

OLD DUTCH PROCESS
WHITE LEAD



SHERWIN-WILLIAMS
PRODUCTS



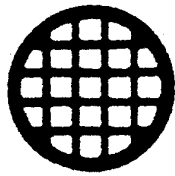
The Dutch Process of Making Lead



THE method employed in England and the United States in the production of white lead, except for a limited amount, is that known as the Dutch Process. In other words, the Dutch are generally credited with the discovery of this successful method, though this contention is disputed by some. For instance, in an old Roman work written about 300 B. C., may be found the following: "Lead is placed in earthen vessels over sharp vinegar, and after it has acquired some thickness of a sort of rust, which it does in about ten days, they open the vessel and scrape it off." There are many references which could be quoted to show that white lead was manufactured in many other countries of Europe prior to the period usually referred to for the establishment of the industry in Holland, *i. e.*, the sixteenth century.

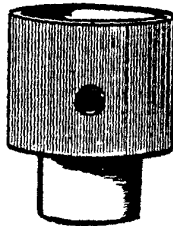
When metallic lead is exposed to the action of the air and moisture, it becomes

covered with a white substance composed



A Lead Buckle

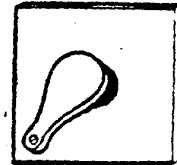
of carbonate and hydrated protoxide of lead, which is the white lead of commerce. By the Dutch Process white lead is produced by artificially creating these conditions and submitting metallic lead to the corroding effects of a warm atmosphere loaded with the vapors of carbon dioxide (carbonic acid gas), of acetic acid and of steam. The indications are that the chemical process in the corrosion of lead by the Dutch Process involves at the start the oxidation of the lead and the formation of basic lead acetate; that this basic lead acetate is decomposed by the carbon dioxide present, the basic lead being precipitated as white lead; and that the neutral acetate, again acting on more metallic lead, is changed into the basic form ready to be acted upon again by the carbon dioxide, and so continuing as long as all the conditions requisite are present.



Corroding Pot

4

Regarding the method of handling the lead in corroding stacks, quoting from an old work, the following may be found as the method used in Rotterdam and Amsterdam: "The lead was first cast in thin sheets, which were rolled in a spiral, and placed in earthen pots 7 to 8 inches high and 4 to 5 inches in diameter, made wider at the top than at the bottom. To prevent the lead from falling to the bottom, they placed inside the pot, and at about one-third of its depth, a piece of wood cut the length of the diameter of the pot. This was the Rotterdam method. At Amsterdam the manufacturers had moulded in the inside of the pot, and at about one-third of its height, three little points, which served, instead of the wood, to support the lead. The stacks were built in one range of four, each being 15 feet square. After the pots had been filled up to an indicated point, with vinegar, and the spiral lead placed in position in each pot, they were arranged in rows in the stack upon a bed of dung, 4 feet thick; the pots were placed together as closely as pos-



Vapor Regulator

5

sible and when the bed was covered with the pots, plates of lead were laid upon them and the whole layer covered with boards. These boards were then covered with dung and another tier of pots placed as before, filled with vinegar and lead, and covered in the same manner. This was repeated until five tiers, or layers, were built up. The lead was left in the stacks from 4 to 5 weeks, 'according,' Jars says, 'to the season and the quality of the dung.' This method, in so far as corroding is concerned, is virtually the same as is in use today, except that spent tan-bark (bark which has been used in tanning operations) is used in place of manure, a flat lead plate (called a buckle) instead of a rolled sheet, and the further fact that the thermometer and ventilating pipe play an important part in the handling of the stacks of today.



6

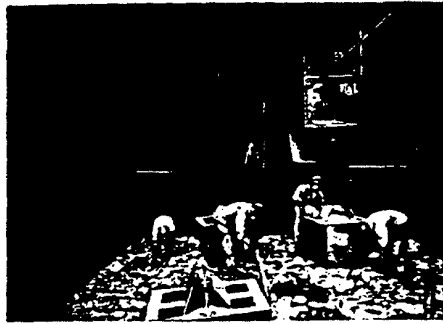
Our Facilities for Making Old Dutch Process Lead



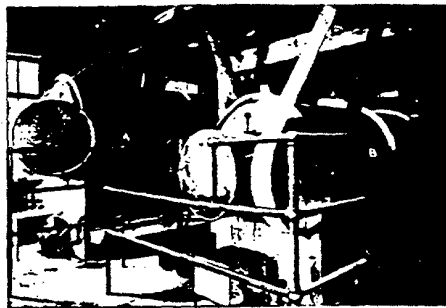
THE Sherwin-Williams Co. has for a long time produced the more important raw materials that enter into its manufactured products. White lead has been left until almost the last because of the large amount of property and investment necessary to complete a suitable corroding plant. We now have at Chicago a complete white lead plant where we are manufacturing Old Dutch Process Lead (ODP).

Our reason for making our own lead is not only due to the fact that our consumption of carbonate of lead is very large, but also to the fact that as we make, sell and distribute a complete line of paint and varnish products, we feel that it is decidedly to our best interests to offer our trade a strictly pure grade of white lead of such quality as will be recognized as the leading brand throughout the country. To safeguard the quality of our lead, we have as corroder a man

7



Lead being taken out of stacks after corrosion. Goes from here to be separated in mill building



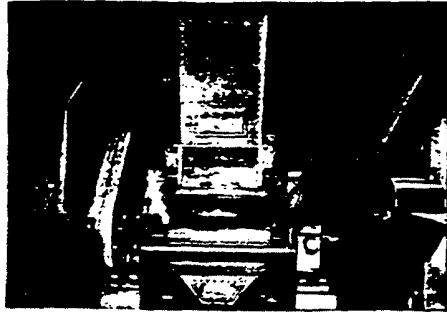
A—Main screen, where second separation is made
B—Last screen, where final separation is made

who has had over 25 years' experience in the lead business. The foremen of each department are also men who have served many years in lead manufacture.

The stack-house where we are corroding Old Dutch Process Lead is 266 feet long, 233 feet wide, and contains 37 stacks, with provision for adding any number of additional stacks from time to time as the growth of the business may require. Each stack has a capacity of 13,000 pots, each pot holding about 18 pounds of lead. The mill building in our plant is 150 feet long, 75 feet wide and 4 stories high. It contains the separating, grinding and washing machinery, settling tanks, mixing machinery and linseed oil storage tanks.

The accompanying view shows a drawing gang dumping the corroded lead from the pots into a dump bucket. A traveling crane, of which there are four, then takes the filled bucket to the buckle-beater where the lead is weighed and dumped and then automatically conveyed to the mill building after the first separation of scrap lead has been made.

The traveling cranes not only operate backwards and forwards, but are so arranged as to leave the bridge behind to travel out over any individual stack. This enables us to handle the material



Grinding rolls



Drag-box, where lead first enters water and is made ready for water mills

most economically both into and out of the stacks. As soon as a stack is emptied the setting gang comes in and the work of rebuilding goes on; corroding pots are served the men by the cranes, who arrange them in rows ready for the new buckles that are delivered from the casting machine in quantities of 3,000 pounds at a time. With the modern stack-house equipment as described, we are able to set and draw lead as economically, if not more so, than any other concern in the white lead business in this country.

The second illustration on page eight shows the screens in our separator house where the carbonate is screened after passing through a series of rolls that break off and flatten out all particles of blue lead that still remain after passing through the first separation in the corroding yard. From the screen "B" the carbonate is delivered to the drag-box, where it is mixed with water and passed into the water mills for grinding.

In making our Old Dutch Process Lead we use only the best specially refined, desilverized pig lead that we can possibly obtain. The greater part of our tonnage of pig lead is shipped to us in car-loads of 50 tons each. The lead comes in pigs weighing about 100 pounds each. Upon receipt of the cars at our Chicago plant,



Tub room, where lead is settled before going to dry pans or mixers



Water mills, where lead is first ground in water

12

each pig is sampled by a tester and analysis made on the combined samples. This gives average figures for each shipment received, allowing us to keep a check and to be absolutely sure that the pig lead we are using is right. One brand of pig lead purchased is the Electrolytic Double Refined Desilverized Corroding Lead and the standard with which our analysis is checked is as follows:

Copper	- - - - -	.001
Silver, not more than	- - -	.001
Arsenic	- - - - -	.002
Antimony	- - - - -	.006
Bismuth	- - - - -	.003
Iron	- - - - -	.002
Zinc	- - - - -	trace

By this thorough method of checking the raw product that goes into our white lead, and by careful and up-to-date means of manufacture, we are able to produce a lead which we know will be absolutely satisfactory in every particular, and one that will meet exactly the guarantee shown on every package of Old Dutch Process Lead that we manufacture:

This package is warranted to contain nothing but Strictly Pure White Lead, ground in Strictly Pure Linseed Oil, and we will pay one ounce of gold for every ounce of adulteration it may be found to contain.

13

0007-SWP-000000362

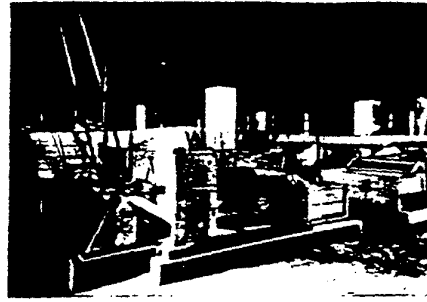
How We Make Old Dutch Process Lead



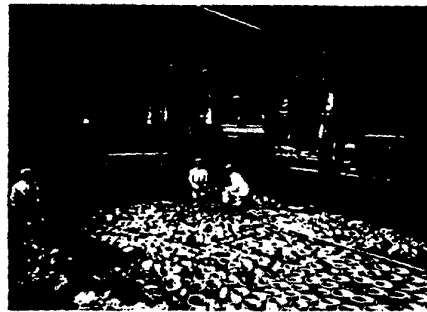
THE process by which we make our lead is as follows: A bed of tan-bark, about 14 inches in depth, is spread in what is called a stack. Upon this bed of bark are set in even rows hundreds of corroding pots. In the bottom of each pot is placed about a pint of $2\frac{1}{2}$ per cent acetic acid. The pots are then filled to the top with lead

buckles, each of which weighs about three-quarters of a pound. When the entire space is filled, except for a wall of tan-bark on four sides, a ventilating pipe with a 2-inch hole in top is placed in position at or about the center, and the whole surface is covered with a layer of boards. Upon the boards is placed another layer of tan-bark, then more pots, acid and lead, and so on until the stack is filled to its limit, and the stack is then finished and ready to be manipulated by the corroder. The hole in the top of each vent is provided with a small pear-shaped button, which is used to regulate the flow

14



Two shaker screens where all foreign matter is eliminated



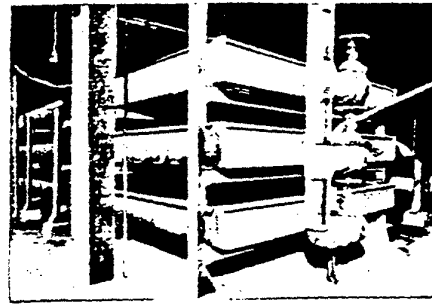
Setting pig lead buckles

15

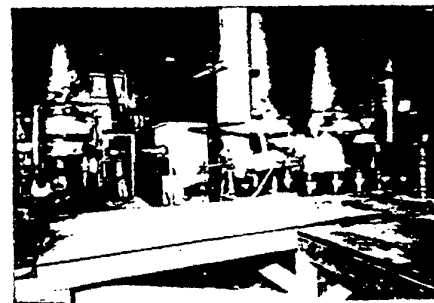
of the vapor from each bell, as the temperature is indicated by the thermometer and as the judgment of the corroder indicates. When the bells are closed, heat is generated by slow combustion in the tan-bark, and at the same time oxidation takes place. The heat also evaporates the acetic acid, which attacks the lead oxide and forms a basic acetate of lead, which when combined with the carbonic acid gas generated by the combustion in the tan-bark, forms what is known as the white lead of commerce. The process requires approximately 120 days from start to finish, or from the time the lead is put in until it has all been taken out.

The results as to the percentage of lead corroded, and the percentage of increase in weight, vary in nearly every stack. The former is likely to be anywhere from 70 to 90 per cent, and as a rule, taken year in and year out, the average will not show over an 80 per cent corrosion. The increase does not vary greatly, and it will be found that for every 100 pounds of metal corroded there will be taken out from 124 to 126 pounds, or an increase of 24 to 26 per cent.

This ends the first step in the process, and all that remains is to put the lead in proper shape for the market. To do this



View of pan-room



Filling device, where lead is weighed into kegs after being ground in pure refined linseed oil

the lead is first passed through a system of screens and rolls so that all metallic particles of uncorroded lead may be taken out; it is then passed along to the water mills to be ground to a proper degree of fineness, and then pumped to a washing and floating system. The lead must be thoroughly washed to take out the acid which remains after the process of corrosion.

Then there remains only to take out any tan-bark which may have dropped in with the lead, settle out the coarse parts to be reground, and float on the fine particles to the settling system, from whence it is pumped on to dry pans and the water evaporated. We then have our Strictly Pure Old Dutch Process White Lead (dry), ready to be pulverized, packed in barrels and sent to our various plants, or ground in oil and sent into the open market.



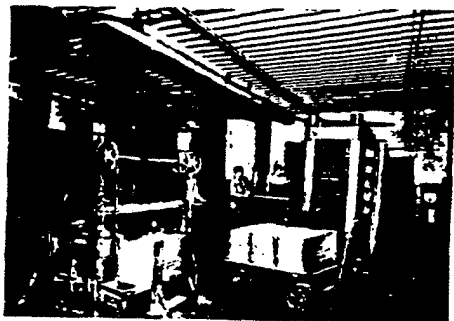
Safeguarding Our Linseed Oil



SAFEGUARDING our raw materials has always been a watchword with this Company. In addition to manufacturing our own white lead, operating our zinc and lead mines and smelters, making our own dry colors, japans, driers, etc., and testing the turpentine which we use, we make the pure linseed oil which we use in our vari-

ous paint and varnish products.

Linseed oil is the most important raw material used in the manufacture of paints and varnishes. It has a peculiar quality of combining with the other ingredients in forming a film which protects the surface underneath. The quality of linseed oil is therefore of the greatest importance, as the use of inferior or adulterated oil for preparing or thinning a paint is sure to cause trouble and give unsatisfactory results. In order to absolutely safeguard our products, we have for a number of years manufactured our own linseed oil. We have given the making of our oil the very closest attention



Linseed Oil Mill, Cleveland—Interior View



Linseed Oil Mill, Cleveland—Exterior View

to insure its quality in every possible way. This care in manufacture starts at the very beginning, as we buy only the best flaxseed obtainable. This seed is screened and recleaned in our own mills, and is then pressed at a lower temperature than is usually employed, leaving in the cake the mucilaginous matter which usually finds its way into the oil. In order to further clarify the oil it is carefully filtered and stored in steel tanks, where it is aged until it becomes clear and brilliant and free from sediment.



First Quality Colors in Oil



THE Sherwin-Williams Co. makes a line of First Quality colors in oil with the special requirements of the most intelligent class of master painters in mind. Our oil colors are used by the practical painter to tint pure white lead or stock white base to the desired shade required for painting the particular job in hand. These colors are ground exceedingly fine in mills of our own special design. They embody the maximum of tinting strength, combined with purity of tone. Owing to the strength of the color and the impalpable fineness to which they are ground, they possess unusual tinting strength, and for that reason are economical in use.

Painters who use tinting colors with white lead as a base will find that the Sherwin-Williams Strictly Pure Old Dutch Process White Lead has all the old-fashioned good qualities necessary for this purpose. Our Old Dutch Process Lead is free from acid and is ground in our own linseed oil. For this reason

22

it will be found absolutely satisfactory in every particular, for use with our First Quality Color in Oils.

Directions for Use.

In using First Quality Colors in Oil with Old Dutch Process Lead or Paste White stock, the lead should first be broken up to a semi-painting consistency and stirred until the mixture is perfectly smooth. The color should then be reduced to about the same consistency by the addition of a little turpentine. Then gradually add the color to the white, keeping the mixture stirred continually until the desired shade appears. It will be found that much less tinting color will be required for Sherwin-Williams First Quality Colors in Oil, so used, than if ordinary adulterated colors or dry colors hand-mixed with oil are used. Sherwin-Williams First Quality Colors in Oil represent the highest quality in purity, tinting strength, and fineness of grinding.



23

Sherwin-Williams First Quality Colors
in Oil are made in the following tints
and colors:

- BLACKS— Ivory Drop
English Coach
Sign Painters
Lamp
- BLUES— Chinese
Prussian
Cobalt
Ultramarine
- BROWNS— Raw Turkey Umber
Burnt Turkey Umber
Raw Italian Sienna
Burnt Italian Sienna
Vandyke Brown
- GREENS— Paris
Bronze
Chrome Light
Chrome Medium
Chrome Dark
- REDS— Dragon Bulletin
Premier Non-Fading
English Vermilion
American Vermilion
English Rose Lake
English Rose Pink
Bright Tuscan
Tuscan
Turkey
Indian
English Venetian
- YELLOWS— Chrome Light, Medium
Orange and Dark Orange
(Chemically Pure)
Chrome Light, Medium
Orange and Dark Orange
Golden Ochre
Yellow Ochre

There is a
SHERWIN-WILLIAMS PRODUCT
for every protective, preservative and
decorative purpose

EACH PRODUCT FOR ITS PURPOSE IS BEST



PAINTS AND VARNISHES

Paints, Varnishes, Stains and Enamels for finishing and refinishing every kind of surface; a complete range of products of the highest quality, for painters and decorators, property owners, householders, railway, street railway and marine use, and the manufacturing trades.

DYESTUFFS, COLORS, PIGMENTS AND CHEMICALS

A wide range of Dyes, Intermediates, Colors and Pigments, as well as an extensive line of chemicals, for prompt shipment and contract.

INSECTICIDES AND FUNGICIDES

A complete line of spraying materials, in both dry and paste form, covering every requirement of landscape, orchard, farm and garden.

DISINFECTANTS

A line of very powerful coal-tar disinfectants for use in the home and on the farm.

DIPS

A full line of coal-tar and arsenical dips for cattle, sheep, horses and other livestock.

WOOD PRESERVATIVES

A line of high quality timber preservatives equal in most respects and superior in many respects to the best imported wood preservatives.

SOAPS AND CLEANING COMPOUNDS

A complete line of liquid and paste soaps for home, industrial and garage use. Cleaners and polishers for metal, furniture, woodwork, automobiles, etc. Floor Oils, Floor Wax, etc.

SHERWIN-WILLIAMS PRODUCTS

PAINTS AND VARNISHES

DYESTUFFS, COLORS, PIGMENTS, CHEMICALS, INSECTICIDES,

DISINFECTANTS, DIPS, WOOD PRESERVATIVES,

SOAPS AND CLEANING COMPOUNDS

Factories: Cleveland, Chicago, Newark, Detroit, Montreal
London, Eng., Sydney, N.S.W.

Sales Offices and Warehouses in Principal Cities

B424 F19 1043

PRINTED IN U.S.A.