in 1775; cobalt was shown to be magnetic as early as 1733, and nickel in 1750.

Concerning these and the many other strange facts scattered through the pages of this book, the surprising thing is to find how early in the game most of the known phenomena of electrostatics were discovered. One finds here dozens of illustrations of the well-known fact that nearly every great discovery in physics has been not only adumbrated but more or less clearly anticipated. Thus the law of inverse squares was distinctly enunciated by Lambert twenty years before the experiments of Coulomb. Nor is it less amazing to see what an enormous amount of fiction has been seriously reported as fact. A paper read before the Royal Society in 1749 explains earthquakes as caused by electricity; an eminent Frenchman, Boulanger, writes a treatise on electricity in 1750, in which he explains that black ribbons are more readily attracted than those of other colors, etc.

This collection of Dr. Mottelay is a veritable treatise on the embryology of electrical science, which will be wanted in every public library, and will be indispensable to students of the history of physics. So long as there is no *index expurgatorius* for electrical books there will ever remain the need for competent critics who can hand on the really essential features of each period, who can appraise the relative merits of various investigations, and who possess the perspective necessary to set forth, in their proper succession and relation to each other, the great discoveries of science. Such a developmental history means much economy of thought. A critical history of this type which would do for the entire subject of electricity and magnetism what Whittaker has done for a portion of the subject in Chapters II and III of his "History of the Theories of Aether and Electricity" would form a worthy companion-volume to that of Dr. Mottelay.

Henry Crew

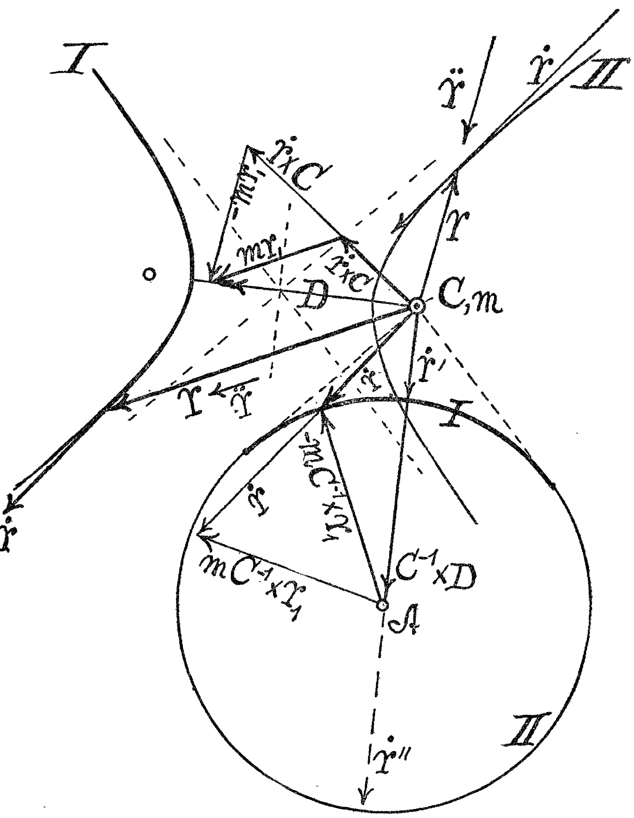
SPECIAL ARTICLES

THE HODOGRAPH OF NEWTONIAN HYPERBOLIC REFLECTION

Apropos of Sir Oliver Lodge's recent treatment (*Nature,* January 5, 1924) of the reflection of atomic nuclei, a graphic exhibit of the hodograph of such cases which we have been considering in my classes may be given, as it contains many interesting features. The vector equations[1] taken in succession (if r is the radius vector, C the angular momentum per gram of planet, m the mass of the repulsive sun and D a vector along the major axis) are: $d^2\mathrm{r}/dt^2 = \mathrm{r}_1 m/\mathrm{r}^2$, $\mathrm{C} = \mathrm{r} \times d\mathrm{r}/dt$, $\mathrm{D} = (d\mathrm{r}/dt) \times \mathrm{C} + m\mathrm{r}_1$, $d\mathrm{r}/dt = \mathrm{C}^{-1} \times (\mathrm{D} - m\mathrm{r}_1)$, the subscript denoting a unit vector. For the case of hyperbolic motion subject to an attracting sun it is then merely necessary to change m into $-m$.

[1] Vectors in roman.

The figure gives the twin hyperbolas with their common axis and asymptotes. If a repelling mass is at m, and C is a normal vector erected there outward (the usual electrical symbol) the hyperbola *I* on the left is in question. The diagram gives all the vectors (heavy lines) for the construction of the hodograph with its center at *A*. It is interesting to see that only the part *I* of the hodograph is needed. This is limited by tangents parallel to the asymptotes and comprehending the smaller velocities (minimum primed in figure, being normal to D).



The hyperbola *II* (light lines) and the remainder of the hodograph belong together and these correspond to an attracting mass at m. Consequently the velocities are all relatively large with a maximum $(dr/dt)''$, again normal to D. All vectors through m originate there. The aim is along the asymptotes.

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STIMULATION OF THE VAGUS NERVE

Following a suggestion made to me by Professor W. B. Cannon, I have found that a definite relationship exists between frequency and strength of stimulation of the vagus nerve in the cat and the effects