No. 706,529. Patented Aug. 12, 1902.

C. C. CLARK.

ELECTROCHEMICAL APPARATUS.

(Application filed Sept. 20, 1901.)

(No Model.)

Fig. 2

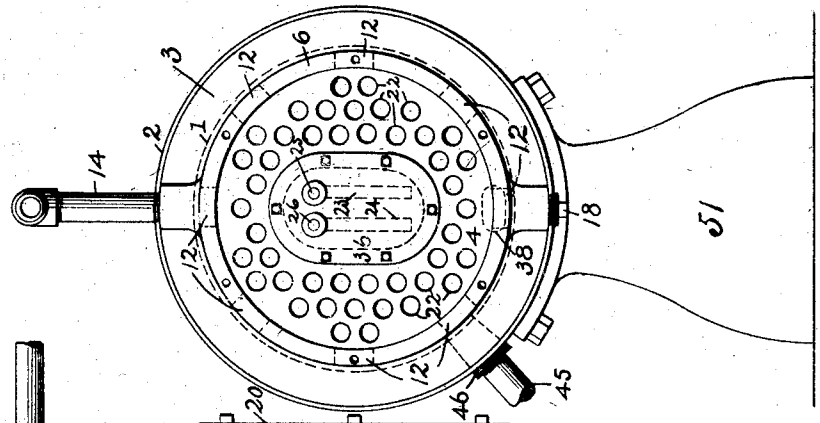
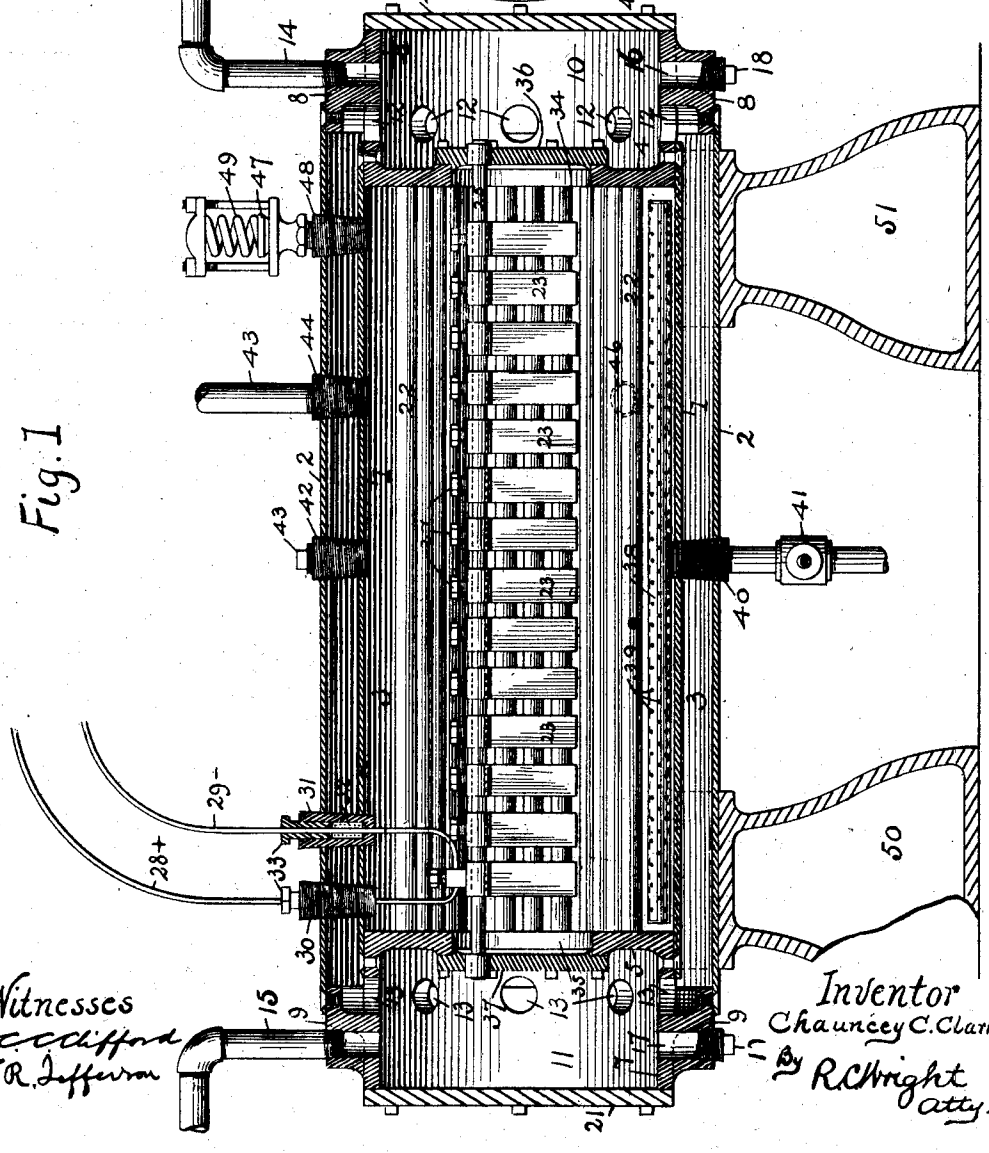


Fig. 1



Witnesses
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UNITED STATES PATENT OFFICE.

CHAUNCEY C. CLARK, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO JAMES G. CARSON, OF PHILADELPHIA, PENNSYLVANIA.

ELECTROCHEMICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 703,529, dated August 12, 1902.

Application filed September 20, 1901. Serial No. 75,728. (No model.)

To all whom it may concern:

Be it known that I, CHAUNCEY C. CLARK, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electrochemical Apparatus, of which the following is a specification.

The object of my invention is to construct a closed apparatus for the electrolysis of chemical solutions, as the production of bleach liquor by the release of chlorin from common salt, the electrodes and their connections being kept at a low temperature by the methods which will be pointed out in the specification and illustrated in the drawings, and in consequence of such low temperature the electrical resistance of the electrodes is so largely diminished that the life of the electrodes and their connections is greatly prolonged.

My invention is illustrated in the accompanying drawings, wherein similar reference characters indicate similar parts in each figure.

Figure 1 is a vertical central section. Fig. 2 is an end view with the end cover removed.

The receptacle has an inner copper or iron cylinder 1 and an outer copper or iron cylinder 2, leaving a space 3 between them, the cylinder 1 being secured to heads, cast iron, at each end and having tube-sheets 4 5 formed integral with outwardly-reaching rings 6 7. The cylinder 2 is secured to L-rings 8 9, extending outward from rings 6 7, and space 3 is put in communication with end chambers 10 11 by openings 12 13, so that fluid entering chamber 10 by inlet-pipe 14 will freely flow to space 3, inclosed by cylinder 2 and surrounding cylinder 1, and pass to chamber 11 and flow to outlet-pipe 15. The inlet and outlet might be oppositely arranged, if more convenient to have them so. Openings 16 17 for drainage are closed by plugs 18 19; but pipes and valves, if more desirable, could be used instead of the plugs. Removable covers 20 21 close chambers 10 11. From chamber 10 to chamber 11 are multiple copper tubes 22, which will preferably be secured through tube-sheets 4 5 by the well-known expansion-stuffing-box method, and these tubes permit free communication from chamber 10 to chamber 11 through cylinder 1 and the material therein and which is subjected to electrolysis by the platinum anodes 23 and zinc cathodes 24, secured on bus-bars 25 26 by screws 27, and electrical conductors 28+ and 29− are in contact with the series of electrodes and pass outward to a dynamo or source of electrical energy through insulating stuffing-boxes 30 31, tapered and screwed through cylinders 1 2, and insulating-packing 32 is compressed by followers 33 to prevent any fluid escaping from cylinder 1. Through tube-sheets 4 5 are openings 34 35, closed by covers 36 37, which support bus-bars 25 26 and the electrodes suspended thereon. The covers being removable permit the insertion and removal of the bus-bars and their attachments and also the introduction and removal of drainage-pipe 38, having perforations 39 its entire length, and a central discharge through tapered and threaded sleeve 40, screwed through cylinders 1 2, is connected to a valve 41, the pipe 38 and its connections being for the withdrawal of refuse only or for washout purposes in connection with top sleeve 42, opened and closed by plug 43, which permits the introduction of a pipe or hose for the desired purpose of cleansing.

The material to be electrolyzed enters cylinder 1 through pipe 43, screwed into tapered sleeve 44, which is threaded and screwed into cylinders 1 2. This pipe 43 will come from any suitable mixing apparatus (not shown) for the proper preparation of the solution for electrolytic treatment. The solution in cylinder 1 is withdrawn by pipe 45, entering through tapered sleeve 46 at one side of the bottom of cylinders 1 2.

A safety-valve 47 is seated above a tapered and screw-threaded sleeve 48, which enters cylinders 1 2. The valve may be of any suitable form and has a spring 49, with means for its adjustment.

Legs 50 51 support the apparatus.

The sleeves 30 31 40 42 44 46 48 open communication with the interior of cylinder 1 through space or jacket 3 and act also as stays between cylinders 1 2, into which they are secured by a tapered screw-thread. It

will be seen that cylinder 1 is surrounded by space or jacket 3 upon its diametral surface and by chambers 10 11 at its ends.

The solution in cylinder 1, from which bleaching material is produced or other solutions to be subjected to electrolysis, must be kept at a low temperature for the most economical and best commercial results, and the electrolysis must also be effected in a closed receptacle to prevent the escape of the liberated gases. The electrical current by which the results are accomplished generates great heat, and without neutralizing the heat the product is imperfect and the parts conveying the current, as the electrodes and bus-bars, rapidly deteriorate.

To overcome the above-enumerated losses and unsatisfactory commercial results, the apparatus is constructed, as heretofore described, to surround and circulate through the electrolyte an abundance of cooling fluid—such as liquid air, ice-water, compressed air, or other suitable or available cooling fluid or material. The means for the production of the cooling material, such as enumerated, are of present manufacture and may be utilized as now known, and their use or the use of different ones may be varied to suit different temperatures of the seasons, the least cooling being required during the winter season.

I claim—

1. In an electrolytic apparatus, two cylinders, one surrounding the other, and an inclosed space between the cylinders, a chamber at each end of the cylinders, means of communication from each chamber to the space between the cylinders, a fluid-inlet to one chamber, a fluid-outlet from the other chamber, means of communication from chamber to chamber through the surrounded cylinder, and a series of electrodes within the said cylinder.

2. In an apparatus for electrolysis, an inclosed cylinder having means for the introduction and the withdrawal of the electrolyte, a series of electrodes within the cylinder, electrical conductors therefor, means to surround the cylinder by a cooling fluid, diametrally, and at its ends, a series of tubes passing through the cylinder for the circulation of cooling fluid, means to introduce the cooling fluid and to permit it to flow from the apparatus, and means for its flowing to the parts surrounding the cylinder diametrally, at its ends, and to the tubes therethrough, to enable a free and uninterrupted flow of the cooling fluid about and through the electrolyte to neutralize the heat generated by the electrodes.

3. In an electrochemical apparatus, two cylinders, one within the other and an intervening space between the cylinders, a chamber at each end of the cylinders, means of communication from the chambers to the intervening space, means of communication from chamber to chamber through the inner cylinder; tube-sheets formed on the chambers, a series of electrodes within the inner cylinder, and means for their removable suspension to the tube-sheets aforesaid.

4. In an electrochemical apparatus, an interior and an exterior cylinder forming an intervening space, a series of electrodes within the inner cylinder, electrical connections therefor, and sleeves tapered and screw-threaded upon their exterior surface and adapted to be screwed into the two cylinders, to tie and connect them, and afford communication from the exterior of the outer cylinder to the interior of the inner cylinder through the intervening space.

5. In an electrochemical apparatus, an inner closed cylinder, an outer closed cylinder, a series of electrodes within the inner cylinder, electrical conductors therefor, and tapered and screw-threaded stuffing-boxes screwed into the inner and outer cylinders and having means for the passing of the electrical conductors therethrough, and for the prevention of liquid flow outward from the cylinders.

6. In an electrochemical apparatus, an inner and an outer closed cylinder, a series of electrodes within the inner cylinder, electrical conductors therefor, and a perforated drain-pipe therefor reaching from end to end of the cylinder, and having a central outward discharge adapted to communicate with the inner cylinder only.

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

CHAUNCEY C. CLARK.

Witnesses:
RANSOM C. WRIGHT,
WILLIAM C. STOEVER.