

## CORRESPONDENCE.

*To the Editor of the AERONAUTICAL JOURNAL.*

DEAR SIR,—I have been very interested in reading the discussion on Major C. F. Abell's paper on "Airship Machinery; Past Experience and Future Requirements," more particularly with reference to the various types of prime movers suggested for use in the propulsion of airships. I should like to say a word in favour of the steam plant. One of the speakers in the discussion (Wing-Commander Cave-Browne-Cave) gave some comparative figures of the fuel consumption of the modern internal combustion aero engine and the steam power plant. Taking the fuel consumption of the modern aero engine as .5lb. per b.h.p. hour, the comparative figure for a steam plant is given by Wing-Commander Cave-Browne-Cave as .85lb. per b.h.p. hour as a minimum estimate. I should be interested to know upon what basis this figure is obtained. It seems to me to be a very high estimate if considered as "at the most optimistic estimate." Perhaps the following rather approximate figures may be interesting, as showing what can be done with the modern steam automobile. The powers developed are necessarily much smaller than those employed for airship work.

There are two modern makes of steam automobile—the Stanley and the Doble. The former is rated at 20 horse power, but it is capable of a continuous output of double this rating, whilst for a short period it will deliver 80 horse power. This car will steam at 40 m.p.h. on the level continuously and keep 500lbs. of steam in the gauge all the time. For a short period it will "sprint" up to between 60 and 70 m.p.h. The complete weight of the car with 5-seater open body is 32cwt. The engine is a simple, double-acting two-cylinder, of bore 4in. x 5in. stroke. The boiler is of the vertical fire tube type, 23in. in diameter and 14in. deep. The consumption of paraffin is about 14 miles per gallon. Thus at 28 m.p.h. the fuel consumed is two gallons per hour, which is roughly equivalent to 16lbs. of fuel per hour. At this speed—28 m.p.h.—the engine is delivering probably in excess of 32 b.h.p., which gives 0.5lb. of fuel per horse power per hour. This figure is the same as for the best aero engines. A condenser, or radiator, is fitted to the car enabling it to travel a distance of from 200 to 400 miles in one filling of the 25-gallon water tank, depending upon conditions of running.

The Doble steam car has an engine of the run-flow type, two-cylinder, double-acting, single expansion, stroke 4in. x bore 5in. The boiler is of the semi-flash water tube type. The fuel is paraffin. The rating of this car is given as 75 horse power, and it is capable of maintaining a speed of some 60 m.p.h. on the level continuously. A condensing system for the water is employed as in the Stanley car. The weight of the car is 2 tons. The fuel consumption is from 9 to 10 miles per American gallon. The car will accelerate from rest to 30 m.p.h. in 5 seconds. The above figures compare, as in the case of the Stanley steam car, very favourably with the best aero engine practice.

It seems to me that the possibilities of steam compare more favourably than is usually supposed with the best performance of the present type of the internal combustion aero engine. There are other obvious advantages of the steam plant as applied to airship work. The question of propeller speed (r.p.m.) is much more favourable to the steam system than to the I.C.E. system, because slow r.p.m. means greater efficiency and the utilisation of larger propeller diameters than otherwise possible. I am not considering here constructional difficulties between the two types; this is doubtless an important aspect of the question also.

The fact that the steam plant is going to return for automobile use raises the question whether or no it may not also usefully be employed for aircraft work, particularly airships. The previous difficulty of water consumption should be able to be overcome by the use of an efficient condensing system, as employed on the Stanley and Doble steam cars.

The fact that enlightened engineers have at last begun to realise that the I.C.E. is, for use in an automobile, at best nothing but a complex example of misplaced ingenuity, leads one to hope that possibly in other directions also the steam plant may prove its superiority over the existing type. The case of the airship seems to be a likely opportunity for this hope to be realised.

I am,

Yours, etc.,

M. A. S. RIACH.

