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C. P. TOWNSEND.

PROCESS FOR THE PRODUCTION OF PIGMENTS.

APPLICATION FILED APR. 18, 1902. RENEWED FEB. 11, 1907.

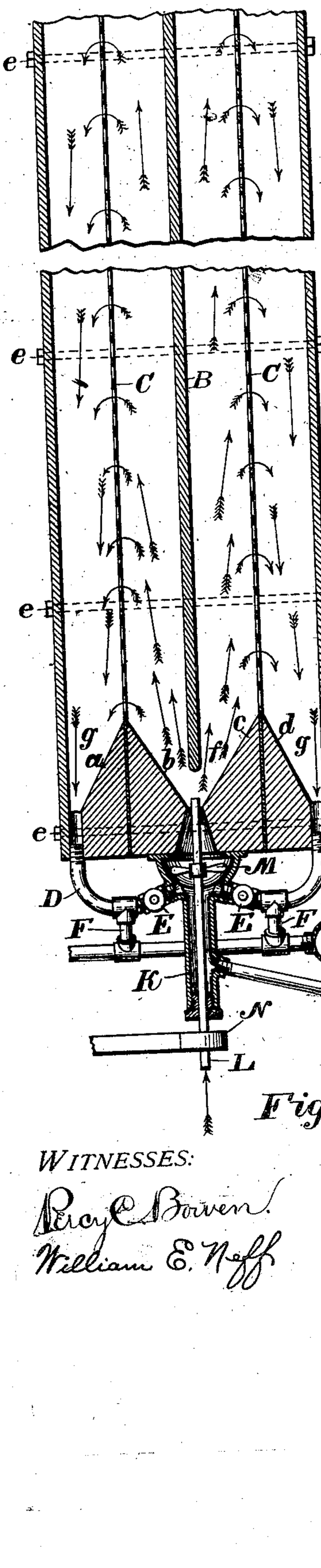


Fig. 1.

Fig. 2.

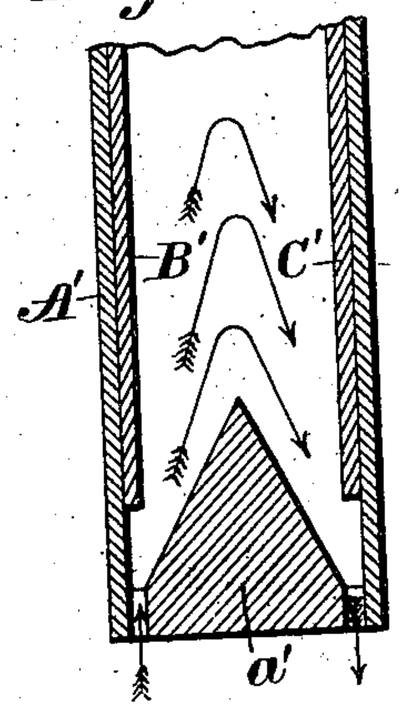
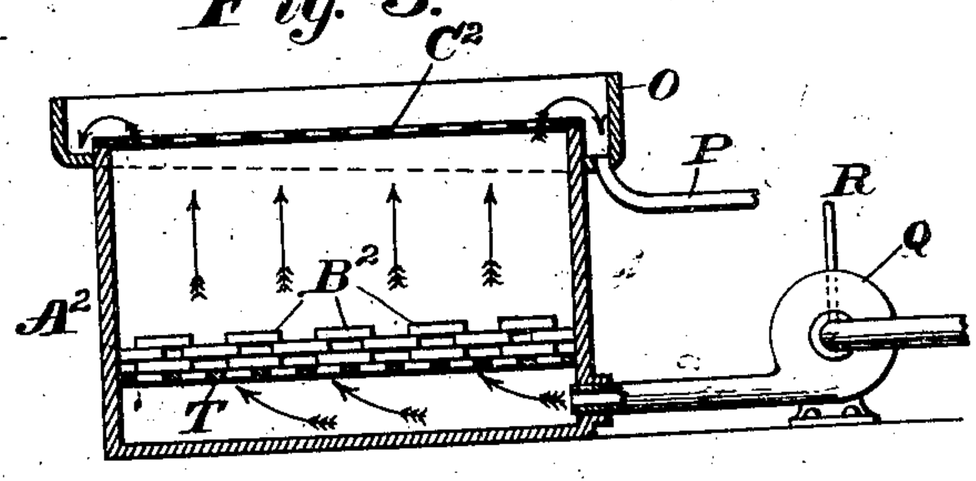


Fig. 3.



WITNESSES:

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PROCESS FOR THE PRODUCTION OF PIGMENTS.

No. 847,032. Specification of Letters Patent. Patented March 12, 1907.

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To all whom it may concern:

Be it known that I, CLINTON P. TOWNSEND, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Processes for the Production of Pigments, of which the following is a specification.

This invention relates to the production of pigments, and particularly to the production of hydrated carbonate of lead or white lead, and consists of a process for the production of such pigments. It has been proposed heretofore to form such pigments electrolytically; but the product has been found to be irregular in composition and quality and deficient in covering power.

I have discovered that a pigment of uniform grade and exceptionally high covering power may be produced in an electrolytic cell and that the condition essential thereto is a definite circulation of the electrolyte successively past the respective electrodes, and preferably in the direction from the anode past or through the cathode.

In the accompanying drawings I have shown several types of cell suitable for carrying out my method. It will be understood that any type or form of cell may be employed.

Figure 1 shows in cross-section a cell provided with perforated cathodes; Fig. 2, a cell in which both anode and cathode are of plate form, and Fig. 3 a form of cell employing pervious anodes and cathodes.

Referring to Fig. 1, the cell A is represented as built up of a series of sections *a b c d*, secured together by bolts *e*. The sections *a b* and *c d* clamp between them the plates C, which may be formed of perforated metal or of wire-gauze and which constitute the cathodes of the apparatus. The sections are so formed as to provide between them and between them and the sides of the cell a series of channels *f g*. The anode B, which may be a plate of lead, is placed above the central channel and the electrolyte is introduced at the bottom of the cell immediately below the anode. The lateral channels *g g* are connected with the outlets D. As illustrated, these outlets are prolonged to reënter the central channel for a purpose hereafter stated.

H represents a filter-press of any preferred type communicating with the outlet-pipes D through pipe G and connections F. For this filter-press a settling-tank or other separating device may be substituted. The filtered electrolyte passes from the press H into the tank I and is thence returned to the cell through pipe J and casing K. As a means for effecting the circulation of the electrolyte I have illustrated a propeller M, mounted upon a shaft L and driven by a pulley N. The shaft L is preferably hollow, and through it carbon dioxid may be introduced into the cell, thereby assisting in the circulation of the electrolyte and regenerating the same.

h represents the pipe for introducing water into the electrolyte. Such water is preferably introduced, as shown, through the filter-press and employed for washing the pigment. The valves E are provided in the pipes D, and by opening them to a greater or less extent a rapid and repeated circulation may be secured through the cell, a portion only of the circulating electrolyte being continuously drawn off through the filter-press.

In the construction shown in Fig. 2 the cell A′ is provided with a bottom section *a′* in the form of an inverted wedge in order that no pigment may collect in the lower portion of the cell. The electrodes B′ C′ are plates placed, respectively, in the neighborhood of the inlet and outlet of the cell. In the construction shown in Fig. 3 a tank A^2 is provided with a false bottom T, which serves to support the divided anode B^2. The cathode C^2 is in the form of a perforated plate transversely of the tank at its upper portion. The electrolyte overflowing through the cathode is collected in the trough O and conducted through the pipe P to the separating devices. The clear electrolyte is returned to the cell by the centrifugal pump Q. In this construction the carbon dioxid required for regeneration of the electrolyte is preferably introduced at the axis of rotation of the centrifugal pump through the pipe R. Introduced at this point it serves to aid the circulation of the electrolyte. The anode B^2 is represented

as consisting of lead in divided form and may be in the form of bars or fragments of lead or of lead sponge or lead in any intermediate form of subdivision.

It will be seen that in Fig. 1 the circulation of the electrolyte proceeds from the anode through the cathodes and thence to a point exterior to the field of electrolysis, at which point a separation of the pigment is effected. In Fig. 2 the circulation proceeds from the anode past the cathode and thence from the cell. In Fig. 3 the circulation is through the anode and cathode successively. In certain cases it may be found desirable to reverse the direction of this circulation.

It will be understood that in the cases illustrated not only does the electrolyte circulate from the anode past or through the cathode, but that the pigment or insoluble compound formed at the anode detaches itself therefrom and is carried upwardly by the electrolyte past or through the cathode and thence to a region outside the field of electrolysis. It will be further seen that in the constructions shown in Figs. 1 and 3 the area of the cathode is greatly reduced as compared with that of the anode. This is of great assistance in preventing the formation of lead sponge by reduction of the pigment, not only because the speed of circulation through the cathode is thereby increased and the pigment prevented from adhering to it, but because the electrolytic reduction itself proceeds more slowly when the cathode area is relatively small and the current density at the cathode relatively high.

In operation a lead anode is employed and an electrolyte consisting of any salt whose acid radical forms a soluble compound with lead. To this solution is added a soluble carbonate. In practice I have found a mixture of sodium nitrate or acetate and sodium carbonate, in proportions approximating ten to one, to constitute a satisfactory electrolyte. The current density depends to some extent on the speed of circulation of the electrolyte, a higher current density being employed as this circulation is more rapid.

To regenerate the electrolyte, it is necessary to add thereto continuously or at intervals carbon dioxid and water in quantity equal to that removed by the pigment. The carbon dioxid may be employed, as shown, to aid or as the sole agent for effecting the circulation of the electrolyte.

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, causing the electrolyte to flow past an electrode and thence to a point outside the field of electrolysis at sufficient velocity to transport the pigment, and transporting the pigment by such flow, 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 carbonating agent, causing the electrolyte to flow past the anode and thence to a point outside the field of electrolysis at sufficient velocity to transport the pigment, and transporting the pigment by such flow, substantially as described.

3. 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, causing the electrolyte to flow between the electrodes and thence to a point outside the field of electrolysis at sufficient velocity to transport the pigment, and transporting the pigment by such flow, substantially as described.

4. 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, causing the electrolyte to flow repeatedly past an electrode and thence to a point outside the field of electrolysis at sufficient velocity to transport the pigment, and transporting the pigment by such flow, substantially as described.

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

CLINTON P. TOWNSEND.

Witnesses:
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