# Technical Talks

By the Technical Editor

## The Fluid Deflector of M. Constantin and its Application to the Aeroplane

I have before me American patent No. 1,065,506 to Louis Constantin, on means for reducing the resistance to the passage of vehicles in fluids. This invention is based on the fact that the streams of fluid deflected laterally by a body in motion preserve their new direction for a certain distance after they are out of contact with the body, and also cause the streams of fluid which they encounter to participate in the deflection.

If a blunt-ended vehicle be provided with a screen of appropriate dimensions (but smaller than the major section of the vehicle), supported at an appropriate distance in front of it, then, the streams of air will be deflected outward so that they will not encounter the vehicle, and the resistance will be that of the screen.

This screen may be a disc, a cone, or two plates, preferably curved, and forming a dihedral angle. Best results are, however, obtained by employing a number of curved

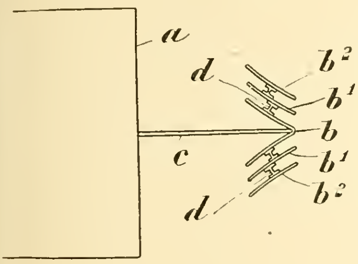


*Fig. 1.*

plates, arranged as shown in figure 1 deflecting the fluid to both sides, or above and below; or, concentric truncated conical surfaces, as shown in figure 2, deflecting the fluid all

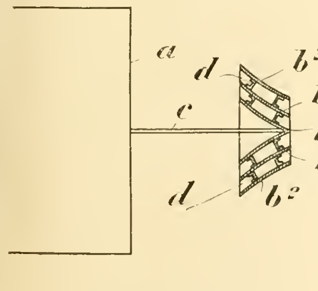


*Fig. 2.*

around the vehicle. In these figures a is the vehicle, b the plates, and c the support. Where it is desired to deflect the fluid to one side only, a single set of parallel plates can be used.

It is reported that the use of this device on an automobile effected a saving in power of 20% at a speed of 42 kilometres per hour.

Of course we are reminded that a large part of the resistance of a body is stern resistance, which this device probably does not diminish. It is possible that by initiating an inward deflection at the stern, the resistance of that porton could be diminished.

A single curved plate, or several parallel plates, can be employed to shield an observer from the wind. Thus, a deflector placed in front of an aeroplane pilot, will shield his head from the wind, while permitting him to see over the deflection.

M. Constantin has applied the principle of the wind deflector to the aeroplane wing, the object being to increase the rarifaction above the wing by a more energetic upward deviation of the air streams, thus increasing the lift. An account of the results obtained is given in "Aerophile" of June 1st, by M. Henri Mirguet, of which I shall give a short abstract.

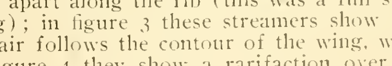

*Fig. 3.*

Figure 3 shows a section of the "Ponnier" wing which was modified by having its entering edge made concave as shown in figure 4. To show the character of the rarifaction above the wing, streamers were fastened a foot apart along the rib (this was a full sized wing); in figure 3 these streamers show that the air follows the contour of the wing, while in figure 4 they show a rarifaction over the portion a, the first two standing erect with their ends turned toward each other.

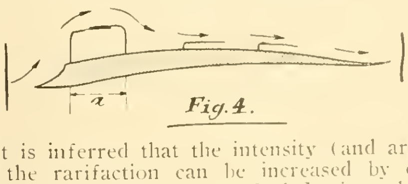


*Fig. 4.*

It is inferred that the intensity (and area) of the rarifaction can be increased by employing a series or set of deflecting plates (similar to those referred to above) and the lift still more increased. This, no doubt, can be done, but what effect it will have on the lift-ratio remains to be seen.

As before stated, the wind pressure on this deflecting portion is detrimental, and one

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would suppose that the loss entailed in deflecting the air upward, would equal the gain due to increased rarifaction. However, an ounce of experiment (properly conducted and rightly interpreted) is worth a pound of argument, and I shall give a brief account of the results obtained, taken from the article above mentioned.

The first test was made in the Eiffel Laboratory by M. Drzewiecki on a wing section which he had previously studied and which was primarily designed to be used as a propeller blade section. "By making the upper entering edge concave the characteristics of the profile were changed as if by magic." The lift was augmented, the drift diminished; and the efficiency (lift ratio) was increased nearly 60% for large angles of attack and 40% for 3°; so that this section most inappropriate for an aeroplane wing, was thereby rendered better than the majority in present use.

A similar test was made by Commandant Dorand on a very thin and good wing section and an improvement (in efficiency?) obtained of 15% for 3°, 26% for 0°, and 55% for 15°, angles of attack. A second test was made by him on a propeller, which showed a marked improvement, though the propeller was already very good, and therefore hard to ameliorate.

Dr. Amans tested wing models of small span and reported an improvement of 95%.

Finally M. Constantin, in collaboration with Commandant Dorand, had ten models tested at the Eiffel Laboratory. One of these was especially good, giving greater lift than the Bleriot XI bis. wing viz. 140% at 0°, 54% at 3°, and 40% at 6°.

A full sized Ponnier aeroplane was tested at Mourmelon. The modification of the wing

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from that shown in figure 3 to that shown in figure 4 produced a marked improvement in flying qualities.

This is all very interesting and remarkable; but, until we can see the tabulated data giving $K_x$ and $K_y$ we can not form a definite conclusion as to the actual value of this improvement.

If the thickness of a wing is increased by changing the contour of its upper surface, both the lift and drift are increased. The use of a concave entering edge and the existence of head resistance in a complete aeroplane bring about that the ratio of lift to total horizontal resistance is not greater for a thick wing than for a thin one. Consequently with a wing of variable thickness we obtain an aeroplane of variable speed. This method is safer than changing the cambre of the wing, and simpler than changing the area.

M. B. SELLERS.