2 Sheets—Sheet 1.

L. P. BRUNELLE & S. MOHR.

GALVANIC BATTERY.

No. 177,056. Patented May 9, 1876.

Fig. 1.

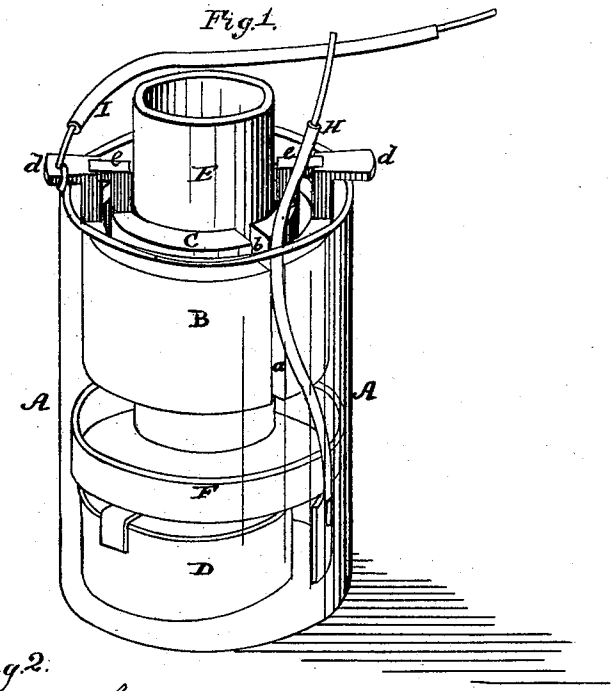


Fig. 2.

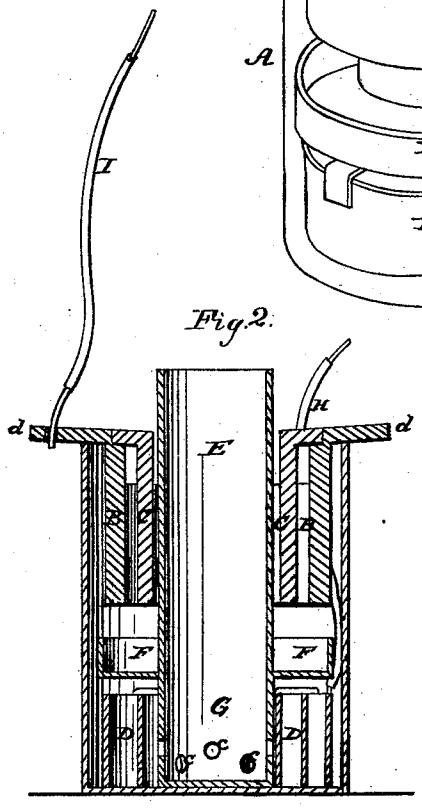


Fig. 3.

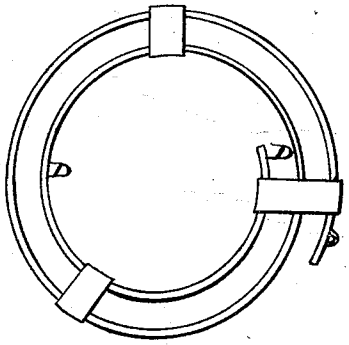
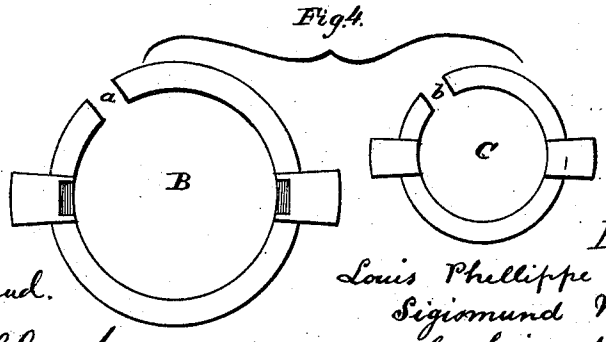


Fig. 4.



Witnesses:
F. B. Townsend.
M. J. Halleck

Inventor:
Louis Phellippe Brunelle
Sigismund Mohr
by their attorney
Colborne Brookes

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

2 Sheets—Sheet 2.

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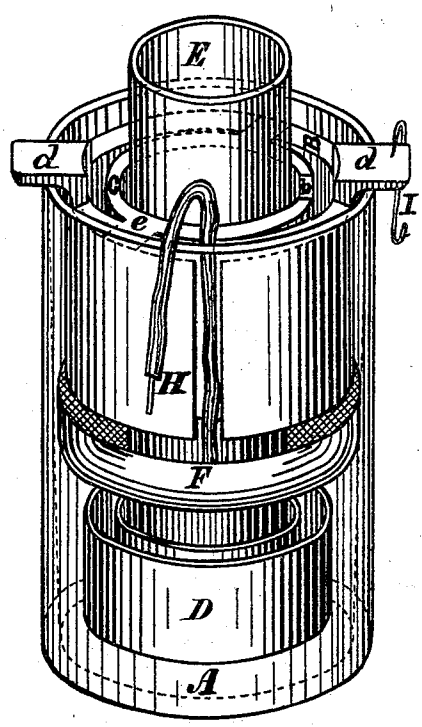
GALVANIC BATTERY.

No. 177,056. Patented May 9, 1876.

FIG. 5.



WITNESSES.

Edith Brookes

R. S. Lacey

INVENTOR.

Louis Philippe Brunelle

Sigismund Mohr

by their attorney

Colborne Brookes

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LOUIS PHILIPPE BRUNELLE AND SIGISMUND MOHR, OF QUEBEC, CANADA.

IMPROVEMENT IN GALVANIC BATTERIES.

Specification forming part of Letters Patent No. **177,056**, dated May 9, 1876; application filed September 30, 1875.

To all whom it may concern:

Be it known that we, LOUIS PHILIPPE BRUNELLE, superintendent of fire-alarm telegraph, and SIGISMUND MOHR, electrician, both of the city of Quebec, in the district of Quebec, in the province of Quebec, in the Dominion of Canada, have invented a Gravity-Battery, of which the following is a specification:

Our invention relates to a gravity-battery, consisting in the combination of two zinc tubes, a cylinder, a zinc-receiver, and a copper-coil plate, in such a manner that the sulphate of copper is entirely separated by means of the receiver from the sulphate of zinc, which is inserted in the cylinder as required.

The objects of our invention are to feed through the perforations of the cylinder the necessary quantity of sulphate of copper required to be consumed; to keep the crystal of sulphate of copper from covering the copper plate, thereby not diminishing its surface; and to double the power of the battery.

Figure 1 represents the gravity-battery. Fig. 2 is the section thereof. Fig. 3 represents the copper-coil plate. Fig. 4 represents the two zinc tubes. Fig. 5 shows a perspective view of a gravity-battery constructed according to our invention, with the lugs *e* of the zinc C sunk into the rim of the outer zinc B.

A is a jar or cup made of glass. B is an outer circular vertical zinc, and C a similar inner one, each having a vertical opening, *a b*, and placed vertically inside the jar A by lugs or ears *d*, bearing on the rim of the jar A. The inner or smaller zinc tube C is also placed vertically inside the outer tube B by means of the lugs *e*, sunk into the lugs *d* or into the rim of the outer zinc B. These two circular zincs, B C, having a large surface, offer thus an additional surface not presented in any other battery-zinc in use. The circular zinc may be of any thickness required. D is a copper-coil plate placed in the bottom of jar A, and corresponding in surface with the zincs B and C. E is a cylinder made of glass, gutta-percha, enameled earthenware, or any non-porous substance, placed in center of zincs B C and copper-coil plate D. This cylinder E exceeds by one inch in height the top of jar A, and serves to contain and feed the sulphate of copper in the lower part of jar A. It can be made of any shape. The lower end can have its bottom cast at the same time as the cylinder, or it may be open and closed with a cock or any stopper made of the same material as the cylinder itself. F is a residue zinc receiver or saucer made of the same material as the cylinder E, and may be either entirely separate from or attached to and around it. The lower part of the cylinder E under the receiver F constitutes the feeder G, having holes or perforations, *c*, to allow the solution of copper to expend itself in the bottom of jar A. H is the covered copper wire in connection with the copper plate D, and I is the wire in connection with the zincs B C. The advantages claimed for the cylinder E are, that the sulphate of copper is entirely separated from the sulphate-of-zinc solution by the residue zinc-receiver F, as the sulphate of copper is inserted in the cylinder E, and dissolves gradually through the perforations *c* of the feeder G. The sulphate of copper also feeds in the necessary quantity required to be consumed, and keeps the copper plate D always immersed in its own solution, thus preventing it from becoming a solid mass. If solidified, the copper plate D would lose part of its surface, and the crystal of copper would cover and stick to it.

The advantages of the receiver F independent of or attached to the cylinder E are to separate entirely and always the zinc solution from the copper solution as the sulphate of copper is introduced through the feeder G into the bottom of the jar A. It also receives the zinc residue; otherwise a mixture of zinc and copper would be caused, which would affect considerably the strength of the battery.

The residue zinc-receiver or saucer F, independent of or attached to the cylinder E, also prevents the zinc residue from dropping into the copper solution, thus not only keeping the copper solution in its pure state, but preserving the surface of the copper plate clear of the residue, which otherwise would diminish the power of the battery.

Having the sulphate of copper in its dissolved state in the bottom of the jar A, in which the copper plate D is immersed, no surface of the copper plate is lost, as in the ordinary battery. But in the latter, when the sul-

phate of copper is placed in its undissolved state, it covers part of the surface of the copper plate, and thereby diminishes the surface of the latter. The introduction of the copper sulphate in our battery through the cylinder E, and not through the solution of sinc, prevents the two solutions from mixing. The cylindrical shape of the two vertical zincs B C gives threefold the surface of the zinc used in the ordinary battery, and their connections are placed in such a position as to save them from corrosion.

This battery, as thus constructed, is equal in power to double the ordinary battery.

Having thus described our invention, what we claim is—

1. The combination of a feeding-cylinder or tube provided with perforations *c*, and having a residue zinc-receiver, F, formed on or attached around the same as described, with a gravity-battery, substantially as and for the purpose hereinbefore set forth.

2. The combination, with the feeding cylinder E, provided with perforations *c*, and having a residue zinc-receiver, F, formed on or attached around the same, and a copper-coil plate, D, surrounding the perforations *c*, of the vertical zincs B C, supported around the cylinder E, and one within the other, substantially as shown and described.

Ottawa, September 3, 1875.

L. P. BRUNELLE.

In the presence of—

H. I. GIBBS,

J. CAIRN COURSOLLE.

Quebec, September 6, 1875.

SIGISMUND MOHR.

In the presence of—

E. B. HARRIS,

W. C. HOWELLS.