

CORRESPONDENCE.

To the Editors of 'The Observatory.'

Pressure in the Reversing Layer.

GENTLEMEN.—

Replying to Prof. Whittaker's last letter published in your April issue, I may perhaps be permitted to point out that in Prof. Schuster's theory referred to by him the conditions of pressure and temperature are investigated in the case of gases in convective equilibrium and subject to gravity only. But there is strong evidence that the absorbing gases exterior to the photosphere are subject to another force directed radially outwards in opposition to gravity. For instance, the hydrogen and calcium in prominences is often found to be moving with great velocity away from the Sun, and in some instances where accurate measurement is possible the receding mass is found to move with accelerating speed, like the matter in comets' tails.

Anyone who is familiar with the appearance of the prominences will know how insignificant a part gravity appears to play in controlling their extraordinary forms and movements, and the same may be said of the chromosphere from which they rise. Under good observing conditions this so-called "atmosphere" of the Sun is seen to be composed of an infinite assemblage of small eruptive jets or miniature prominences. Whether the matter composing these jets returns to the Sun by gravity, or is dissipated in space, as in some of the larger eruptions, is an open question. What does seem certain, however, is that the chromosphere (including the reversing layer) cannot be treated as a statical atmosphere like that surrounding the Earth, and estimates of the pressure at the photospheric level based on the observed depth of the chromosphere and the force of gravity must be entirely misleading.

As to the amount of material which may be projected above the photosphere in the chromospheric jets and the larger prominences, since the absorption effects may be exactly reproduced by the infinitesimal quantities we can handle in the laboratory, it does not seem necessary, as I said in my previous letter, to assume a much larger quantity in the Sun.

Regarding "pressure shifts," Prof. Whittaker adduces no evidence, direct or indirect, tending to show that spectrum-lines become immune, so to speak, to pressure-shifts when we pass from the temperature of the electric arc to that of the reversing layer. This change of temperature, after all, may not be greater in absolute measure than the ratio 2 to 3, when we consider that the reversing layer must be cooler than the photosphere, the temperature of which is estimated at about 7000° C., and the gases carrying the current in the arc are probably much hotter than the

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positive pole of the carbon arc, estimated at 3400° C. It would seem quite legitimate, therefore, to argue that absence of pressure-shifts in the reversing layer implies low pressures in that region.

Yours faithfully,

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J. EVERSHED.