foundations on which the theory of heat rests require careful examination.[1] Further thought evidently led him to doubt the correctness of the second assumption. It is the first point to which Thomson, more than twenty years after, directs his attention. He conceives the idea of measuring temperature by such a scale that for an equal drop in the scale—*i.e.*, by letting down heat by an equal number of degrees on the new scale—equal amounts of work shall be done.[2] The speculations of Sadi Carnot remained unnoticed for a long time. Ten years later Clapeyron[3] reverted to the subject, and put the reflections of Carnot into graphical form and into mathematical language. He introduced the conception, based on Carnot's theory, of the ratio of heat transferred from a higher to a lower level of temperature to the maximum of work obtainable,—a quantity independent of the substance employed,—and he called this fixed ratio Carnot's function. It was through his paper that

21. Clapeyron's graphical method.

motrice est . . . due . . . non à une consommation réelle du calorique, mais à son transport d'un corps chaud à un corps froid, c'est-à-dire à son rétablissement d'équilibre" (ibid., p. 6).

[1] "Au reste, pour le dire en passant, les principaux fondements sur lesquelles repose la théorie de la chaleur auraient besoin de l'examen le plus attentif. Plusieurs faits d'expérience paraissent à peu près inexplicables dans l'état actuel de cette théorie" (ibid., p. 20, note). "La loi fondamentale que nous avions en vue . . . est assise sur la théorie de la chaleur telle qu'on la conçoit aujourd'hui, et il faut l'avouer, cette base ne nous parait pas d'une solidité inébranlable" (p. 50). As stated above (p. 118, note), Carnot emancipated himself from the conventional or material view of the nature of heat. See the appendix to the edition of 1878.

[2] See 'Cambridge Philosophical Society Proceedings,' June 1848; reprinted in Thomson's (Lord Kelvin's) 'Math. and Phys. Papers,' vol. i. p. 100.

[3] Benoit Pierre Émile Clapeyron was an engineer. In 1834 he published, in the fourteenth cahier of the 'Journal de l'École Polytechnique,' his "Mémoire sur la Puissance motrice de la Chaleur." It was through a translation of this paper in 'Taylor's Scientific Memoirs' that Thomson heard about Carnot's earlier work, and through a translation in Poggendorf's 'Annalen' (1843) that Helmholtz became acquainted with the subject.