netism, retention, discharge, and some other points, with an application of the theory to these effects, and an examination of it by them.

Royal Institution, Nov. 16, 1837.

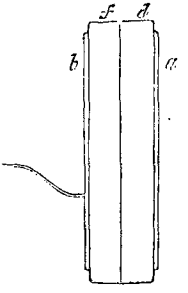

Fig. 11.

Omitted in page 365. (1246.)

LVI. *On a new Voltaic Combination.* *By* W. R. Grove, *Esq., M.A.*

To the Editors of the Philosophical Magazine and Journal.

Gentlemen,

On first hearing of porous porcelain being employed as a diaphragm for preventing the mutual precipitation of the metals on each other in voltaic combinations, it struck me that one of the plates of metals usually employed might be dispensed with by precipitation upon the other from a metallic solution. After some unsuccessful trials, I constructed a trough as following: a piece of common stout millboard of the length required, and of breadth sufficient to form the bottom and sides, is separated lengthwise into three parallel divisions by cuts one-third through; it is then covered with a thin layer of cement and bent up into the form of a trough; four-inch squares of common sheet iron and unglazed porcelain plates of the same dimensions are then warmed and slid alternately into the trough, as in Cruickshank's form, at about three tenths inch distance *. A solution of sulphate of copper and dilute acid being poured into the alternate cells, a very active series is formed by the precipitation of the copper on one sur-

* Pasteboard is preferable to wood for the formation of these troughs: it has not strength sufficient by its warping to crack the cement, is much more easily constructed, and a better insulator; it should be thinly coated with varnish on the outside to prevent capillary absorption by accidentally touching liquids. The plates of porous ware here mentioned may be conveniently employed for rendering constant the common Cruickshank trough, being warmed sufficiently to melt the cement and slid into the cells.

face of the iron; that which I formed was of twenty plates: the shock, without coils or condenser of any description, was so powerful as to be scarcely tolerable. When a wire was scraped along the edge of the plate at one extremity, the other hand touching the opposite end, the decomposition of water was also rapid, though I have not yet accurately measured its powers: its action continued unabated for nearly three hours without the addition of any acid or sulphate. If greater constancy be required, the alternate cells can be filled up with coarsely powdered sulphate, and some added as required. I was fearful that upon a second trial the intensity would have much abated, in consequence of the oxidated surface of the plates preventing so uniform a deposition of the precipitate, but was gratified to find that, after having been suffered to dry and remain at rest for several days, its action was as intense and constant as upon the first trial. The advantage of this form, where series and sustained power are required, I consider to be its extreme œconomy, a single cheap metal being employed instead of two expensive ones; the greater durability of iron as compared with zinc; the cutting in squares, so that none is wasted; and the tiresome process of soldering being altogether dispensed with. The diaphragms and solutions are common to every form of constant battery: possibly very thin plates of deal might do as well as porcelain; the durability of the latter material, however, makes its expense unimportant. My object in this communication is not so much to vaunt this particular form of battery as to direct increased attention to the porous filter as likely to form an important element in the analysis of the voltaic trough: it may possibly throw some light upon the organization of the torpedo.

Hoping you will consider this letter of sufficient importance to merit insertion in the Philosophical Magazine,

I remain, Gentlemen, yours, &c.

Swansea, Oct. 26, 1838. W. R. Grove.

LVII. *On the Reduction of the Chlorides of Mercury when mixed with Organic Substances.* *By* John B. Nevins, Esq.

To the Editors of the Philosophical Magazine and Journal.

Gentlemen,

A SHORT time since Mr. West, Lecturer on Chemistry at the Medical School in this town, mentioned to me the fact, that if a mixture of Hg Cl with some vegetable substances be heated, metallic Hg is sublimed; and recommended that the circumstances upon which this depended should be ex-