder being touched; and on another occasion it flew a complete circle with all controls locked automatically assuming the correct bank for the radius of turn. The peculiar form of wing used, the camber of which varied from the root to the tip, gave rise however, to a certain loss in efficiency, and there was also a difficulty in the pilot assuming adequate control when desired. Other machines designed to be stable--such as the German Etrich and the British Weiss gliders and Handley-Page monoplanes--were based on the analogy of a wing attached to a certain seed found in Nature (the 'Zanonia' leaf), on the righting effect of back-sloped wings combined with upturned (or 'negative') tips. Generally speaking, however, the machines of the 1909-1912 period relied for what automatic stability they had on the principle of the dihedral angle, or flat V, both longitudinally and laterally. Longitudinally this was obtained by setting the tail at a slightly smaller angle than the main planes.

The question of reducing the resistance by adopting 'stream-line' forms, along which the air could flow uninterruptedly without the formation of eddies, was not at first properly realised, though credit should be given to Edouard Nieuport, who in 1909 produced a monoplane with a very large body which almost completely enclosed the pilot and made the machine very fast, for those days, with low horse-power. On one of these machines C. T. Weyman won the Gordon-Bennett Cup for America in 1911 and another put up a fine performance in the same race with only a 30 horse-power engine. The subject, was however, early taken up by the British Advisory Committee for Aeronautics, which was established by the Government in 1909, and designers began to realise the importance of streamline struts and fuselages towards the end of this transition period. These efforts were at first not always successful and showed at times a lack of understanding of the problems involved, but there was a very marked improvement during the year 1912. At the Paris Aero Salon held early in that year there was a notable variety of ideas on the subject; whereas by the time of the one held in October designs had considerably settled down, more than one exhibitor showing what were called 'monocoque' fuselages completely circular in shape and having very low resistance, while the same show saw the introduction of rotating cowls over the propeller bosses, or 'spinners,' as they came to be called during the War. A particularly fine example of stream-lining was to be found in the Deperdussin monoplane on which Vedrines won back the Gordon-Bennett Aviation Cup from America at a speed of 105.5 m.p.h.--a considerable improvement on the 78 m.p.h. of the preceding year, which was by no means accounted for by the mere increase in engine power from 100 horse-power to 140 horse-power. This machine was the first in

which the refinement of 'stream-lining' the pilot's head, which became a feature of subsequent racing machines, was introduced. This consisted of a circular padded excresence above the cockpit immediately behind the pilot's head, which gradually tapered off into the top surface of the fuselage. The object was to give the air an uninterrupted flow instead of allowing it to be broken up into eddies behind the head of the pilot, and it also provided a support against the enormous wind-pressure encountered. This true stream-line form of fuselage owed its introduction to the Paulhan-Tatin 'Torpille' monoplane of the Paris Salon of early 1917. Altogether the end of the year 1912 began to see the disappearance of 'freak' machines with all sorts of original ideas for the increase of stability and performance. Designs had by then gradually become to a considerable extent standardised, and it had become unusual to find a machine built which would fail to fly. The Gnome engine held the field owing to its advantages, as the first of the rotary type, in lightness and ease of fitting into the nose of a fuselage. The majority of machines were tractors (propeller in front) although a preference, which died down subsequently, was still shown for the monoplane over the biplane. This year also saw a great increase in the number of seaplanes, although the 'flying boat' type had only appeared at intervals and the vast majority were of the ordinary aeroplane type fitted with floats in place of the land undercarriage; which type was at that time commonly called 'hydro-aeroplane.' The usual horse power was 50--that of the smallest Gnome engine--although engines of 100 to 140 horse-power were also fitted occasionally. The average weight per horse-power varied from 18 to 25 lbs., while the wing-loading was usually in the neighbourhood of 5 to 6 lbs. per square foot. The average speed ranged from 65-75 miles per hour.

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By ERNEST JONES

FOLLOWING is a list, chronically arranged, of all those who piloted power airplanes anywhere in the world to the end of 1908, so far as the record seems to show in press items, aeronautic journals and official reports. The compiler solicits corrections.

1-WILBUR WRIGHT,

United States

December 14, 1903---Wilbur Wright made the WORLD"S FIRST FLIGHT in a power-driven airplane, 105 ft. in 3.5 secs. in Kitty Hawk, North Carolina. The machine was slightly damaged in landing.

On December 17, 1903, he made the world's third flight, one of 195 ft. in just under 13 secs. Later in the day the fifth and world famous flight was made, 852 ft. in 59 secs. The wind ranged from 22-27 mph. While deciding on further flying, the wind turned the machine over and damaged it beyond the practicability of further immediate flights, and the Wrights returned to Dayton.

On September 16, 1908, Wilbur Wright began a series of astounding flights in France in the course of delivery to a French syndicate, ending the year with another NEW WORLD RECORD for distance and duration, covering 124.7 kils. in 2:20:232 and winning the Michelin trophy---by far the longest flight ever before made.

2-ORVILLE WRIGHT

United States

December 17, 1903---Orville Wright, in Kitty Hawk, North Carolina, made the WORLD'S SECOND FLIGHT, 120 ft. in 12 secs., against a wind of 27 mph. The fourth flight of the Wright machine was made the same day---200 ft., 15 secs. Local citizens were present during all of these flights. The method of launching was by rail. The French experimeters employed wheels.

During 1904 and 1905 flights were continued with two other machines at Dayton, Ohio, where local residents were again astonished witnesses. The more important of these flights were as follows:

September 26, 1905---11,125 miles in 18:09 by Wilbur Wright; September 29, 1905---12.00 miles in 19:55 by Orville Wright; September 30, 1905---...miles in 17:15 by Orville Wright; October 3, 1905---15.25 miles in 25:05 by Orville Wright; October 4, 1905---20.75 miles in 33:17 by Orville Wright and October 5, 1905---24.2 miles in 38:03 by Wilbur Wright.

To the end of 1905 about 160 flights in all were made, covering as many miles. The record of October 5, 1905, was not beaten anywhere in the world until 1909.

May 6, 1908---Renewing flights preparatory to fulfilling foreign and American contracts, the Wrights returned to Kitty Hawk and made a series of 13 flights as follows:
May 6, 1908---1,008 ft. in 0:22;
May 8, 1908---956 ft. in 0:31;
May 8, 1908---2,186 ft. in 0:59.5;
May 11, 1908---0.78 mile in 1:11;
May 11, 1908---1.55 miles in 2:11;
May 11, 1908---1.80 miles in 2:28;
May 13, 1908---1.85 miles in 2:44;
May 13, 1908---0.60 miles in 0:55;
May 13, 1908---------- miles in 2:40;
May 13, 1908---2.40 miles in 3.20;
May 14, 1908---0.37 miles in 28:6 (In this flight, Charles Furnas, SECOND AIRPLANE PASSENGER, flew with Wilbur);
May 14, 1908---2.55 miles in 3:40:25 again with Furnas and
May 14, 1908---5.00 miles in 7:29

In September 1908, Orville Wright began flying in Washington preliminary to delivering the airplane contracted for under Signal Corps

specifications, breaking all previous records.

3-T. VUIA,

France

March 18, 1906---Despite the credit generally given Santos Dumont, it would appear that Vuia was the first beside the Wrights to take off with a power airplane.

After some days of trials at Sartrouville, beginning March 2, 1906, a flight of about 12m. was made on March 18.

The machine was a miniature tractor monoplane, wings arched laterally, rudder immediately to rear of chassis, 25 h.p. carbonic-acid gas engine. No appreciable flights were made, however, until August 12, 1906. After changes in the machine (*Viua II)*, and a rear horizontal stabilizer added, a flight of 8-10m. was made at Montagny, June 21. Other flights were as follows:

July 19---20m., Montagny
August 19---24m., Montagny
October 7-14---4m., Issy
January 26, 1907-----m., Bagatelle
March 2, 1907---4-10m., Bagatelle
March9-27---Running on ground and up to 3-4m.

April 1907---Machine modified and Antonoinette 24 h.p. engine installed. This was a tractor monoplane with folding wings of steel tube ribs, rudder aft hinged to chassis, fixed horizontal stabilizer aft on outrigger and an elevator further aft.

July 5, 1907---Flew 20m. and crashed at Bagatelle.

Vuia never attained further prominence in aeronautics, and made no further flights.

4-J. C. H. ELLEHAMMER

Denmark

September 12, 1906---Ellehammer, who had begun full-sized experiments in 1905 at Lindholm, Denmark, made his first flight of 42m. in his monoplane. Between that date and 1908 he made some 200 flights, of which the longest was 175m. on January 14, 1908, in a tractor triplane with his own engine of some 36 h.p.

His 1906 machine had but nine h.p. His second machine was a baby tractor of 18 h.p., rear elevator automatically connected with engine and variable angle of incidence of wings. This got off temporarily on various occasions.

On February 13, 1908, he covered 300m., and began curves. In June 1908, he made short hops, up to 100m., in Kiel where he won 5,000 marks in the presence of Prince Henry of Prussia for a flight lasting 11 secs. He was not prominent after this date.

5-SANTOS DUMONT

France

September 13, 1906---Alberto Santos Dumont,a Brazilian resident in France, famous for his experiments with small airships, made the first recobnized airplane flight in France, on of 7-8m. at Bagatelle, in his XIV-*bis* (Antoinette 50 h.p.), after experiments with the ehlicopter.

The machine was a box-kite structure, a pusher tailless biplane, wings at sharp dihedral, with a box elevator forward at the end of a covered fuselage.

Trials of the machine had actually begun in July, suspended under his airship *XIV* and run along the ground, and later on its wheels without the balloon support.

October 23, 1906---He flew more than 50m., though not measured. He was carried about on the shoulders of an American named Huntington. The flight was officially homologated at 23m., winning the Archdeacon Cup for the first time.

November 12, 1906---Flew 220m., officially obsserved, in 21.2 secs., winning the Archdeacon Cup and the Aero Club of France prize of 1,500 F. for the first flight of 100m. FIRST "OFFICIAL" DURATION AND DISTANCE RECORD.

Five other flights were made this day of 40, 40, 60, 50 and 82.6m.

Two auxiliary surfaces were added to each outer cell of the machine acting as ailerons. He won the first of the 100F. prizes of the A.C.F. and was declared

second holder of Archdeacon Cup by his flight of 82.6m. in 7.2 secs.

The entire world heralded these flights. Made before officials of the Aero Club de France, newspaper correspondents and other witnesses, they stirred up renewed effort everywhere, and attracted attention to the earlier and infinitely greater flights of the Wrights.

The winter was spent in building a new machine, thought his next flight was at St. Cyr, on April 4, 1907, 50m., in the *XIV-bis* of 1906.

Trials went on at same time with the new machine *XV* (Antoinette 100), a headless biplane with sharp dihedral in wings like *XIV-bis,* a tractor this time, with elevators on outer forward corners of dihedral main planes of wood instead of fabric, biplane tail enclosing two vertical panels. The tail acted as both elevator and rudder, being mounted on a universal joint at the end of bamboo outriggers. No flights appear to have been made, thought trials began March 22, 1907.

The next Dumont airplane was the *XIX,* the famous *Demoiselle,* a baby tractor monoplane with two-cylinder opposed air-cooled Dutheil-Chalmers engine of 17-20 h.p., with elevator forward just ahead of the chassis on a level with the axle. The wings had a sharp dihedral angle. Vertical lozenge-shaped panel on each side of chassis and a universally mounted cruciform tail.

November 16, 1907---With this machine wre made flights of 200m., 100m. and 200m. at Issy on November 17, among others.

March 1908---Experiments were made with Dumont's sixteenth aircraft, a machine with two engines of low power.

October 1908---A new *Demoiselle* was flown at Issy similar to above but with forward elevator omitted and with an Antoinette 24 h.p. engine. In November it was flown at St. Cyr.

Flights were continued at various times through 1909, including the FIRST CROSS-COUNTRY flight one of about eitht kils., from St. Cyr to Buc on September 13, returning the following day, and another on the seventeenth, of 18 kils. in 16 mins. Dumont's name was not thereafter prominently connectied with aeronautics.

The *Demoiselle,* fitted with two-cylinder engine, became rather popular. It was flown by Audemar and Roland Garros at the Belmont Park, New York, meet in 1910 and facsimiles and parts therefor were sold by American supply concerns for several years thereafter.

6-CHARLES VOISIN,

France

March 16, 1907---Charles Voisin made his first power flight. He and his brother Gabriel were among the pioneers in flight (1904) experimentation and had had long experience at gliding. They had established a factory for the production of gliders and experimental machines for themselves and others.

Having constructed a power machine for Leon Delagrange, Charles Voisin undertook to demonstrate it and began grasscutting on February 28, 1907, at Bagatelle. On March 16 it flew 10m.

March 30, 1907---Flights of 20 adn 60m. The machine was a biplane pushere, biplane elevator forward on outriggers, box tail aft on outriggers, rudder inside tail and Antonoinette 50 h.p. engine.

April 8, 1907---50m at Bagatelle; on the thirteenth, 34m. The machine was delivered to Delagrange, but he did not fly it until later. Charles Coisin did not fly again.

7-LOUIS BLERIOT,

France

April 5, 1907---On this day Louis Bleriot made his first flight, one 5-6m, at Bagatelle, after several years of experimenting. April 5, 2-3m; April 19, crash.

The machine was a tailless pusher monoplane, elevator and rudder forward, paper-covered wings upturned at lateral extremities and Antoinette 24 h.p. engine.

Bleriot began in 1900 with a beating-wing machine. His second was a Voisin along the lines of that made for Farman and Delagrange in 1905. In 1906 a third was experimented with on Lake Enghien. This two-screw, 24-h.p.

Antoinette tractor biplane had two elliptical cells arranged in tandem, forward biplane elevator, rudder aft and was mounted on two floats. It was later altered and tried October 12-18, 1906, with two 24 h.p. Antoinette engines driving two propellers.

Again it was remodeled, fitted with a 50 h.p. Antoinette. In this the rear ellipticalcell was comprised of two parallel surfaces. Two pusher screws were placed aft of the forward cell, with rudder in rear cell. Biplane elevator forward on outriggers.

Wheels were substituted for floats and the machine moved to Bagatelle. Mounted by Peyret, this machine, now called No. 4, was smashed without flying.

Bleriot himself achieved his success with No. 5, the *Canard,* his first monoplane, on April 5, 1907. On the nineteenth it was broken.

Then No. 6 was constructed, a Langley-type tractor monoplane, the *Libellule,* with dihedral wings covered with paper, Antoinette 24 h.p. engine and rudder at aft end of fuselage. At the tips of the wings were wing sections otating about transverse shaft as elevators. With this he made flights between July 11-August 6 up to 150m.

August 10-September 17---With a 50 h.p. Antoinette, flights were continued, the longest being 184m., the longest flight since that of 220 m. by Santos Dumont on November 12, 1906.

The *Bleriot VII* (50 h.p. Antoinette), tractor monoplane, with combined ailerons and elevators (?) at each side of aft end of fuselage, flown next at Issy.

October 5-December 18, 1907---Various flights up to 500m.

April 1908---Trials commenced with *Bleriot VII-bis.* (Antoinette 50 h.p.), tractor monoplane with warping wings, elevator and rudder aft end of fuselage.

June 17-July 23, 1908---with *VIII-bis.* On June 29 he won the second A.C.F. prize for 200m. in a flight of 700m. On July 4 he flew 8:24 in the *VIII-ter.*

September 9-October 30, 1908---Flights with *VIII-ter* at Issy, the longest being seven kils. in 6:40 on October 21.

October 31---Bleriot flew cross-country from Toury to Artenay 14 kils. He returned to Toury after one stop en route. Other flights in November. The *Bleriot IX* was not overly successful.

Then he produced No. *X,* a biplane, with three rudders forward on outriggers, two elevators aft on outriggers at outer extremities of wings, no tail and driven by chain through reduction gears by a 50 h.p. Antoinette. It was not lown.

The *Bleriot XI* (Antoinette 65 h.p.) was brought out ini January 1909. This was a tractor monoplane with warping wings, open fuselage, fixed horizontal stabilizer in tail to which were hinged elevators and which were hinged elevators and rudder on rear strut of fuselage.

This machine with the Gnome 50 and 100 h.p. engines was so successful that it was copied all over the world. In America copies and parts gherefor were sold to a rather large extent. Leblanc and others flew Bleriots in the Belmont Park meet in 1910.

Bleriot's greatest achivement in actual flight was his FIRST AIRPLANE CORSSING OF ENGLISH CHANNEL., July 25, 1909. In the Rheims meet in August 1909, he won first prize for speed over Curtiss. After some further experimenting with two other machines, including a monoplane "limousine," Bleriot quit active participation in flying.

8-HENRI FARMAN,

France

September 30, 1907---Starting with a Voisin-50 Antoinette similar to that built for Delagrange, Farman was successful in flying 30-80m. at Issy, his first flight.

October 15, 1907---285m., unofficially beating the Santos Dumont record of 220m. Subsequent principal pioneer flights were made as follows;

October 19, 1907---100m.

October 23, 1907---185m. in 15.4 secs., winning the first of the 150m. prizes of the A.C.F. Five others, longest 150m.

October 24, 1907---Three flights 100m. or more.

October 25, 1907---Six flights up to 190m.

October 26, 1907---770m. in 52.6 secs., a new OFFICIAL WORLD

RECORD FOR DURATION AND DISTANCE, winning the Archdeacon Cup held by Santos Dumont and money prize of the A.C.F. for the first official flights of 300 and 500m. Seven other flights up to 400m. Other flights up to 400m. made following days. He also established speed record of 52.7 k.p.m.

November 9, 1907---Twice beat previous record by flying 800 and 400m. and beginning to circle.

November 10, 1907---1,036m. in 1:14, complete circle and some short flights, continuing on eleventh. THIRD MAN TO FLY A KILOMETER, and first in Europe.

November 11, 1907-January 11, 1908---Flights with circles continued almost daily, up to 700m. On January 11, 1908, he covered 1,800m. in 1:45.

January 13, 1908---Won Deutsch-Archdeacon prize of 50,000F. offered four years before for the first complete circuit of 1,000m. at Issy, duration 1 min. 28 secs. Another new DURATION AND DISTANCE RECORD; also SPEED RECORD of 1:28 for one kil.

January 14, 1908---he made a flight of 1,500m. in 1:33.

At this time he was constructing his tandem monoplane *Farman II* that never achieved success.

March 14, 1908---Renault 40 h.p. engine fitted and flights 500-600m. at Issy. The machine, the *I-bis,* had been slightly altered.

March 21---DURATION AND DISTANCE RECORD flight of 2,004.8m. in 3:31, doubling previous official flight in circular flight, the Antoinette having been reinstated.

May 1, 1908---Antoinette 60 h.p. substituted and short flights made. On may 25-June 2 exhibition flights were made in Ghent, Belgium.

May 30, 1908---In Ghent, Ernest Archdeacon carried 1,241m., the THIRD PASSENGER TO RIDE IN AN AIRPLANE.

July 6, 1908---At Issy, Farman flew 20:19.6, winning the Armengaud prize of 10,000F. for first machine to fly a quarter hour in France. A new DURATION RECORD.

July 31-August 8, 1908---Farman flew in America at Brighton Beach, New York.

September 29, 1908---42 kils. in 43 mins. at Mourmelon.

September 30, 1908---34 kils. in 35:36 mins. at Mourmelon.

October 2, 1908---40 kils. in 44:32 mins. at Mourmelon.

October 28, 1908---M. Painleve carried about two kils. and other flights made up to 40 kils. Ailerons put on.

October 30, 1908---Flew cross-country Chalons-Rheims, 27 kils. in 20 mins., the machine returning by truck.

October 31, 1908---Won the 25m. height prize.

November 16, 1908---Added extra surface turning the machine temorarily into a triplane at Chalons and made some flights up to 10 kils.

Filghts continued up to the end of the year and subsequently. In 1909 he designed and built his own machine, which he entered at the great Rheims meet. On July 18, 1909, he flew for one hr. 23 mins, at Chalons, and on August 27 he made a 180-kil. flight in 3:04:56.4 at Rheims, official WORLD RECORD FOR DISTANCE AND DURATION, winning first prize. On the twenty-eighth he flew 10 kils. in 10:39 with two added passengers, the FIRST TIME THREE WERE CARRIED IN AIRPLANE.

He next flew proiminently at Blackpool meet, England, and won first duration and distance prize of $10,000, on OCtober 20, 1909. On November 3 he flew 232 kiils. in 4:17:53 at Mourmelon, another new WORLD DURATION AND DISTANCE RECORD.

Farman went into manufacturing and became one of the world's most famous makers of airplanes.

9-ROBERT ESNAULT PELTERIE,

France

October 22, 1907---Robert Esnault Pelterie made his first flight, one of 150m., at Buc. Other flights were as follows;

October 26---Several of 100m.

October 27---Described arcs and damaged machine; 100m.

November 16---Short flight.

The *Pelterie I* was a tractor monoplane, closed fuselage, warping wings, flexible rudder and elevator aft. R.E.P., 30 h.p. air-cooled, seven-cylinder engine.

June 8, 1908---Trials began with *Pelterie II,* flying 300m., 500m., and 1,200m. at 30m. height, record height and distance for monoplanes.

The machine was then altered into the *II-bis* and in November 1908 flights were continued. On November 21, 1908, at Buc, the machine made 316m. and other flights of 250-300m. flown by M. Chateau, who won the third and last A.C.F. prize for 200m. The Pelterie machine was flown in the Rheims meet of 1909, but was not prominent thereafter. It was the first machine to have a welded steel fuselage and an oleopneumatic landing gear.

Subsequently, Pelterie quit flying and devoted himself to the manufacture of aircraft engines and planes. He began his experimenting in 1906, making towed flights.

September 19---He flew 500m.

10-LEON DELAGRANGE,

France

November 5, 1907---First flight by Leon Delagrange, thought the machine built for him by Voisin brothers had been previously flown by Charles Voisin in a series of experiments beginning at Vincennes, February 28, 1907. The flights were later made at Issy where, on November 5, 1907, Delagrange himself flew 100m.

January 20, 1908---With the *Delagrange II,* similar to the previous one, with Antoinette 50 h.p. engine, he flew 100m.

March 14, 1908---300m. in 19 secs.

March 16---Five flights 500-600m.

March 17---Won first of the 200m prizes by a flight of 269.20m. in 21.2 secs.

March 20---Competing in rivalry with Farman, he made a circle of about 700m.

March 21---Took up Henri Farman, FIRST PASSENGER TO FLY IN AIRPLANE. Other flights made up to 1,500m. in 2.5 mins.

April 10---2,500m., in which the wheels touched for an instant.

April 11---3,925m., in 6:30, although the flight really lasted 9:15 and covered 5,575m., but the wheels touched. The smaller figure established a NEW WORLD DISTANCE AND DURATION RECORD official, beating Farman's record of 2,004.8 in 3:39 of March 21.

May 23-31---In exhibitions in Rome, Italy, he made numerous flights up to eight kils. in 9:30 before the king (May 27) and established new official world DURATION AND DISTANCE RECORDS of 16 kils. in 16:30 (June 22) and 17 kils. in 18:30 (June 23).

June 27-July 10---Flights in Turin. On July 8 he took up Mme. Therese Peltier, FIRST WOMAN TO FLY IN AIRPLANE, and M. Montu.

Returning to France he began flying again on September 3. On September 5 he flew 10 kils. in 9:40 with a new Antoinette of 50-60 h.p.

September 17, 1908, he flew 30:26 and again took up Mme. Peltier.

Flights continued. In August 1909 he flew a Voisin and a Bleriot at Rheims meet in which Curtiss represented America. He ahd become one of the greatest aviators of his time and flew in a number of meets. An unsuccessful attempt was made to bring him to America.

He was killed in flight at Bordeaux, January 4, 1910.

11-COUNT HENRI DE LA VAULX,

France

November 19, 1907---At St. Cyr, in a monoplane (Antoinette 40 h.p.) constructed by Mallet, the balloon constrctor, on plans of Tatin, De la Vaulx flew some 70m., smashing the machine in a second attempt.

It was a pusher monoplane, with twin pusher screws, elevator and rudder on outriggers aft.

De la Vaulx did not pursue aviation thereafter.

12-M. DE PISCHOFF,

France

After experimenting with gliders, Pischoff began construction of a power biplane. The main planes were curved in an arc laterally. Rudder and elevator aft on outriggers. An Anzani 25 h.p. air-cooled engine drove tractor screw.

December 5-6, 1907---First flights of some meters.

December 12, 1907---Flights of 50 and 100m. at Issy. On January 15, 1908, flights of 30, 40 and 80m.

He then joined with Koechlin and built a tractor monoplane with three pairs of wings tandem, stepped up toward the fron to closed fuselage. Dutheil-Chalmers 20 h.p. engine.

October 29, 1908---Flights with this machine commenced at Villacoublay, up to 500m.

The machine never became prominent nor did Pischoff attain fame as a pilot.

13-BOYER,

France

February 8, 1908---First flight by Boyer, a mechanic for Gastambide-Mengin, who flew the machine several meters. Tractor monoplane with Antoinette 50 h.p. Tail at aft end of fuselage. No elevator.

February 13---100 and 150m.

February 14---Flights up to 60m.

Boyer does not subsequently appear as a flyer.

14-WILLIAM W. CHRISTMAS,

United States

March 8, 1908---SECOND FLIGHTS IN AMERICA were made by Dr. William W. Christmas at Fairfax, Washington, D. C., one of which included a 90-degree turn, ending in a crash. On his plane was made the first application of ailerons as are known today. His patent was purchased by the Government for $100,000, after exhaustive verification by Air Corps patent examiners.

15-F. W. BALDWIN,

United States

March 12, 1908---THIRD FLIGHTS IN AMERICA. Flew 319 and 120 ft. at Hammondsport, New York, in the *Red Wing,* first airplane of Dr. Bell's Aerial Experiment Association.

The machine was a biplane, with wings tapering from a chord of 6.3 ft. at the center to four ft. at the extremities. The spread was 43 ft. The gap decreased toward each wing tip from 65. ft. at the center section, to five ft. at the ends. The total area of the main cell was 385.7 sq. ft. The elevator was placed in front at the end of a pointed rectangular bow projecting from the center panel. A fixed stabilizer and a rudder were mounted at the end of outriggers to the rear, no lateral control being provided. The engine was an air-cooled, eight-cylinder Curtiss, with carburetor for each cylinder, developing 40 h.p. at 1,800 r.p.m. It weighed 220 lbs., complete. The landing gear consisted of skids for operating from the ice of the lake, with light skids under tail and wing tips. The total weight of the machine with pilot was 570 lbs.

On May 18, 1908, the association's second machine, the*White Wing,* was flown 279 ft. The plane was generally similar to the *Red Wing.* It had, however, a box tail, triangular wing tips movable in opposite directions through a shoulder yoke control and a three-wheeled fixed running gear. On both machines a wheel on a pillar rocked fore and aft to operate the elevator. Turning the wheel steered left or right, respectively.

16-LIEUTENANT T. E. SELFRIDGE,

United States

May 19, 1908---Lieutenant Selfridge made two flights in the *White Wing,* of 100 and 240 ft., respectively. Subsequently, he made one flight in the *June Bug.*

17-GLENN H. CURTISS,

United States

May 22, 1908---The *White Wing* was also flown by Curtiss, a distance of 1,017 ft. in 19 secs., the longest flight made thus far by the Aerial Experiment Association.

June 21, 1908---The third machine of the association, and the best known, the *June Bug,* was first flown by Curtiss. The first three flights were 456, 417 and 1,266 ft. Twenty-nine flights were made from June 21 to August 31, the longest being two miles.

July 4, 1908---The FIRST "OFFICIAL" FLIGHT in Amereica was made in the *June Bug* at Hammondsport by Curtiss when he won the *Scientific American* trophy for the first flight of one kil. in America. The distance officially recorded was 5,090 ft., and the time 1:42:5.

The *June Bug* was generally similar to its predecessors, but various detail changes were made. In November 1908 pontoons were added, and unsuccessful attempts were made to fly it as a seaplane.

On order of The Aeronautic Society of New York, the first Curtiss airplane known as such, waas built, and marked Curtiss' entrance into airplane manufacture. First flights were mad ein June 1909 and in the summer at the society's meet in New York. His subsequent flights during the teaching of Charles F. Willard were so successful that a duplicate machine was rushed to Europe, fitted with a more powerful engine. Curtiss won the first Gordon Bennett race in France and other events there and in Italy. On his return, he launched into the flying exhibition business and his teams covered the
On May 29, 1910, he flew from Albany to New York for t he world's $10,000 prize, making an AMERICAN CROSS-COUNTRY RECORD. The Curtiss machine was duplicated by hundreds throughtout the land, knock-down parts being featured by airplane supply houses.

18-J. A. D. McCURDY,

United States

May 23, 1908---McCurdy, a Canadian engineer like Baldwin, also a member of the A.E.A., made his first flight in the *White Wing* some 600 ft. On alighting, the machine turned over and was wrecked. McCurdy then made eight flights in the *June Bug* during July.

December 6, 1908---The fourth airplane of the experiment association, the *Silver Dart,* was the particular design of McCurdy who was its only pilot. Eleven flights from 200 yds. to a mile were made between December 6-22, 1908

February 23, 1909---The machine was next flown at Dr. Bell's summer home in Nova Scotia, with a new Curtiss eight-cylinder engine, the first Curtiss water-cooled one. Many flights were subsequently made, the longest being 12 miles. These were the FIRST FLIGHTS IN CANADA.

The *Silver Dart* had a vee-belt drive from the engine, which was mounted on the lower wing. It generally resembled the others, but had greater spread and wing-tip control surfaces. The forward wheel of the tricycle running gear was made steerable, being connected with the vertical rudder. There was no horizontal surface in the tail of this machine.

19-CAPTAIN L. F. FERBER,

France

July 22, 1908---First flights of Captain L. F. Ferber in Brest of 10, 30, 50 and 120m. in the *Ferber IX,* a reproduction of a model of 1905. On July 25 he covered 300m. Ferber was one of the pioneers in flight experiments,

interrupted by other work. He began in 1898 and collaborated with Chanute by correspondence, who converted him to the biplane. Ferber, however, introduced birdlike transverse curves in his wings. The machine was a tractor with triangular vertical fins at the lower extremities of the outer rear struts, adjustable, to serve in lieu of rudder. The elevator was forward on outriggers. The horizontal stabilizer was aft on outriggers with a fixed vertical skid panel. Antoinette 50 h.p. engine.

The machine was flown in August by Legagneux for 256m., winning the third prize of the A.C.F. for 200m.

September 5, 1908---Ferber flew for two mins., and on the nineteenth, 230m. On September 19 he made a flight of 500m. The machine was renamed the *Antoinette III.*

June 13, 1909---In a Voisin, Ferber flew five kils. at Juvisy in 5:30. On September 15, in Boulogne, he covered 9.65 kils. in nine mins. in a cross-country flight. On September 22, in BOulogne, he was killed when his machine overturned in rolling into a ditch preparatory to attempting a cross-channel flight.

20-PAUL ZENS

France

August 4---First flights of the Zens pusher biplane with elevator and rudder forward. Antoinette 50 h.p. Just hops off the ground.

21-GEORGES LEGAGNEUX,

France

August 19, 1908---With the *Ferber IX (Antoinette III),* Legagneux, mechanic of Antoinette company, flew 256m. and won the third prize of the A.C.F. for 200m.

September 19---He flew 500m. at Issy.

In 1909 he was flying a Voisin and became one of the world's foremost aviators.

22-WELFERINGER,

France

August 20, 1908---Welferinger of the Antoinette works, flew the Gastambide-Mengin machine up to 100m. at Issy after remodeling by the Antoinette company. On the flight of 100m., Wleferinger carried a passenger, Robert Gastambide, FIRST MONOPLANE TO CARRY TWO for 100m., on August 21. Other short flights were made to 50m. and 1:36 in duration, including a circle. The machine continued flying through October and was renamed the *AntoinetteIV*.

November 16---He flew the plane at Issy 600-700m., and continued on following days.

23-RENE GASNIER,

France

September 9, 1908---Rene Gasnier, famous balloonist, after trials beginning August 4, made flights of 30 to 80 m. in a pusher biplane with dihedral wingw, elevator forward on outriggers, rudder and ailerons on wings. Antoinette 40 h.p. engine.

Other flights were made through September up to 500m., when Gasnier was injured. Later, he learned to fly a Wright.

24-S. F. CODY,

England

On September 29, 1908, at Aldershot, S. F. Cody, an American living in England and working in aeronautics for the British Government, made his first flight of about 78 yds. On October 14 he covered 200ft.

The machine was a twin-screw tractor biplane, with front elevator on outriggers, rudder aft and ailerons on wings. Other machines were built, and he made some memorable flights.

On January 9, 1909, the machine was wrecked after 250 yds. February 22, 1909---First important flight, of 1,200 ft. On May 14 he covered a mile. On August 29 he carried a passenger in three flights, and on September 8 he made

a cross-country flight of about 40 miles lasting 1:03:00. The machine was wrecked and Cody injured at Doneaster meet, October 16, 1909. Cody became a naturalized subject of Great Britain. He had already become famous for his man-lifting kites with which the British Army experimented to a great extent. In 1907 Cody glided half a mile when released from a kite.

25-GABRIEL VOISIN,

France

October 6, 1908---Gabriel Voisin took off with the Goupy triplane, but crashed. Several other subsequent flights were made by him in the machine.

26-COLLIEX,

France

October 29, 1908---Piloted by Colliex, the Goupy triplane made several short hops at Issy. On November 9 he again flew it.

27-BARON DE CATERS

France

October 31, 1908---Baron de Caters made his first flight of 800m in a Voisin triplane with Vivinus engine of 57 h.p.

28-GRADE,

England

November 2, 1908---The Grade triplane flew 50m. at Magdebourg. A later monoplane became fairly successful. Grade did not become famous in aeronautics.

29-BELLAMY,

England

November 3, 1908---His palne took off but ended in a crash. Other experiments were subsequently made, but he did not achieve success.

30-GOUPY,

France

November 9, 1908---Goupy triplane flown by Goupy in a short flight at Issy. December 7 flights up to 120m.

31-LIEUTENANT MARIO CALDERARA,

France

November 9, 1908---Goupy triplane flown by Lieutenant Calderara, of Italy, at Issy, France. In 1909 he was a pupil of Wilbur Wright at Rome and became prominent.

32-ZIPFEL,

France

November 19, 1908---At Lyon the Zipfel airplane took off.

Flights were made on November 25 up to 200m., and on November 26, 300m. By December 17 he had attained 1,500m. On January 28, 1909, he exhibition flights in Berlin. He was not, however, prominent thereafter.

33-J. C. MOORE-BRABAZON,

France

November 20, 1908---First flight of Moore-Brabazon machine at Issy. Flights up to 30m. on November 28.

December 3---Flights 500-600m.

December 7---200m.

January 17, 1909---Up to 500m.

January 18---800m.

January 28---J. C. Moore-Brabazon began learning the use of the Voisin airplane. Continuing his flying he won the *Daily Mail* $5,000 prize for a flight with a British Wright machine at Shell Beach on October 30, 1909.

From January 12 to February, 1909 he flew several times up to 3-5 kils.

In May, 1909 Brabazon was flying a Voisin in England. He was not

prominent thereafter.

34-CHATEAU,

France

November 21, 1908---At Buc, Chateau flew the *Pelterie II* for 316m., and other flights of 250 and 300m., winning the third and last A.C.F. prize for 200m.

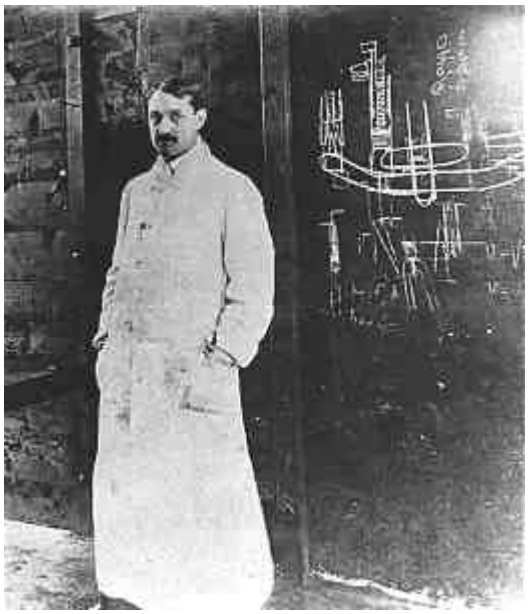
35-MELVIN VANIMAN,

France

December 18, 1908---Melvin Vaniman flew at Gennevilliers with his triplane, 70-80 Antoinette were on wing tips of central plane. Elevator and rudder forward on outriggers, stabilizer tail aft on outriggers.

HOME

Robert Esnault-Pelterie



Robert Esnault-Pelterie

1881 -- France

Naissance à Paris de Robert Esnault-Peltrie, le père de l’astronautique en France.

La grande aventure de l'espace, tome 1, Editions Rombaldi, 1967

1912 -- France - Russie

Robert Esnault-Peltrie prononce à Saint-Petersbourg une conférence sur "Les considérations sur les résultats d'un allégement indéfini des moteurs".

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

13/11/1912 -- France

Robert Esnault-Peltrie prononce pour la deuxième fois, à Paris à la Société française de physique, une conférence qui est accueillie avec scepticisme mais qui marque une date dans l'histoire de la navigation spatiale : "Les considérations sur les résultats d'un allégement indéfini des moteurs".

La grande aventure de l'espace, tome 1, Editions Rombaldi, 1967

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

01/02/1928 -- France

Robert Esnault-Peltrie et André Hirsch, un banquier, créent le prix international d'astronautique d'une valeur de 5000 francs afin de récompenser chaque année le meilleur ouvrage scientifique, théorique ou expérimental.

Exploration de l'espace, Editions Bordas, ISBN 0-0401277-1, 1982

Robert Esnault-Pelterie

01/11/1930 -- France

La collaboration est suffisamment bonne entre Robert Esnault-Peltrie et Jean-Jacques Barré pour qu'en novembre 1930, Esnault-Pelterie qui travaille sous contrat du Ministère de la Guerre demande le détachement de Barré auprès de lui pour travailler à la réalisation d'une fusée aérologique destinée à atteindre cent kilomètres d'altitude.

Ce détachement n'interviendra en fait que le vingt-cinq septembre 1931.

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

Janvier 1931 -- France

Robert Esnault-Peltrie entame la mise au point d'un moteur utilisant de l'oxygène liquide et de l'hydrocarbone en essai statique.

Encyclopédie visuelle de l'exploration de l'espace, Editions Bordas, ISBN 0-0401277-1, 1982

25/09/1931 -- France

Détachement de Jean-Jacques Barré auprès de Robert Esnault-Peltrie.

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

Octobre 1931 -- France

À peine trois semaines après son arrivée au laboratoire de Robert Esnault-Peltrie, situé à Boulogne sur Seine, Jean-Jacques Barré est le témoin d'une explosion résultant d'un essai d'un mélange de pétrole et de tétranitrométhane qui emporte l'extrémité des quatre doigts de la main gauche d'Esnault-Pelterie.

Notons que cet accident est à l'origine directe du choix de l'oxygène liquide jugé moins dangereux pour les essais de moteurs et de fusées qui auront lieu au cours des qinze années suivantes.

Au sein de la petite équipe d'Esnault-Pelterie, Barré poursuit des études théoriques et commence à mettre au point des composants de moteurs.

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

Septembre 1932 -- France

En septembre 1932, le détachement de Jean-Jacques Barré se termine, l'Administration militaire n'estimant pas alors que "l'étude des fusées puisse absorber l'activité d'un officier".

Toutefois, Barré apprend à Robert Esnault-Peltrie que le général Weygand est prêt à doubler voire à tripler la subvention accordée à ses travaux à condition qu'il obtienne des résultats tangibles dans les trois ans.

Jacques Villain, Jean-Jacques Barré pionnier français des fusées et de l'astronautique, SEP, 1993

01/12/1936 -- France

En décembre 1936, un moteur-fusée créé par Robert Esnault-Peltrie développe cent ving-cinq kilogrammes durant soixante secondes.

Exploration de l'espace, Editions Bordas, ISBN 0-0401277-1, 1982

06/12/1957 -- France

Décès de Robert Esnault-Peltrie.

La grande aventure de l'espace, tome 1, Editions Rombaldi, 1967

The Pioneers : Rep page 52

This page mostly contains slightly improved scanned reproductions of pre-WWI postcards. Quality may not always be as good as one would wish but the historical importance more than makes up for this.

Wright Flyer III (1908)

Few men could have imagined the importance of the Wright brothers' first powered flight on December 17, 1903. Five years later, in 1908, they showed their improved Flyer III in France. They proved that their design was superior to anything flying around at that time. Whereas most European machines could hardly make a few straightforward hops, they made long flights including turns. Europe was impressed to say the least !

Curtiss pusher (1906)

Whereas the Wright brothers approached aircraft development from a scientific point of view, Glenn Curtiss saw good business opportunities in aircraft production. His early pusher designs were built to order and several flew (or hopped ?) around in Europe.

Ferber (1908)

Captain Ferber, one of the early French pioneers, was also one of the first victims in an aerial crash. He died when his plane crashed and he got smashed by the engine. Early aviation could be dangerous too !

Voisin (1909)

One of the pioneers of French powered flight, Gabriel Voisin's biplanes became reknown for their stability. Several aircraft, including the racer illustrated, were built to order.

Witzig, Liore et Dutilleul biplane

Length : 12 m

Wing span : 8 m

Total wing surface : 50 m2

Max.weigth : 550 kg

Engine : 50 hp Renault

Sometimes described as a triplane, this machine had an auxiliary wing mounted between the main wing cellule and the tail. During its test flight period, it saw several modifications, sometimes even rather drastic, without much improvement to its 'flight' characteristics.

Avro Triplane

Owned by the Shuttleworth Thrust, this aircraft still is airworthy, nearly 100 years after its first flight !

Gastambide-Mangin monoplane (1908)

Precursor to the Antoinette series of monoplanes, this modern-looking aircraft made some succesful flights.

Antoinette VII monoplane (1909)

One of the first modern-looking monoplanes, the Antoinette was the type of aircraft in which Hubert Latham tried to cross the Channel, the 30 km stretch of sea separating France and England. He failed twice, its V-8 engine cutting out above the water on both occasions.

Length : 7.89 m

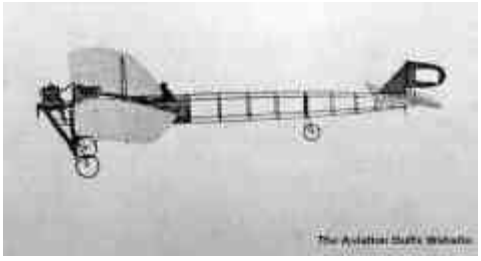
Wing span : 8.69 m

Empty weigth : 200 kg

Load : 120 kg

Bleriot XI (1909)

Most important competitor to Hubert Latham for the cross-channel flight, Louis Bleriot made it on his first attempt on July 25, 1909. The very simple 3-cylinder 25hp Anzani engine allegedly received some much needed additional cooling from a bit of drizzle when nearing the English coast. Louis Bleriot instantly turned into a national hero, England was no island anymore.



Tellier monoplane

The best compliment to a good design is a better copy. Whether the Tellier was better than the Bleriot XI it tried to imitate is doubtful, but it sure was a flyable aircraft, as evidenced by this picture.

Deperdussin monoplane (1909)

The cross-channel flight of Louis Bleriot proved the soundness of monoplane aircraft, and several builders followed Bleriot's example. One such aircraft was the Deperdussin monoplane, which looked extremely modern by the standards of the day. The Deperdussin company later became known as SPAD, famous for its S.VII and S.XIII fighters during the First World War.

Engine : R.E.P. of 25 or 30 hp

Wing surface : 17 m2

Maximum loaded weight : 440 kg

R.E.P. II

Robert Esnault-Pelterie may not have designed the most gorgeous aircraft, but his aircraft contained some important innovations. The method of controlling an aircraft in the air differed wildly between different designs, but Esnault-Pelterie's system was the first standardised system (stick and rudder pedals) which is still in use to this day.

Length : 7 m

Wing span : 11 m

Empty weight : 270 kg

Farman Type III (1910)

The Farman brothers Henry and Maurice wanted to become part of the ever-increasing number of aviatiors and ordered a Voisin biplane. Gabriel Voisin, however, decided to sell the aircraft built for the Farmans to someone else. The brothers were very disappointed and decided then to construct their own aircraft based on the Voisin design. Their Type III can easily be termed one of the most successful prewar aircraft, being licence-produced by several companies and illegally copied by others. Gabriel Voisin probably did not intend it this way !

Breguet

One of the other well-known French aircraft pioneers was Louis Breguet, who was able to commercialize this strange flying machine.

Sommer biplane

Loosely based on the Voisin and Farman designs, the Sommer was another successful aircraft. It was used in many prewar races and meetings and set some records.

Goupy II (1910)

Although not well-known, the Goupy is said to be the father of the modern biplane. Its construction are still in use today, the tractor propellor and ailerons being seen on most aircraft.

Robert Esnault-Pelterie (1881-1957)

Robert A. C. Esnault-Pelterie of Geneva, Switzerland, an EB Life Member, passed way in November, 1957.
Mr. Esnault-Pelterie made his first flight in the spring of 1907 at his own Aerodrome Toussus-le-Noble (Seine et Oise). He held French Pilot License N.4 (1908). Saw military service in Sapeurs-Telegraphistes Mont-Valerien Paris under Commandant Ferrie's command and made an Officer de la Legion d'Honeur. He was one of the best known early French aircraft designers and had several inventions to his credit.

Gordon Bennet Race, 1909

For the Gordon Bennet Race in 1909 lots had been drawn for the order of start and priority had fallen to the R.E.P. extablishment of Robert Esnault-Pelterie.

A dark-haired man of great personal magnetism, he was a graduate of the Sorbonne and a sculptor, engineer, and inventor whose thoughts were often in the clouds.

He had been born in Paris on 8 November 1881 and was the fourth person to obtain a pilot's license in France.

In 1904 he had started to experiment with gliders, and by late 1907 he was making brief essays on a monoplane of advanced design with internally braced wings and enclosed fuselage of steel tubing.

He had also invented a four-bladed propeller and a lightweight motor whose fan-shaped "magic seven" cylinders delivered from 30 to 35 horsepower.

But Esnault-Pelterie's career as a pilot had ended in a crash on 18 June 1908. After that, fearing the effect of his injuries might cause him to make an involuntary movement of the controls, he flew only as a passenger.

Robert Esnault-Pelterie's 'R.E.P 2'

Although his contributions have been obscured by subsequent developments, Robert Esnault-Pelterie continued in Verne's tradition of French leadership in the interplanetary project. Esnault-Pelterie was one of the pioneers of French aviation, whose contributions include the first all-metal monoplane, which he built in 1907.

REP's work culminated in 1930, with the publication of his Astronautics, which constituted a landmark review of the problems and prospects of space travel. A subsequent edition in 1934 gave considerable attention to interplanetary travel, including the applications of nuclear power.

On 15 November 1912, Esnault-Pelterie presented a paper to the Physics Society of France. In one of the first scientific discussions of the problems of space travel, he suggested that atomic energy would hold the key to solving the problem of reaching the Moon and other celestial bodies.

Although long a proponent of nuclear propulsion, by the early 1930s the work of others on the potential of chemical propulsion had convinced him that nuclear propulsion would not be required to accomplish lunar missions.

Esnault-Pelterie's greatest contribution was the pubication in 1930 of a book entitled L'Astronautique (Astronautics), which, together with its 1934 supplement, L'Astronautique-Complement, covered virtually all that was then known of rocketry and space flight.

Although Esnault-Pelterie's major interest was theoretical astronautics, he was well aware of the military implications of rocketry.On 20 May 1929, he proposed to French army general Ferrie a plan for the development of ballistic bombardment missles against which he could imagine no defense. We wrote such weapons could deliver "over several hundreds of kilometers...thousands of tons" of destructive payload, all within a few hours. (He was obviously thinking in terms of salvo firings like the World War II V-1 and V-2 offensives) "Moreover." he added, "the necessary ground installations would not entail great expense and would doubtles be infinitly less burdensome than if it were a question of delivering the same load by aeroplanes."

His proposal resulted in the appointment of ingenieur general J.J. Barre to his laboratories in 1931, which in turn led to work approved by the Commission des Poudres de Guerre at Versailles first on liquid-oxygen-gasoline motors, then on nitrogen peroxide-benzene motors, and one powered by liquid oxygen and tetranitromethane. In October 1931 (during) tests of the last, an accident occured, causing Esnault-Pelterie to lose four fingers.

In 1934 a study contract was let to Esnault-Pelterie by the Direction des Etudes et Fabrications d'Armement under the general supervision of ingenieur general Desmazieres. There, in addition to liquid rocket work, 80-mm solid-fuel rockets were developed whose application was to have been to accelerate bombs. Elsewhere, the Services de l'Armement Fracaise studied, in 1939, the use of 1,000-pound-thrust JATO units for assisting heavy bombers to take off. Air Liquide, a private concern, worked for a short period of time on a 100-pound-thrust test motor under Air Ministry contract at Champigny and at Seyne. French rocketry continued sporadically, and without conclusive results, until the outbreak of war."

Also, in 1929, Esnault-Pelterie proposed aero-braking: using atmospheric drag to slow a spacecraft for gravitational capture by a planet.

European Sport Pilot Association (ESPA)