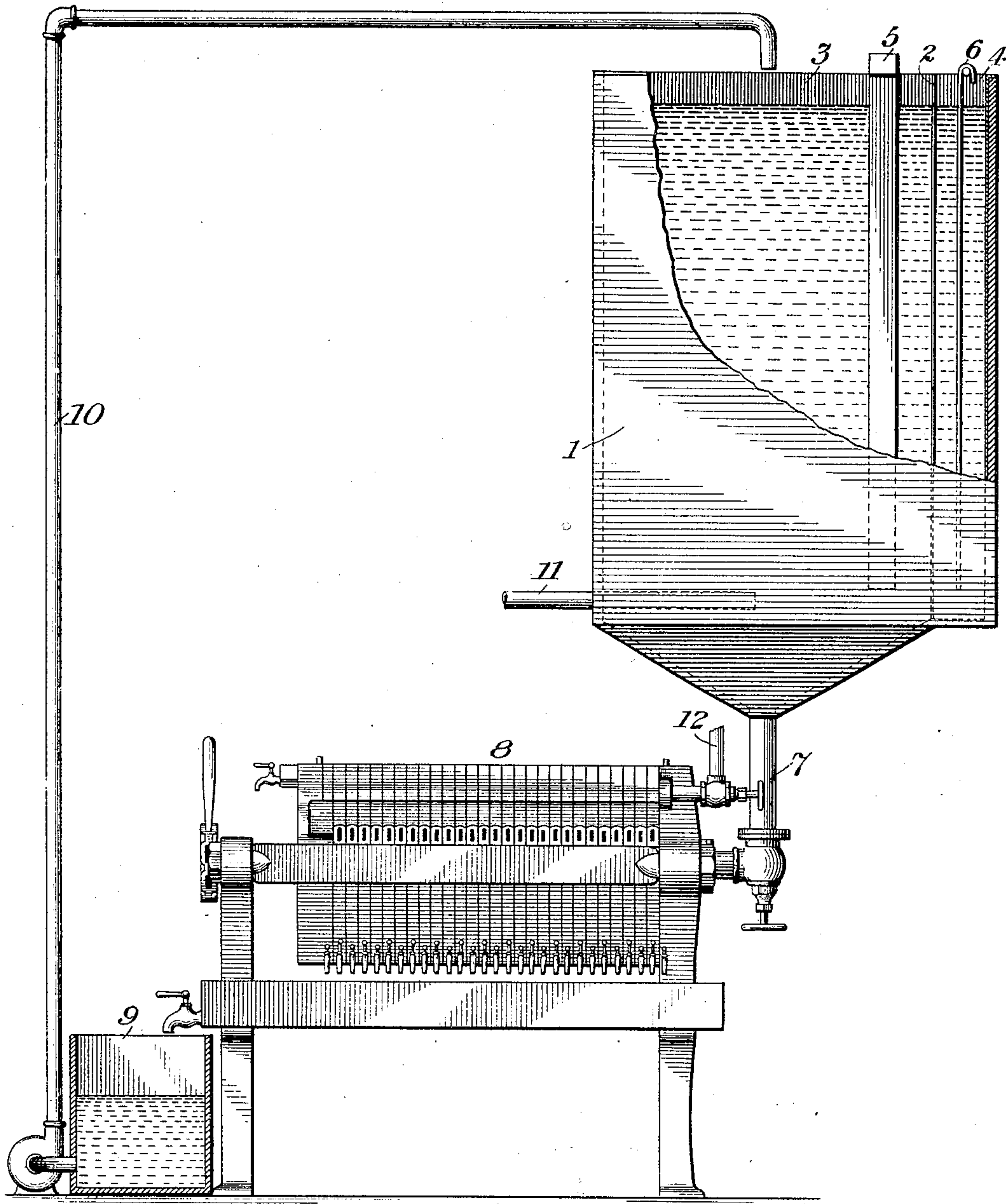


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C. P. TOWNSEND.
METHOD OF MAKING WHITE LEAD.
APPLICATION FILED MAR. 22, 1904.



Witnesses:
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UNITED STATES PATENT OFFICE.

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METHOD OF MAKING WHITE LEAD.

SPECIFICATION forming part of Letters Patent No. 791,956, dated June 6, 1905.

Application filed March 22, 1904. Serial No. 199,491.

To all whom it may concern:

Be it known that I, CLINTON PAUL TOWNSEND, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Methods of Making White Lead, of which the following is a specification.

This invention relates to the manufacture of pigments, and comprises a novel method of producing white lead.

According to my method I use in connection with a suitable electrolyte, such as is hereinafter described, an anode of lead and a suitable cathode, which may conveniently be of lead, iron, or copper, and I interpose between these electrodes a membrane which is capable of substantially preventing the passage to the cathode of the soluble or insoluble compounds of lead which may be present in the electrolyte surrounding the anode. The portion of the electrolyte which surrounds the cathode, and which will be herein designated the "catholyte," is preferably neither circulated, carbonated, nor otherwise treated, whereas the portion of the electrolyte surrounding the anode and herein referred to as the "anolyte" is preferably circulated and is continuously or intermittently regenerated by the addition of carbon dioxid.

In the electrolytic production of white lead a serious difficulty arises from the tendency of the lead dissolved from the anode to deposit upon the cathode in the form of a more or less adherent body of sponge-lead, which must from time to time be removed to prevent portions of the same from becoming detached and contaminating the product. This deposit of sponge is, furthermore, objectionable because it represents a loss of current. By operating according to my method no deposit of lead sponge occurs.

White lead has heretofore been produced by methods involving the use of an electrolytic cell provided with a diaphragm, the anode and cathode being in the separate compartments thus formed; but in such cases the cathode electrolyte has always been utilized in the production of the pigment, said cathode electrolyte being either added to the anode solution to precipitate hydroxid of lead, said

hydroxid being thereafter carbonated, or said cathode solution being first carbonated and then added to the anode solution to precipitate therefrom a carbonate of lead. In either case the anolyte consists of a solution of a salt of lead from which the lead is separated by addition of the cathode solution. My method differs from these in that the catholyte appears to take no part in the reaction, which is limited entirely to the region of the anode. Furthermore, in operating according to my method no appreciable quantity of lead is found in solution in the anolyte. The pigment is formed in the cell in the anode-compartment thereof and is preferably continuously separated from the anolyte by means of a suitable filter, settling device, or other separator. The portion of the anolyte separated from the pigment may be regenerated by the addition of carbon dioxid and returned to the cell, or the carbon dioxid may be added continuously to the anolyte in the cell. Water is added at convenient intervals to maintain the original concentration. In practice this is accomplished by returning to the electrolyte the first washings from the pigment.

For a full understanding of my invention reference is made to the accompanying drawing, wherein the figure is an elevation, partly broken away, of a simple arrangement of apparatus suited for carrying out my method.

Referring to said drawing, 1 represents a suitable tank or electrolytic cell, which may be provided with a non-conducting lining. In practice I have employed a wooden vessel interiorly lined with sheet-lead, said lead lining or a portion thereof being conveniently treated with a solution of paraffin. Said electrolytic vat is divided by means of a diaphragm 2, of the character hereinafter described, into a relatively large anode-compartment 3 and a relatively small cathode-compartment 4. The anode 5 is of lead and may be of any suitable form or dimensions. The cathode 6 may consist of a sheet or mesh of any suitable conductive material.

From the bottom of the anode-compartment a pipe 7 leads to a filter-press 8 or other suitable separator. The electrolyte, freed from the suspended pigment, is collected in a tank

9 and thence returned through a pipe 10 to the anode-compartment. A continuous circulation through the anode-compartment is thus established. The necessary carbon dioxide may be introduced, as at 11, directly into the anode-compartment, or it may be introduced into the anolyte at any point in its circuit. The pigment may be wholly or partly freed from the electrolyte by washing in the press, a water-supply pipe 12 being provided for this purpose. Sufficient of the first washings to maintain the original volume should be added to the electrolyte.

It will be obvious that the apparatus may be modified in many ways, and my invention is in no way limited to the use of apparatus substantially as here shown by way of example. For instance, I may provide a cathode-compartment between two anode-compartments, said anode-compartments communicating or not, as may be desired, or I may provide an anode-compartment between two cathode-compartments, said cathode-compartments being either distinct or communicating, or I may provide a series of compartments, the electrodes therein alternating in polarity, like compartments being either separate or communicating. Inasmuch as the catholyte does not take any apparent part in the reaction whereby the basic pigment is produced, I consider it advantageous to make the cathode-compartment very small as compared with the anode-compartment, and the membrane may, if desired, be in substantial contact with the face or faces of the cathode. I prefer to make the anode-compartment of quite large capacity in order that the composition of the electrolyte therein may not be subject to considerable variations.

The membrane used should be of such character as to substantially prevent the compounds of lead present in the anolyte from coming into contact with the cathode. I have found that vegetable parchment or parchment-paper is particularly suited for this purpose; but I do not limit myself to this particular material. I believe it to be essential, how-

ever, that the membrane should be substantially impermeable as a filter, and I have not been able to obtain any useful results by the use of tissues or woven fabrics.

I do not limit myself to the use of any particular electrolyte, it being essential merely that the electrolyte shall comprise a mixture of salts in solution, one of said salts being capable of yielding at the anode a solvent for lead, while the other salt or precipitant must necessarily be a soluble carbonate or bicarbonate. I prefer to have the proportion of carbonate quite small as compared with that of the solvent salt. As a solvent salt I prefer to use one of the soluble acetates and preferably sodium acetate. The catholyte may have the same initial composition as the anolyte, or it may consist initially of water or of any solution not incompatible with the operation.

I claim—

1. The method of producing white lead, which consists in passing an electric current from a lead anode to a cathode through an electrolyte capable of yielding a lead solvent and containing a carbonating agent, and substantially excluding lead compounds from said cathode by a suitable diaphragm, whereby the pigment is produced in the anolyte within the confines of the electrolytic cell, substantially as described.

2. The method of producing white lead, which consists in passing an electric current from a lead anode to a cathode through an electrolyte capable of yielding a lead solvent and containing a soluble carbonate, and substantially excluding lead compounds from said cathode by a suitable diaphragm, whereby the pigment is produced in the anolyte within the confines of the electrolytic cell, substantially as described.

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

CLINTON PAUL TOWNSEND.

Witnesses:

C. W. FOWLER,
JULIA B. HILL.