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EXPERIMENTS ON THE ABSENCE OF MECHANICAL CONNEXION BETWEEN ETHER AND MATTER.

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VI. *Experiments on the Absence of Mechanical Connexion between Ether and Matter.*

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Received January 19,—Read March 4, 1897.

The conclusion of the experimental part of a previously published memoir, on "Aberration Problems and the connexion between Ether and gross Matter," dated March, 1892, and published in the 'Phil. Trans.,' Series A, for 1893, p. 777, is as follows:—

"The velocity of light between two steel plates moving together in their own plane, an inch apart, is not increased or diminished by so much as $\frac{1}{200}$th part of their velocity."

Since that date, of March, 1892, a considerable number of further experiments have been made, tending to confirm and extend the above conclusion; and of these experiments it is the object of the present communication to give a brief account. The general plan of experimenting having been sufficiently indicated in the previous memoir, no more details will now be related beyond those necessary to make the record of use to a later student of the subject.† The figures on pp. 759, 761, 767 illustrated the apparatus used.

The chief conclusion of the theoretical part of the former paper (p. 752) is that no first-order effect of purely irrotational etherial motion can ever be optically detected; in other words, that as long as the motion of a medium is characterised everywhere by a single-valued‡ potential function, the course of all observable *rays* through it, however reflected and refracted they may be, is independent of the motion (no matter how the *waves* may be tilted), and the time of journey along any given path through any kind of material is likewise perfectly definite, and independent of the motion, except for experiments directed to the second order of aberration-magnitude.

Hence no attempt to disturb the ether by using a spoked wheel, or revolving bars

* Assisted by Mr. Benjamin Davies.

† It may be argued that the details of an experiment having a negative result should not be published; but to me it seems that their publication in that case is more essential than in any other, because on them alone can a judgment be made as to how far the problem has been attacked in a careful and responsible manner, and because an answer "no," *when really attained*, is just as definite and positive a reply to some questions as an answer "yes."

‡ The epithet "single-valued" should be explicitly prefixed to the words "potential function" in § 29, p. 752, of the memoir referred to, 'Phil. Trans.,' A, 1893.