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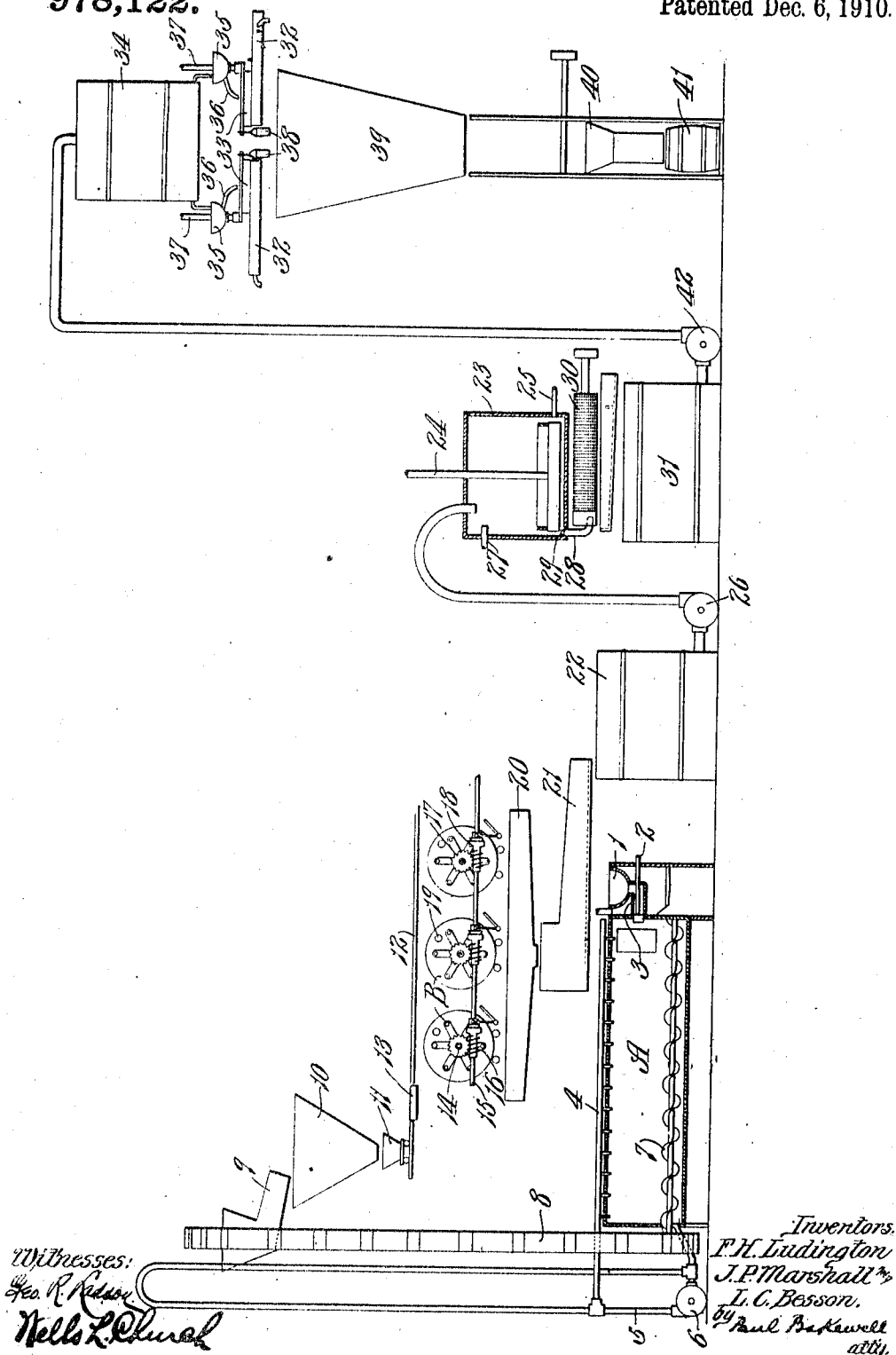
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APPARATUS FOR MAKING WHITE LEAD.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MAKING WHITE LEAD.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, FRANCIS H. LUDINGTON, JOHN P. MARSHALL, and LOUIS C. BESSON, all citizens of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Apparatus for Making White Lead, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in the process and apparatus used in the continuous mechanical production of lead carbonate, or carbonate of lead, commonly known as white lead, and lead oxid.

One object of the invention is to provide a continuous method of manufacturing white lead cheaper, and in a shorter period of time, than is possible by other methods.

Another object is to provide a method whereby a purer and superior product is produced by the practical elimination of all metallic lead and other impurities.

Another object is to provide a mechanical apparatus of novel construction for accomplishing the results above-mentioned. And still another object is to provide an apparatus, the use of which makes the process practically a mechanical one, requiring the employment of few operatives, and being so designed that the material in process is under absolute control at all times, it being thus possible to stop operations at any stage of the process for an indefinite period of time, and continuing again without injurious results of any kind to the finished product.

The method, briefly described, consists in first reducing metallic lead to a comminuted or powdered condition by melting it, and then atomizing the molten metal, collecting the fine particles of metallic or blue lead together in a chamber or vessel containing water, forming a sludge, agitating this mixture of blue lead and water in the presence of air, thereby converting it into an oxid of lead, and separating the lead oxid from any unoxidized particles; then agitating this mixture of lead oxid and water in the presence of carbon dioxid, thereby forming lead carbonate; then passing this mixture of lead carbonate and water through a screening de-

vice for the purpose of eliminating all foreign substances; then conveying this mixture of lead carbonate and water onto a heated surface on which it is spread in a thin layer or film, quickly dried, and then conveyed to an automatic packing device where it is made ready for delivery to the consumer.

Various kinds of apparatus can be used for carrying out our process, but we prefer to use one which comprises a rotatable receptacle or member for oxidizing the metallic or blue lead, and a stationary tank (which admits of greater capacity and output) equipped with a suitable agitating device for carbonating purposes, the carbon dioxid being introduced into said tank through one or more conduits placed in such manner that the gas is drawn into and mixed with the agitated material and reaches every particle of the lead oxid. This method of carbonating materially shortens the time consumed in converting lead oxid into lead carbonate or white lead by reason of the instantaneous and perfect mixture of the gas and the material. The lead carbonate being at all times mixed with water, flows freely from the carbonating tank, is easily spread in a thin film or layer over a flat heated surface which quickly eliminates all moisture. Suitable means is provided for removing the dried product from the drying member, and said means is so designed that the product will be fed automatically into the container in which it is to be placed on the market.

The figure of the drawings is an elevational view, partly in vertical section, of the apparatus that we prefer to use for practicing our method.

Said apparatus comprises a melting-pot 1 in which the metallic or pig lead is melted, and a pipe 2 for introducing a jet of steam or compressed air into the nozzle of the discharge spout 3 of said pot so as to atomize or comminute the lead as it emerges from said discharge spout. A collecting chamber A receives the atomized lead that emerges from the discharge spout of the melting-pot and said chamber is provided with suitable means for washing or collecting the particles of atomized lead together at the bottom of said chamber. If desired, a spraying pipe 4 can be connected to a

stand-pipe 5 that communicates with the pump 6 which draws the excess water out of the collecting chamber A and forces it upwardly through pipe 5 and into spraying pipe 4 again, thereby using the same water over and over. A suitable device, preferably a spiral conveyer 7 is arranged at the bottom of the collecting chamber for drawing out the blue lead and water into a bucket or other conveyer 8 which delivers the mixture of lead and water into a discharge chute 9 from which it passes into a suitable storage hopper 10. Charges of blue lead mixed with water are then conveyed from the hopper 10 to the oxidizing receptacle B, by means of a car 11 which runs on a track 12 arranged above the oxidizing receptacle, and, if desired, a platform scale 13 can be arranged in the track 12 so as to enable the charges of lead and water to be weighed before being introduced into the oxidizing receptacles, said receptacles being provided with receiving openings, not shown, through which the lead and water is introduced into same.

While we prefer to equip the apparatus with mechanical means for conveying the blue lead from the collecting chamber to the oxidizing receptacles, we wish it to be understood that it is immaterial, so far as our broad idea is concerned, how the blue lead is conveyed from the collecting chamber into the oxidizing receptacles.

The oxidizing receptacles preferably consist of horizontally disposed cylinders supported on friction rollers or other suitable means, and each cylinder is provided with an air supply pipe 14 and also a vent for the escape of the fumes.

We prefer to use a single drive shaft 15 for operating the cylinders or receptacles B, said shaft being provided with worm gears 16 that mesh with worm wheels 17 attached to spiders bolted to the heads of said cylinders. If desired, the worm gears 16 can be connected to the shaft 15 by means of manually-operated clutches 18 so as to make each receptacle or cylinder an independent unit.

The motion of the receptacle B causes the metallic lead in same to detach by agitation the particles that have been oxidized, and fresh surfaces of the metallic lead are thereby constantly exposed for oxidation, this process continuing until the metallic lead is exhausted. Each oxidizing receptacle is provided at one end with a discharge opening that is normally closed by a plug or other suitable means 19 and a trough 20, that is arranged under the discharge openings of said receptacles, receives the lead oxid that flows from said receptacles, said trough having an opening through which the lead oxid can escape into conduit 21 which leads to a storage tank 22. While

we prefer to separate the lead oxid from the non-oxidized particles of metallic lead by means of a conduit, it will, of course, be obvious that various other well-known means could be used for this purpose. The next step is to carbonate, and while this can be accomplished in various ways, we prefer to introduce lead oxid mixed with water into a tank 23 which is equipped with an agitating device 24, the motion of which has the effect of keeping the particles of oxid thoroughly mixed with water in said tank. The carbon dioxide is supplied to the tank 23 by means of pipes suitably located and provided with regulating valves, the apparatus herein shown being provided with a pipe 25 that enters the lower end of the tank 23.

The apparatus is provided with a pump 26 for pumping the lead oxid from the storage tank 22 into the carbonating tank 23, and, if desired, the carbonating tank can be supplied with a pipe 27 for drawing any surplus water from the tank. The carbonating tank is provided with a discharge pipe 28 that is normally closed by a plug or other suitable means 29, and a screening device 30 is arranged between the discharge pipe of the carbonating tank and a storage tank 31 for removing any foreign substances that may have become mixed with the material, said screening device preferably consisting of a mechanically-driven reel over which is tightly drawn a cloth of fine mesh.

The final step in the method consists in drying the carbonate of lead and conveying the dried product to the receptacle in which it is to be placed on the market. One or more steam-heated tables 32 are preferably used for drying, and scraping devices 33 are provided for removing the product when dried from said tables. A supply tank 34 is conveniently placed for feeding the mixture of lead carbonate and water to rotatable receptacles 35 provided with discharge spouts 36 that introduce the material onto the drying tables, the scraping device 33 and the receptacles 35 that cooperate with each table being connected to a driven shaft 37. The spouts 36 spread the material in a thin film or layer over the drying tables, and the heat that radiates from said tables quickly drives off the moisture from the material, which is removed by the scraping device 33 and fed to buckets 38 which discharge the product into a spout 39 and down which it falls into a packing device 40, thence into the container 41 in which it is to be placed on the market. Any suitable packing device can be used for this purpose. The carbonate of lead could, of course, be fed directly from the storage tank 31 to the drying tables, but we prefer to use a feeding tank 34 from which the material can flow in a continuous stream, a pump 42 being provided for trans-

ferring the material from the tank 31 into the tank 34.

An apparatus of the character above described can be run by very few operatives owing to the fact that the material does not have to be handled manually from the time it is introduced in a raw or metallic state into the melting-pot to the time it is placed on the market.

The apparatus is, of course, provided with suitable valves for controlling and cutting off the flow of the material through the pipes or conduits which connect the various tanks and devices together, also any connection with the gas and air supply.

As the atomizing device, the oxidizing receptacle, the carbonating tank, and the drying device are all separate and distinct from each other, the time which the material is kept in the various stages of process can be varied at the will of the operator.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An apparatus for making white lead, comprising means for atomizing the metal and converting it into a sludge, a rotatable oxidizing receptacle that contains air and water and which is adapted to receive said sludge and thus cause the metallic lead to be converted into a lead oxid, means for supplying the sludge to said oxidizing receptacle, a discharge conduit communicating with said receptacle and provided with means for collecting the metallic lead or non-oxidized particles of lead that escape from the oxidizing receptacle with the lead oxid, a carbonating tank provided with an agitator and having carbon dioxid supply pipes connected with same, means for feeding the oxidized lead to said carbonating tank, a screening device through which the carbonate of lead passes after it is drawn out of the carbonating tank, a heated drying member, means for feeding the carbonate of lead to said drying member, and means for removing the dried product from said drying member.

2. An apparatus for making white lead, comprising means for atomizing lead and converting it into a sludge, a rotatable oxidizing member that contains water and which is adapted to receive said sludge, means for supplying air to said member,

means for conveying the sludge from said atomizing means to said oxidizing member, a carbonating tank, means for conveying the lead oxid from the oxidizing member to said carbonating tank, means for agitating the material in the carbonating tank and introducing a supply of carbon dioxid into the mass so as to convert the oxid into carbonate of lead, a screening device through which the carbonate of lead passes after it leaves said carbonating tank, a drying mechanism provided with means for converting the carbonate of lead into a powdered condition, and means for supplying the carbonate of lead to said drying mechanism.

3. An apparatus for making white lead, comprising means for atomizing the lead and converting it into a sludge, a supply hopper, means for conveying the sludge into said supply hopper, a rotatable oxidizing member, means for conveying a certain quantity of sludge from said hopper and introducing it into said oxidizing member, a conduit adapted to receive the material that is drawn out of said oxidizing member, a storage tank communicating with said conduit, a carbonating tank provided with an agitating device, means for transferring the oxid from said storage tank to said carbonating tank, means for introducing a supply of carbonic acid gas into the contents of said tank, means for screening the carbonate of lead that is drawn out of the carbonating tank, a storage tank for containing the screened carbonate of lead, a heated drying member provided with a scraping device which removes the dried material therefrom, means for feeding a stream of carbonate of lead onto said drying member, a cooling apparatus through which the dried product passes after it leaves the drying member, and a packing apparatus for packing the product in the container or package in which it is placed on the market.

In testimony whereof, we hereunto affix our signatures, in the presence of two witnesses, this 25th day of February, 1910.

FRANCIS H. LUDINGTON.
JOHN P. MARSHALL.
LOUIS C. BESSON.

Witnesses:

E. K. LUDINGTON,
THOMAS F. ARMSTRONG.