

SINGLE FLUID BATTERY.

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The battery here illustrated is a very efficient and simple form for open or closed circuit work. It represents a favorite and recent type for such cells, and can be put together with the minimum number of tools and appliances.

The cover is made of wood. If a circular vessel is used, the cover should be cut in a circle equal in diameter to the outside of the jar, and a shoulder should be formed to hold it in place and prevent lateral motion. Any number of holes, according to the size, are bored through it, one set for the reception of the carbons and the others for the zincs. Care should be taken to bore these holes truly vertical to the plane of the cover, and the bit used should make a hole of exactly the right size to fit the carbons and zincs respectively. The fit must be a very tight one, so that the rods have to be driven into their places with a mallet or hammer.

For the positive elements, zinc rods, such as sold for the Leclanche battery, are used. Such rods can be bought of 6 or 8 feet in length and of uniform diameter. Pieces are cut off of the proper length, a cold chisel, hack saw, or file being used. A very easy way of dividing the rod is with mercury. A fine groove is filed around it. A globule of mercury is placed in a saucer with a little dilute sulphuric acid. A thin slip of zinc or a strip of galvanized iron is dipped in the mercury. Some adheres to it. This is then drawn around the cut, so as to fill it with mercury and amalgam. Then the rod is broken off, either in the hand or in a vise. It becomes almost as brittle as a pipe stem. This process is hardly to be recommended for the upper ends of the zincs. These have to be soldered, and the mercury interferes with the operation to some extent.

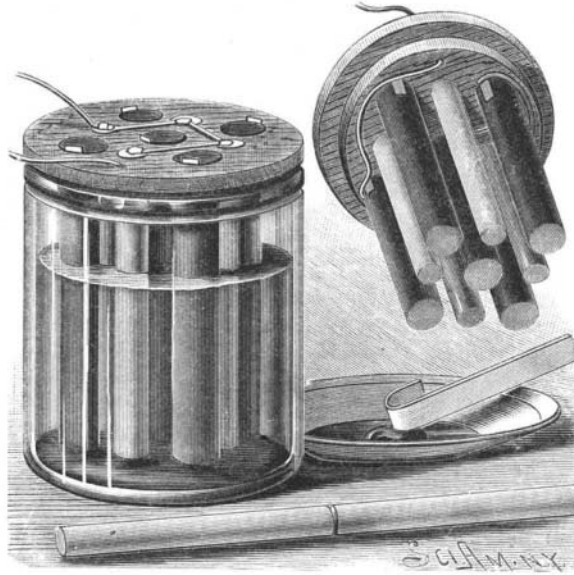
For negative elements, electric light carbons are used. The copper is dissolved off by nitric acid, they are washed, dried, cut to the proper length by a saw or cold chisel, and their upper ends are soaked in hot paraffine.

Both elements are now driven into their respective places. With each carbon a slip of copper $\frac{1}{4}$ inch wide is also introduced, and lies alongside, pressed hard against it and projecting about as much below the cover. As shown in the cut, a wire is carried around the outer circle of the carbons, and is soldered to the copper strips. If a central carbon has been used, as shown, a special connection is soldered to it and to the main wire. The end of the wire is carried up through a hole in the cover. A second wire is soldered to the zincs, this piece lying on the upper surface of the cover. Concentrated hydrochloric acid (muriatic acid) is the best flux for the zincs. If desired, the projecting end of the zinc connection may be secured to the wood by a staple. This is not necessary if the soldering is solid.

To amalgamate the zincs, a strip of galvanized iron is far the best instrument. The end of such a piece, which may be 2 inches by $\frac{1}{2}$ inch, is bent into a hook, so as to fit the zinc rods. This is dipped into

the globule of mercury as it lies under a little dilute acid, and is rubbed up and down the rods. If the mercury does not take hold at once, the zincs and carbons may be dipped nearly to the level of the cover in dilute sulphuric acid. After a few minutes' immersion the zinc will be ready to amalgamate, and the rods will shine like silver after a few minutes' rubbing with the galvanized iron and mercury.

The soldering may of course be dispensed with. Instead of strips of copper, the ends of some pieces of wire may be flattened and driven into the holes along with the carbons and zincs. By twisting together the



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ends of these, zinc connections and copper connections separately, the battery will work perfectly if care is taken to avoid short-circuiting. When it is made in a hurry, for temporary use only, the paraffining of the carbons may be dispensed with, and the copper may be left upon their upper ends. The wires may be soldered directly to this, although such connection is rather weak.

For bichromate solution, $2\frac{1}{2}$ oz. of bichromate of potash in fine powder are shaken up in 10 fl. oz. of water. To this $2\frac{1}{4}$ fl. oz. of sulphuric acid are added slowly with constant stirring. Great care should be taken in pulverizing the bichromate of potash, as it causes ulcers if inhaled. For open circuit work a solution of sal ammoniac may be used. The ends of burned-out carbons, such as are thrown away by the lamp attendants, answer perfectly for the smaller sizes of this battery.

DR. W. CROOKES mentions that if gallium could be obtained in sufficient quantity, it would be a perfect metal for producing vacuum in air pumps, as it is liquid at 86° F., gives off no vapor, and does not oxidize.

The Bell Telephone Patent Canceled in Austria.

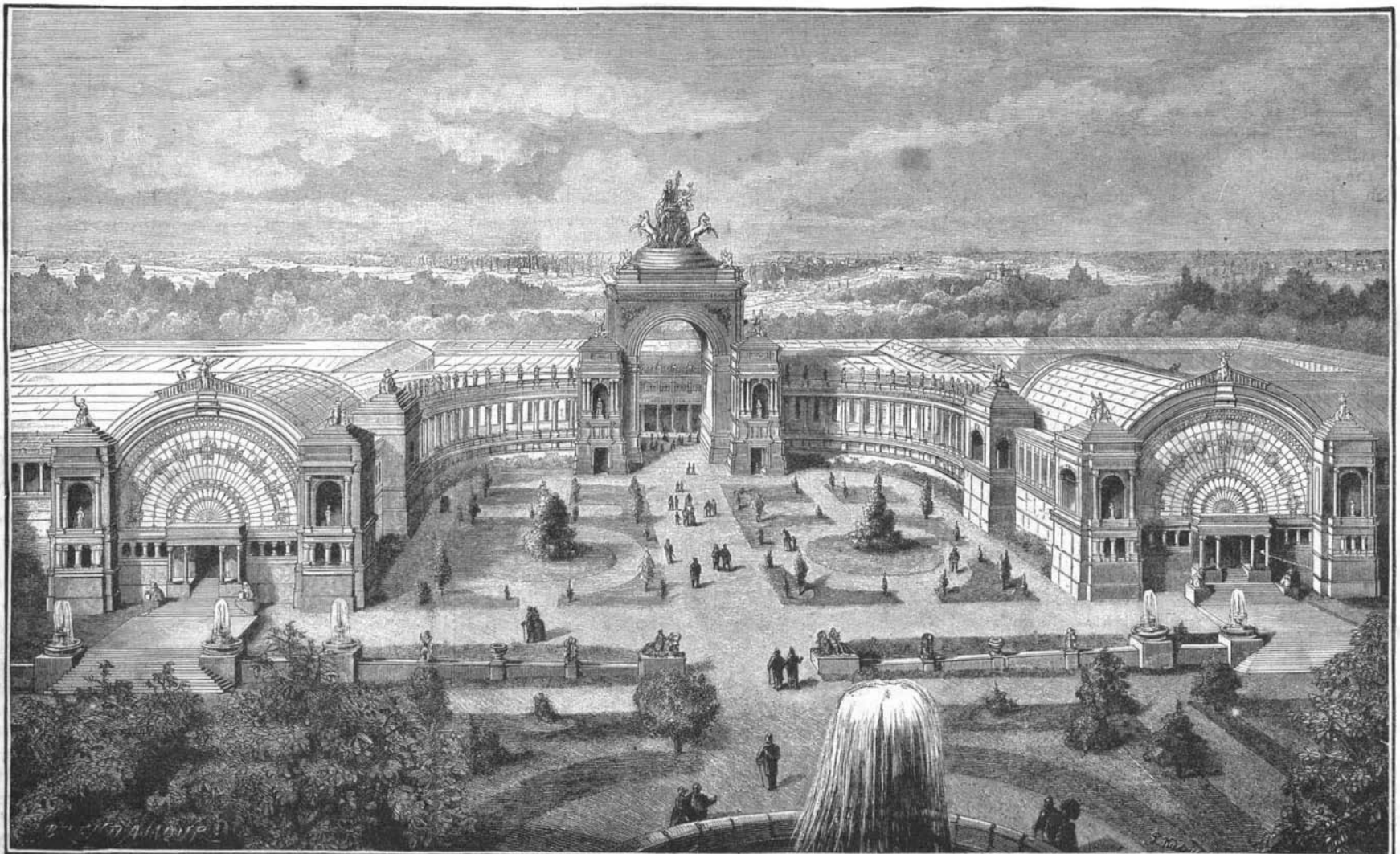
The efforts of the Telephone Company of Austria to get the Bell patent canceled have at last been successful. Their manager, Mr. R. Howard Krause, believed this possible from the commencement, and with the assistance of Mr. Otto Schaffler the company has been the means of securing free trade in telephones in Austria. The result of the decision of the Austrian Ministry of Commerce and the Hungarian Ministry of Agriculture, Industry, and Trade, dated October 28, 1887, seems to be that all those clauses of Bell's patent which refer to the telephone are canceled, only those referring to the multiplex telegraphy being allowed to stand. Certain clauses were canceled because the Telephone Company of Austria was able to prove prior publication, and others were canceled because the company proved that they embodied scientific principles which, according to Austrian law, cannot be the proper subject of a patent.

THE BRUSSELS INTERNATIONAL EXHIBITION, 1888.

A great international competition of sciences and industry and universal exhibition will be opened at Brussels, the capital of Belgium, on the first Saturday of May, 1888. Applications for space must be made by January 15, and all entries by April 15, the goods to be in their places by April 25. Belgium is in an eminent degree a manufacturing country, and in many lines of production a close competitor with France, Germany, and England; therefore it is proposed to make this exhibition rather an exception to most previous international displays in the fact that a more enlarged programme of direct competition has been offered, which will tend to bring out a good representation of the different industries represented. The products are to be grouped in fifty special competitions, in such manner as to supply material for the complete study of any branch of industry in comparison with the similar products of other nations.

The rewards and cash prizes are to amount to \$100,000, and numerous committees have been appointed to the end that the greatest possible amount of information may be obtained and placed at the service of the public. Exhibitors will be free to take part in the competitions or in the exhibition only, or simultaneously in both. An international jury on rewards will be appointed, whose members will be designated by the governments of their respective countries, and the jurymen of nations not officially represented will be proposed by delegates of the exhibitors of such nations. Foreign products designed for the exhibition may be imported with provisional right of free entry, on condition that they will be afterward exported. The exhibition buildings will cover an area of 100 acres, the permanent ones being supplemented by temporary structures of brick, iron, and glass, and the grounds being laid out in beautiful gardens.

Messrs. Armstrong, Knauer & Co., of Nos. 822 and 824 Broadway, New York City, are the authorized agents for the exhibition in this country.



THE BRUSSELS (BELGIUM) INTERNATIONAL EXHIBITION OF 1888.