different electric phenomena—those of electricity in the state of rest, called statical effects; those of electric currents on each other, the dynamical results; and those of electric conductors in a state of motion, the phenomena of induction—in one general and fundamental formula or law. He had before him Coulomb's electrostatic formula, Ampère's electro-dynamic formula, and a more general one established by Franz Neumann, which described and embraced not only the phenomena discovered by Oersted, but also those of moving conductors discovered by Faraday. It is not necessary here to enter into the details of the investigations, experimental and mathematical, by the aid of which Weber succeeded in establishing his very remarkable and seemingly all-embracing formula. Two remarks, however, present themselves, bearing upon the history of thought and the value of precise mathematical expressions. The first is, that as the gravitation formula necessitated a series of the most careful definitions and measurements of physical quantities, and the invention of accurate instruments and methods of measurement, so the first and probably the most valuable performances of Weber were his ingenious apparatus, and the careful measurements by which he

38. Weber's fundamental measurements.

the death of Tobias Mayer. Gauss introduced Weber to his own exact measurements of terrestrial magnetism, and from hence Weber's own line of thought led through the phenomena of magneto-induction (discovered by Faraday in 1831) and terrestrial magneto-induction (1832) to electro-dynamics, the science which Ampère had created in the years 1820 to 1823. In 1846 Weber speaks in the introduction to the 'Electro-dynamische Maassbestimmungen' of the endeavour to determine natural phenomena according to number and measure, expressing surprise that this has not yet been done in electro-dynamics, and then proceeds to describe his "electro-dynamometer," an instrument used by him for many years. With this instrument he then, further, proceeds to confirm Ampère's formula for the action at a distance of the elements of electric currents.