

No. 675,459.

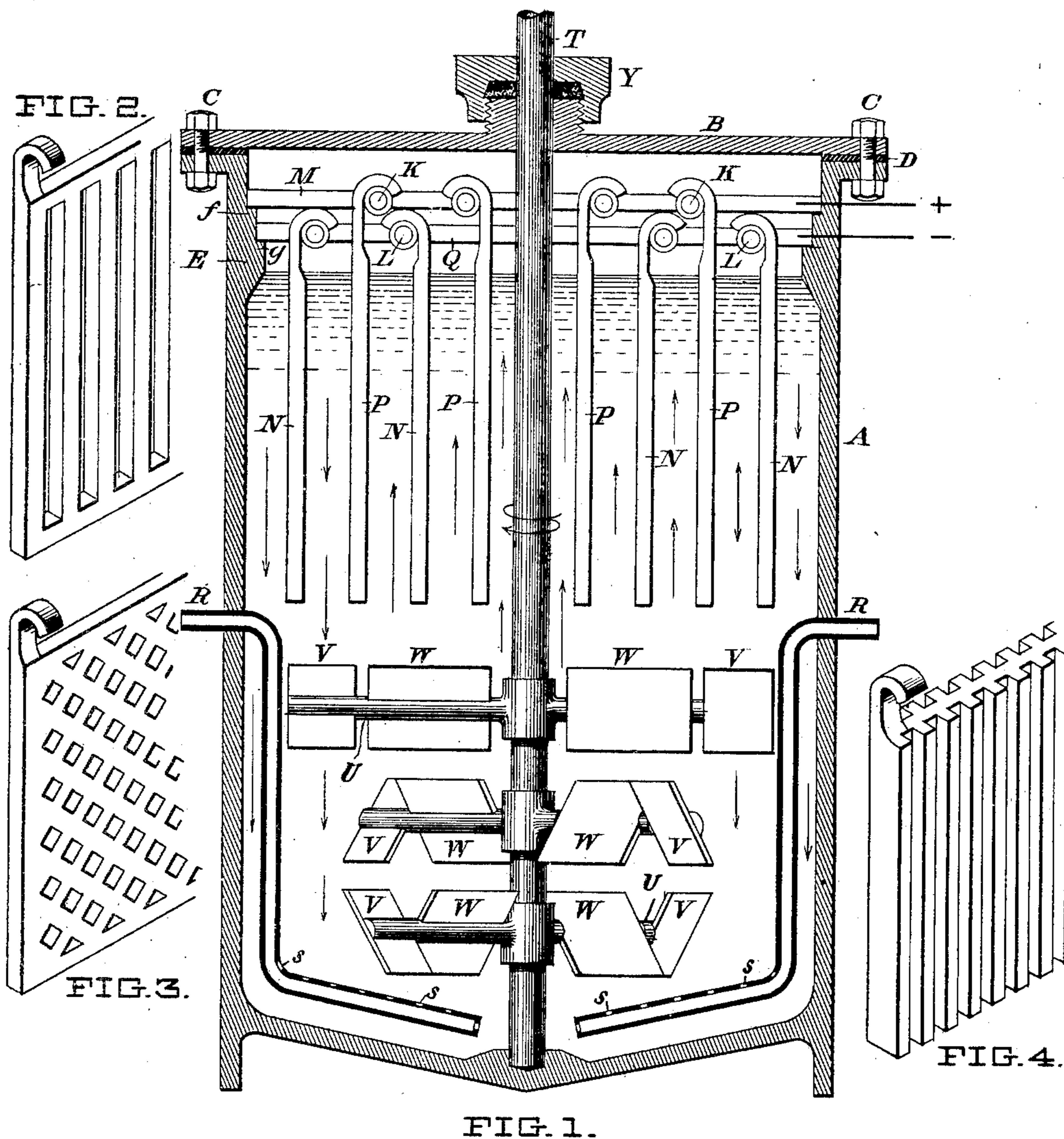
Patented June 4, 1901.

J. A. YUNCK.

APPARATUS FOR THE ELECTROLYTIC PRODUCTION OF PIGMENTS.

(No Model.)

(Application filed Dec. 16, 1898.)



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN A. YUNCK, OF HOOSICK, NEW YORK, ASSIGNOR TO LE GRAND C. TIBBITS, OF SAME PLACE.

APPARATUS FOR THE ELECTROLYTIC PRODUCTION OF PIGMENTS.

SPECIFICATION forming part of Letters Patent No. 675,459, dated June 4, 1901.

Application filed December 16, 1898. Serial No. 699,427. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. YUNCK, a citizen of the United States, residing at the town of Hoosick, in the county of Rensselaer and State of New York, have invented certain new and useful Improvements in Apparatus for the Electrolytic Production of Pigments; and I do hereby declare the following to be 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.

On the 12th day of November, 1889, Letters Patent of the United States of America No. 414,935 were granted and issued to John B. Tibbits, of Hoosick, New York, as assignee of the inventor, Turner D. Bottome, for improvements in the manufacture of white lead. The object of the invention set forth in said patent was "the commercial manufacture, by the agency of an electric current, of white lead in the form of the hydrated carbonate, which can thus be effected quickly and uniformly, instead of the tedious oxidation process heretofore generally used." Said patent described and claimed a process for the manufacture of the product irrespective of any particular kind of apparatus for carrying on the process. The present invention has for its object to provide apparatus by the use of which the process of said patent may be most successfully carried on and the product secured in its highest state of perfection and in remunerative quantities. That patent describes the formula or mode of operation which must be followed to successfully carry out the process, and also describes the chemical reactions which attend the operation of producing white lead in the manner therein described. Therefore I do not here discuss those matters, but refer to said patent therefor. Experience in working said process has demonstrated the necessity, or at least the paramount advantage, of carrying on the process in air-tight vessels when the agent for regenerating the electrolyte is supplied in gaseous form and also the necessity of constantly agitating the electrolyte as the regenerating agent is supplied to it while the

operation is in progress. Briefly stated, that process consisted in manufacturing white lead by electrolytically dissolving a lead anode in an alkaline liquid solution while supplying the latter with carbon dioxid.

This invention relates to means for maintaining a constant agitation of the electrolyte during the operation of the aforesaid process.

One form of the apparatus which I have devised with which to work the process of said patent is illustrated in the accompanying drawings, in which—

Figure 1 shows a vertical section of my tank with the various parts in their proper positions for use. Figs. 2, 3, and 4 exhibit different designs for the electrodes.

My apparatus comprises a tank A of any appropriate form, to which a cover B is fitted, with a packing D between them, if necessary. The cover may be held in place by any convenient means, as by bolts C C. Within the tank is journaled an agitator consisting of the upright shaft T, from the bottom part of which project the arms U U. Each of these arms is equipped with floats or vanes V V and W W. These vanes are set on an incline, those nearest to the shaft being inclined in one direction and the outside ones in the opposite direction. The smooth sides of each, however, are presented uppermost, so that as the shaft revolves they will offer the least resistance to the liquid in which they move. The opposed inclinations of these vanes aid in the performance of a special function in the operation of the process. When the shaft is rotated in the direction indicated by the arrow, the inner vanes will exert a force which tends to induce an upward flow of the liquid in the tank around the shaft or through the center of the tank, while the outside vanes being oppositely inclined will tend to set up a downflowing current between the central current and the walls of the tank. The purpose of establishing these currents is to counteract the tendency of the electrolyte where it comes in contact with the anode to become impoverished, whereby polarization ensues and the decomposition of the anode gradually slackens and finally ceases if the bath in the

immediate vicinity of the electrodes becomes stagnant. Hence the desirability of establishing constant currents between the opposing electrodes for the purpose of effecting perfect diffusion of the regenerating agent throughout the bath, so as to maintain as nearly as possible a constant state of homogeneity of the same. The regenerating agent is taken into the bath through pipes R R, which pass through the walls and down to near the bottom of the tank. The lower parts of these pipes are perforated with fine apertures s s s, through which the regenerator, if a gas, can escape into the bath. These pipes lead from a source of supply, and the supply may be under pressure, which in some cases is desirable. Within the tank resting upon supports f f and g g are barred racks or grids M and Q, from one of which the cathode-plates or electrodes N N N N are hung and from the other the anode-plates P P P. All of these are of metallic lead and may be made of any form or design which will promote or aid the circulation of the electrolyte in the tank. Preferably they are perforated or of some design of open or fret work, so that the electrolyte may circulate freely through the openings, thus exposing to its decomposing action as much as possible of the surface of the plates. The electrodes are provided with hooks at their tops by which they may be hung to the bars K and L of the racks. The agitator-shaft T passes through a packing-box Y in the cover to prevent the escape of gas when gas is used.

It has been shown by experience that if the regenerating-gas is simply fed to the electrolyte at the bottom of the tank and is left to itself to diffuse throughout the whole body of the solution a homogeneous diffusion throughout the whole mass does not ensue, and also that although extraneous agitation of the electrolyte promotes diffusion, yet that is not enough; but when some mechanical agency is brought to bear on the electrolytic solution, whereby intermingling counter-currents can be established in the solution as the regenerative gas is supplied to it the best results follow and the deposition of the pigment in the bottom of the tank proceeds most uniformly and rapidly.

My apparatus is used as follows: The tank having been properly filled with the electrolytic solution, the electrodes are hung in position, all the anodes being coupled together and connected with one pole of the dynamo and all the cathodes being similarly coupled and connected with the other pole. The anode and cathode plates are arranged in alternation, as shown. The cover is then securely closed. The pipes R R are then connected with the source of supply of the regenerative agent, which in the patent referred to is carbon dioxide. This is supplied to the electrolyte under pressure and passes into the tank through the apertures s s s. The agitating

or diffusing apparatus then being started and revolving in the direction of the arrow which encircles the shaft, as seen in Fig. 1, the inner inclined vanes W W W W in motion exert a lifting tendency on the solution which they confront in action, and thereby set in motion an upward current, as indicated by the arrows which point upwardly, while the vanes at the extremities of the arms exert a force on the solution with which they come in contact in the opposite direction, as indicated by the arrows which point downwardly. Thus opposing vertical currents are established, which take up the carbon dioxide supplied through the pipes R R at the bottom of the tank and cause the same to be thoroughly diffused throughout the electrolytic solution, so as to render the same practically homogeneous. As the various electrochemical reactions which take place in the body of the electrolyte between the electrode-plates proceed the anode-plates dissolve, as shown in the patent aforesaid, and a precipitate of hydrated carbonate of lead is evolved, which falls to the bottom of the tank, from which it is recovered, washed and dried, when it is ready for use.

It will be apparent that by the use of an air-tight tank the supply of the regenerating agent can be most economically controlled, so that there will be no loss of the gas, and the deleterious consequences attendant upon its escape into the atmosphere of the laboratory are avoided.

I regard any devices or means connected with the tank and its contents by the use of which a uniform and practically constant circulation of the electrolyte between the electrodes can be maintained and the regenerative gas can be diffused through the body of the electrolytic solution as equivalents of my invention. To the extent, therefore, that the use of an air-tight tank prevents waste of the regenerating agent and protects the health of the attendants and the use of the agitating and diffusing device increases the product, I regard the use of my invention in the manner indicated as an improvement upon the process set forth in the said Bottome patent. I therefore claim as my invention, and desire to secure by Letters Patent, the following:

An electrolytic apparatus embracing in combination a tank adapted to hold the electrolyte, having a detachable cover adapted to be fitted thereto air-tight; provisions within the tank for independently suspending electrodes therein which are adapted to be connected with the opposite poles of an electric generator or a battery; a conduit leading from the exterior into the tank having a terminal at or near the bottom of the tank and opening thereinto; and a diffusing-agitator within the tank provided with arms, each of which is equipped with a plurality of vanes between the agitator-shaft and the walls of the tank,

all of said vanes, however, which rotate in the same vertical orbital field being inclined in the same direction, and all those occupying an adjacent vertical orbital field being inclined in an opposite direction, the whole being adapted by its action to induce opposing vertical currents in the electrolyte.

In testimony whereof I have hereto affixed my signature in presence of two witnesses.

JOHN A. YUNCK.

Witnesses:

FRANKLIN SCOTT,
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