Linseed
Oil

November 30th. 1905. M O N T R E A L R. (179)

BLOWN OIL. (10 lbs. to Gall.)

Heat the 500 gallons of (2) to 200°, then begin blowing, should not let heat of (2) go below 200° not higher than 250°, after the 3rd day find Oil hold its own heat and should be careful not to let heat go too high, blow to consistency of sample which takes about 6 days.

B L O W N O I L .

Our blowing tanks hold about 60 barrels and are 7' diameter and 10' high. These tanks were originally intended for storage tanks and we are only able to blow about 20 barrels to advantage. A shallow tank preferred.

Steam coil - Square coil made from 1" pipe and 10 coils high. Use live steam.

Air Pipe - We took a 2" pipe and ran it within 2" of bottom of tank plugged the end and drilled 20 - 1/2" holes at the extreme end.

Put in 20 barrels of (197) or (2), a much lighter and cleaner oil can be made with (197), turn on steam and air heating to 140 degrees. Turn off steam and watch carefully to see that it does not run higher as excessive heat will darken the oil. When the oil is once heated it requires very little steam to keep it warm enough. If temperature rises while steam is turned off the air should be stopped until sufficiently cooled. It takes about 300 hours to make (213) from (197)

B O I L E D O I L

Tank holds about 60 barrels and is 7' diameter by 10' high.

Steam and Aid Coils - Same as for Blown Oil.

We pump 41 barrels of (2) into tank, turn on the steam and heat to 180 degrees (10 or 20 degrees more will not hurt it) then add 5% of (5) which has been practically heated to about 180 degrees. The air is then turned on to thoroughly mix the oil and drier and is continued until all taken up which will be in about one hour.

The boiled oil will be much improved if allowed to settle a few weeks before sending out to customers.

C O P Y.

MANUFACTURING DEPARTMENT

100 Canal Street, CLEVELAND. 6-14-05.

Mr. A. E. Schafer,

General Sales Mgr.

Dear Sir:-

As requested, we have looked into the matter of finishes to be applied over fire proofed wood, samples of which were sent in by Newark, and I desire to report on them as follows:-

For Mahogany we used our new Stain 207 new. The second coat was the First Coater, or Primer for fire proofed wood which we estimate would cost about 66¢ per barrels. The third and fourth coats were Durable Wood Finish Interior 029.

For the Oak panel we applied for first coat this new Golden Oak Stain 0636, second coat - same First Coater as applied on the above (Mahogany) and third and fourth coats - Durable Wood Finish Interior.

The pine panel was given the First Coater directly over the wood, followed by four coats of Durable Wood Finish Interior.

The Golden Oak Stain had a somewhat washed out appearance which was probably caused by the compound used in impregnating the wood, acting on the stain.

The Mahogany 207 did not retain its bright colour as well as when applied on an ordinary Mahogany panel about the same time.

We do not, however, experience any trouble in the way of our material not drying as they seem to act very well in this respect and rub nicely.

Yours very truly,

General Supt.

EG-LP.

COPY.

MANUFACTURING DEPARTMENT.

100 Canal Street, CLEVELAND.

10-5-05

Mr. W. H. Sieplein, Gen'l Supt:,

Lewis Berger & Sons Co., Ltd.

Dear Mr. Sieplein:-

Mr. Beardslee has asked information to be sent you relative to finishing fire proof wood, and I do not know whether what I can give you will be of any benefit or not, as I do not know what chemicals were used on these underground cars, and consequently our method of finishing may not apply to the case you have in mind.

Last May we had samples of wood prepared by the American Wood Fire Proofing Co., and these were finished up according to the report made to the General Sales Dept., copy of which I will attach.

The First Coater mentioned in this report is made up of 20 gallons (236) 5 gallons (226), and 20 gallons (14). Mr. Beardslee says you have the formulae for both the varnish and prepared wood oil.

I am sorry that I cannot help you out to any greater extent than this.

Yours very truly,

(Signed) E. P. Schafer.

EJ-EPS.

MANUFACTURE OF CARTER "FIT" LEAD

The pigs of lead averaging a trifle over 100# are conveyed into a furnace where they are melted at a temperature of about 650 degrees. This molten lead is then run through the nozzle. This nozzle is solid so as to retain the heat. The lead flowing through an opening of about $\frac{1}{2}$" in diameter through the center. At the orifice it is enveloped by a jet of slightly superheated steam which escapes completely surrounding the stream of lead. This atomizer converts it into a fine metallic lead dust. It is then conveyed out of this apparatus and put into cars containing about 4500#. These cars are taken up to the third floor where the entire contents is dumped as one charge into the corroding cylinders, which cylinders are made of wood about 8' in diameter and 12' long placed so as to rotate slowly. Weak acetic acid is added and to this charge is added 40 gallons of water each day for the first four or five days and then 65 gallons of water per day during the balance of the time while the corroding is going on. This corrosion requires from 12 to 14 days.

CO_2 gas is delivered to these cylinders through a pipe extending through an opening at the center at the rate of about 225 cu. ft. per minute. At the end of 12 or 14 days all of the metallic lead has been converted into white lead and then lies as a white paste in the cylinders. The man holes in the cylinders are opened and allowed to stand for 24 hours or so at which time a man gets into the cylinder and shovels out the material through a hole in the bottom. It is then washed to separate from it any particles of lead which are uncorroded which are gathered by a chain conveyor made of a sprocket chain with cross pieces of wood which travel along the bottom of this washing tank in a trough and deliver these particles through an opening higher up in the trough. The corroded lead is then drawn off into other tanks, allowed to settle, water siphoned off the paste then put into steam jacketed drying pans where it is dried for a period of five or six days. It is then pulverized, packed in barrels in the dry state or taken before being pulverized and ground with oil.

In grinding 80# of raw linseed oil is mixed with 1000# of dry lead in a chaser. After it is smooth it is conveyed from the chaser into mixers set in the floor much the same as the 30" mixers used in our factories. Material is delivered to the mixers through a vertical worm conveyor which delivers the material to the mills as fast as it can be taken. The mills are much the same as our 30" paste mills except they are not water cooled and the stones are very much rougher.

The lead does not heat up very much and seldom attains a temperature of more than 140 degrees F. From the mills it is conveyed in a water jacketed conveyor to the filling hopper. At the bottom of this filling hopper is a short conveyor about 2' long which conveys it to the kegs where it is filled through a spout which fits into a 2" bung hole. This is firmly pressed against this hole thus filling it under pressure to make it level up inside of the keg to allow for the displacement of air a small ventilating hole is put into the head of the keg and afterward plugged up with a wooden plug. The label is pasted over this bung and the kegs are finished with a cheap finishing varnish.

RIBBON METALS

A process by which ribbons of various metals can be manufactured very cheaply has been devised by Messrs. Strange & Graham, Research Chemists and Chemical Engineers, of 7 Staple Inn, Holborn, W.C., the Patentees, with the result that any of the more easily melted metals can be obtained as ribbons of extreme fineness, which, owing to the large surface-area they possess, are eminently suitable for many chemical and mechanical operations.

The process is an exceedingly simple one. The molten metal is caused to flow through one or more nozzles in a thin stream on to the periphery of a rapidly rotating water-cooled drum. The metal solidifies immediately, and is thrown off from the surface of the drum in the form of a continuous and uniform ribbon.

The width of the ribbon is dependent upon the diameter of the nozzle, and the thickness varies inversely as the speed of rotation of the drum. It is quite a simple matter to obtain metal of a fineness of $\frac{1}{1000}$ inch, and half a mile of ribbon can readily be obtained from each nozzle per minute.

There is no difficulty in increasing the number of nozzles in use on one drum, and thus the output is proportionately increased with scarcely any additional expense. The cost of the plant is small, and it is calculated that Ribbon Lead can be prepared at a cost of from 2*s.* 6*d.* to 3*s.* 6*d.* per ton.

The cost of preparing strip lead or lead shavings as now made by some cutting operation for jointing purposes is greatly in excess of this, and the material when prepared is hardened by the action of the cutting tool used, and is useless for white-lead making and not so suitable for jointing.

The process has already been successfully applied to the manufacture of ribbons of lead, zinc, tin, and some alloys, such as Babbitt's metal, and experiments have been made with aluminium which promise complete success.

The applications of Ribbon Metals are many and various :—

1. Probably the most important will be in the white lead industry, for Ribbon Lead is in a form peculiarly suitable for the manufacture of white lead either by the "Stack" or "Chamber" method. Small scale experiments have shown that Ribbon Lead even when pressed together into a cake of about half the density of solid lead is uniformly and evenly attacked by the ordinary corroding gases used in the manufacture of white lead by the "Stack" and "Chamber" processes, and is converted into white lead in about twenty-four hours, whereas about one hundred days is the time required to complete the corrosion by the present methods.

It seems reasonable to expect that a large and important industry will be transferred from the Continent to the United Kingdom, and that "Chamber" white lead, which is now almost entirely imported from abroad, will in future be made in this country; especially as white lead which can be guaranteed as "English Corroded" secures a substantial premium over the imported article.

2. Another very important use for Ribbon Lead is for metallic joint packings in water, gas, and steam pipes, in the place of the more expensive and less suitable cut shavings of lead now used

3. Ribbon Lead is in a very convenient form for use in the construction of secondary batteries.

4. Metals can be provided in a convenient form for attack by acids and in chemical industries, *e.g.*—

Aluminium for use in organic preparations and Thermit.
Tin for the preparation of Tin Salts used in dyeing.

5. The alloys, such as Babbitt's metal, will take the place of the more expensive mechanically prepared shavings now made for engine or valve packings.

6. Ribbon Zinc can be made at a small cost suitable for the reduction of gold and silver by the Cyanide process. At the present time zinc turnings or shavings have to be used, and the cost of making these by cutting or turning is very considerable.

As is also the case with Ribbon Lead and the other metals, it is found that Ribbon Zinc is exceedingly active in chemical reactions. This is very noticeable with the Copper Zinc couple. This behaviour is possibly due to the extreme suddenness of the solidification.

7. Ribbons and Tapes of metal can be made, and probably also metal foil, thin sheets, and electric fuses. There is a possible application for certain of the Ribbon Metals in the textile industries.

8. Metallic Felt can be made for filtering purposes and the metal recovered and used over and over again owing to the cheapness of the process.

9. Ribbons have been made from $\frac{1}{1000}$ inch upwards in thickness, and are exceedingly suitable for decorative purposes.

There is no doubt that as other metals are tried many other uses will be found for the process, for there seems to be no reason why any metal should not be successfully treated under proper conditions.

Patents Nos. 6629, 6630 (1907), and No. 7211 (1908) have been secured in Great Britain. Patents have also been applied for, and in some cases already granted, in the Colonies, and all other important countries.

The Industrial Chemical Company, Limited, of Rainham, Essex, will undertake the manufacture of Ribbon Metals for laboratory and experimental purposes, and will pay a royalty of 75 per cent. of the net profits after deducting a sinking charge for expenses incurred in erecting the plant.

This plant is ready to be installed, and will be available for demonstration purposes.

The Industrial Chemical Company, Limited, are also willing to give facilities for the erection of a White Lead Chamber of a size suitable for manufacturing, and will act as selling agents for the white lead if required.

The process of making Ribbon Metals was shown in December last at the Exhibition of the Physical Society of London, and at the Royal School of Mines, and in January at the Royal Institution, and created much interest on each occasion.

The apparatus has been set up at No. 50 City Road, E.C., and the process of manufacture and some of the applications of Ribbon Metals can be seen there any day between the hours of 11 a.m. and 4 p.m.

Admission on presentation of visiting card.

No. 50 City Road, is about midway between Finsbury Square and Old Street. The nearest stations are :—

Moorgate Street—Metropolitan Railway.

Old Street—City & South London Tube Railway, and Gt. Northern & City Tube Railway.

London County Council tramcars and several lines of omnibuses pass the door.

Negotiations are in progress for the sale of some of the foreign rights.

An option has been granted for a substantial consideration to an American financial firm to purchase the American and Mexican rights for a sum of £25,000 in cash, and 10 per cent. of the stock of any Company or Companies formed to develop those rights. It is stipulated that there shall be only one class of stock issued of such Company or Companies, and that no Debentures, Loans, Mortgage or Preferred Stock shall be issued without the consent of the English Company. The English Company is also to have the right to nominate one Director from time to time on the governing body of such Company or Companies.

Arrangements have been made with a gentleman who has agreed to proceed to the Argentine, Chile and Peru at his own expense to dispose of the South American rights on somewhat similar terms.

A like arrangement has been made for dealing with the French rights, and negotiations are pending with regard to the other European rights, and the Australian and other Colonial and Foreign rights.

Draft Suggestion for a Ribbon Metals Syndicate

N.B.—*No capital is invited or will be accepted until proposing investors have received copies of the final prospectus, which will be issued later, and may contain modifications and alterations in the following scheme.*

In order to develop the above described process it is suggested that a Company be formed to be called :—

THE RIBBON METALS SYNDICATE LIMITED.

Capital, £20,000 divided into :—

"A" 10,000 6 per cent. Cumulative Preferred Ordinary Shares—£1 each.

"B" 10,000 Deferred Ordinary Shares—£1 each.

The profits to be divided as follows :—

Firstly, in paying a Cumulative Preferential dividend of 6 per cent. on the "A" Shares.

Secondly, in paying a dividend of 6 per cent. on the "B" Shares.

Thirdly, any balance is to be divided equally between all the shares.

The "A" Shares are to be preferred as regards capital.

The consideration to the Vendors, Messrs. Strange & Graham, Ltd., for the Ribbon Metals process will be £2,000 in cash and the whole of the "B" or Deferred Shares.

They will transfer to the Company the whole of the rights in the Patents, British and Foreign, together with the benefits of all contracts that have been made by them and all negotiations in progress connected with Ribbon Metals process.

The "A" Shares only will be offered for subscription.

It is suggested that :—

The sum of 2s. 6d. per share shall be paid on application.

The sum of 7s. 6d. per share shall be paid on allotment.

The balance of 10s. per share shall be paid in four amounts of 2s. 6d. each, as and when called for by the Directors at intervals of not less than three months.

The first call shall not be made less than three months after allotment, and one month's notice of each call shall be given to each shareholder.

The Directors shall not proceed to allotment unless at least 5,000 of the "A" Shares are applied for.

It is also suggested that :—

The Board of Directors shall consist of not less than three and not more than eleven. This somewhat large maximum is suggested in order that the various important manufacturing industries affected by the process may each be represented.

The Vendors shall have the right to nominate not less than three Directors to the Board.

The fees of a Director other than the Managing Director shall not exceed £2 2s. per meeting of the Board until a dividend of 6 per cent. is being paid, when an increased remuneration may be sanctioned by the Company in general meeting.

When the final prospectus is issued, Messrs. Elder, Bliss & Co. Ltd., of 17 Victoria Street, S.W., will be authorised to offer the 10,000 Preferred Ordinary Shares above mentioned for subscription, and will be glad to hear from those interested in the matter.

A draft of the proposed Memorandum and Articles of Association of the Company can be seen and all information can be obtained at their offices.

The fullest investigation will be welcomed.

A properly drawn prospectus and forms of application for shares will be issued in due course. Those desiring to receive one are requested to fill up and post the enclosed card.

[Third Edition.]

N° 11,602 A.D. 1890

Date of Application, 24th July, 1890

Complete Specification Left, 23rd Apr., 1891—Accepted, 30th May, 1891

PROVISIONAL SPECIFICATION.

A Process for Manufacture of White Lead.

I, GUSTAV BISCHOF of No. 4 Hart Street, Bloomsbury, in the County of London, Professor of Chemistry do hereby declare the nature of this invention to be as follows:—

In manufacturing white lead by acting with carbon dioxide on a lead oxide in the presence of suitable reagents such as acetic acid or its compounds, great difficulty is experienced in obtaining for this purpose an oxide such as will produce white lead of a clear white colour. One cause of this difficulty seems to be that lead oxides of commerce, such for instance, as litharge, are mixtures of several compounds of lead with oxygen, which are differently acted on by the reagents employed, so that some of these oxides become converted before others of them, and when the reaction is continued in order to convert those others, those first converted are apt to be rendered crystalline, thus greatly impairing the value of the product.

My invention relates to a process whereby I can overcome the difficulty above stated, and can obtain from ordinary mixed lead oxides a clear uniform white lead without crystals, in the following manner.

I first partially deoxydise the crude lead oxides, by exposing them at a temperature of 250° to 300° C. to the action of gas rich in hydrogen, such for instance as water gas. This operation may be conducted in revolving vessels, or in stationary vessels provided with agitators, and with suitable worms or other conveyors for delivering the partially deoxidised product, which is thus reduced to the condition of suboxide of lead (Pb_2O). As it is of advantage to cool the product before it leaves the deoxidising atmosphere, the delivery passage or passages should be water jacketted or otherwise kept cool. Having thus reduced the material to the uniform condition of suboxide, I hydrate and oxidise it by slaking it with water and exposing it to the air, the suboxide being thus converted into a higher oxide, probably monoxide. Finally, I subject this oxide mixed with water, sugar and acetic acid or an acetate, such as acetate of lead, to the action of carbon dioxide. The proportions of the charge may vary; practically I find a suitable proportion to be:—Hydrated lead oxide about 900 lbs., water about 250 gallons, commercial acetic acid equivalent to about 14 lbs. of the pure chemical-acid, (or the equivalent of this in lead acetate) and sugar about 45 lbs. The liquid portion of the charge, after the white lead is separated from it, may be used with successive charges of lead oxide.

This operation is conveniently performed in revolving vessels, the gas, when it is pure, being admitted through a trunnion under a little pressure.

When the carbon dioxide gas is mixed with air or other gases, it is of advantage to employ in rotation a series of carbonating vessels with inlet through the one trunnion and outlet through the other, so that the surplus gas can be conducted from the one to the next in order, until the whole of the carbon dioxide or nearly the whole is absorbed.

Dated this 24th day of July 1890.

ABEL & IMRAY,
Agents for the Applicant,

[*Price 8d.*]

COMPLETE SPECIFICATION.

A Process for Manufacture of White Lead.

I, GUSTAV BISCHOF, of No. 4 Hart Street, Bloomsbury, in the County of London, Professor of Chemistry, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

In manufacturing white lead by acting with carbon dioxide on a lead oxide in the presence of suitable reagents such as acetic acid or its compounds, great difficulty is experienced in obtaining for this purpose an oxide such as will produce white lead of a clear white colour. One cause of this difficulty seems to be that lead oxides of commerce, such for instance as litharge, are mixtures of several compounds of lead with oxygen, which are differently acted on by the reagents employed, so that some of these oxides become converted before others of them; and, when the reaction is continued in order to convert these others, those first converted are apt to be rendered crystalline, thus greatly impairing the value of the product.

My invention relates to a process whereby I can overcome the difficulty above stated, and can obtain from ordinary mixed lead oxides a clear uniform white lead without crystals, in the following manner:—

I first partially deoxidise the crude lead oxides by exposing them at a temperature of about 250° to 300° C. to the action of gas rich in hydrogen such for instance as water gas; but care should be taken to avoid the presence of sulphur compounds.

This operation may be conducted in revolving vessels, or in stationary vessels provided with agitators and with suitable worms or other conveyors for delivering the partially deoxydised product which is thus reduced to the condition of suboxide of lead, probably corresponding to the formula Pb_2O. As it is of advantage to cool the product before it leaves the deoxidising atmosphere, the delivery passage or passages should be water jacketted or otherwise kept cool.

Having thus reduced the material to the uniform condition of suboxide, I hydrate and oxidise it by moistening it with water and exposing it to the air, the suboxide being thus converted into a higher oxide, probably monoxide, which may be expressed by the formula PbH_2O_2.

Finally, I subject this oxide mixed with water and acetic acid or an acetate, such as acetate of lead, and preferably with sugar, to the action of carbon dioxide. The proportions of the charge may vary; practically I find a suitable proportion to be:—

Hydrated lead oxide about 900 lbs., water about 250 gallons, commercial acetic acid equivalent to about 14 lbs. of the pure chemical acid (or the equivalent of this in lead acetate) and sugar about 45 lbs. The sugar however is not absolutely necessary, but is useful in promoting the reaction. The liquid portion of the charge after the white lead is separated from it, may be used with successive charges of lead oxide.

This operation is conveniently performed in revolving vessels, the gas, when it is pure, being admitted through a trunnion under a little pressure.

When the carbon dioxide gas is mixed with air or other gases, it is of advantage to employ in rotation a series of carbonating vessels with inlet through the one trunnion and outlet through the other, so that the surplus gas can be conducted from the one to the next in order, until the whole of the carbon dioxide or nearly the whole is absorbed.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed I declare that what I claim is:—

The herein described process for manufacture of white lead, by reducing the

mixed lead oxides of commerce to the condition of suboxide, oxidising and hydrating this product and subjecting it in admixture with water acetic acid or acetates, with or without sugar, to the action of carbon dioxide.

Dated this 23rd day of April 1891.

ABEL & IMRAY,
Agents for the Applicant.

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.
[G 3217—125—4/1890

104 CANAL STREET
CLEVELAND, O., U. S. A.

LEWIS BERGER & SONS, LTD.

DATE 4/25/1906

FOR W. R. Sieplein,

SUBJECT Yellows & Greens

Gen'l Supt.

MAY 9 1906

Dear Sir:

Replying to your recent letter with reference to Yellows and Greens I take pleasure in handing you herewith copy of Mr. Ashby's reply giving full details with reference to the matter.

Yours very truly,

General Superintendent

B-3

7 MAY 1906

Cleveland.

J. C. Beardslee.

7 MAR 1906

4/19/06.

Yellows and Greens.

H. H. Ashby.

All gallons are U.S.

Mr. J. C. Beardslee,

Dear Sir:-

In regard to information for Mr. Sieplein for Yellows and Greens the only help I can give on Yellows is as follows;

We are making our light and orange shades practically the same as when he was here in Chicago; the only change has been on the medium which we make as follows:

738 lbs. --------48 (Pulverized litharge).

246 lbs. ---------60 % Acetic Acid.

460 lbs. --------- Bichromate of Soda.

150 lbs. ---------Muriatic Acid containing 28% H.Cl.

The litharge and acetic acid are made up into basic acetate as usual and after ripening 48 hours are put into the 2000 gallon tub and stirred up with 3 inches of water for one hour. This tub is then filled three quarters full and the stirrer kept going all the time. Bichromate of soda is dissolved in 300 gallons of water. The hydrochloric acid is run into the big tub after the lead solution and the chrome then allowed to run into the big tub, taking one hour to run in. The batch should be washed six times.

From our experimental batches we find that this yellow will stand exposure better than any we have yet made.

French Crown Green Medium 11001. 369 lbs. of

litharge and 123 lbs. of acetic acid are made up into basic acetate of lead and shovelled into the 2000 gallon tub, containing three inches of water and stirred for a half hour. 181 lbs. bichromate of soda is then dissolved in 200 gallons of water in a 300 gallon tub and 37 lbs. sulphuric acid added to it and filled up to 250 gallons with water. Then fill up the big tub to about 700 gallons of water and run in the chrome and sulphuric acid quickly. Dissolve 7 lbs. tartaric acid in 50 gallons of water and dump into the yellow. Then run in 375 gallons of blue solution; then shovel in 200 lbs. china clay, 1600 lbs. barytes. Let stirrer run during whole operation. When finished let the green stand over night, syphon off, press, and dry hot.

The blue solution is made as follows:

300 lbs. Yellow Prussiate of Potash and 300 lbs. Green Vitrol are dissolved separately and run into 1000 gallon kettle and boiled with fire for eight hours.

Pump four of these batches in 12000 gallon vat, add 180 lbs. sulphuric acid and oxidise with a solution of 1200 lbs. 28 % hydrochloric acid, 175 [redacted]iron, 230 lbs. nitric acid.

After oxidation wash clean and allow to settle down to 4000 gallons. We do not dissolve this blue after washing neither do we filter press it, but use it as a standard solution, figuring that 4000 gallons contain 1200 lbs. yellow prussiate.

The 11000 and 11002 are made in exactly the same way except that more or less blue is used inorder to get the shade.

The blue is made on the Louis-Berger formula brought over by Mr. Cottingham and is the finest blue we have ever seen.

We have found that the small clippings from a wire nail factory make the most convenient form of iron to use.

We have been able to produce a lemon yellow similar to the lightest of the English yellows and much cheaper and apparently more

fast to light on the following formula:

738 lbs.------- -Litharge.

246 lbs.----------Acetic Acid.

181 lbs. ---------Bichromate of Soda.

187 lbs.----------Sulphuric Acid.

The Chrome and the Sulphuric Acid are dissolved together and run quickly into the lead solution. This is then washed six times and dried in an air dry kiln at about 125° Fahrenheit.

We can not give Mr. Sieplein any reliable information concerning the manufacture of 173, 174, or 175 as we have not been able to match these shades satisfactory.

If Mr. Sieplein works these formulas out I should be very glad to receive them from him.

Our Sulphuric Acid is about 98% pure.

Yours very truly,

H.M.A.- .H. Superintendent.

Mr. H. I. Ashby,

The following report covers the work done on exposure tests of colors made from February 23rd, 1906 to February 16, 1907.

During this time we have made 1304 exposures of all colors made in our line, and five exposures of colors from Harrison Bros., John Masury & Son, and A.C.Getchens.

For the first 9 months very batch of color made was exposed to test but during the last four months we gradually decreased the number, particularly the Reds, as they seemed to run about the same each time.

The colors were exposed on small panels, painted with one coat, and afterward varnished with S.W. No. 1. Coach Varnish. They were cut in racks so constructed as to entirely cover one third the panel (leaving two-thirds exposed to the sun and atmosphere) and placed on the east roof of the "S" Building where the sun shone until 1 p.m.

The following formulae was used for the Vehicle in grinding the colors into paint form:-

5 parts		(21)
1	"	(7)
2	"	(1)

Thinned with turpentine.

Most of the colors were exposed for 1 month. Others were exposed for three months - 6 months - 9 months and a year according to the space I had on the racks. The colors were made throughout with Lake Calumet water.

In order to facilitate the work and systematize the records, each panel was marked into one of five grades:-

GRADE A. - signified that the panel had undergone no practicaly change.

GRADE B. - a slight change but not to a bad change.

GRADE C. - considerable change but still on order of original color.

GRADE D. - badly changed and very dirty.

GRADE E. - "all gone to pieces". Not much that could indicate original color.

The Reds should all be in GRADE A - to be called good and not fugitive. But the grade of "B" in a Yellow would mean that it was real good and the grade "A" (seldom seen) would mean that it was excellent. This would apply also to the Greens, although grade "A" in a green would mean that it was unusually poor, while in a Yellow, it would be as good as the average seen on the market to-day.

There were 20 batches of 10C04 exposed. 15 of these were a grade "A" on 1 month's exposure, and grade "C" nearly to "D" on 3 month's exposure, while two of them had gone to pieces entirely and were graded "E". Five exposures in September - 1906, were graded "A" at the end of four months. The average was grade "A" for 1 month, and

grade "C" nearly "D" for 3 months, showing that the color was quite fugitive.

Five exposures of 10020 were grade "A" for 1 month. Three of these were grade "A" for 2 months, and one exposed for 5 months was grade "B". Two others were badly faded in 2 months.

Twenty-five exposures of 10049 were graded "A" for 1 month with one exception. Fire were graded "A" for 5½ months and nine graded "C" for 3 months. These were all faded to grade "E" at 7 months.

Two exposures of 10061 were made. These were graded "A" for 1 month and "D" for 3 months. They were really faded having only the slightest red color left.

Seven tests of 10062 were made, of which 5 were graded "A" for 1 month and two "B" one month. All were "D" or nearly so far three months. This color was very fugitive.

The two tests made on 10063 were very poor, and showed a fugitive color. One was graded "A" for 1 month, but "E" at end of 3 months. The other faded to grade "E" in 1 month and was entirely white.

Five exposures of 10064 were graded "A" for onemonth. Two of these were graded "A" for 3 months and at the end of 7½ months were graded "B" showing quite a permanent color.

There were seven tests made on 10066. All were graded "B" for one month. Two changed to grade "D" in three months.

Two exposures of 10071 were graded "A" for two months.

There were 42 exposures made of 10091. Thirteen of these exposed 1 month only and were graded "A". Eleven were exposed for 6 months were graded "A" for first month - "B" for 3 months - "C" for 6 months. Eight were exposed for 5½ months and were graded "A" for one month - "B" for 5½ months. One of these turned to grade "D" in 5½ months. Nine received a grade "B" for one month and one a grade "C" for one month. These nine were graded "D" at end of three months. These last ten were all made at about same time (June '06) and I believe at this time we were having trouble with the Para from Metz.

An average for 10091 when the dye if right, would be abouta

Grade A - one month.
B - three "
C - six "

All the six tests made on 10096 were graded "A" for one month. Three were graded "B" at end of 3 months. Two were graded "C" at end of six months, and one of these was still grade "C" at end of year. What few tests were made on this color came out well and it seemed to be quite permanent.

There were 35 panels exposed of 10109. None of these failed to be grade "A" in one month or worse than grade "B" in 3 months. One was a grade "C" in 7 months. 15 were graded "B" at end of 5½ months, and same at end of 7 months. Three were graded

year was still a grade "B". This seems to me to be the most permanent Red we have.

Four tests made on 10113 resulted in grade "A" for one month. Three of them had turned much darker at end of 3 months and were a grade "B" but nearly "C". At end of 6 months they had turned to a grade "D". One teet on 10120 was graded "A" for one month.

Two tests on 10121 resulted in grade "A" for one month and grade "B" for four months.

One exposure on 10122 was graded "A" one month and "C" at end of 4½ months.

One panel was exposed of 10124 which was graded "A" for one month. "B" for four months.

There were 12 panels exposed of 10125. Nine were graded "A" for month and "B" at end of four months. Two of the 12 were graded "B" for onemonth and one "C" for one month.

Fourteen exposures of 10126 were graded "A" for one month. Seven were dirty and badly faded in 3 months to a grade "B". Two were grade "A" at end of 4 months. One was grade "E" at end of 6 months. It was entirely gone.

Four tests of 10128 resulted in a grade "A" for one month for 3 of them a nd grade "B" for one month for the other. At the end of 3 months all had faded to a grade "C". They were much deeper in shade and quite dirty. In 7 months one had turned to grade "D".

Seven tests were made on 10129. These were all grade "A" at end of one month. Five were grade "C" at end of 4½ months. One was "B" for 3 months. One was graded "D" at end of 4½ months.

Out of 22 exposures of 10131 none were worse than grade "A" for one month. Nineteen were graded "B" for 3 months. Sixteen were graded "B" at end of 4 months. Seven were graded "B" at end of 8 mohths. Three changing to a grade "C" in 6 months. Four were still grade "B" at end of 9 months and two were grade "B" at end of year. This color seemed to always hold its color well but changed gradually to a deeper shade.

Sixteen tests of 10132 resulted in grade "A" for 14 of them at end of a month. Four were graded "A" at end of 3 months. Six were grade "B" at end of 3 months. Five were grade "B" at end of 8 and 9 months and one was grade "B" at end of a year. Three changed to grade "C" in 6 months. Two to grade "D" in 4 months. This color was also one of the most permanent.

Contrary to what was expected of 10133 I found this to be the most irregular and most fugitive of the Reds. It didn't exactly fade but changed to a very dirty color first and then faded. Out of 20 exposures made, only seven were grade "A" at end of one month. These changed to "C" (one to "D") at end of 3 months. Four were a grade "B" at end of one month. Six were a grade "C" in same time and three were so much changed at end of a month as to be graded "D".

were grade "B". Twenty-eight were graded "B" at end of 3 months. Sixteen were graded "A" at end of 3 months. Two were graded "B" at end of 8 months. One was still a grade "B" at end of a year. This color stood up well showing no change at all in a month's time. It held its tone and clean shade.

One test on D 619 was graded "B" one month.

One test on D 621 was graded "B" one month.

Two tests on D 624 were "A" for one month and "C" 3 months for one; "B" one month for the other.

Four tests on D 631 resulted in two grade "A's" - a grade "C" and a grade "E" for one month. One was grade "D" at end of 3 months. Another was grade "E" at end of 5 months.

Two tests on D 634 gave a grade "A" for one month. One of these was grade "E" in 5½ months.

Three tests on D 661 were a 1 graded "A" for one month, and one of these was still grade "A" at end of 4 months.

One test on D 664 was a grade "B" for one month.

Two tests on D 683 were graded "A" for one month.

Two tests on D 676 were graded "A" and "B" respectively at end of one month.

The 11000's usually were graded "B" at end of one month. They did not seem to fade but seemed to turn to a deeper shade of Green, and in a good many instances - to a richer shade. The usual occurrence was to turn to a slightly deeper shade (a good shade B) and remain that way for a good while. As a whole I think they "stood up" very well and would compare favourably with any Greens on the market.

Twenty-nine tests on 11000 resulted in a grade "B" for 20 of them at the end of one month. Eight were graded "A" and one was graded "D". This last was made on September 12 '06. On this day the water was unusually warm, very riley and dirty.

There were 85 exposures made on 11001. 77 of these were graded "B" at end of one month and eight were graded "C" in same time. Fourteen were still "B" at end of two months and twelve still remained "B" at end of 5 months.

Ten exposures of 11002 resulted in all being of a grade "B" at end of one month. Six were still grade "B" at end of 3 months, and four remained unchanged at end of 5 months.

Only three tests were made on 11003. Two of these were a grade "C" at end of a month. The other was one of the best exposures of all our line. It stood a grade "A" for 6 months with not the slightest change.

Thirteen exposures of 11004 resulted in 7 grade B's and 6 grades "C" for one month. This color changed to a much cheaper shade and became flat in appearance.

Three tests on 11005 resulted in grade "B" for one month.

Four tests on 11013 resulted in grade "C" for one month. Turned to dark, dirty green.

Four tests on 11014 resulted in a grade "B" for three and grade "A" for one at end of one month's time.

There were 6 exposures made on 11015. Five were graded "B" at end of one month. One was graded "A" at end of one month and "B" at end of 3 months.

There were 25 tests made on 11018 - 13 of which were graded "B" for first month. Two graded "C" and 3 graded "D" for one month were made the middle of September '06 when the water was the poorest. Seven others were graded "C" for one month but did not change from this grade after 5 months exposure..

Nine tests on 11019 gave excellent results, four being grade "A" for one month and 5 being grade "B" for same time.

Eight tests on 11020 were all graded "B" at end of one month and were all very good tests. Two were still graded "B" at end of 5 months.

11022 before being exposed was reduced with 20 parts White Lead. In this way 14 exposures all were grade "A" at end of one month. Eight of them changed to grade "B" at end of 5 months. Four were still unchanged at end of 5 months.

Two exposures of 11023 were grade "A" for one month. One turned to grade "B" at end of 5 months.

Out of 57 tests on 11024 only two were worse than a grade "B". Sixteen panels exposed for 5 months were still grade "B". This colour ran very uniform and "stood up" well.

One test on 11030 was grade "A" at end of a month.

Three tests of 11032 were graded two B's and one C.

Six tests on 11034 resulted in three being grade "B" and three were grade "C" for one month.

Ten exposures of 11035 were graded "A" for one, grade "B" for four and grade "C" for five at end of one month's time.

There were 5 tests on 11036 - three being grade "C" and two being graded "B" in one month's exposure.

Nineteen exposures were madeof 11043. Fourteen were grade "B" at end of one month and five were grade "C".

One test on 11047 was grade "B" at end of onemonth.

differ greatly in the test. One batch made in the morning would have a grade "B" at end of a month. Another batch made toward evening on same day would go all to pieces and appear very dirty. This can only be laid to the water. In fact, on May 3rd '06 we noticed the water was exceptionally dirty.

We followed through a batch of 12008, S 416 made on that day very carefully and inside of two weeks after being exposed it had turned to a very dirty shade. At end of a month it was grade "E".

A batch of 12017 made in the morning of May 3rd gave a very good test.

Slip 505 of 12007 shows the same irregularity. Batches 4 and 5 were made on June 15th, '06. Batch 4 was very nearly a "B" grade and a very good test, while batch 5 was very dirty and a grade "D". In this case they were made exactly the same - one the same day - painted at the same time and exposed the same. This is only one of a great many similar occurrences.

Seven tests made on 12004 resulted in grade "E" at end of one month. The Yellow color had entirely disappeared and it looked more like mud than Chrome Yellow.

Eight tests of 12006 resulted in a grade "A" for one month showing a remarkable good test. Five had turned to a grade "C" at end of 3 months, and 3 to a grade "B". They were slightly faded but appeared clean at end of this time.

There were 150 exposures made on 12007. 88 resulted in a grade "C". 52 were graded "B". 6 were graded "D" and four were graded "E". The worst results occurred during the Summer of '06. The previous winter and the following winter showed much better results. A great many of these panels graded "C" were quite good and almost a grade "B". Some were exposed for 3 months - 6 months and 7 months. Only one of these was still a grade "B" at end of 6 months and that turned to "D" during the next two months.

12008 turned out very poorly. Out of 31 exposures, one resulted in a grade "B". Fourteen were grade "C" - four "D" and twelve "E". They turned completely muddy and had no semblance of Yellow left.

12009 had the best results of any of the Yellows. Out of 19 exposures, 14 resulted in a grade "B" - an exceptional percentage of good results. One of these was so good as nearly to be called a grade "A". The other 5 were graded "C". None of them turned to the dirty color so often seen in 12007 and 12008.

Out of 152 tests on 12010, 99 resulted in grade "C". Thirty in grade "B" and 23 in grade "D". This seemed to run fairly regular but would have those peculiar changes as appeared in 12007, etc. that is - two batches made on the same day would give very different results.

12007 ran quite regular - being 46 grade "C" and 35 grade "B".

There were 15 tests made on 12013. Seven were grade "A" - four grade "B" and four grade "C". This color seems to stand well.

There were 19 tests on 12017. Seventeen were graded "C" and two "B".

Fourteen tests on 12020 resulted in a grade "B" for ten of them and grade "A" for four of them. At end of 6 months these were all grade "B".

Fourteen exposures of 12018 gave eight grade "C's" and six grade "B".

There were 108 tests made on 12015. Sixty-one were graded "B". There was one "A" and one "D".

I also exposed for one month samples of Harrison Bros. Deep Orange Chrome, first quality and Medium Yellows, first quality. The Orange was graded "A". The Medium Yellow was graded "B", having the slight dirty look that all Yellows have.

John W. Masury & Sons Chrome Yellow,M. first quality, was grade "B" - toward "C". It was no better than some of our 12010's.

A.C.Getchens Chrome Yellow Orange was grade "B" and had turned somewhat dirty No better than ours. His Chrome Yellow M was a grade "B" and quite good.

To summarize, I should say the Red had stood first rate.

The Greens were good in general and turned slightly but not at all to a bad shade. Slightly deeper in most all cases.

The Yellows were very irregular.

The Oranges stood up very well and compare with any on the market. The Medium shades were only fair and not what they should be. The light shades were on the whole failures. However, those which did come out well go to show that it is not the method of making but due to something else and most probably the dirty and warm water we were obliged to use.

ESTIMATE SLIP

Goods Red Orange Chrome Yellow

For 1206.12

Location New Formula

Formula

Quantity	Stock	
738	48	at ..... per lb ..... Litharge
246	(119)	" 60% acetic acid
325	293	" Bichromate soda
107	370	" Soda ash
6	68	" Lasine X or Troy Pig Scale 3
		" " dissolved in alcohol
		" " Weight and Paint Book
		per gall
		" "
		" " MAY 1906
		" "
		" "
		" "

Grinding ..... Hours ..... Mill

Weight per Gall. ..... Output .....

Cost Prod. 870 lbs.

PACKAGE	NUMBER	PACKAGE COST	PACKING COST	COST	VALUE
Bulk					
Tubes					
Jars					
¼ lb. Cans					
½ " "					
1 " "					
2 " "					
3 " "					
5 " "					
5 lb. Pails					
10 " "					
12½ lb. Pails					
25 " "					
5 lb. P. C'n					
10 " "					
12½ lb. Kegs					
25 " "					
50 " "					
100 " "					
200s Kegs					
250s "					
300s "					
500s "					
½ Bbls.					
Bbls.					

Material
Grinding
Package
Packing

MANUFACTURING DEPARTMENT

PLANT NUMBER 2

DRY COLOR WORKS

PULLMAN STATION, CHICAGO, ILL.

FOR	England.	OFFICE		DATE	5/15/06.
MR.	R. W. Sieplein.			SUBJECT:	12012.
ANSWERING LETTER OF				DICTATED BY	H. M. Ashby.

MAY 23 1906

Mr. R. W. Sieplein, Gen'rl Mgr.,

c/o Lewis-Berger Co., Homerton, London, N.E.

Dear Mr. Sieplein:-

We experienced the same difficulty in the manufacture of 12012 that you mention in your letter of April 11th. We occasionally produced the right shade on this formula but generally had to tone up with a scarlet lake.

We have since made up an orange which is considerably stronger than the old color and which we dye with eosine. It is somewhat high-priced but is so much stronger than the other oranges on the market that Mr. Beardslee has accepted it and we have discontinued the old formula. It is made as follows:

The litharge and acetic acid are made up in the regular way and shovelled into the 2000 gallon tank containing about three inches of water or enough to cover the steam pipe after the le lead is all in. Turn on the steam and bring the mass to a good boil then run in the chrome and soda ash, which are previously dissolved in about 300 gallons of boiling water. Boil the yellow in the big tub for about three quarters of an hour, then wash until the solution shows no alkali then add the eosine dissolved in a little water, and generally the color will set without the addition of any mordant. If it does not do so it shows that the color was not washed free

from alkali. In this case add enough nitrate of lead to precipitate the eosine.

Trusting this will enable you to make a suitable color , I remain,

Yours very truly,

H.M.A.-H.

H. M. Ashby.
Superintendent.

P.S. Doubtless Jeff has written you that I am to be in London about August 5th. I am looking forward to it, as you may guess. I will come well provided with plans, formulae etc. If there is anything special, let me know in time. I leave here July 25th. Hurd don't tell my folks if you see any of them.

COPY.

5/15/06.

SUBJECT: 12012.

Dear Mr. Rieplein,

We experienced the same difficulty in the manufacture of 12012 that you mention in your letter of April 11th. We occasionally produced the right shade on this formula, but generally had to tone up with a scarlet lake.

We have since made up an orange which is considerably stronger than the old color and which we dye with eosine. It is somewhat high-priced but is so much stronger than the other oranges on the market that Mr. Beardsley has accepted it and we have discontinued the old formula. It is made as follows:

The litharge and acetic acid are made up in the regular way and shovelled into the 2000 gallon tank containing about three inches of water, or enough to cover the steam pipe after the lead is all in. Turn on the steam, and bring the mass to a good boil then run in the chrome and soda ash, which are previously dissolved together in about 300 galls. of boiling water. Boil the yellow in the big tub for about three quarters of an hour, then wash until the solution shows no alkali then add the eosine dissolved in a little water, and generally the color will set without the addition of any mordant. If it does not do so it shows that the color was not washed free from alkali. In this case add enough nitrate of lead to precipitate the eosine.

Trusting this will enable you to make a suitable color, I remain,

Yours very truly,

(Signed) H. M. Ashby,

Superintendent.

FORMULA.

RED ORANGE CHROME YELLOW, 12,012.

738	48.	Litharge.
246	119.	60% Acetic Acid.
325	293.	Bichromate Soda.
107	370.	Soda Ash.
6	68	Eosine.

PRODUCT, 870 lbs.

TRIP TO ELBERFELD PLANT.

Dear Mr. Beardsley:-

The Plant of the Elberfeld Company at Leverkusen, which is said to be the newest and most advanced of its kind, impressed me so much with its excellence that I wish to give you an outline of the way this excellence has been obtained.

Dr. Hess, one of the sub-directors who took me around, stated that the era of expansion and improvement dated from the time when they adopted their present form of organization and that they credit their success entirely to it.

The supreme heads of the business are three directors, two of whom are chemists and the third a business man. They would correspond to our President, Vice-President and General Manager. Under them are seven sub-directors, four of whom are chemists, two business or financial men and one a lawyer. They would perhaps correspond to our Sales Managers and General Superintendent Manager of oil mill, zinc works, etc.

They form a committee in whose hands is the actual conduct of the business subject only to a very general oversight from the head directors. Under them, and sometimes of them, are the heads of the various divisions of the factories and the Sales Managers.

No research work is done at Leverkusen(it is all done at the old plant at Elberfeld) so the factory is divided into three parts:

A--Inorganic (Acids, alkali, salts etc.)

B--Azo Colors.

C-- Alizarine.

The head of each division is a chemist who has worked up through the various stages and has developed into a ther-

oughly practical man. Dr. Hess stated that it is a strict rule that there should always be a well trained understudy for each important position. This is considered very important.

Young chemists are being constantly taken into the employ of the Company and are handled as follows: They must be men with an academic degree preference being given to these with a PhD, and for the first two years they act as assistant chemists in the laboratories. They receive at the start about $600 or $700 a year. At the end of two years they are sorted out according to their ability for research work, analytical work, or factory Superintendence. During the two years TRIAL they are tested out for their ability in these lines. The men sent into the productive work are given charge of the minor part of the work, under the close supervision of the head of the department. From thence the development is quite usual. The foremen are comparatively unimportant men, who simply see that the instructions of their superiors are properly carried out. The real knowledge and conduct of the manufacturing is vested in scientifically trained men. Each assistant chemist has a laboratory boy working with him and these boys form excellent material for foremen and upper workmen.

The Elberfeld Company employ in all about 200 chemists out of about 6000 employees of all kinds. I believe the firm is rated at over seven million dollars.

My first impression of the factory was one of absolute cleanliness. Their work is practically as dirty as that done in our Dry Color factory and Zinc Smelters, etc. and the degree of cleanliness is far in excess of anything we have attained and they claim that it is a distinct aid to the <u>cheaper</u> production of their goods. Everything was kept in absolute cleanliness and perfect rapa air as far as is humanly possible.

The comparative scarcity of workmen in proportion to the extent of the plant was remarkable but is explained by the great use of machinery, tramways, etc.

Their buildings are as cheaply put up as is compatable with safety and efficiency, but in proportion a much larger amount of money is spent on the finest machinery and labor saving devices.

Their practice is to build with the idea of using the plant for a period of ten years, at the end of which time they expect to be able to plan something much better. They therefore wipe off 10% of the original cost of the buildings each year, and from 15 to 25% of machinery. This leaves them free to keep abreast of the times.

They also surprised me with the amount of money they spend on their supervision. I had always supposed that they obtained their chemists at a very low figure but they really pay very much higher wages for such men than we do, especially taking into consideration the relative cost of living. I put this question to several of their sub-directors. "Suppose their business had to be done on a very close margin of profit, and competition was very keen both in price and quality, would they advocate the same care and cleanliness throughout their plants, employ as highly trained scientific men, and use as expensive machinery?" In every case they replied that the keener the competition and the closer the margin, the more necessary it was to work along these lines. As they are engaged in the manufacture of several things that are sold as close as anything we make, such as acids, alkali, etc. their opinion should carry weight.

In regard to the experimental department their method is as follows: All preliminary work is done in the chemical laboratory on a small scale. Any results that appear useful are turn-

ed over to the technical laboratory where the method is worked out on a somewhat larger scale, say about five to twenty-five pound batches. If a practicable method can be devised here the process is passed on to the actual factory to be finally worked out. It often happens that a process which is alright in the chemical laboratory is no good in the technical laboratory, and one that will work in these two will still be unsuccessful in the factory.

A large amount of attention is given to employees' welfare. A good hospital is maintained on the grounds. Two doctors are always in attendance free and provide medicine gratis to all employees, also examine them at stated intervals, if the work makes it necessary. Baths etc. are provided. Three very handsome club houses are maintained by the company surrounded by beautiful grounds for the three classes of employees, and excellent lunch rooms are maintained at convenient points around the grounds. The employees pay for these privileges at a moderate cost price. Nothing of this kind is given away. On account of the location of the plant, which is several miles from the nearest town, the company has built houses for its employees, that from the outside appear to be models of style and architecture. The company makes no charge for the land but charges 3% on the cost of the building for repairs and taxes. Their plant at Leverkusen covers 1200 acres. There was a noticeable absence of the barrack-like appearance even in the cheapest dwellings, so often seen in such places. The usual German system of compulsory pension and sickness insurance is in force. The employee pays from five cents to seven cents per week, the company pays a like amount, and it works out about as our sick benefit does, except that at seventy a pension of about seven dollars per week is given for life. My guide stated that there were large numbers of ex-employees draw-

ing the pension.

Their water-works, power generation and distribution, air compression, distribution of raw materials, etc etc. would take too long to describe, but each appeared to be almost perfect in its way.

I might note in passing that they have formed a satisfactory meter for measuring live steam, and that they charge the cost of such steam to each department. I will send particulars of this meter to our Mechanical Department. Their syste: of figuring costs appear to be much more elaborate than ours.

In conclusion I can only state that they appear to be as far ahead of our Chicago Dry Color plant, as that plant is ahead of the Berger factory, and would most strongly recommend that we look more closely into their methods and embody as much as is practicable into our own organization, especially as far as the Dry Color Department and similar chemical departments are concerned.

Yours very truly,

Superintendent.

DESCRIPTION OF VISIT TO THE WORKS OF THE

GRIMSDOWN LEAD CO.Ltd.,

by

Messrs. Sieplein & Street,

on March 8th, 1909, to view the Bischof Process of White Lead Manufacture - English Patent No. 11602 - 1890

The Pig Lead is first melted in a furnace, heated by Mond Gas, the base of this furnace having a specially designed bottom - sort of a shallow vessel largely composed of bone ash. Air is blown against the surface of this molten lead, and as the Litharge is formed, it is floated in the molten state through little channels at the front end of the vessel, and runs through an opening into small bogie trucks placed underneath, about 2-ft. in diameter, and hemispherical in shape. These have a capacity of about 1-cwt. each. When filled, they are put aside to cool, and during the process of cooling, which takes about 12 hours, the Litharge breaks up into a powder, or rather small lumps.

The bogie truck, which is mounted on trunnions, is then taken to a point over a grating in the floor, where it is placed on stationary trunnions and inverted, dumping the contents into a hole in the floor, which is in connection with a conveyer. A hood is erected directly over this hole to carry away the dust, thus protecting the workmen.

This conveyer, takes the Litharge to a pulveriser, where it is very finely ground. This Litharge is likely to contain some particles of metallic lead, and special care must be taken to keep at least some portion of the product free from this, as it is undesirable for some purposes. A proportion of the ground Litharge is particularly selected for Varnish Makers' Litharge. They have at times separated out the particles of metallic lead by grinding the litharge in a ball mill, which had the effect of flattening out the particles of metallic lead in such a way that they could be retained by passing the Litharge through a sieve.

The Litharge is then put into vessels and heated, and treated with Reducer Gas, which is made by blowing a mixture of steam and air over red hot fuel. This changes the Litharge over to black sub-oxide of lead, which product is quite unstable, and even in twenty-four hours much of it changes back to Litharge.

The lead sub-oxide is next dropped, in weighed charges, into other tubs, where it is mixed with water, forming lead hydrate. At this point a small proportion of acetic acid is put in with it, forming lead acetate. Carbon dioxide is forced in under pressure and measured through a meter to determine the proper weight of gas being used. The volume of gas and temperature at this point regulates the physical characteristics of the lead, that is whether it be more or less dense, slimy, etc. etc.

The whole process of converting from metallic lead into Carbonate of Lead takes about 12 hours, not including all of the time that may be required for the

transferring from one stage of the process to the next.

More water is then added, and the whole churned up for several hours to allow any particles of metallic lead to settle out. It is then pumped by air pressure through filter-presses, and put into filter racks, where about 5% more of moisture leaves it. Incidentally, these filter-presses, which are about 3-ft. square, are closed by hydraulic pressure.

The proportion of the Lead sold in the dry state is then dried by passing through an ingenious form of dryer, which has an endless wire screen belt which passes through a body of this pulp lead, picking up as much as can be contained within the meshes of the screen. This endless belt then travels through heated chambers until the lead is dry. The size of the chamber, rate of travel, and heat are so arranged, that one complete trip through the entire length of this chamber will bring the lead out dry at the other end, and as the screen passes over the pulley at the end, the little lumps of lead are automatically dropped from the meshes of the screen. This dry lead is then carried away on a conveyer to a pulveriser, and dropped into a hopper connected with exhaust draft, and from this into barrels, the barrels being placed on a jolting table, which facilitates the packing.

Such Lead as is ground in oil is conveyed through a chute from the filter racks into mixing pugs, where 7% or 8% (of the dry lead) of oil is mixed with it, and mixed for 10 to 12 hours. This mixing with oil automatically displaces the water, all but about 2% after a short time. The water is then drained off and a blast of hot air blown against the surface of the lead in the mixer, which has the effect of taking off the other 2% of moisture. It is of course essential that practically all of this moisture be driven off, as otherwise the Lead would not grind properly.

The charge from the mixing pug is taken out on a small truck, then taken to an upper floor by means of a lift, where it is conveyed to small mixers which act as feeders for the roller mills placed on the ground floor. The filling into packages is done directly from the mills.

WHITE LEAD PROCESS EMPLOYED BY MATHEWSON & CO. JAN. 25th, 1906.

E. W. D A H L.

The molten Lead is run from the melting pot into large tubs of water which causes it to harden in thin sheets of irregular shape. It is then taken from the water, run along on trucks over tubs containing weak Acetic Acid, and is then dropped into these tubs, where the Basic Lead Acetate is formed. Carbonic Acid Gas (CO_2) is then blown into this mixture, which forms the Carbonate of Lead. It is then allowed to settle and the upper liquor drawn off, and used again in the Acid tubs.

The precipitate is next washed thoroughly, and then pumped to chamber filter presses, where about 30% of the mixture is extracted. It is taken from the filter on trays, which are put into racks twenty high (three tiers), and then passed on through a drying kiln, into which hot air is blown at a temperature of about 160 degrees. These trays are next dumped into shoots which feed the Lead to the chasers, where it is ground in the dry state. In the chasing the Lead can be made more dense.

The powdered Lead is then conveyed through a conveyor to the department where it is packed in parcels, or to where it is put into mixers to be mixed with oil, and then ground in rolling mills and filled into kegs through a conveyor.

In the process of mixing, this must not be interrupted until the mixing is completed. This process makes a very white lead, which is also very soft and quite bulky.

A building 50 feet by 110 ft (3 stories) with 5 men to operate the machinery, has a capacity of 10 tons per day. The process takes about 10 days, about 2 tons each day taken from the tubs, and 2 tons of fresh lead added each day.

The pig lead used in manufacture, is not necessarily very pure, or free from iron, copper, etc.

SHERWIN-WILLIAMS CO.
COLOR AND VARNISH MAKERS
CLEVELAND. CHICAGO. NEWARK.
KANSAS CITY, NEW YORK, SAN FRANCISCO, MONTREAL,
DALLAS, TEX., BOSTON, LOS ANGELES, TORONTO.
MINNEAPOLIS. SAVANNAH, SAN DIEGO, WINNIPEG,
CINCINNATI, BUFFALO, PORTLAND, ORE., LONDON, ENG.

MANUFACTURING DEPARTMENT
PLANT NUMBER 2
DRY COLOR WORKS
H. M. ASHBY, SUPT.

PULLMAN STATION, CHICAGO

July 22, 1907.

Mr. R.W. Sieplein,

G.M. -Lewis-Berger Co.

Homerton, London, England.

Dear Sir-

Herewith enclosed please find copy of D62I which formulae you requested from Mr. Beardslee's office.

It is simply a 10% LitholRed dyed on best ~~Geranium~~ German Orange Mineral. Your own people are more familiar with the handling of this dye and can get better results than we can. You can undoubtedly find something in your line which will be satisfactory and about that depth.

Yours truly,

H. M. Ashby

Enc.

Superintendent

D621

100 lbs Litharge
Red Paste
17½ lbs Barium
Chloride
1000 lbs germa
Orange mine
Make same
as any Litharge Red

104 CANAL STREET
CLEVELAND, O., U. S. A.

LEWIS BERGER & SONS, LTD.

DATE 7-17-07

FOR Mr. W. R. Sieplein,

SUBJECT Bulletin Red in Oil.

Dear Sir:

I wish to acknowledge receipt of yours of the 1st, regarding Bulletin Red in Oil and I take pleasure in sending to you a copy of our formula for 20226, a new Bulletin Red Paste to displace 3985. 3985 was criticised on account of the color not being permanent. The change in color was toward darkening and, although this new goods is not as fugitive, as the other still it is not what you would call a permanent red and in fading tends toward a lighter and yellower shade. 3985 has not yet been made void, although it probably will be dead except at such times as some of our customers demand some of the old goods, as I believe that it was used to some slight extent for other purposes than a Bulletin Red.

D 621, an Artificial Vermilion made for the Navy Department of the U.S. government, is what is known as a Lithol Red. I am asking Mr. Ashby to send you a copy of the formula and what instructions are necessary in the making of the material. A standard sample of the Bulletin Paste and of D 621 I am forwarding to you under separate cover, the formula however, going in a package of others which will also leave here today.

Yours very truly,

J. Beardsley per E.P.

Gen'l Supt.

Dry Colour Dept.

List of Raw Materials. Aug 1-1906

SEP 4 1906

Recd from Ashby

No 1	Dry White Lead	$ 4.52
No 7	Barytes	.70
No 8	China Clay	.53
NO 9	Sublimed White Lead	5.75
NO 12	----------	
No 16	Bolted Gilder's Whiting	.76
No 20	Asbestos Pulp	.58
No 25	Raw Sienna	2.45
No 26S-	Burnt Italian Sienna	2.40
30 D	Chinese Scarlet	9.75
No 32 S	----------	3.95
No 33	Paris White	
No 44	Sugar of Lead	9.40
No 47	Bichromate of Potash	8.45
No 48	Litharge	6.75
No 53	Orange Mineral	8.52
No 53 S	Tour's Orange Mineral	11.65
No 53 F	----------	8.77
No 68	Eosine B. P.	72.00
No 112	Oxide of Zinc	4.50
No 113	Off Shade Zinc Lead	4.00
No 201	Bradley's Orange Mineral	8.07
No 202	St Louis Red Lead	7.75
No 211	Nitrite of Lead	8.35
No 213	Blanc Fixe	3.11
No 217	Scarlet	17.50
No 221	Barium Chloride	2.07
No 222	Glucose	2.72
No 276	Paranitraniline	25.88
No 278	Para Soap	19.59
No 279	Sodium Nitrite	8.37
No 285	Orange "Y"	24.00
No 291	Eosine B.B. Ext.	127.78
No 293	Bichromate of Soda	5.88
No 297	Ferric Sulphate	2.00
No 298	Yellow Prussiate of Potash	14.36
No 298 S	----------	9.68
No 301	Beta Naphthal	20.57
No 302	Alphanaphthylamine	15.58
No 302 S	Alphanaphthylamine Base	10.14
No 303	Caustic Soda	2.68
No 306	Barytes "Swans Down"	.80
No 307	White Arsenic	6.75
No 313	Acid Green "O"	46.80
No 314	Copperas	.52 1/2
No 316	Oxalic Acid	6.75
No 317	Glauber Salts	.60
No 318	Blue Vitriol	6.15
No 321	Lake Scarlet R	21.03
No 329	Chlorate of Potash	8.31
No 336	Sal Soda	.83
No 347	Acid Rubine B	19.80
No 353	Bromo Acid	90.74
No 357	Glue	12.08
No 359	Bromo Acid A3G	104.86
No 360	Calcium Chloride	.96
No 361	Azaphor Pink Base	98.81
No 362	Ammonia Alum	2.18
No 363	Acetate of Soda	5.44

Make pay to ... in Raw Mat Book

0007-SWP-000122243

List of Raw Materials Cont'ed.

No 364	Mono Acid	$42.00
No 365	Ultramarine Blue Subst.	75.74
No 366	Topping Blue	55.72
No 368	Alum	1.97
No 370	Soda Ash	1.05
No 375	Claret Red B	87.73
No 376	Amaranth S.S.	19.03
No 379	Alizerine Red O. T.	16.25
No 380	Phosphate of Soda	2.60
No 386	Helio Purpurine 7B.L.	33.05
No 387	Light Green S.L.	45.79
No 3[illegible]	Pigment Scarlet 3B.	35.73
No 396	Tin Crystals	21.85
No 397	Tartar Emetic Subst.	15.58
No 433	Tartaric Acid	28.68
No 434	Aluminum Sulphate	2.22
No 436	Filter Alum (Calumet)	1.25
Alizerine Red-2A-B.B.		$16.13
Alphanaphthol		18.78
Alumina Hydrate Pulp		3.25
Analine Oil		12.24
Bone Black		5.36
Brillian t Green Crystals		52.15
Brilliant Orange R.		32.86
Chinoline Yellow		45.15
Chrysodine		36.92
Citric Acid		38.12
Coal		.11
Cream Silica		.60
Dianil Direct Black-B		33.75
Resine Y N		135.26
Epsom Salts		1.55
Formaldehyde		9.00
Fuchsine F.C.O.C.		75.00
Glue		7.02
Helio Fast Red R.L.		18.75
Ice		.12 1/2
Lime		.28
Lithol Red Paste		26.79
Lump Tannin		10.08
Methyl Violet 6B		85.00
Muriate of Ammonia		7.85
Nigrosine J		50.00
Ortho Anisidine #6660		65.86
Ponolith		3.63
Quercitron Extract		3.53
Rhodamine B		34.30
Scarlet G.R.C.L.		19.00
Scarlet R.		23.56
Silicate of Alumina		1.58
Snow Flake Alum		1.75
Tannic Acid		35.50
Terra Alba		.88
Victoria Blue B		45.00
Visuivine		36.92
(16) Sulphuric Acid		.83
(119) Acetic Acid		3.85
(121) Muriatic Acid		1.00
(134) Nitric Acid		4.36
(235) Turkey Red Oil		8.13