(No Model.) 2 Sheets—Sheet 1.

T. CRANEY.

APPARATUS FOR ELECTROLYSIS OF SALT.

No. 496,863. Patented May 9, 1893.

Fig 2.

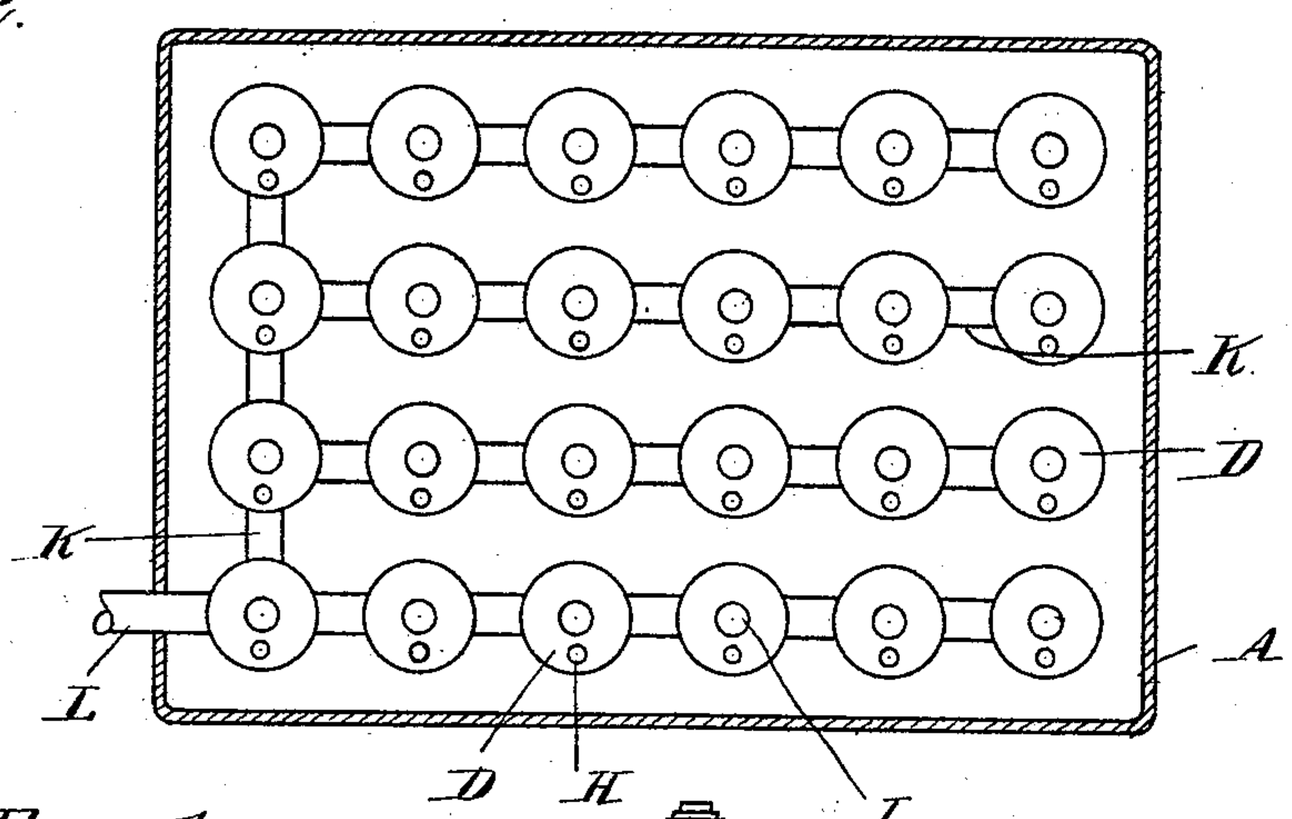
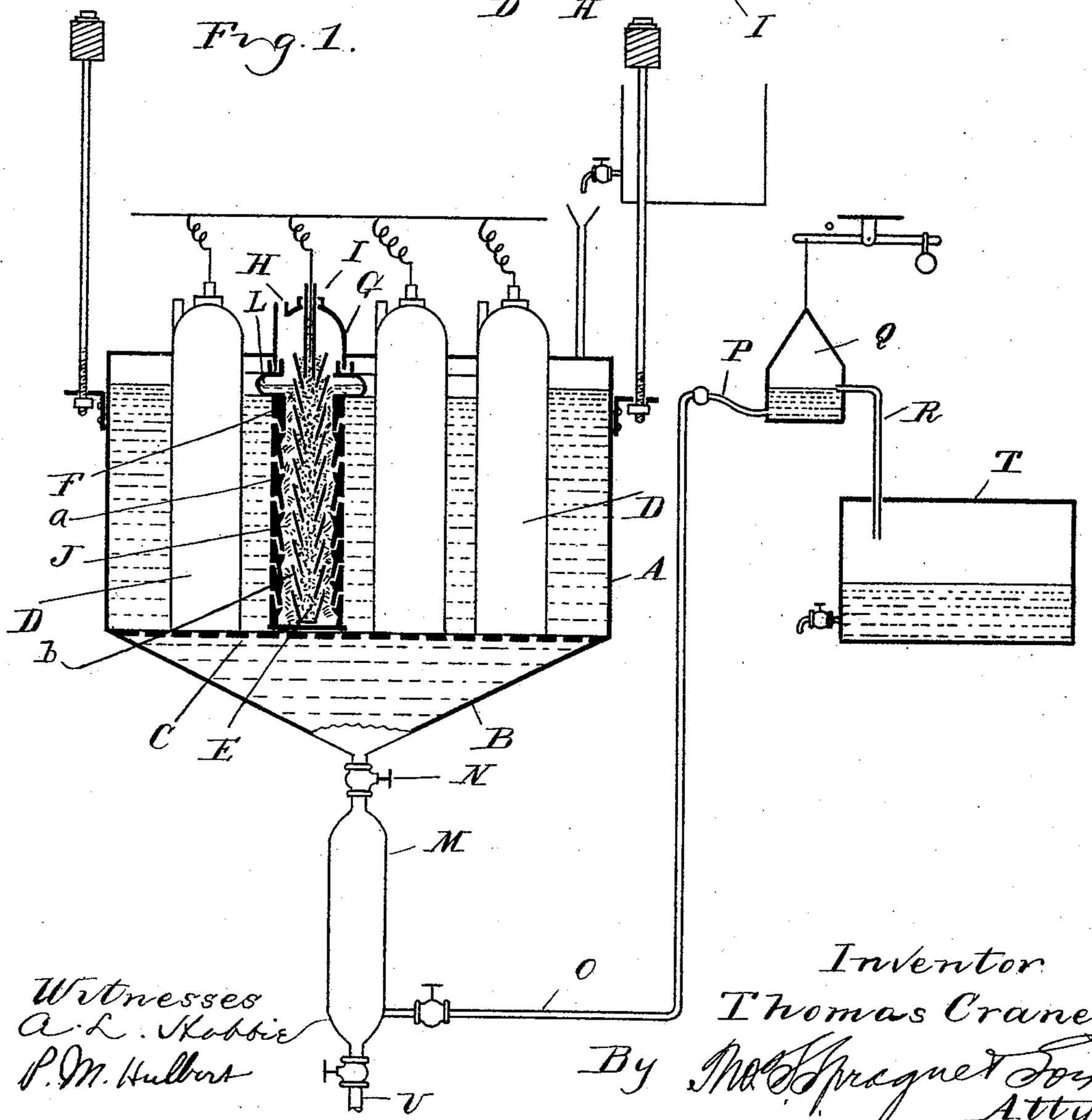


Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

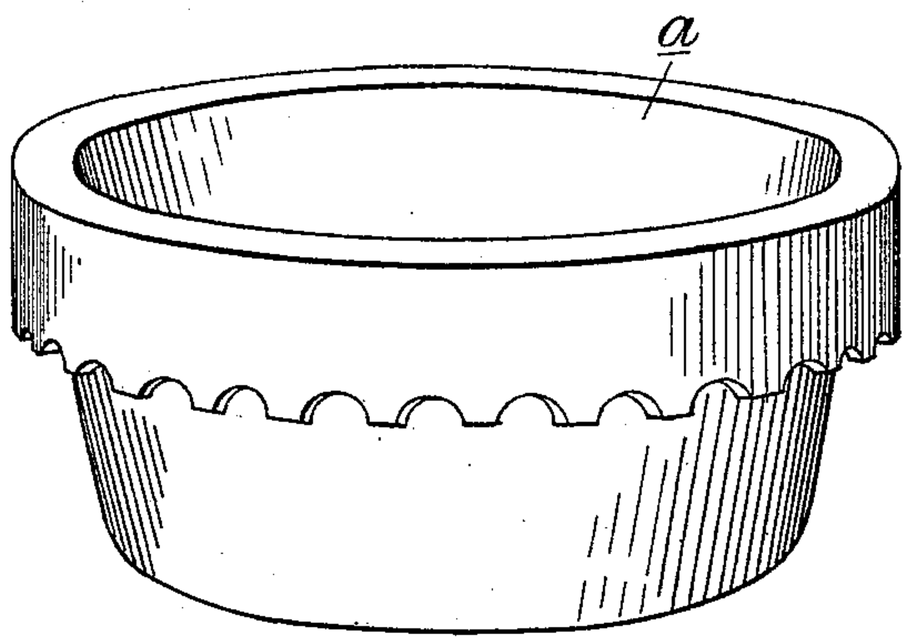
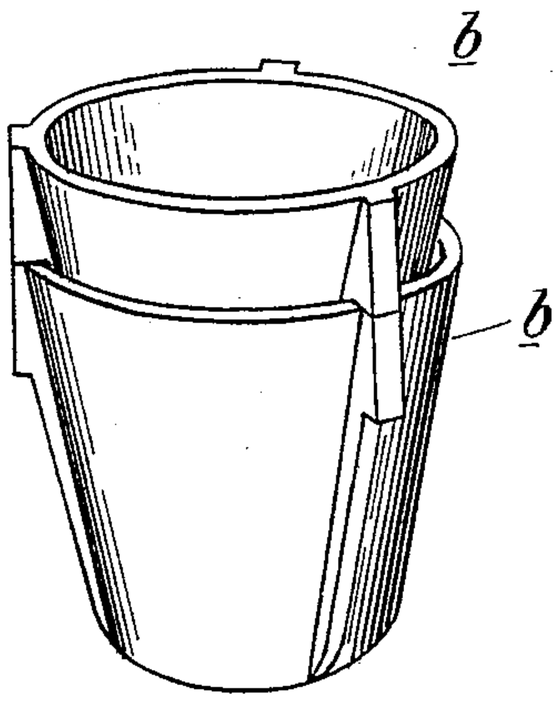


Fig. 4



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UNITED STATES PATENT OFFICE.

THOMAS CRANEY, OF BAY CITY, MICHIGAN.

APPARATUS FOR ELECTROLYSIS OF SALT.

SPECIFICATION forming part of Letters Patent No. 496,863, dated May 9, 1893.

Application filed January 4, 1892. Serial No. 416,957. (No model.)

To all whom it may concern:

Be it known that I, THOMAS CRANEY, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Apparatus for Electrolysis of Salt, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to new and useful improvements in apparatus for the manufacture of caustic soda by electrolytic decomposition of chloride of sodium or common salt, and the invention consists in the arrangement and combination of different parts whereby the apparatus is adapted for commercial use.

The main object of my invention is to adapt the apparatus for continuous work to facilitate the collection of the products and to control its operation, all as more fully hereinafter described, and shown.

In the drawings, Figure 1 is a vertical, central cross-section, shown in diagram. Fig. 2 is a plan view of my apparatus. Fig. 3 is a detail showing the construction of the support for the anode. Fig. 4 is a detail showing the construction of one of the sections of the cup.

A is a tank or vat containing the electrolyte in solution. This tank is preferably made of iron in a substantial form and provided with a conical bottom B and a false bottom C, which is grated or perforated, and of suitable strength to support the weight of the cells, and their inclosed anodes. The tank preferably forms the cathode and is connected to the proper pole of the generator and insulated in any suitable manner. The tank may be supported in any manner, preferably by suspending it from overhead beams.

Within the tank or vat and supported upon the perforated bottom C thereof, is a series of cups D which inclose the anodes E and serve as a dividing diaphragm between the anodes and cathodes, and as receptacles for a solid body of the electrolyte and for the collection of the gaseous product at the anodes, and to this end these cups are constructed in the following manner. That portion of the cups which is immersed within the solution of the tank is built of superimposed sections *a* of stone ware or other like indestructible material as shown in Fig. 3, and affording between the joints (which are preferably interlocking) communication between the interior of the cups and the tank for efficient electrolytic action, the upper portions of the cups are made gas tight in one or more sections, preferably of an apertured ring section F and a dome shaped top or cover G sealed upon the ring section and provided with a fill aperture H, and a central aperture, I, through which the upper end of the anode protrudes and is sealed therein.

J is a body of salt, preferably of the granulated form in which it is usually manufactured, and filled in the space around the anode up to or near the height of the solution in the tank.

The anode is preferably made of a body of carbon inclosed within and supported by superimposed sections *b*, as shown in Fig. 4, of stone ware which form large open interstices between to expose the carbon for electrolytic action upon the electrolyte.

The cups communicate with each other at or near the surface of the solution in the tank through pipes K sealed in the apertures, provided for in the ring sections of the cup, and leading to a discharge pipe L for carrying off the chlorine or other gaseous product of decomposition arising within the cups and also as an overflow for the solution from the tank itself, whereby some of the waste products incidentally formed are also carried off and may be separately collected. This construction of the cups and anodes has been made substantially in the form described the subject matter of two concurrent applications and are not claimed herein. The parts which are involved in the present application consists in the following arrangement: to the lower end of the conical bottom of the tank is connected a collector or receiver M with a valve N between it and the tank. From this collector a pipe O leads up to or near the level of the surface of the solution in the tank, and is connected by a flexible portion P to a receptacle Q, which is swung from a scale beam adjusted to hold the out-flow opening of the overflow pipe R at a corresponding level with

the solution in the tank, provided the receptacle is filled with a solution of caustic soda of proper strength, such as will be furnished by the proper and effective operation of the apparatus in its working condition.

The overflow pipe R discharges into a tank T, in which the product from the apparatus is collected for further operation.

It will be seen that with this arrangement the greater specific gravity of the solution of caustic soda, compared with that of the solution undecomposed in the tank is made use of to separate and collect it and at the same time control and determine such separation by the weighing process, as the receptacle Q which necessarily when the solution is not strong enough becomes lighter and thereby rises up and carries the flexible portion of the pipe P with it thereby diminishing the overflow until electrolytic action has again reached its proper limit.

The apparatus is provided in addition to the devices described with all proper appurtenances for maintaining the solution in the tank at a suitable level; for carrying off the hydrogen from the space above the tank; for replenishing the cups with fresh salt, and for the regulation of the current as required. A discharge pipe U and suitable valves are also provided for drawing off or emptying the contents of the tank when required, as, for instance, should the contents become foul or saturated with accumulated waste products, which may thus be saved for other purposes if desired.

I lay particular stress upon the facile separation provided in my tank for the escape of the caustic alkali which can freely follow its specific gravity, and naturally gravitate to the lowest point, and from there into the collector M, and finally into the tank T.

I do not intend to confine myself to carrying on the operation exactly in the manner described, as circumstances may arise where it is preferable to draw off the caustic alkali at intervals and the direct discharge or overflow provided at intervals directly from the bottom of the tank or from the receiver.

With this application I have filed two concurrent applications, Serial No. 416,764, filed January 2, 1892, and Serial No. 416,958, filed January 4, 1892, relating to the construction of parts of this apparatus, viz. the construction of the anodes and of the diaphragms or cells inclosing the anodes, and the invention therein shown and described is embodied in this apparatus but not claimed herein.

What I claim as my invention is—

1. The combination with an electrolytic cell, of a receiver, depending from the bottom of the cell by a valve-controlled connection and means for discharging the liquid from the receiver, substantially as described.

2. The combination in an electrolytic cell of the tank for containing the electrolyte, the receiver connected to the bottom thereof, the overflow pipe extending from the receiver up to the height of the solution in the tank, the weighing receptacle flexibly connected to said overflow pipe, and the overflow from said receptacle, substantially as described.

3. The combination in an electrolytic cell, of a suspended tank for containing the electrolyte, the perforated false bottom or grating, the receiver connected to the bottom thereof, the overflow pipe from the receiver extending up to the height of the electrolyte in the tank, the weighing receptacle flexibly connected to said overflow pipe and the overflow from the receptacle, substantially as described.

4. The combination with an electrolytic cell of an overflow pipe at the bottom of the cell through which the decomposed liquid is discharged and a weighing receptacle flexibly connected thereto into which said overflow pipe discharges, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS CRANEY.

Witnesses:

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N. L. LINDOP.