CORRESPONDENCE

To the Editor of the JOURNAL OF THE ROYAL AERONAUTICAL SOCIETY.

SIR,—I was interested to read on page 547 of the October issue of the Journal the statement in a note by Mr. Oscar F. Gnosspelius that:—

> "Mr. Handley Page, by constructing a few rough feathers and arranging them in a certain manner, has been able to multiply the lift coefficient by approximately 3. With this disposition, however, the drag has been reduced to about 5 to 1, thus reducing the practical value of the discovery."

I presume that Mr. Gnosspelius refers to the slotted wing, but I am unable to follow the figures which he gives, and would ask him if he could furnish some explanation of them.

With the slotted wing the maximum lift coefficient of 1.96 has been obtained.

That part of the drag coefficient due to induced resistance is dependent on aspect ratio alone, and is therefore unaltered by the slotting of the wings. The profile resistance of the section is increased by slotting, but certainly not nine times. Twice would seem to be a figure more in accordance with the test results.

As, however, Mr. Gnosspelius refers to the construction of "a few rough feathers"—of which I was unaware—I should be interested to hear as to what he refers and the results which were obtained.—I am, Sir, Your obedient servant,

F. HANDLEY PAGE.

October 28th, 1925.

To the Editor of the JOURNAL OF THE ROYAL AERONAUTICAL SOCIETY.

DEAR SIR,—I am sorry to learn that Mr. Handley Page objects to my description of his slotted wing as a few rough feathers. When I first found the remarkable results which could be obtained by dividing a wing into a series of vanes I was struck by the fact that the bird's wing also consisted of a series of vanes, and I have always looked on the phenomenon as a sort of vane or feather effect.

Nature uses many more vanes than Mr. Handley Page, and therefore I used the word few. I said rough because the vanes roughly resemble a bird's feathers. Perhaps the word was not very wisely chosen, as a bird's feathers are in some respects rough and Mr. Handley Page's vanes are smooth.

What I wanted to point out was the remarkable results which had already been obtained by departing from the single surface and adopting a multi-vane construction.

With regard to the figures for the drag coefficient which I mentioned, and which Mr. Handley Page also objects to, I arrived at the rough figure nine in the following manner: A wing section of the R.A.F.15 type gives an L/D ratio of approximately 15 to 1 at about a quarter of the maximum lift coefficient where normal flight usually occurs. The slotted wing in the form giving the highest lift coefficient I have always found to give an L/D ratio of about 5 to 1 over

most of its range, and I find this confirmed by the diagrams in Mr. Handley Page's paper read before the Society.

If we consider the conditions between one-fourth and one third of the lift coefficient as the normal flying speed, for the same ratio of lift to drag, the drag coefficient must be increased three times, owing to the lift coefficient being increased three times, but the L/D ratio here is about 5 to 1 instead of 15 to 1, and as assuming 15 to 1 ratio the drag would be three times as great, therefore, as the ratio is really 5 to 1, the drag coefficient must be 3×3, or nine times as great.

I have now checked this rough estimate by figures taken from the curves published in Mr. Handley Page's paper, and find the results shown in the attached table comparing the slotted wing with R.A.F.15.

	R.A.F.15	Slotted Wings 5 Slots.	7 Slots.
K_L max.	.538	1.21	1.7
Ratio of K_L max. R.A.F.15 to K_L max. Slotted	—	2.25	3.16
K_D at K_L max.	.0630	.24	.395
Ratio of K_D at K_L max. R.A.F.15 to K_D at K_L max. Slotted	—	3.8	6.27
K_D at K_L max./4	.0093	.0604	.106
Ratio of K_D at K_L max./4 R.A.F.15 to K_D at K_L max./4 Slotted	—	6.5	11.4
K_D at K_L max./3	.0112	.0775	.126
Ratio of K_D at K_L max./3 R.A.F.15 to K_D at K_L max./3 Slotted	—	6.83	11.2

If figures were available for the wing with six slots it would appear that my figure of nine should be a very close approximation; on the other hand, the figure three for multiplying lift should be increased to 3.4.

From these figures I consider that my rough estimate of three and nine as the numbers by which the lift and drag coefficients must be multiplied in changing from a single vane to a multi-vane construction giving the maximum known lift, are justified.

I quite agree with Mr. Handley Page that, if the aspect ratio of the slotted wing on an actual aeroplane can be improved owing to its diminished area an improvement will take place in these figures. This is an advantage which can be made use of by the aeroplane designer, but it does not appear to me to alter the aerodynamic comparison of the two wings.—Yours faithfully,

OSCAR F. GNOSSPELIUS.

November 3rd, 1925.