of cost only a limited set of tests were made, but these showed that for the particular machine tested there was instability in normal flight when the centre of gravity was farther back than 40 per cent. of the chord. In a dive the instability became more marked. The *Pou* tested in the Farnborough tunnel had a maximum control setting of +4.8 deg., and this was only sufficient to give a positive pitching moment (i.e., to bring the machine out of a dive) about the c.g. at angles down to −15 deg. At more negative incidences recovery could not be made. The machine was tested without the airscrew, and the pilot was represented by a dummy. The French tests showed, however, that there was very little difference "engine on" and "engine off," and it is not thought that the "piloted" tests in the Chalais-Meudon tunnel disclosed any important differences due to these causes.

Pitching moments were calculated for three c.g. positions, i.e., at 40 per cent., 50 per cent., and 60 per cent. of the chord. For all three c.g. positions there is a very large positive pitching moment with the front wing set at +4.8 deg. (β) and at incidences (α) from 0 to −10 deg. The pitching moment curve for c.g. position of 50 per cent. of the chord shows that when the machine is trimmed with the control stick well forward, $\beta = -2.4$ deg. and $\alpha = +0.3$ deg., the attitude corresponds to an angle of about 67 deg. from the horizontal and a speed of about 160 m.p.h. The machine is not, of course, likely to be kept in a dive long enough to attain this speed, but in a dive at 100 ft./sec. an increase of β to 4.8 deg. by pulling the stick back would give a positive pitching moment (i.e., tending to right the machine) of 800 lb. ft. "Similarly," the official Farnborough report continues, "the trim point given by $\beta = +2.0$ deg. and $\alpha = -10.5$ deg. corresponds to an over-the-vertical dive at 116 deg. from the horizontal at a speed of 110 m.p.h. Pulling the stick hard back would give a positive moment of about 800 lb. ft. at this speed. Extrapolation of the curve suggests that at an incidence of about −15 deg. the aeroplane is trimmed with the stick hard back, and there is no moment available for pulling out in the usual way." The pitching moment curves also show that when the machine is trimmed in a dive it is in unstable equilibrium. With the c.g. at 50 per cent. of the chord there is neutral stability at an incidence α of +5 deg. The effect of c.g. position becomes evident at this point, as a more forward location would give stable and a more backward c.g. unstable equilibrium.

Reversal of Control

The official report further states: "Before giving a more definite opinion as to the safety of this aeroplane it would be necessary to make a step by step integration of the motion in the initial stage of a dive." The Chalais-Meudon tests have shown that with the short *cabane* there is a range of angles within the normally safe range at which reversal of control would be necessary, i.e., pulling the stick would steepen the dive, and pushing the stick would bring the nose up.

To sum up the situation, it may be said that, generally speaking, the *Pou-du-Ciel* is stable at positive angles of incidence above about +5 deg. Below that there comes a narrow region of neutral stability, and below about −15 deg. loss of control sets in. It should be understood, of course, that increasing the range of positive angles of the front wing will improve the control, i.e., make it possible to pull out of a dive, *but it has no effect on stability*.

The cure which was at one time thought to be complete, i.e., to increase the angular range of the front wing, is now in some doubt, as it was on a *Pou* reported to have been so modified that M. Robineau was killed. The explanation of this *may* be that the righting moment is not sufficiently powerful to bring the nose up until a good deal of height has been lost. If that is the reason, the future does not look bright for the *Pou-du-Ciel*. Mignet designed the *Pou* as an aeroplane which would not spin. Like any other aeroplane, it *will* stall, and if the height lost in the stall is great the machine is no safer, even if it is no more dangerous, than any other aeroplane which stalls and recovers in a dive at the same speed and with the same loss of height before recovery. This question now seems to have become the crux of the whole matter.

The foregoing remarks apply, of course, to the standard *Pou-du-Ciel*. That a variant may be found which is more suitable for amateur flying is not impossible. Mr. L. E. Baynes has requested the hospitality of *Flight's* columns for an explanation of how he came to design the Abbott-Baynes cantilever *Pou* and the safety features which he claims to have introduced. His notes follow.

THE CANTILEVER "POU"

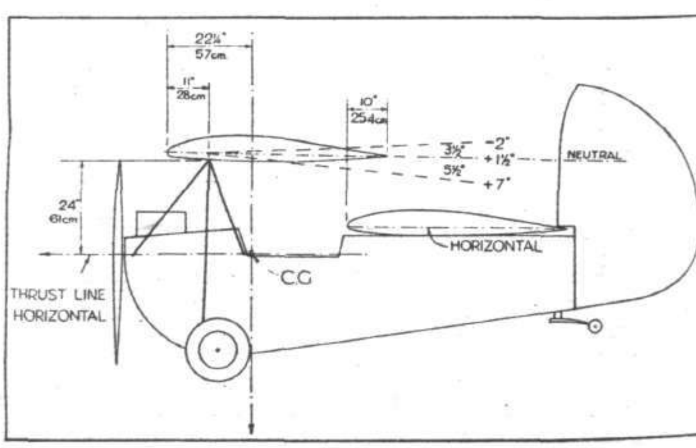
An Explanation by Mr. L. E. Baynes, its Designer

THE work done and the results obtained which culminated in the production of the Abbott-Baynes Cantilever *Pou* started when Mr. S. V. Appleby's original *Pou* was crashed at Heston. The late Sir John Carden and Mr. Appleby invited me to investigate the theory, and to redesign and rebuild in whatever manner I thought best, regardless of M. Mignet's book and according to accepted design principles. Before starting design on the new machine a theory was got out which led to the following conclusions:

That if the c.g. was farther back than approximately 60 cm. from the leading edge of the front wing (= about 40 per cent. of the chord) the machine would be longitudinally unstable; that as the rear wing with this c.g. position would only carry approximately 8 per cent. of the total weight, the machine should be regarded as a monoplane with a large tail rather than as a tandem-wing machine. The machine was under-spanned for its weight, resulting in a high sinking speed. The slot effect of the arrangement was really nil, as the rider plane would be the main wing, and the only slot effect would be a slotted tail surface, which does not stall anyway. The *raison d'être* of the whole wing arrangement was to make possible lateral control by rudder only, and it was doubtful whether this would work anything like so well with any other arrangement. The elimination of the foot control was the chief merit of the whole conception, and as such justified the unconventional layout.

Longitudinal control by varying the incidence of the front wing was sound, and had the advantage that there was little or no trim of the fuselage; with the other features it made for a simple structure, probably the simplest and cheapest airframe that has ever been produced.

The fuselage and exposed engine mounting were of such



Rigging diagram of the Abbott-Baynes Cantilever *Pou*. It should be noted that the position of the centre of gravity is at approximately 40 per cent. of the chord from the leading edge. This location of the c.g. lengthens the take-off, but it also improves the stability.