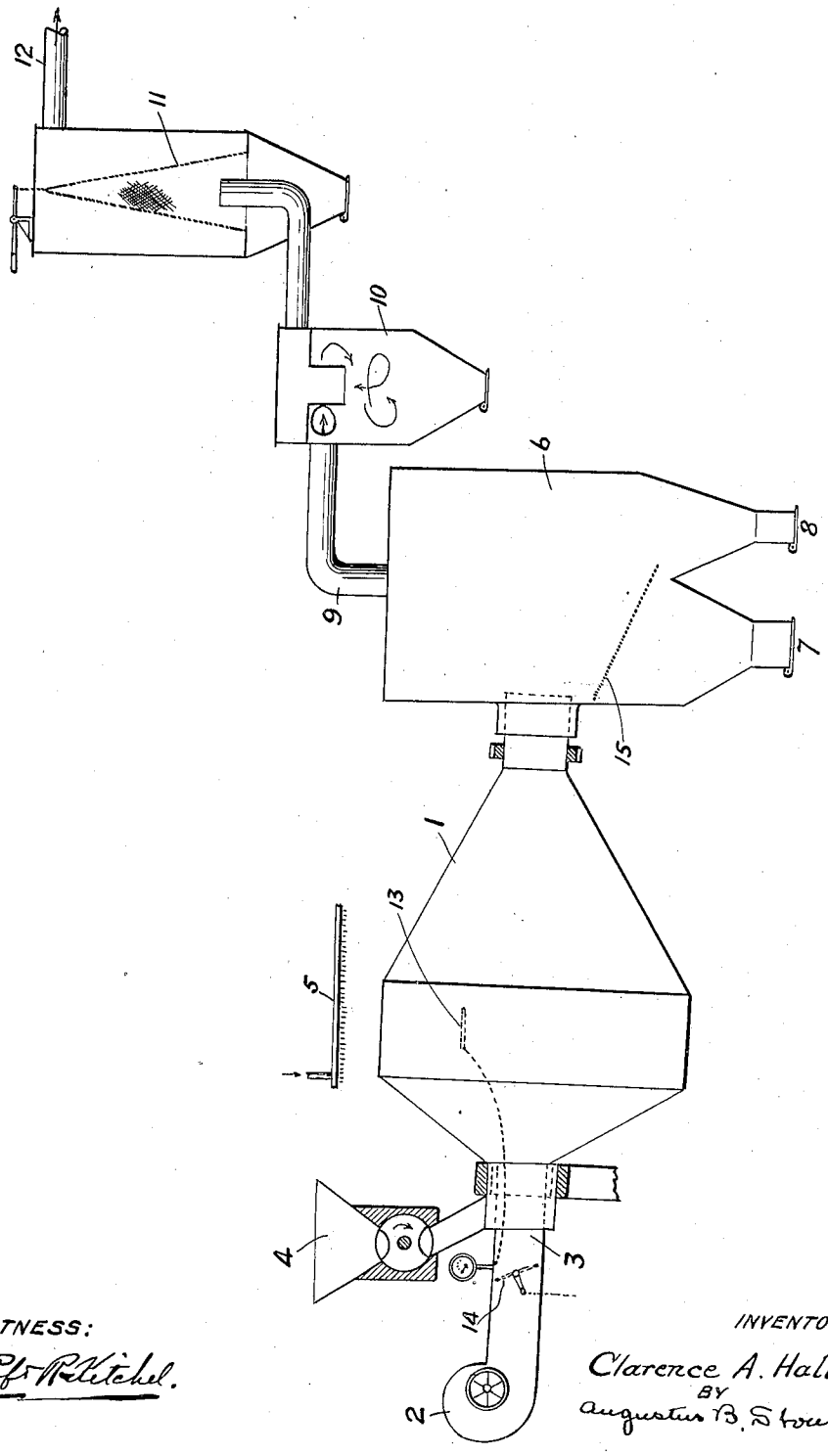
Nov. 22, 1932. C. A. HALL 1,888,823

LEAD OXIDE POWDER AND METHOD OF MAKING THE SAME

Original Filed March 29, 1924



WITNESS:

Robt. R. Ketchel.

INVENTOR

Clarence A. Hall

BY

Augustus B. Stoughton,

ATTORNEY.

Patented Nov. 22, 1932 1,888,823

UNITED STATES PATENT OFFICE

CLARENCE A. HALL, OF PHILADELPHIA, PENNSYLVANIA

LEAD OXIDE POWDER AND METHOD OF MAKING THE SAME

Application filed March 29, 1924, Serial No. 702,389. Renewed December 24, 1926.

Objects of the present invention are, first, to provide a lead oxide powder of the order of lead oxides used extensively in the arts but much less expensive to produce and capable of replacing them for many purposes such as in the manufacture of storage batteries and paints and in some cases with beneficial and improved results; and second, to provide an expeditious, comparatively inexpensive and reliable method of making such lead oxide powder of substantially uniform qualities.

Other objects of the invention will appear from the following description and the invention will be claimed at the end hereof.

In the following description reference will be made to the accompanying drawing comprising a single figure and illustrating, partly in section but principally in side elevation, apparatus by means of which the product can be made in accordance with the method.

The product is an amorphous fine powder. The degree of its fineness can be illustrated by saying that it will pass through a 200 mesh. The powder is olive gray in color and it is unstable or highly chemically reactive if exposed to air, more particularly moist air of the atmosphere, and spontaneously oxidizes or approaches litharge. The specific weight (weight of a given volume of powder in terms of the same volume of water) of the product is approximately from 2.10 to 2.25, and it contains from 50% to 80%, or the major portion, of oxide calculated as litharge. The product in sealed drums, such as are usually used for lead oxides, will remain stable for a week or so. Some of the product is absorbed in a dilute solution of acetic acid and some of it remains as metallic lead of spongy form. The quality of the product is very uniform and when used for paints its instability and property of oxidizing in the air is of value and its uniformity of quality is of value not only in the paint industry but also in battery production. The product differs from the five well known oxides of lead although it may be a mixture of them or some of them and may possibly contain, in addition to metallic lead, lead in somewhat intermediate state or condition or lead suboxide. While a number of its identifying characteristics have been set forth, the clearest and best way to identify the product appears to be reference to its process of production or to the process of which it is the result.

In the drawing 1 is a double cone mill of the Hardinge type and it is revolved around an axis in general horizontal but very slightly inclined to the horizontal towards its outlet end. 2 is a blower having a discharge 3 into the casing 1. 4 is a hopper for feeding balls or lumps of lead into the mill and it is of the type that excludes the entrance of air. 5 is a device for putting water on the exterior of the mill. 6 is a discharge hopper fitted with a stoppered outlet 7 for the leaden powder and with a stoppered outlet 8 for coarse material which is returned to the mill. The hopper 6 is fitted with an air off-take 9 which may include a dust catcher 10 and a dust bag 11 from which air escapes at 12. The devices 10 and 11 serve as a means for recovering some of the product. 13 is a thermometer device for ascertaining the temperature existing in the mill. 14 is a shutter for controlling the air supply. The temperature can be controlled by the discharge of water at 5 and also by adjustment of the damper 14, and adjustment of the damper 14 is one way in which the supply of air and consequently the available oxygen content at the reaction zone can be adjusted. 15 is a screen.

While the described apparatus is subject to considerable modification and change, for example, in the direction of travel of the air, still it will be referred to in describing the method of the invention which may be said to consist in subjecting lumps or balls of metallic lead to mutual attrition and oxidation at a temperature limited to approximately under the melting point of lead and in the presence of a supply of air.

For the sake of further description it may be said that good results can be produced as follows: With a drum 1, six feet in diameter and ten feet in length, fourteen revolutions per minute are appropriate. One hundred and fifty cubic feet of air per minute are passed through the mill which is charged with 19,000 pounds of balls of metallic lead

of 5/8 inch in diameter. Substantially 480 pounds per hour of product are produced and somewhat less than 480 pounds of lead balls are fed into the mill per hour having in mind the increase in weight due to the oxidation of lead. The temperature is kept at less than 360° F. by water discharged from 5 onto the mill. It may be said by way of illustration that in the reaction zone, which may be taken to be located generally at the center of the mill, the air is substantially 6% oxygen content, whereas when introduced from the atmosphere it is about 20% oxygen content. From the foregoing description it will be apparent that the pieces or balls of metallic lead are reduced to powder by mutual attrition and that the powder is oxidized under controlled temperature and available oxygen conditions.

It is not the intention to limit the invention in respect to the size of the lumps or balls of metallic lead or to the exact size and speed of the mill, or to the quantity of the air, or to the temperature of the reaction, as they may be varied in accordance with practical requirements. Control of these factors, however, is the spirit of this invention, whereby any product once established may be kept substantially uniform in quality. The direction of the travel of the solid material undergoing process is generally axial of the mill and so is the direction of the stream of air, whether it flows counter to or with the solid material.

The apparatus shown and described is not claimed herein because it forms the subject-matter of my application, Serial No. 702,890.

The invention is not limited to the details of procedure herein descriptively referred to nor in respect to matters of mere form, nor otherwise than as the prior art and the appended claims may require.

I claim:

1. As an article of manufacture an amorphous lead oxide powder of olive gray color and of specific weight approximately 2.15 and being the product of the mutual attrition of metallic lead lumps at a temperature under 360° F. and in the presence of a controlled stream of air.

2. The process of making lead oxide powder of olive gray color and of amorphous structure which consists in subjecting balls or lumps of metallic lead to mutual attrition by rumbling them while confined by the closed wall of a vessel in a stream of air passing through said vessel, and controlling the temperature by the application of cooling fluid to the exterior of said wall.

3. The process of making lead powder of the order or lead oxides and of amorphous structure which consists in subjecting balls or lumps of metallic lead in a dry state or condition to mutual attrition in a stream of air thereby evolving heat in excess of that appropriate for the reaction and limiting the resultant heat to a degree appropriate for the reaction by controllably dissipating heat in excess of that appropriate for the reaction, continually introducing fresh supplies of lumps or balls, and drawing off the product.

4. The process of making an oxidized lead powder which consists in establishing and maintaining a triturating and oxidizing zone or region within a vessel closed to the atmosphere by rumbling a mass of lumps or balls of lead in a dry state or condition in said vessel and by passing a regulated stream of air axially therethrough and by controlling the temperature thereof, feeding lumps or balls of lead to said region, and axially withdrawing oxidized powder from said region, substantially as described.

CLARENCE A. HALL.