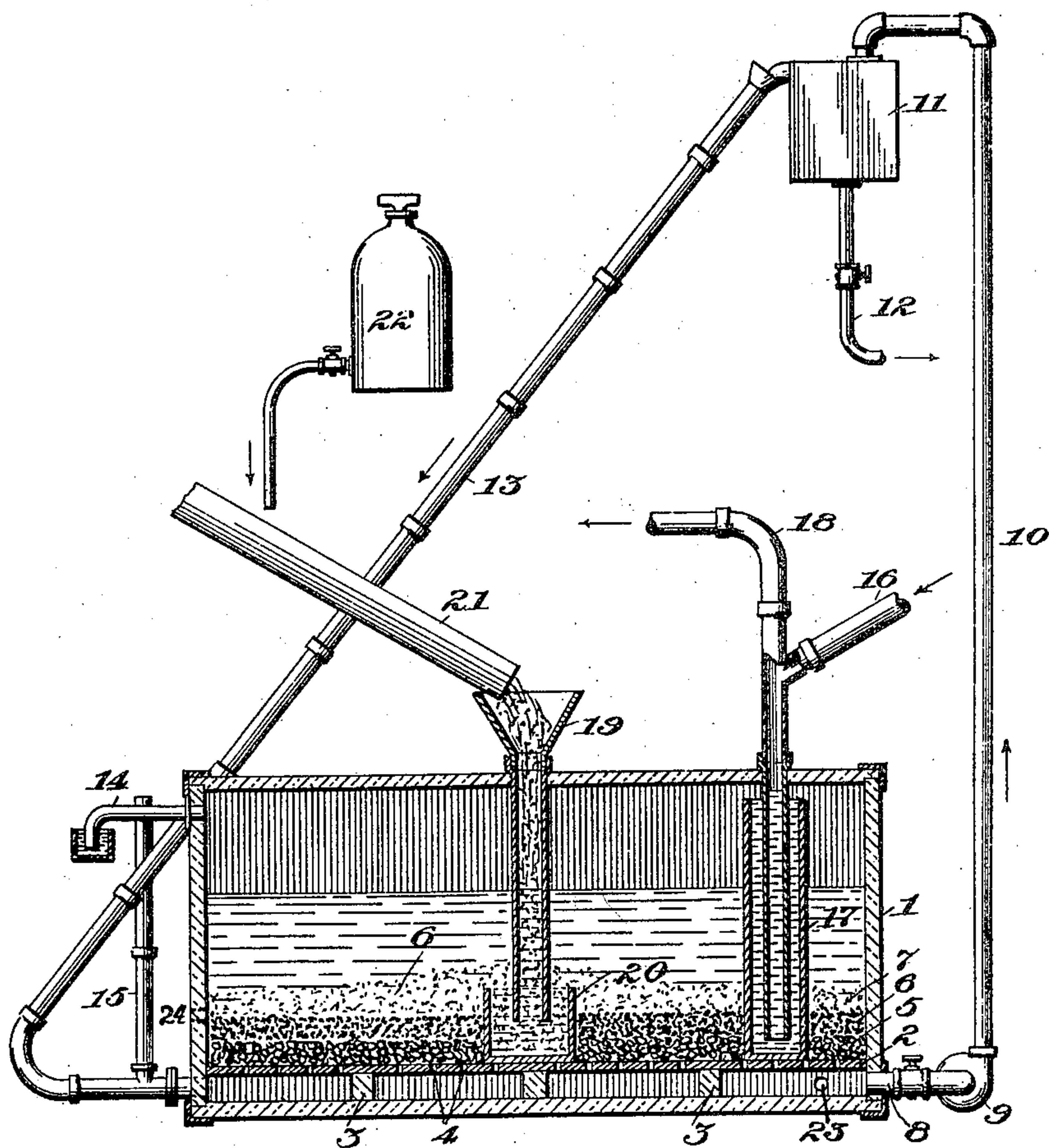


**No. 844,314.**

PATENTED FEB. 19, 1907.

**L. H. BAEKELAND.**  
**APPARATUS FOR REGENERATING ELECTROLYTES.**  
**APPLICATION FILED FEB. 16, 1906.**



*Witnesses:*

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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR REGENERATING ELECTROLYTES.

No. 844,314.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed February 16, 1906. Serial No. 301,420.

*To all whom it may concern:*

Be it known that I, LEO H. BAEKELAND, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Apparatus for Regenerating Electrolytes, of which the following is a specification.

The object of this invention is to provide an apparatus for treating and regenerating electrolytes, particularly chlorinated and spent or depleted brine which has undergone electrolysis for the production of chlorine and caustic soda, and for supplying the same under constant pressure to the electrolytic cells.

It is established that in the electrolysis of chlorid solutions, as sodium chlorid, the cells operate to better advantage and with higher efficiency if the electrolyte be maintained at all times substantially saturated. Furthermore, it is advantageous to maintain a regular circulation of the electrolyte through the anode-compartment of the cells and to separate therefrom suspended impurities. My apparatus is intended to accomplish these results, to provide a regular brine-supply under constant pressure to the cells, and to effect other results, as hereinafter set forth.

For a full understanding of my invention reference is made to the accompanying drawing, showing in vertical section a preferred form of my apparatus.

1 represents a covered regenerating-tank of size proportionate to the volume of electrolyte to be treated and constructed of material which is substantially unaffected by chlorinated brine. I prefer to construct this tank of slate or of concrete lined with slate, the joints being waterproofed by an acid-proof cementing material, such as pitch or asphalt. It may be here stated that all portions of the tank and its appurtenances, as well as of the circulating system, should be constructed of acid-proof stoneware, hard rubber, or other material not injuriously affected by chlorinated brine. A false bottom 2 is suitably supported, as by blocks 3, above the tank-bottom and is provided with a multiplicity of apertures 4. This false bottom may consist of perforated slate, as shown, of spaced parallel bars or strips, of "drainer-blocks" such as are commonly used in pulp manufacture, or of equivalent materials.

Over this false bottom I preferably distribute acid-proof gravel or crushed stone 5, upon which I may, if desired, spread a layer 6 of sand. This serves to support a bed 7 of salt, which should be of a high degree of purity and which is replenished as dissolved. The thickness of the layer of gravel or of gravel and sand may vary according to requirements, and any equivalent permeable support for the salt may be substituted therefor.

8 represents the inlet-pipe of a rotary pump 9, a cock being preferably interposed between the pump and the tank. This pump discharges through pipe 10 into a supply-tank 11, serving as a source of supply through outflow-pipe 12 to the several electrolytic cells and located at a height sufficient to give the pressure required. The supply-tank 11 is provided with an overflow, whereby any excess of liquid above that required for the cells is returned through pipe 13 to the side of the tank 1 opposite to the pipe 8. The pump 9 should have a capacity somewhat exceeding the maximum requirements of the cells. Tank 1 is provided with a liquid-sealed overflow 14, and I preferably provide also a safety overflow-pipe 15, extending from the horizontal member of pipe 13 to a point somewhat above the level of the overflow 14, but below the top of the tank.

The chlorinated and spent brine from the electrolytic cells is permitted to flow to the regenerating-tank 1 through a conduit 16, discharging into a well 17 within the tank. The construction is such as to permit the free escape of chlorine dissolved or otherwise conveyed by the liquid in conduit 16, and a branch pipe 18 is provided for conveying the separated chlorine to the bleach-chambers or other points of utilization.

The salt is introduced, preferably continuously, through a charging-hopper 19, which extends below the normal liquid surface. A sealing-wall 20 surrounds the lower portion of the sealed inlet and serves to prevent escape of chlorine therethrough in case the liquid is withdrawn from the tank. The salt is introduced to hopper 19 through a trough or chute 21, which may be of wood, and is conveyed by saturated brine in quantity sufficient to maintain the proper volume of liquid in the system. This brine flowing upwardly from the sealing-wall 20 into the



body of the tank 1 carries with it the salt and distributes the same over the surface of its supporting-bed. It will be noted that the spent brine is introduced into the tank above this body of salt and percolates through the same and through its supporting-bed, whereby any suspended impurities are removed.

In case the salt from which the brine is prepared contains impurities which are precipitated in alkaline solution it is preferably preliminarily rendered slightly alkaline and decanted or filtered from the precipitate. In such case it is desirable to neutralize any alkalinity by the addition of hydrochloric acid in theoretical proportions or in slight excess thereof. I have indicated for this purpose an acid-supply 22, arranged above the chute 1 and discharging into the brine flowing therein. Acid introduced into the brine at this point is quickly and thoroughly commingled therewith. 23 represents an aperture, normally closed, of which a number may be provided for the purpose of flushing out the tank 1 when required. 24 are similar apertures for the flushing out of impurities which may have accumulated on the top of the filtering-bed.

I claim—

1. Apparatus for regenerating electrolytes comprising a regenerating-tank, means for supporting a body of salt therein, and means for circulating electrolyte transversely through said tank beneath said body, substantially as described.

2. Apparatus for regenerating electrolytes comprising a regenerating-tank, means for supporting a body of salt therein, means for circulating electrolyte transversely through said tank beneath said body, and means for introducing spent electrolyte into said tank above said body, substantially as described.

3. Apparatus for regenerating electrolytes comprising a regenerating-tank for supporting a body of salt, an elevated supply-tank, a circulating system including said tanks, and a brine-outflow pipe leading from said supply-tank, substantially as described.

4. Apparatus for regenerating electrolytes comprising a regenerating-tank, means for supporting a body of salt therein, an elevated supply-tank, and means for circulating electrolyte in succession transversely beneath said body of salt and through said supply-tank, substantially as described.

5. Apparatus for regenerating electrolytes comprising a regenerating-tank, means for supporting a body of salt therein, an elevated supply-tank, means for circulating

electrolyte in succession transversely beneath said body of salt and through said supply-tank, and means for supplying spent electrolyte to said tank above said body of salt, substantially as described.

6. Apparatus for regenerating electrolytes comprising a regenerating-tank for containing a body of salt, a sealed inlet therefor, and means for supplying a mixture of brine and salt through said inlet, substantially as described.

7. Apparatus for regenerating electrolytes comprising a regenerating-tank for containing a body of salt, a sealed inlet therefor, means for supplying a mixture of brine and salt through said inlet, and a distributing device beneath said inlet, substantially as described.

8. Apparatus for regenerating electrolytes comprising a regenerating-tank for containing a body of salt, a sealed inlet for spent brine, and a gas-escape connected with said inlet, substantially as described.

9. Apparatus for regenerating electrolytes comprising a closed regenerating-tank, a sealed overflow therefor, and a safety-overflow arranged to discharge above said sealed overflow, substantially as described.

10. Apparatus for regenerating electrolytes comprising a closed regenerating-tank, a sealed overflow therefor, a sealed inlet for spent brine, and a gas-escape connected with said inlet, substantially as described.

11. Apparatus for regenerating electrolytes comprising a regenerating-tank for containing a body of salt, said tank having an overflow and an inlet for spent brine, a gas-escape connected with said inlet, an elevated supply-tank, a brine-supply pipe leading therefrom, and means for circulating electrolyte successively through said regenerating and supply tanks, substantially as described.

12. Apparatus for regenerating electrolytes comprising a regenerating-tank, said tank having an overflow and an inlet for spent brine, a gas-escape connected with said inlet, means for supporting a body of salt in said regenerating-tank, an elevated supply-tank, a brine-supply pipe leading therefrom, and means for circulating electrolyte in succession beneath said body of salt and through said supply-tank, substantially as described.

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

LEO H. BAEKELAND.

Witnesses:

MELVIN RICKER,  
FONNUM G. ANDERSON.