

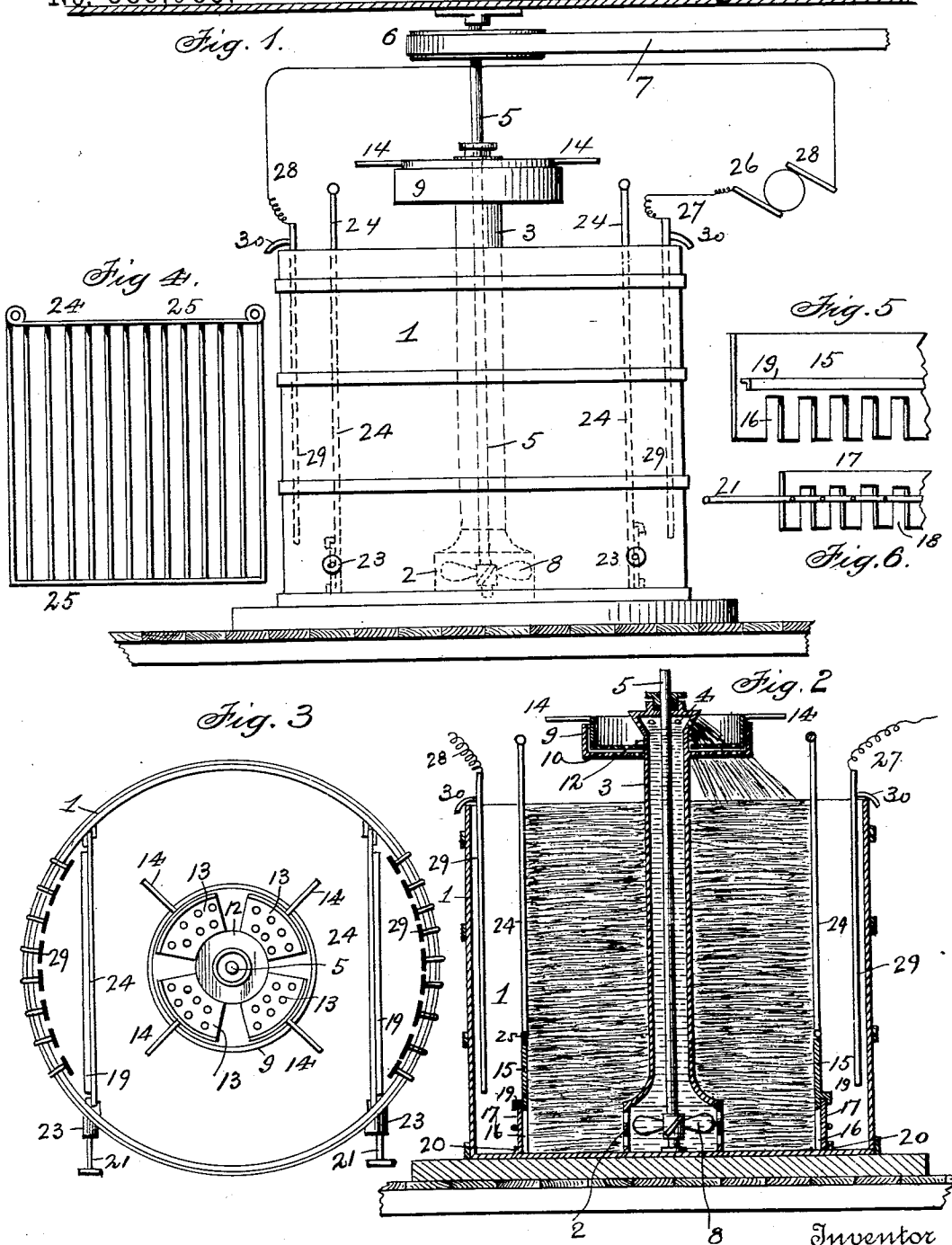
(No Model.)

G. H. POND.

METHOD OF AND APPARATUS FOR ELECTROCHEMICAL TREATMENT OF FIBROUS MATERIAL.

No. 588,085.

Patented Aug. 10, 1897.



Witnesses
Frank L. Ouraud.
Albert H. Williams.

Inventor
Goldsbury H. Pond
by J. S. L. Coombs
Attorney

UNITED STATES PATENT OFFICE.

GOLDSBURY HARDEN POND, OF ASHBURNHAM, MASSACHUSETTS.

METHOD OF AND APPARATUS FOR ELECTROCHEMICAL TREATMENT OF FIBROUS MATERIAL.

SPECIFICATION forming part of Letters Patent No. 588,085, dated August 10, 1897.

Application filed February 12, 1897. Serial No. 623,207. (No model.)

To all whom it may concern:

Be it known that I, GOLDSBURY HARDEN POND, a citizen of the United States, residing at Ashburnham, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in the Method of and Apparatus for the Electrochemical Treatment of Fibrous Material; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to a novel method of and apparatus for treating straw and other fibrous material by electrolytic action for the manufacture of pulp, whereby the sodium hydroxid produced by the decomposition of chlorid of sodium and water is caused to combine with the silica and intercellulose matter of the straw, disintegrating the latter and then subjecting the disintegrated straw to the action of chlorin, produced by the decomposition for bleaching the straw, such disintegration and bleaching being effected by a continuous operation.

The invention is designed as an improvement upon that described in an application filed by me September 15, 1896, Serial No. 605,915; and it consists in the novel method and novel construction and combination of parts hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is an elevation of an apparatus for treating straw according to my invention. Fig. 2 is a central longitudinal section of the same. Fig. 3 is a plan view, the electrical connections being omitted. Fig. 4 is an elevation of one of the gratings removed from the tank or vat. Fig. 5 is a detail perspective view of one of the stationary partitions. Fig. 6 is a similar view of one of the movable gates.

In the said drawings the reference-numeral 1 designates an open tank or vat of any suitable dimensions and material. Secured centrally to the bottom of this tank or vat is a perforated cylindrical casing 2, provided with a vertical pipe 3, which extends up above the top of the tank or vat and has its upper end

made flaring and formed with a number of inclined perforations 4. Located within said pipe and stepped in the bottom of the tank or vat is a rotatable shaft 5, which passes through an aperture in the closed top of the pipe and is provided with a pulley 6, driven by a belt 7 from any suitable motor. Secured to the lower end of the shaft 5 and located within said casing is a screw 8, and secured to the pipe 3 a short distance below its upper end is a cylindrical cup-shaped receptacle 9, provided with apertures 10 in its bottom. Located in this receptacle and secured to the pipe 3 is a hub 12, and between this hub and the rim of the receptacle are a number of independently-movable perforated plates 13, resting on the bottom of said receptacle. The outer ends of these plates are turned upwardly, forming handles by which they may be moved. When these plates are moved so that their apertures coincide with those in the receptacle, the solution pumped into the latter will escape into the vat or tank. As the said plates are separate and independent from each other, by moving the same the solution may be directed to any part of the vat or tank desired or cut off altogether, in which latter case the movement of the screw is arrested.

The parts so far described are the same as shown in my application before referred to.

Located in the lower portion of the tank or vat at opposite sides thereof are stationary partitions 15, which extend about one-fourth way up the tank or vat. These partitions are formed with a number of openings 16, which are opened and closed by slidable gates 17, formed with corresponding openings 18. The upper edges of these gates work in ways 19, secured to the partitions, while the lower edges are held in place by ribs 20, secured to the bottom of the tank or vat. Rods 21, passing through stuffing-boxes 23 in the vat, are secured to said gates for opening and closing the same. Seated upon the upper edges of said gates are removable gratings 24, consisting of a number of parallel vertical bars connected together at their ends by horizontal bars 25. Against these gratings and partitions the straw is solidly packed, and when the gratings are removed an open cell will be formed at the anode and cathode sides of the

vat or tank, the inner walls of which cells will be formed by the mass of packed straw and the stationary partitions.

The reference-numeral 26 designates a dynamo or other source of electric energy, and 27 the negative conductor thereof, and 28 the positive conductor. These conductors 27 and 28 are connected with carbon or other electrodes 29, located, respectively, in the cathode and anode cells in the tank or vat. Said electrodes are held in place by hooks 30, secured thereto and engaging with the upper edge of the tank or vat.

The operation is as follows: A suitable quantity of electrolyte, a solution of chlorid of sodium and water, is placed in the tank and the straw or other fibrous material to be treated packed therein and banked against the partitions and gratings. The gratings are then removed, when an open anode and an open cathode cell will be formed at opposite sides of the tank with a compact, but porous, mass of straw therebetween forming the inner walls of the cells. The gate at the cathode side of the tank is now opened, so as to uncover the openings in the partition of the cathode-cell, and the gate of the anode-cell closed. The electric current is then turned on and the shaft 5 rotated. Electrolysis will now take place, the solution being decomposed and most of the chlorin produced in the anode-cell being prevented from entering the compact mass of straw by the stationary partition and closed gate. At the same time the soda will form in the cathode-cell, and the sodium hydrate will be drawn into the mass of straw through the openings in the partition through the medium of the screw and will be forced up through pipe 3 into the cup, from whence it will escape to the tank and be caused to circulate through the straw, the sodium combining with the silica and intercellular matter and disintegrating the straw. After disintegration has been completed the gate of the cathode-cell will be closed and that of the anode-cell opened, when the chlorin solution will be circulated throughout the mass of straw, and the chlorin freed by the decomposition will act upon the straw and bleach the same.

The gates of both the anode and cathode cells may be opened during the bleaching operation, so as to cause hypochlorite of soda to be formed and circulated through the straw, if desired, or the openings in the partitions may be so regulated by the gates as to use any proportion required of either the sodium hydrate or the chlorin developed by the decomposition of the salt in the respective cells.

Having thus fully described my invention, 60 what I claim is—

1. The method herein described of disintegrating and bleaching straw by the electrochemical decomposition of a solution of chlorid of sodium, which consists in packing or banking the straw in a tank containing a solution of chlorid of sodium in such manner that an open cell is formed between the mass of straw and the cathode and between the straw and the anode, then causing the solution to be circulated throughout the straw from the cathode-cell to disintegrate the straw and then circulating the solution from the anode-cell through the disintegrated straw to bleach the same, while passing a current of electricity through the solution. 75

2. The method herein described of disintegrating and bleaching straw, which consists in packing the straw in a suitable tank in such manner as to form an open cathode and an open anode cell at opposite sides of the tank, then placing a solution of chlorid of sodium in said tank, and causing a circulation of the same throughout the mass of straw, first from the cathode-cell and then from the anode-cell, while passing a current of electricity through the solution. 85

3. The method herein described of disintegrating and bleaching straw, or other fibrous material, which consists in decomposing the chlorid-of-sodium solution in separate cells formed on each side of the material being treated and drawing the resultant parts of the decomposition of the salt from either cell in the proportions desired and circulating the same through the material substantially as described. 95

4. In an apparatus for the electrochemical treatment of fibrous material, the combination with the tank, having ribs formed on the bottom at opposite sides of the tank, of the stationary partitions located at the lower part of the tank at opposite sides, formed with openings in the lower edge, the ways secured to said partitions, the slidable gates formed with openings in the lower edges, working between said ways and ribs, and the rods secured to said gates and projecting through the tank for operating the gates, the removable gratings resting on said partitions, and the anode and the cathode at opposite sides of the tank, substantially as described. 100 105 110

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

GOLDSBURY HARDEN POND.

Witnesses:

JOS. L. COOMBS,

FRANCK L. OURAND.