

Alphonse Pénaud: 150 Years of Aeromodelling Part 1

Bernhard Schwendemann

On 18th August, 1871, 150 years ago, Alphonse Pénaud launched the first model aeroplane in the Jardin des Tuileries in Paris. The model flew over a distance of 40 m in 11 sec in front of members of the French aeronautical society.

The model, named "Planophore" by Pénaud, had a wing span of 46 cm, a length of 51 cm and weighed 16 g. The pusher propeller with a diameter of 21 cm was driven by a twisted rubber band weighing 5 g. Thus, aeromodelling was ahead of attempts with "big" planes – Otto Lilienthal did not fly until 20 years later in 1891. Alphonse Pénaud's work was hugely significant for the further development of aviation.



In spite of handicap

Alphonse Pénaud was born in 1850 as the son of an admiral. Due to a hip disease, he walked with the



aid of crutches and was unable to attend naval school. He began to study aviation at the age of 20 and became a member of the newly-founded "Société Aéronautique de France". His developments were the basis of his reputation as one of the most influential pioneers of aviation of the 19th century.

Flight stability

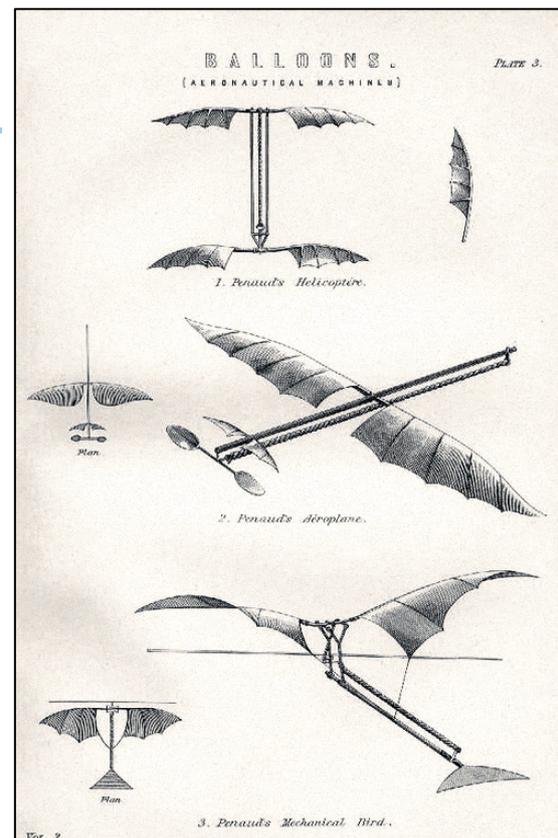
Pénaud's models and later designs for man-carrying aircraft had many characteristics important for flight stability: the wings were already V-shaped for lateral stability (in some drawings the slight upward bend of the wing tips can be seen), longitudinal stability was provided by the vertical tail, the crucial pitch difference between wing and elevator was present, and he had already realised the

importance of the position of the centre of gravity. Only some of his models were equipped with a vertical tail. Pénaud's aircraft were the first to be capable of dynamically stable flight – a tremendous overall achievement. He only briefly experimented with ornithopters, unlike other aviation pioneers, many of whom made significant efforts with this type of propulsion.

Simple solution

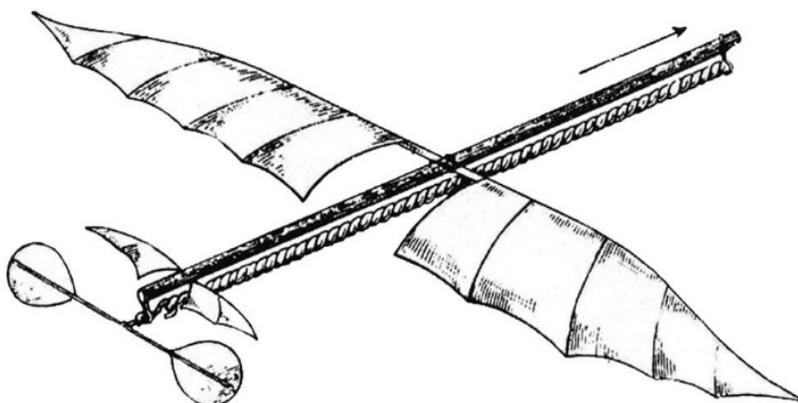
Another of Alphonse Pénaud's important insights was the fact that the power-to-weight ratio of a rubber band motor significantly exceeds that of a steel spring or even a steam engine. Earlier aviation pioneers worked with elongated rubber but using this to drive a propeller is mechanically complicated. The twisted rubber used by

Alphonse Pénaud provides a simple and elegant solution. 5 g twisted 240 times – that was his energy store. Apart from his "winged" aircraft, he also developed "helicopters" with counter-rotating rotors at top and bottom and the twisted rubber in between for propulsion, just like the toys that are still available today.



Overview of some of Alphonse Pénaud's flight projects (Wikipedia)

Alphonse Pénaud's "Planophore" (Wikipedia)



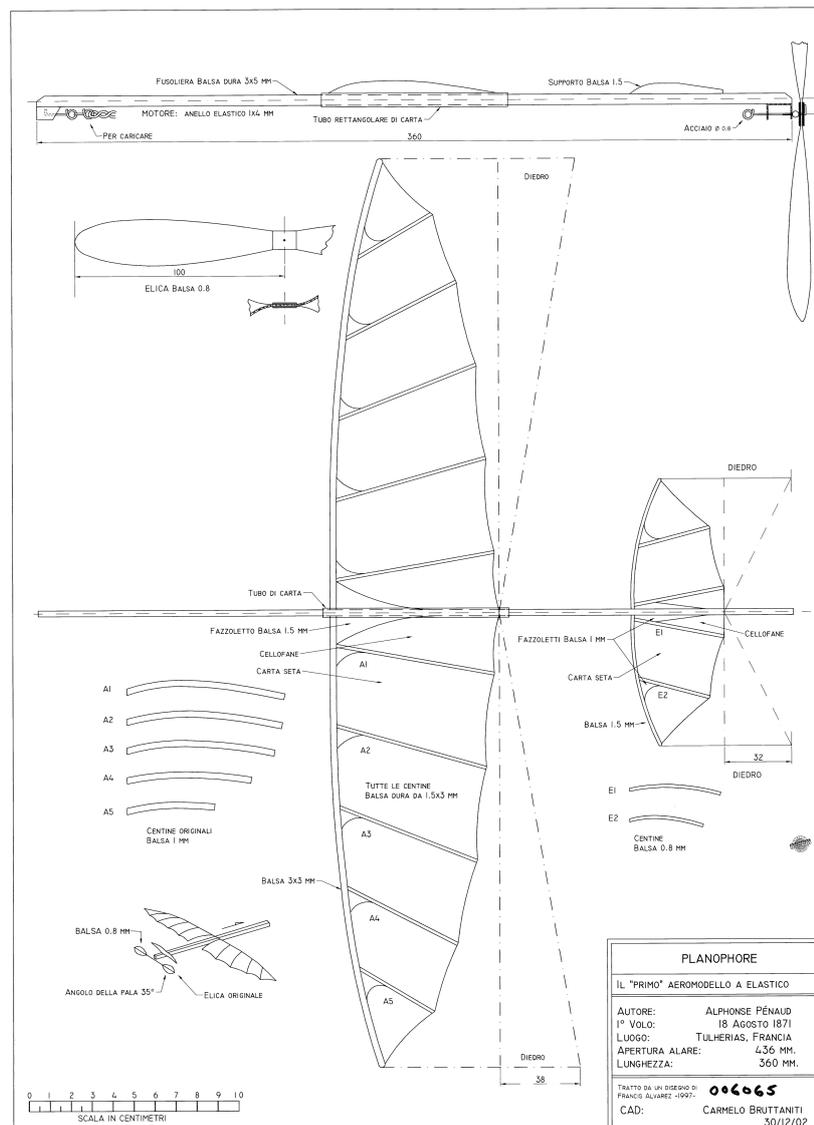
The rubber band motor still in use

150 years on, the rubber band motor is still used to power Wakefield models (F1B). These modern designs with 180 cm wingspan and weighing only 200 g use 30 g of rubber to climb to an altitude of around 100 m and then glide. FAI World Championships in this free-flight category are held every two years and the team world champion is presented with the "Alphonse Pénaud Cup". Since 1979, the FAI has been awarding the "Alphonse Pénaud Aeromodelling Diploma" for ongoing outstanding achievements in aeromodelling. In 2020, this went to British F3A & F3P aerobatic pilot Matthew Hoyland.

As early as 1911, English "Viscount Lord Wakefield of Hythe" donated a cup for the best performance of a rubber band model, hence the name of this category. The first competition was won by E.W. Twining (GBR) with a model of 64 cm wingspan, 114 cm in length and fitted with two propellers. The cup disappeared without trace after a few years but the original replacement cup then donated by Lord

Wakefield in 1928 is still awarded to the F1B world champion today. It is likely to be one of the sporting trophies with the oldest tradition. While in the early years there was no restriction on the amount of rubber that could be used, a limit of 80 g was introduced in 1954 and gradually reduced to 30 g. The cup is currently held by Mickael Rigault (France).

For those wanting to build their own Planophore, a plan adapted for modern times can be found the British website for vintage and old-timer plans at https://outerzone.co.uk/plan_details.asp?ID=9501 (File: Planophore_DBHL_o29501).



CIAM Flyer 5-2021

Author: Bernhard Schwendemann. Translated by Birgit Wagner
Editor Emil Ch. Giezendanner
<https://www.fai.org/sport/aeromodelling>