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Scientific Section
Educational Bureau
American Paint and Varnish Manufacturers' Association

**INSPECTION RESULTS ON THREE SERIES OF
QUICK-DRYING HOUSE PAINT TESTS**

By H. A. Gardner and L. P. Hart

Apparently the type of exposure described by the writers,
which involves the use of full size siding upon fence sur-

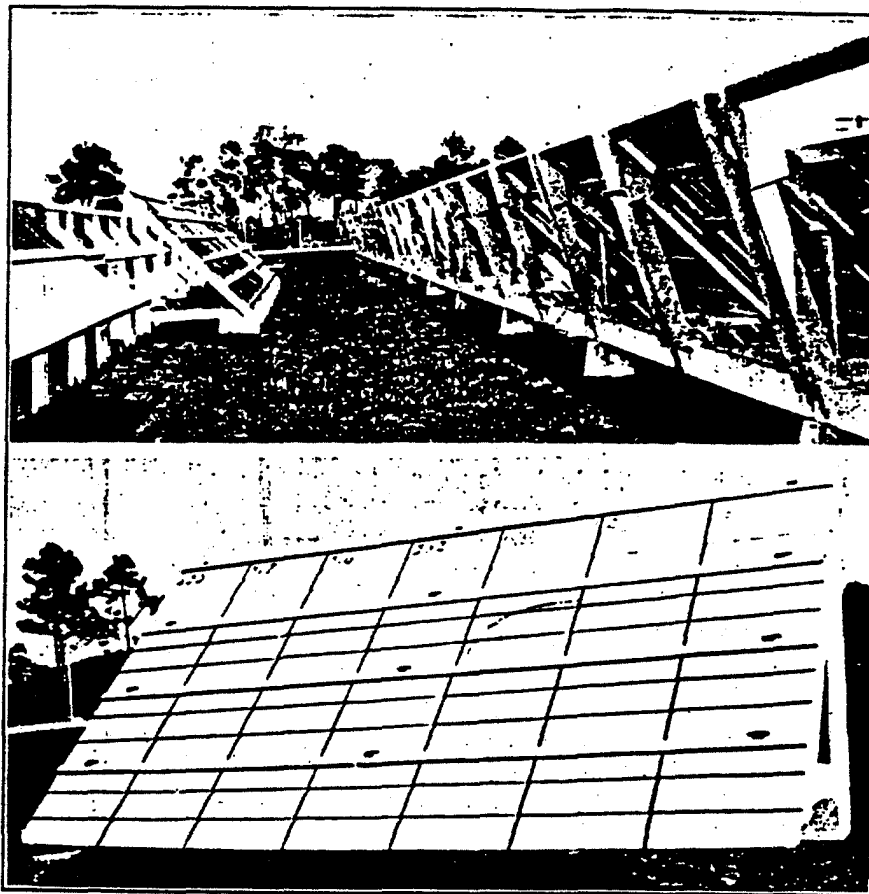


FIGURE 1
Quick-Drying Paint Tests Exposed at Miami on Swinging Racks
Upper view shows rack swung away from sun to
facilitate inspection

289

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faces constructed at an angle of 45 degrees to the vertical, facing south, provides extremely rapid breakdown of paints. It is possible that tests of this character may give in one year results that may be comparable to two and a half or even three years of service upon the side of a dwelling under normal conditions of exposure. Such tests might, therefore, be referred to as accelerated exterior exposure tests. It is wise, whenever such tests are made, to have them located in at least two different sections of the country, and many of the tests which are described below were so exposed.

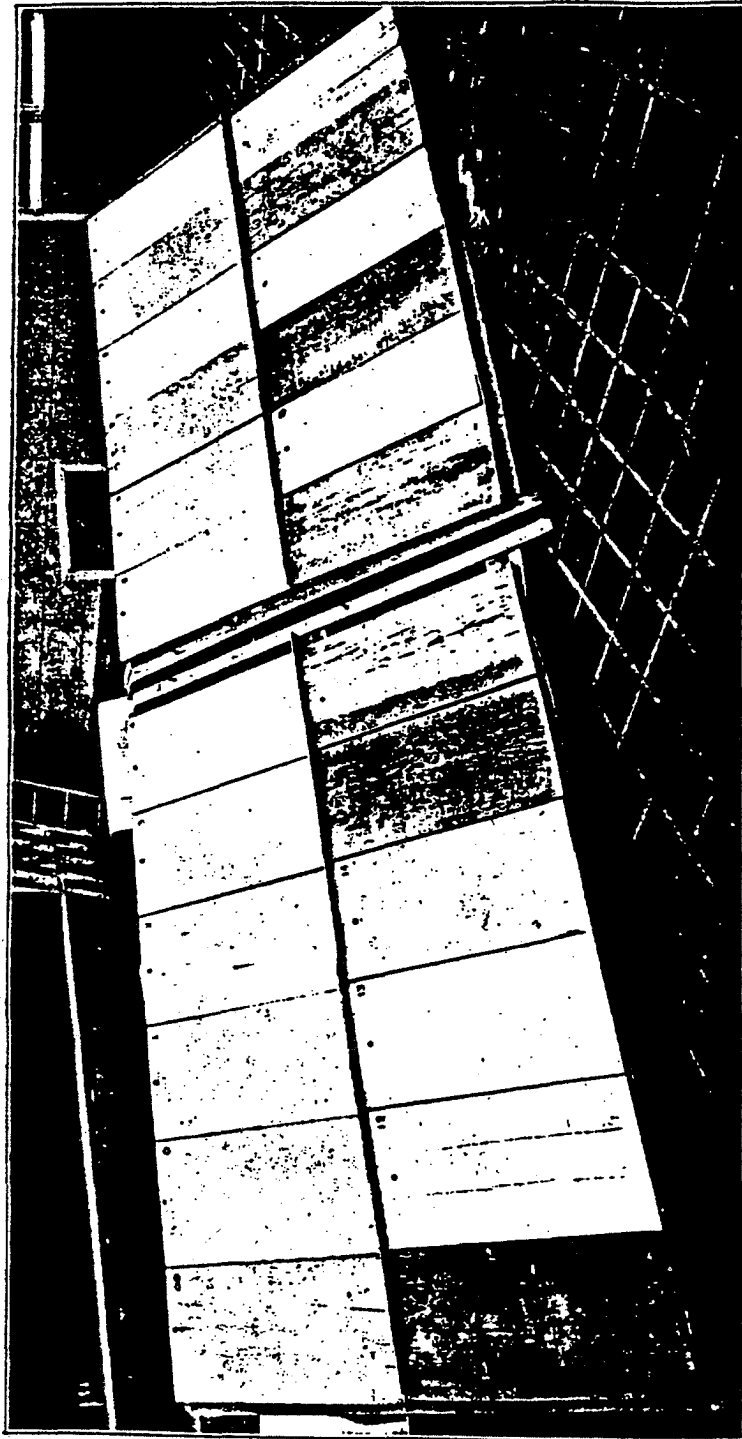
Two series of quick-drying house paint tests were applied to a test fence in Florida during December, 1930, and February, 1931. The original report regarding these tests, together with subsequent reports of inspection, are covered in Scientific Section Circulars Nos. 374, 377 and 406. The tests have since been continued, and an inspection was made thereof under date of September 20, 1932. At that time sections of the siding were removed from each panel. The sections removed were approximately 12 inches in width and 36 inches in length. They were returned to the laboratory in Washington so that a careful inspection might be made of each panel. It is extremely difficult to make a satisfactory inspection on tests in Florida, which face south, because of the sunlight conditions.

After the panels were received at the laboratory, a detailed study was made of each, and a report on the condition as of September 20, 1932, is presented on the following pages, at the foot of each formula. On the opposite pages are presented photomicrographs made at a magnification of X10, which show in a very graphic manner the condition of each paint. Most of the paints, upon examination through a microscope, showed defects which were recorded in the photomicrographs. It should be stated that many of the paints presented a satisfactory visual appearance, when viewed at a short distance from the fence. The reader should bear this in mind when judging the condition of each panel from the photomicrographs and not be too severe in his criticism of the paints.

For those who desire information other than the inspection results which are presented in this paper, it is suggested

that a study of the previous circulars referred to may be of interest, since they contain data regarding the condition of paints on storage, the original painting conditions, type of lumber used, repainting, workability of alkyd resin and tung oil compositions, possibilities of varnish paints, lacquer compositions, and others. It may, however, be stated that with one commercial variety of quick-drying paint made with glycerin phthalate, very interesting results were obtained. In the third series of tests described on page 346, two such compositions were applied, and in general their tint retention was superior to that indicated by some of the paints made with tung oil as the quick-drying ingredient. In an additional series of solid color tests made with glycerin phthalate liquids, described in Scientific Section Circular No. 420, generally satisfactory conditions have been observed to date, although these tests have not been exposed for any great period of time. Nevertheless, it would appear that glycerin phthalate liquids may be widely employed in the future for the production of some types of exterior coatings for dwellings, and for solid colors for use on railroads, gas stations, trucks, metal structures, and similar projects. There appears to be quite a variety of these liquids available on the American market. In the writer's opinion, some of them are plasticized to too great an extent with fatty oils. While they set rapidly, some do not dry hard throughout for a considerable period of time, and in communities where there is a high amount of plant pollen in the atmosphere, mildewing might be observed. In fact, it was observed on a small dwelling which the writer had painted in Florida, right in the midst of an agricultural community. It is believed that much of the mildew observed in that instance was due to the fact that the material was applied by a painter accustomed to handling linseed oil paints. He found it somewhat difficult to apply the highly pigmented glycerin phthalate composition that was used. Consequently the coating was applied too heavy and the thick film formed did not show the desired rapid drying. Plant pollen accumulated, and mildew was observed in a few months.

In conclusion, it is suggested that manufacturers should be cautious about recommending all forms of quick-drying house paints until they are fully satisfied that they have worked out certain difficulties which have existed in the past. Brushing and storage properties must be given most careful consideration. Moreover, small tests such as those which are described in this circular are not always reliable. Full size house paint tests, including repainting tests, should be made before definite conclusions are drawn regarding the value of a new product. One should always have in mind the necessity of maintaining easy brushing properties in a house paint, as such paints are often employed at fairly low temperatures in northern countries, and difficulty in application would immediately arouse objections to their use. Nevertheless, manufacturers should be constantly experimenting with the newer type products along the practical lines suggested above, in order to be prepared for developments or requirements which may take place in the future.

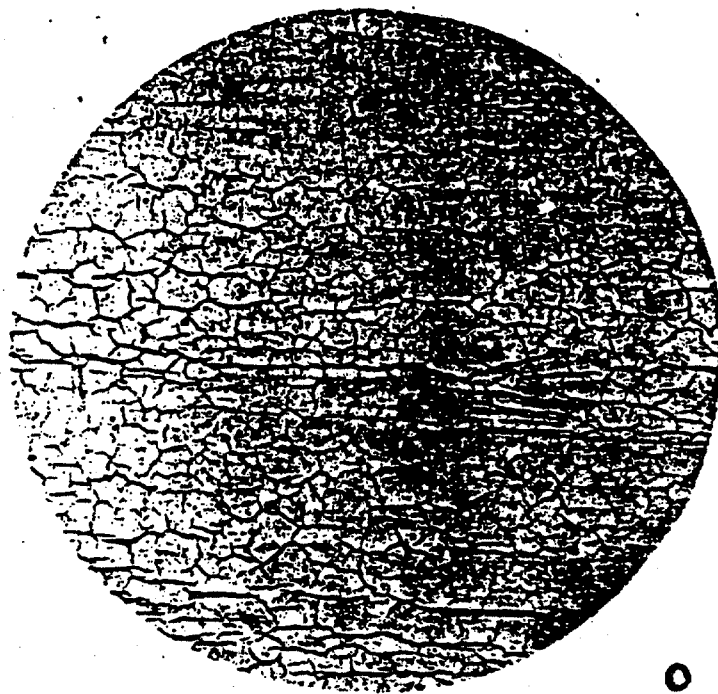


On page 79 of Scientific Section Circular No. 406, there was presented a view showing the dirt accumulation at Washington in 14 months on a few of the quick-drying paints that were exposed in Florida. The boards shown in this photograph were continuously exposed on the roof of the laboratory at Washington. The photograph referred to shows the condition after fourteen months of exposure. After twenty months of exposure, the panels on the Washington laboratory roof have weathered to a very marked extent, but the photograph indicates the relative weathering, whiteness, and dust retention properties of a number of these compositions.

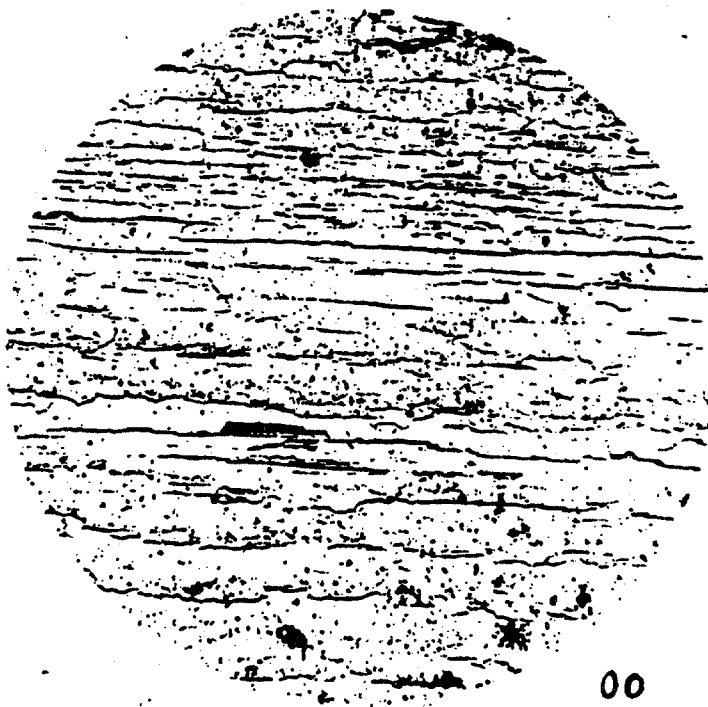
The panels are as follows:

Upper Row: 00, 01, 02, 03, 04, 05, 06, 07, 08, 9, 10.

Lower Row: 11, 12, 13, 14, 16, 17, 18, 19, 20.



0



00

294

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RESULTS OF INSPECTION OF FIRST SERIES OF TESTS

Cypress siding constructed without backing. Paints applied at 9 a. m. during December, 1930, directly upon fence at Gainesville, Fla. Excess moisture on fence first removed with a sponge. Two coats of paint applied in two days.

FORMULA 0

25 lbs. White Lead Paste
3 quarts Linseed Oil
1 gill Turpentine
1 " Drier

This should show: Pigment 72.8
Liquid 27.2

Pigment: 100 White Lead
Liquid: 89 Raw Linseed Oil
6 Turpentine
5 Drier

Spreading Rate. 1st coat, 492 sq. ft. per gal.
2nd coat, 757 " " " "

Comments: Uniformly and easily applied. Finishing coat flats in spots over entire area.

Inspection September, 1932: Heavy chalking. Some surface checking of the white lead type. Film rather thin and eroded in spots.

FORMULA 00

Pigment 60.0
Liquid 40.0

Pigment: 50 Basic Carbonate White Lead
50 Zinc Oxide

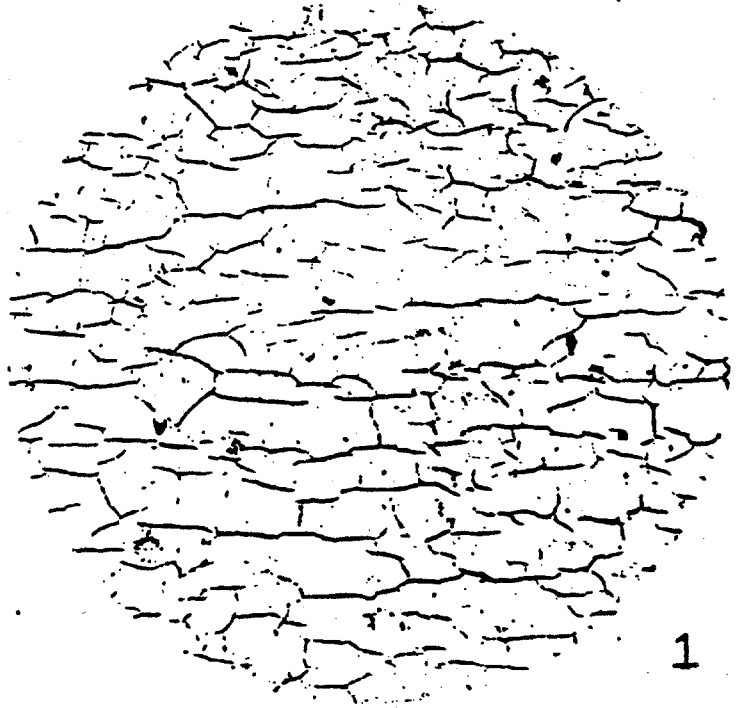
Liquid: 86.0 Linseed Oil
14.0 Turpentine and Drier

Spreading Rate. 1st coat, 525 sq. ft. per gal.
2nd coat, 750 " " " "

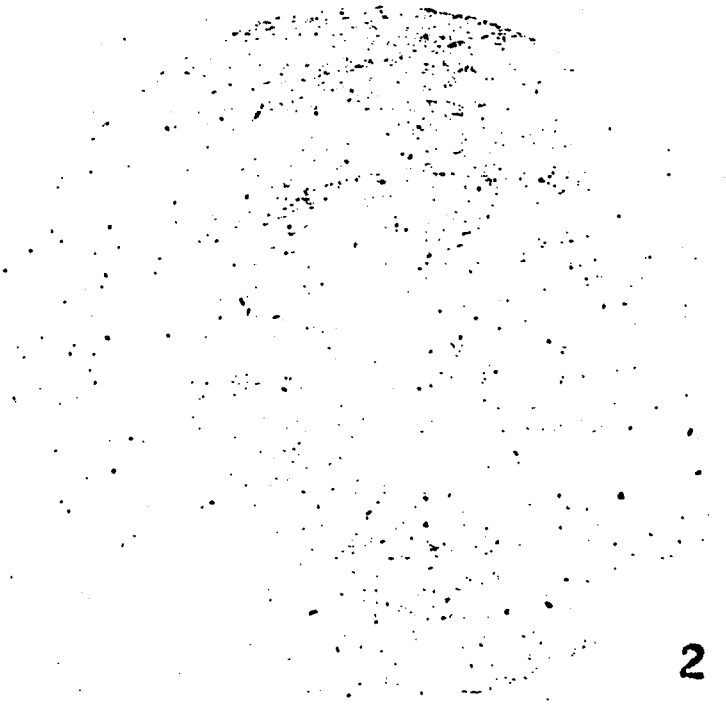
Comments. Uniformly and easily applied. Finishing coat flats in spots over entire area.

Inspection September, 1932: Medium chalking. Considerable checking. Slight flaking.

Note: 0 and 00 are control tests of normal drying paints.



1



2

FORMULA 1

Pigment 62
Liquid 38

Pigment: 40 Titanox
30 Zinc Oxide
30 Basic Carbonate White Lead
Liquid: 50 Raw Linseed Oil
25 Bodied Tung-Linseed Oil
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 422 sq. ft. per gal.
2nd coat, 570 " " " "

Comments. Slight pull under brush but applied uniformly.
Finishing coat presents dense, uniformly
glossy surface.

Inspection September, 1932: Medium chalking. Heavy check-
ing. Slight mildew spotting. Few cracks.

FORMULA 2

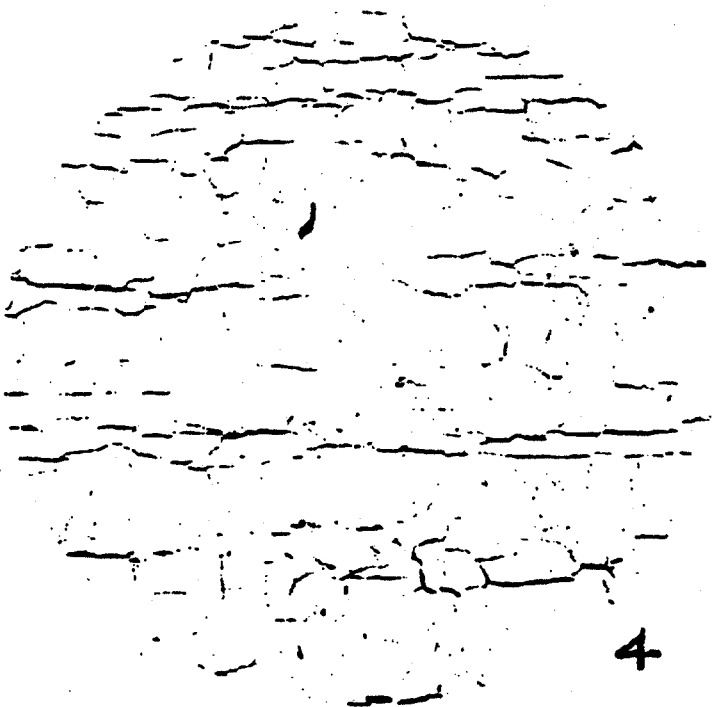
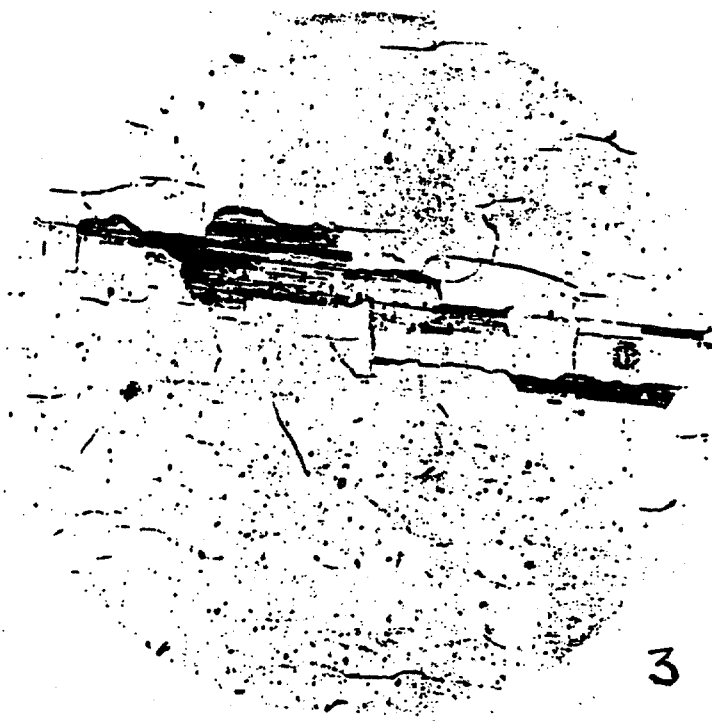
Pigment 51.4
Liquid 48.6

Pigment: 75.3 TiO_2
24.7 Basic Carbonate White Lead
Liquid: 13.2 Linseed Oil
39.2 Bodied Tung-Linseed Oil
3.3 Drier
44.3 Thinner

Spreading Rate. 1st coat, 489 sq. ft. per gal.
2nd coat, 744 " " " "

Comments. Uniformly and easily applied. Finishing coat
presents dense, glossy and very white appear-
ance. This and No. 22 are the whitest on the
fence.

Inspection September, 1932: Very heavy chalking. Otherwise
sound. Extremely white.



FORMULA 3

Pigment 65
Liquid 35

Pigment: 40 Titanox
30 Zinc Oxide
30 Basic Carbonate White Lead
Liquid: 10 Refined Linseed Oil
10 Bodied Tung-Linseed Oil
45 Bakelite XV-954 Varnish
30 Turpentine
5 Drier

Spreading Rate. 1st coat, 475 sq. ft. per gal.
2nd coat, 600 " " " "

Comments. Pulls heavily under brush. Difficult to apply uniformly. Finishing coat presents dense, high gloss film of cream tint.

Inspection September, 1932: Heavy chalking. Good whiteness. Bad flaking over summer wood.

FORMULA 4

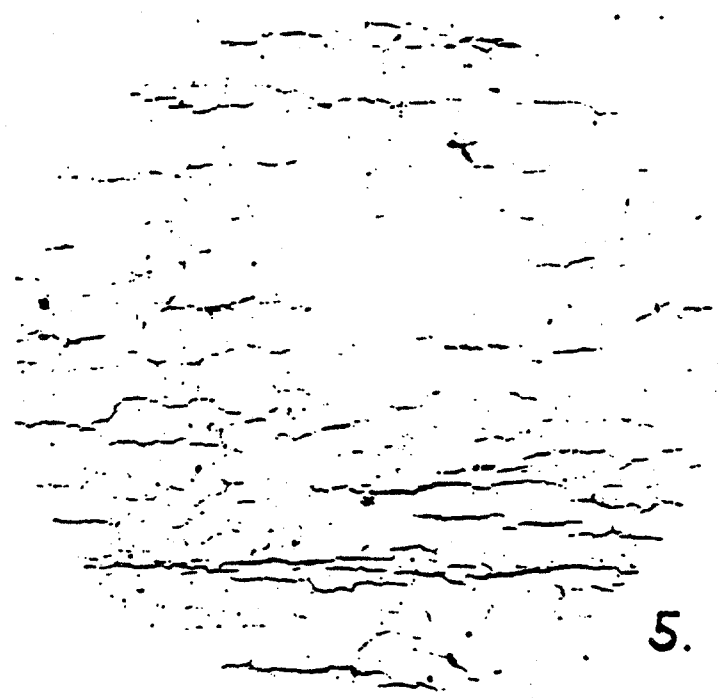
Pigment 64.6
Liquid 35.4

Pigment: 45 Titanox
35 Basic Carbonate White Lead
20 Zinc Oxide
Liquid: 84.0 Oils
16.0 Thinner and Drier

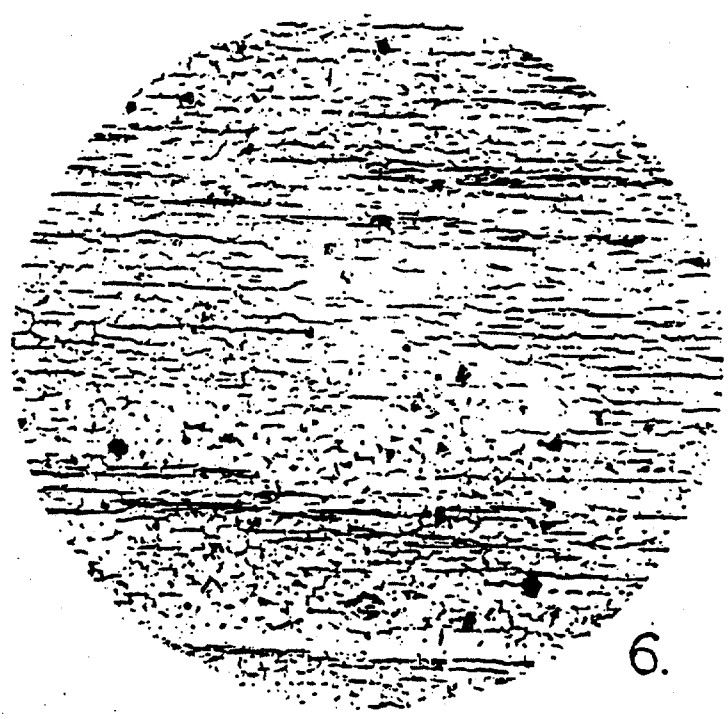
Spreading Rate. 1st coat, 462 sq. ft. per gal.
2nd coat, 762 " " " "

Comments. Uniformly and easily applied. Finishing coat presents very white, dense surface of medium gloss. Slight flatting in spots.

Inspection September, 1932: Medium chalking. Very bad checking. Good whiteness.



5.



6.

300

FORMULA 5

Pigment 65.2
Liquid 34.8

Pigment: 35 Titanox
35 Basic Carbonate White Lead
30 Zinc Oxide

Liquid: Similar to No. 4

Spreading Rate. 1st coat, 498 sq. ft. per gal.
2nd coat, 720 " " " "

Comments. Uniformly and easily applied. Finishing coat presents white, dense surface of "sleepy" gloss.

Inspection September, 1932: Considerable chalking. Surface checking. Good whiteness. Slight cracking.

FORMULA 6

Pigment 50
Liquid 50

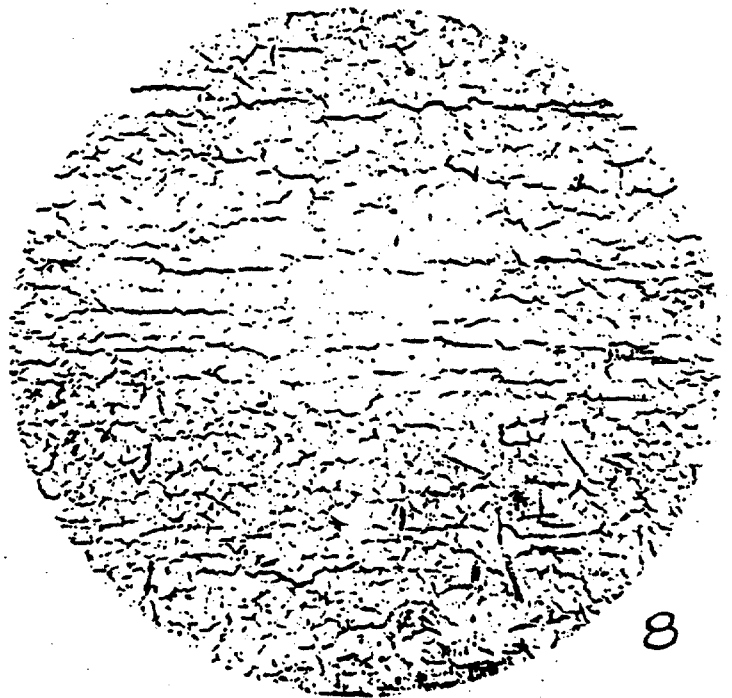
Pigment: 50 TiO_2
40 Zinc Sulphide
10 Zinc Oxide

Liquid: Tung oil-diphenyl varnish of 20-gal. length, having 75% non-volatile.

Spreading Rate. 1st coat, 460 sq. ft. per gal.
2nd coat, 605 " " " "

Comments. Some pull under brush. Difficult to apply uniformly. First coat developed a mottled gray tint over night, indicating possible reaction of traces of chlorine compounds upon the pigments. Finishing coat presents dense white surface with some flat spots.

Inspection September, 1932: Heavy chalking. Bad washing. Thin film. Several mildew spots.



302

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FORMULA 7

Pigment 50
Liquid 50

Pigment: 50 Antimony Oxide
40 Titanox
10 Zinc Oxide

Liquid: 85 Commercial 17-X varnish. This is an early form of a phthalic anhydride linseed oil fatty acid type resin in a solvent.

15 Mineral Spirits

Spreading Rate. 1st coat, 440 sq. ft. per gal.
2nd coat, 600 " " " "

Comments. Some pull under brush. Finishing coat rather streaky, with good gloss and fair hiding.

Inspection September, 1932: Slight chalking. Very badly checked and scaled. Poor condition.

FORMULA 8

Pigment 50
Liquid 50

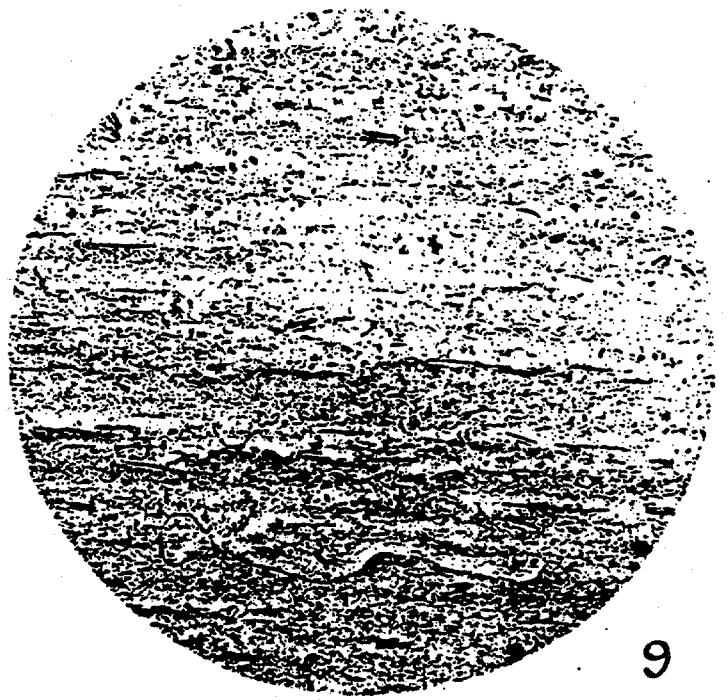
Pigment: 50 Titanium Oxide
40 Zinc Sulphide
10 Zinc Oxide

Liquid: Tung oil varnish of 75-gal. length, made with BS-1. Contains 60% non-volatile.

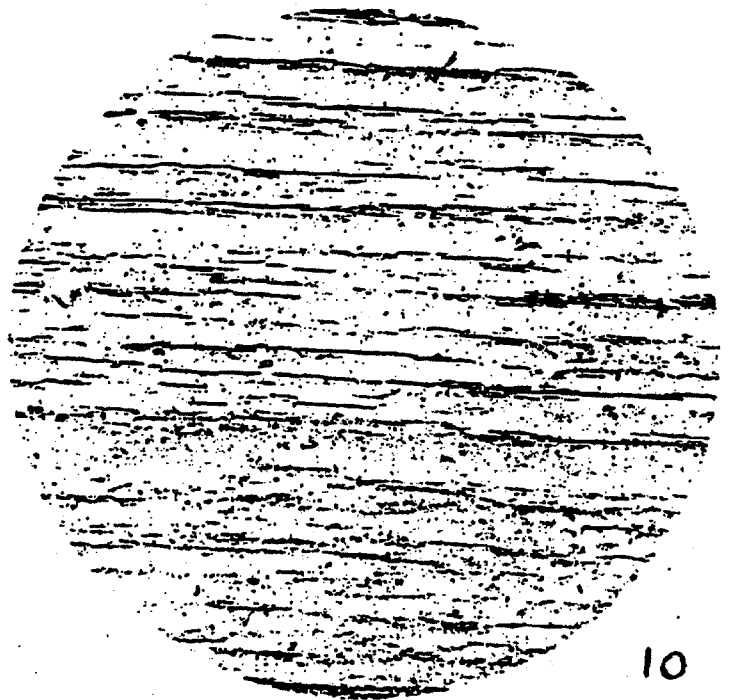
Spreading Rate. 1st coat, 415 sq. ft. per gal.
2nd coat, 582 " " " "

Comments. Difficult to apply uniformly. Finishing coat dense and of good gloss.

Inspection September, 1932: Heavy chalking. Surface checking. White.



9



10

304

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FORMULA 9

Pigment 50
Liquid 50

Pigment: 50 Titanium Oxide
40 Zinc Sulphide
10 Zinc Oxide

Liquid: Commercial tung oil varnish of 50 gal.
length, made with Bakelite XR-254 resin.

Spreading Rate. 1st coat, 416 sq. ft. per gal.
2nd coat, 603 " " " "

Comments. Heavy pull under brush and required considerable working. Finishing coat develops marked cream tint but is dense and of high gloss.

Inspection September, 1932: Heavy chalking. Distinct yellow tint. Rather thin film.

FORMULA 10 *

Approximate Composition by Analysis

Pigment 50
Liquid 50

Pigment: 60 Titanox
25 Zinc Oxide
15 Asbestine

Liquid: 51 Synthetic Resin (glycerol-phthalic fatty
acid type)
49 Solvent Naptha, Turpentine and Drier

Spreading Rate. 1st coat, 509 sq. ft. per gal.
2nd coat, 660 " " " "

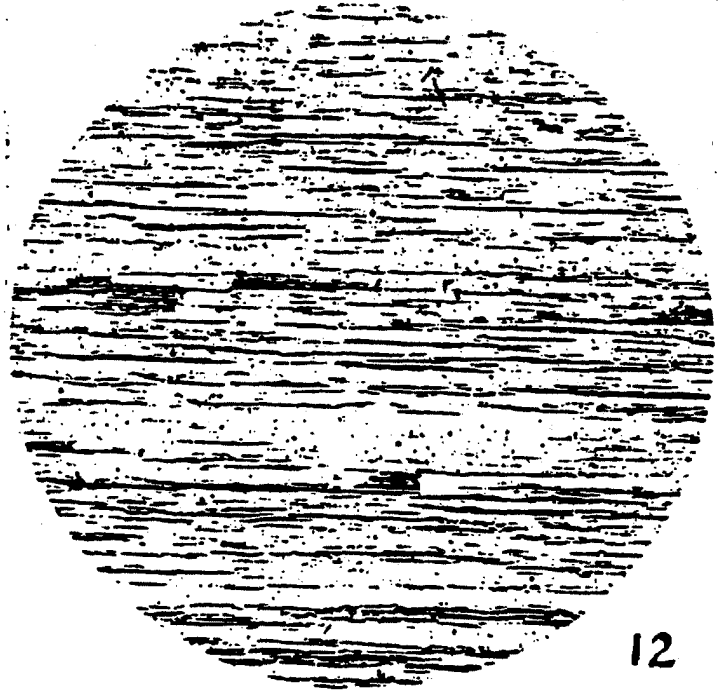
Comments. Some pull under brush but can be applied uniformly. Finishing coat is uniform, quite white, but of rather poor hiding.

Inspection September, 1932: Considerable chalking. A few slight surface cracks. White.

* Commercial sample.



11



12

306

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FORMULA 11

Pigment 51.5
Liquid 48.5

Pigment: 75 Basic Carbonate White Lead
25 Zinc Oxide

Liquid: 41.0 Linseed Fatty Acid Glycerol Phthalate
Resin (an early form)
56.6 Heavy Mineral Naphtha
2.4 Wood Turpentine
Drier: Cobalt linoleate.*

Spreading Rate. 1st coat, 430 sq. ft. per gal.
2nd coat, 468 " " " "

Comments. It was necessary to add 8 fluid ounces of solvent naphtha per gallon of paint in order to brush. Pulled under brush and very difficult to apply uniformly. Finishing coat of cream tint. Very poor hiding and streaky.

Inspection September, 1932: Medium chalking. Badly scaled and flaked. Poor condition.

FORMULA 12

Pigment 39
Liquid 61

Pigment: 82.5 Titanox
10.3 TiO₂
7.2 Zinc Oxide

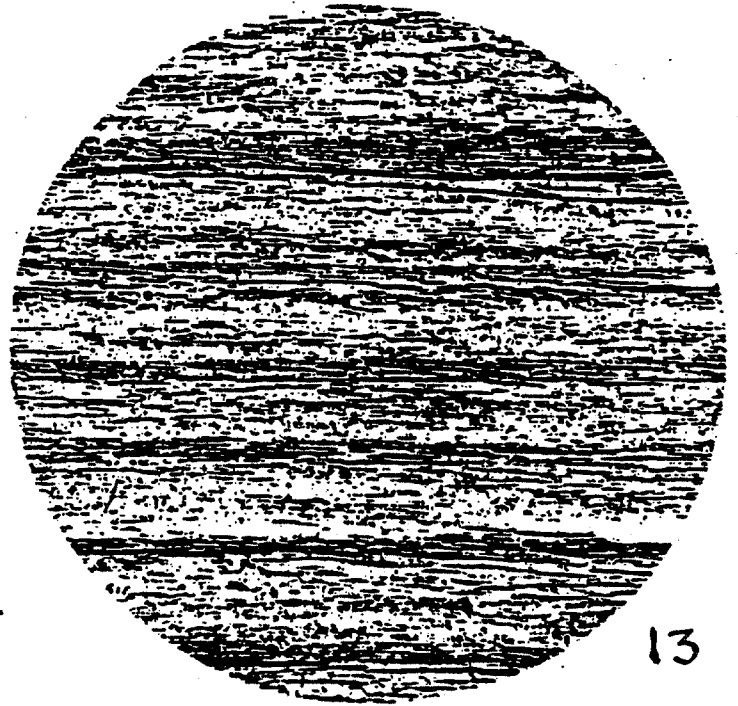
Liquid: 41.0 Linseed Fatty Acid Glycerol Phthalate
(an early form)
56.6 Heavy Mineral Naphtha
2.4 Wood Turpentine
Drier: Cobalt linoleate.*

Spreading Rate. 1st coat, 463 sq. ft. per gal.
2nd coat, 490 " " " "

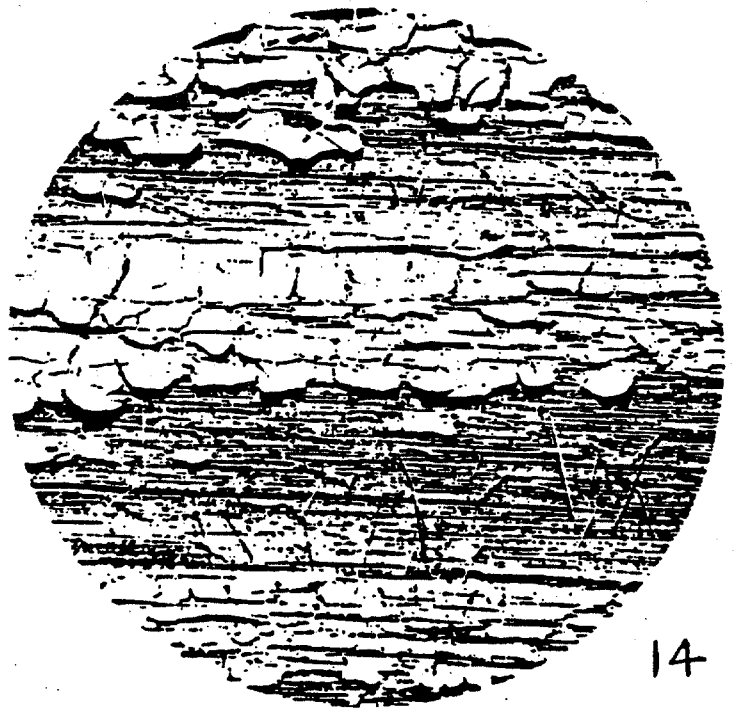
Comments. It was necessary to add 4 fluid ounces of solvent naphtha per gallon of paint in order to brush. Pulled under brush and very difficult to apply uniformly. Finishing coat white. Poor hiding, fair gloss, somewhat streaky.

Inspection September, 1932: Slight chalking. Few mildew spots. Very thin film. Weathered badly. Poor condition.

* Used 0.015 cobalt based on resin in Formulas 11, 12, 13 and 14.



13



14

308

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FORMULA 13

Pigment 28.4
Liquid 71.6

Pigment: 83.3 TiO₂
16.7 Zinc Oxide
Liquid: 41.0 Linseed Fatty Acid Glycerol Phthalate
(an early form)
56.6 Heavy Mineral Naphtha
2.4 Wood Turpentine
Drier: Cobalt linoleate.*

Spreading Rate. 1st coat, 467 sq. ft. per gal.
2nd coat, 470 " " " "

Comments. It was necessary to add 4 fluid ounces of solvent naphtha per gallon of paint in order to brush. Pulled under brush. Very difficult to apply uniformly. Finishing coat fairly white and dense. Good gloss.

Inspection September, 1932: Medium chalking. Badly weathered over entire area. Some flaking. Poor condition.

FORMULA 14

Pigment 48
Liquid 52

Pigment: 85.7 Lithopone
14.3 Zinc Oxide
Liquid: 41.0 Linseed Fatty Acid Glycerol Phthalate
(an early form)
56.6 Heavy Mineral Naphtha
2.4 Wood Turpentine
Drier: Cobalt linoleate.*

Spreading Rate. 1st coat, 416 sq. ft. per gal.
2nd coat, 460 " " " "

Comments. It was necessary to add 8 fluid ounces of solvent naphtha per gallon of paint in order to brush. Pulled under brush. Very difficult to apply uniformly. Finishing coat shows fair hiding. Good gloss but not uniform.

Inspection September, 1932: Film almost entirely washed and scaled away, leaving bare wood. Poor condition.

* Used 0.015 cobalt based on resin in Formulas 11, 12, 13 and 14.

FORMULA 16 (Lacquer Type)

11.3 1/2 second Nitrocellulose
32.1 Toluol
22.0 Butyl Acetate
8.2 Alcohol
3.7 Ethyl Acetate
8.0 Rapeseed Oil
11.0 TiO₂
1.7 Zinc Oxide
2.0 Tricresyl Phosphate

100.0

Spreading Rate. 1st coat, 357 sq. ft. per gal.
2nd coat, 305 " " " "
3rd coat, 350 " " " "

Comments. Difficult to apply and not uniform. Second coat streaky and dull. Third coat fair gloss, good hiding, but light cream tint.

Inspection September, 1932: Entirely failed.* Very little coating left.

FORMULA 17 (Lacquer Type)

8.7 1/2 second Nitrocellulose
32.9 Toluol
14.5 Butyl Acetate
8.4 Alcohol
3.8 Ethyl Acetate
11.0 Rezyl 19
5.5 Rezyl Balsam (33)
11.4 TiO₂
1.8 Zinc Oxide
2.0 Tricresyl Phosphate

100.0

Spreading Rate. 1st coat, 346 sq. ft. per gal.
2nd coat, 294 " " " "
3rd coat, 288 " " " "

Comments. Difficult to apply and not uniform. Second coat streaky and dull. Third coat white, good hiding, good gloss.

Inspection September, 1932: Entirely failed.* About half of coating left.

* Photomicrographs not necessary.

FORMULA 18 (Lacquer Type)

10.8 1/2 second Nitrocellulose
29.7 Toluol
25.2 Butyl Acetate
8.4 Alcohol
3.8 Ethyl Acetate
7.2 Paraplex Resin G-20
11.2 TiO₂
1.8 Zinc Oxide
2.0 Tricresyl Phosphate

100.0

Spreading Rate. 1st coat, 420 sq. ft. per gal.
2nd coat, 337 " " " "
3rd coat, 295 " " " "

Comments. Difficult to apply and not uniform. Second coat streaky. Third coat white, fairly good gloss. Good hiding.

Inspection September, 1932: Entirely failed.*

FORMULA 19 (Lacquer Type)

9.1 1/2 second Nitrocellulose
18.1 Toluol
15.3 Butyl Acetate
8.5 Alcohol
3.8 Ethyl Acetate
27.1 Gardlite Resin
3.1 Diphenyl Phthalate
11.3 TiO₂
1.8 Zinc Oxide
2.0 Tricresyl Phosphate

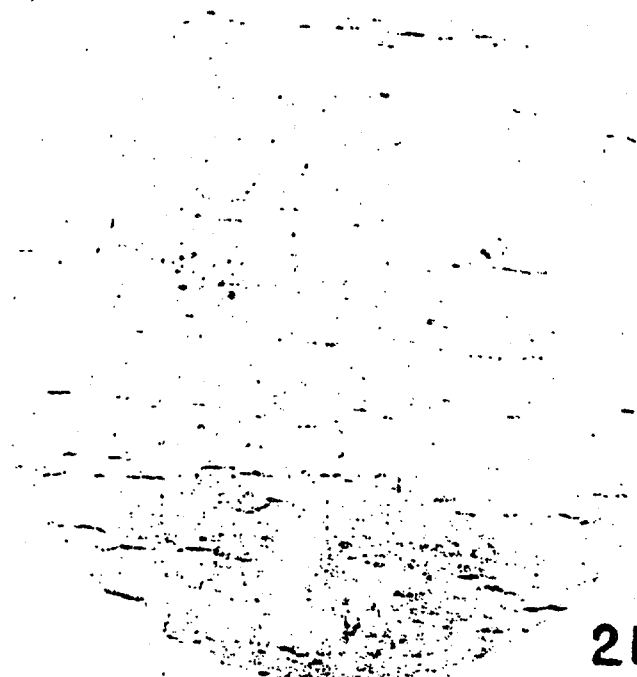
100.1

Spreading Rate. 1st coat, 456 sq. ft. per gal.
2nd coat, 304 " " " "
3rd coat, 356 " " " "

Comments. Difficult to apply and not uniform. Second coat streaky but good gloss. Third coat white, very high gloss, and good hiding.

Inspection September, 1932: Badly eroded but wood still covered. Cracked and mottled. Failed.*

* Photomicrographs not necessary.



21

312

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FORMULA 20

Pigment 40
Liquid 60

Pigment: 50 TiO_2
40 Zinc Sulphide
10 Zinc Oxide
Liquid: 64 Bodied Tung-Linseed Oil S. P.
15 Raw Linseed Oil
16 Turpentine
5 Drier

Spreading Rate. 1st coat, 492 sq. ft. per gal.
2nd coat, 562 " " " "

Comments. Uniformly and easily applied. Finishing coat white, uniform gloss and appearance.

Inspection September, 1932: Failed completely.*

FORMULA 21

Pigment 60
Liquid 40

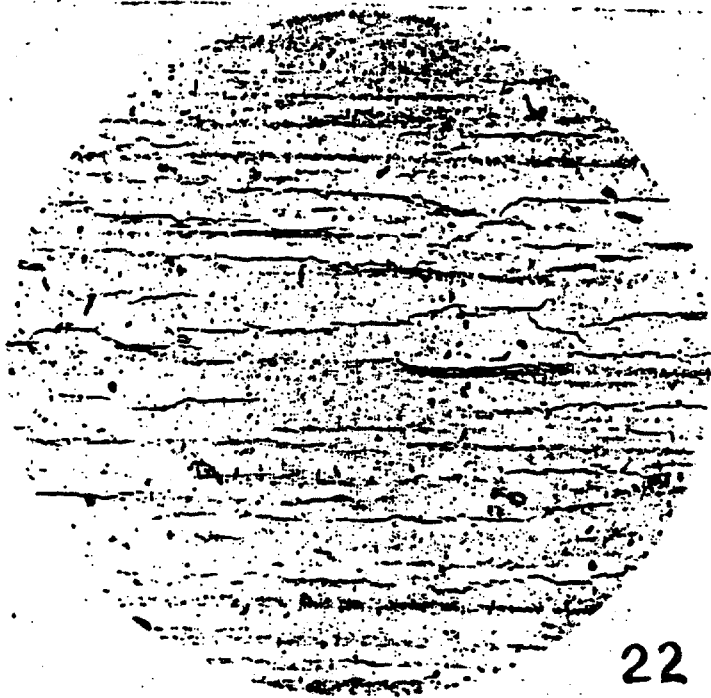
Pigment: 50 Titanox
10 TiO_2
40 Basic Carbonate White Lead
Liquid: 30 Refined Linseed Oil
66 Tung Oil spar varnish of 20-gal. length
made with K-12-A resin. Varnish
contains 63% non-volatile.
4 Drier

Spreading Rate. 1st coat, 406 sq. ft. per gal.
2nd coat, 650 " " " "

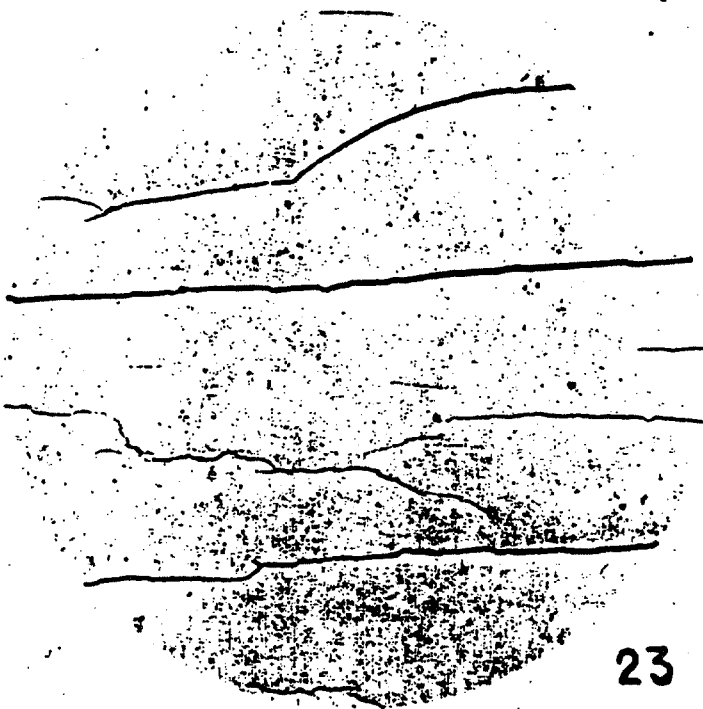
Comments. Some pull under brush. Finishing coat fairly white, high gloss, dense and uniform.

Inspection September, 1932: Heavy chalking. Generally sound condition. Very white.

* Photomicrographs not necessary.



22



23

314

0007-SWP-000005766

FORMULA 22

Pigment 63

Liquid 37

Pigment: 40 White Lead
40 Antimony Oxide
20 TiO_2

Liquid: 50 Raw Linseed Oil
30 Lead Tungate L.
15 Turpentine
5 Drier

Spreading Rate. 1st coat, 530 sq. ft. per gal.
2nd coat, 635 " " " "

Comments. Pasty condition but brushes out very satisfactorily. Finishing coat white, fair gloss, dense and uniform.

Inspection September, 1932: Heavy chalking. Mottled yellow spots over entire area. Slight surface checks. Otherwise sound.

FORMULA 23

Pigment 60

Liquid 40

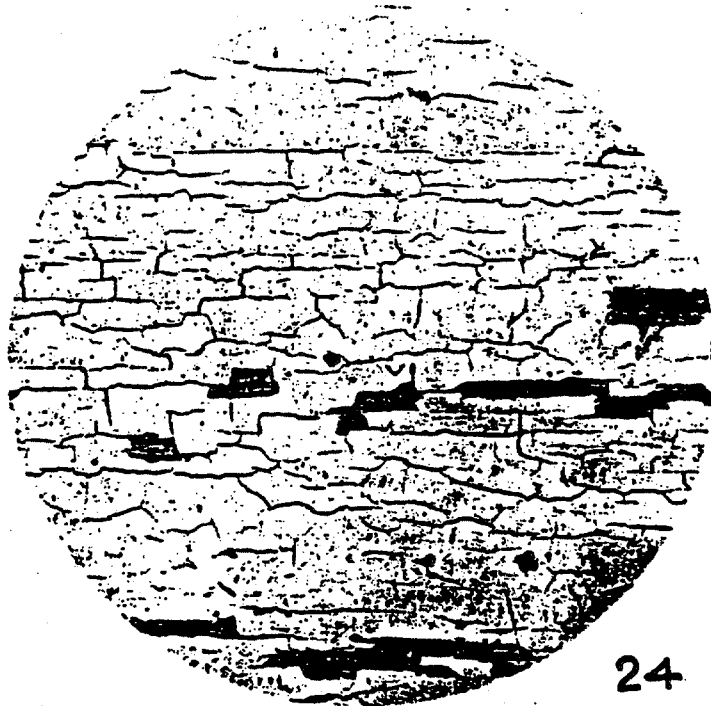
Pigment: 50 Titanox
40 Basic Carbonate White Lead
10 TiO_2

Liquid: 57 Rezyl #1102 in xylol (non-volatile 50%)
12 Rezyl Paste Plasticizer #114
28 Toluol
3 Drier

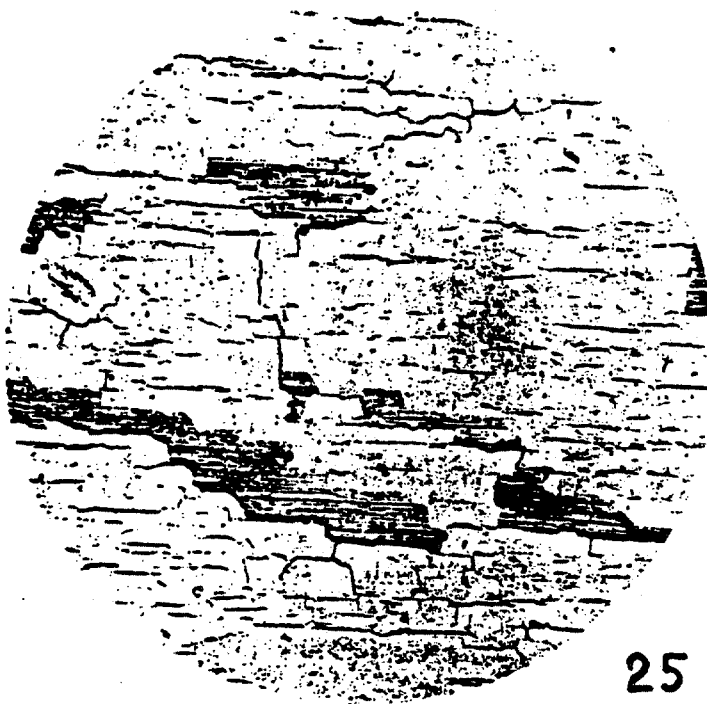
Spreading Rate. 1st coat, 238 sq. ft. per gal.
2nd coat, 308 " " " "

Comments. Almost impossible to apply with brush, as it sets almost instantly. Finishing coat very dull and dense white.

Inspection September, 1932: Medium chalking. Long fissures and bad scaling. Very white. Film brittle. Poor condition.



24



25

316

FORMULA 24

Pigment 62
Liquid 38

Pigment: 40 Titanox
40 Zinc Oxide
20 White Lead
Liquid: 42 Linseed Oil
21 Bodied China Wood and Linseed Oil
21 Bakelite Varnish XR-254 of 25-gal.
length
5 Drier
6 Wood Turpentine
5 Solvent Naphtha

Spreading Rate. 1st coat, 468 sq. ft. per gal.
2nd coat, 620 " " " "

Comments. Some pull under brush. Finishing coat white, dense, of fair gloss and uniform in appearance.

Inspection September, 1932: Considerable chalking. Some checking and flaking. Clean film. Very white.

FORMULA 25

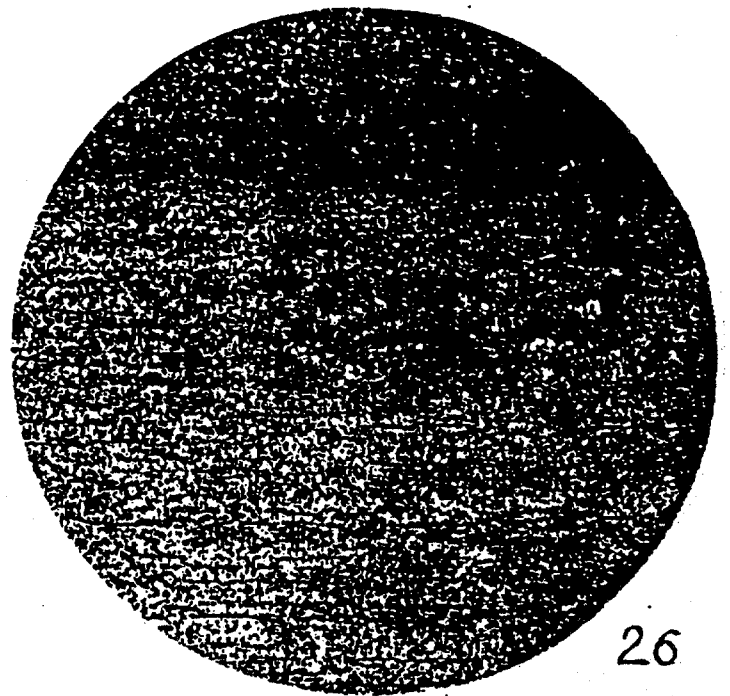
Pigment 62
Liquid 38

Pigment: 40 Titanox
40 Zinc Oxide
20 White Lead
Liquid: 37 Boiled Linseed Oil
47 Bakelite Varnish XR-254 of 25-gal.
length
5 Drier
5 Solvent Naphtha
3 Wood Turpentine
3 Cellosolve

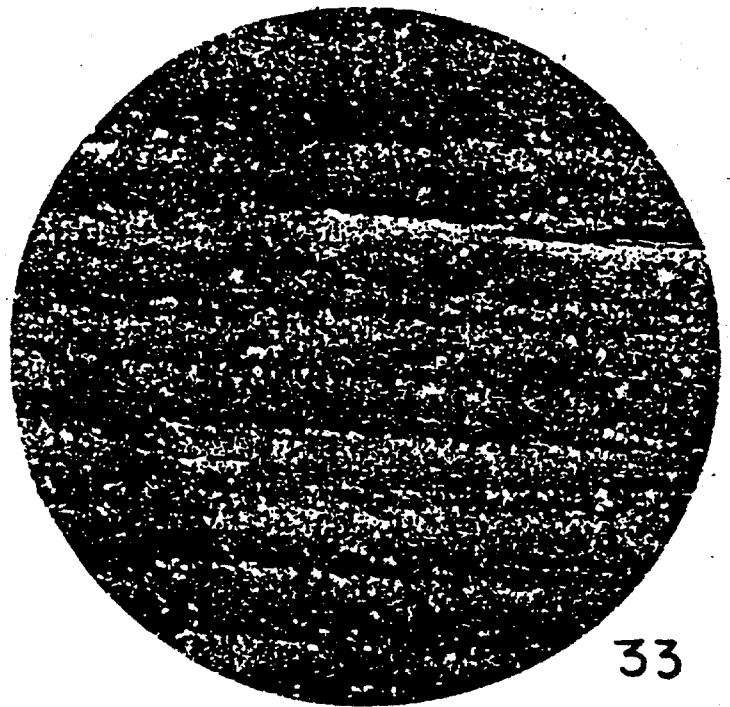
Spreading Rate. 1st coat, 490 sq. ft. per gal.
2nd coat, 795 " " " "

Comments. Some pull under brush. Finishing coat slight cream, dense, rather dull, but of uniform appearance.

Inspection September, 1932: Considerable chalking. Surface checks and scaling. White. Poor condition.



26



33

318

0007-SWP-000005770

FORMULA 26

Green made from 1 lb. Chrome Green Paste in Raw Linseed Oil and 1 pint of 4-hour Tung Oil Spar Varnish.

Applied in 2-coat work over 1 coat of Aluminum Spar Varnish Primer.*

Spreading Rate. 1st coat, 750 sq. ft. per gal.
2nd coat, 940 " " " "

Comments. Easily applied. Uniform gloss and good hiding.
Inspection September, 1932: Very badly faded in streaks over grain of wood. Apparently peppered with mildew. Very slight checks. Otherwise sound.

FORMULA 33

Commercial Quick Drying Green Trim

Pigment 35

Liquid 65

Pigment: 37.0 Chrome Green
63.0 Mag. Silicate

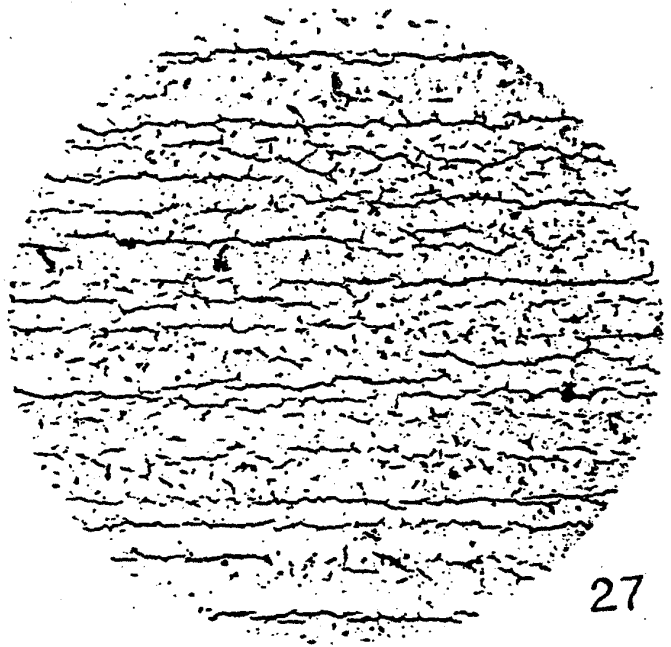
Liquid: 52.5 Synthetic Phthalate Resin Base
47.5 Thinner and Drier

Applied in 2-coat work over 1 coat Aluminum Spar Varnish Primer.

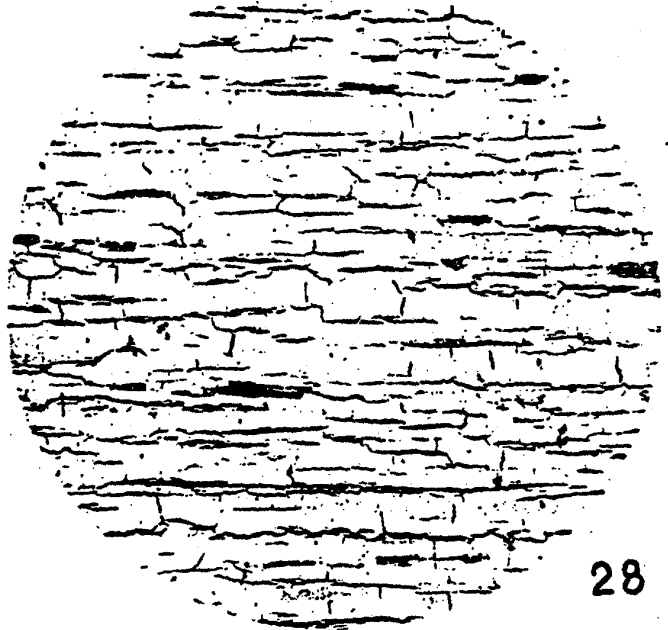
Spreading Rate. 1st coat, 615 sq. ft. per gal.
2nd coat, 1000 " " " "

Comments. Easily applied. Uniform gloss and good hiding.
Inspection September, 1932: Better color retention than No. 26. Some fading of uniform character. Otherwise sound.

* 2 lbs. Aluminum Powder, 1 gal. Varnish, and 2 pints Turpentine.



27



28

320

0007-SWP-000005772

FORMULA 27

Paint No. 4 applied in 2-coat work over 1 coat Aluminum Spar Varnish Primer.

Spreading Rate. 1st coat, 615 sq. ft. per gal.
2nd coat, 820 " " " "

Comments. Uniformly and easily applied. Finishing coat very white, dense, and of good gloss.

Inspection September, 1932: Heavy chalking. Marked checking. White. Mildew spotted.

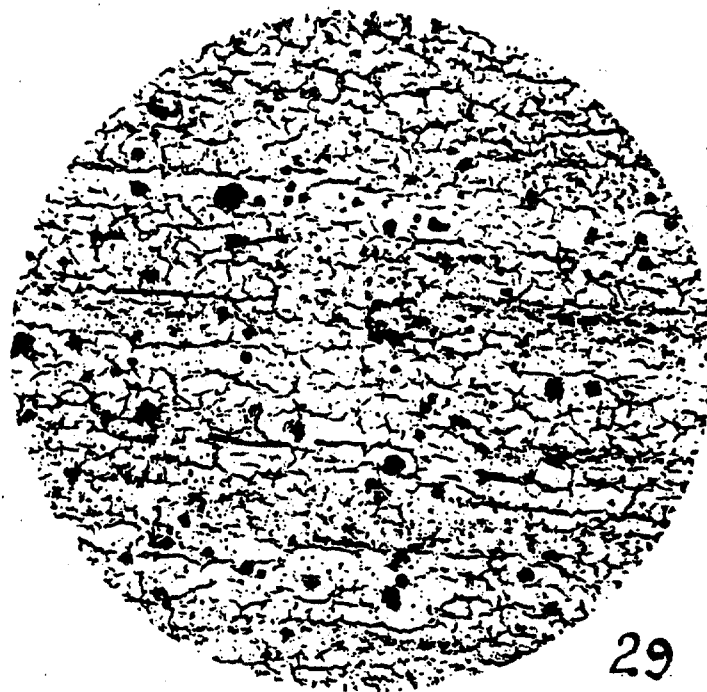
FORMULA 28

Paint No. 4 applied in 2-coat work over 1 coat clear 4-hour Spar Varnish Primer.

Spreading Rate. 1st coat, 710 sq. ft. per gal.
2nd coat, 925 " " " "

Comments. Uniformly and easily applied. Finishing coat very white, dense, and of good gloss.

Inspection September, 1932: Medium chalking. Marked checking. Some cracking.



29

322

0007-SWP-000005774

FORMULA 29

Paint No. 20 applied in 2-coat work over 1 coat Aluminum Spar Varnish Primer.

Spreading Rate. 1st coat, 497 sq. ft. per gal.
2nd coat, 850 " " " "

Comments. Uniformly and easily applied. Finishing coat very white, dense, and of good gloss.

Inspection September, 1932: Medium chalking. Fine order of checking. Covered with tiny mildew spots.

FORMULA 30

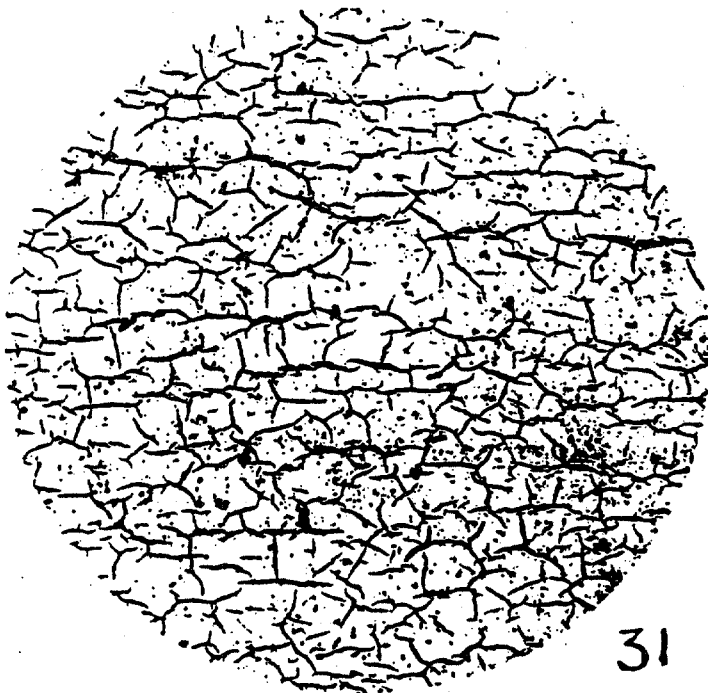
Paint No. 20 applied in 2-coat work over 1 coat clear 4-hour Spar Varnish Primer.

Spreading Rate. 1st coat, 555 sq. ft. per gal.
2nd coat, 900 " " " "

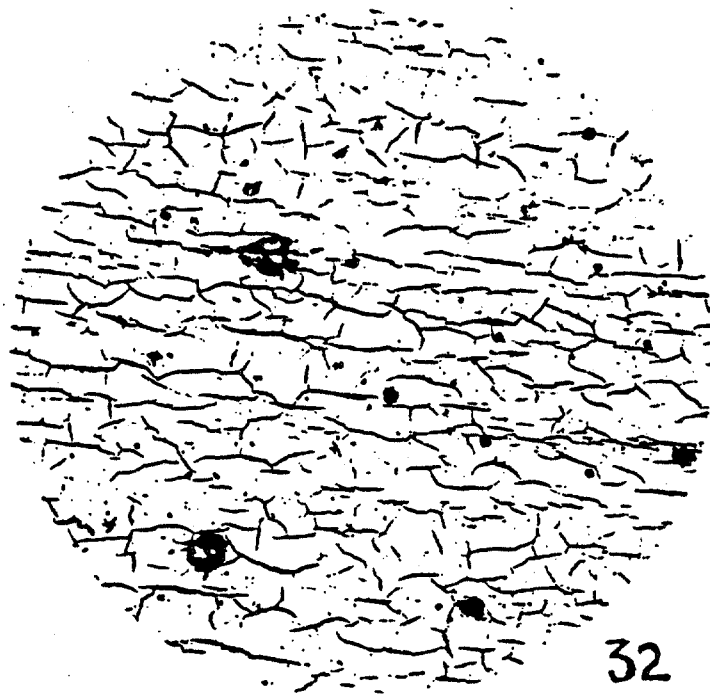
Comments. Uniformly and easily applied. Finishing coat very white, dense, and of good gloss.

Inspection September, 1932: Completely failed.*

* Photomicrographs not necessary.



31



32

324

FORMULA 31

Paint No. 1 applied in 2-coat work over 1 coat Aluminum Spar Varnish Primer.

Spreading Rate. 1st coat, 452 sq. ft. per gal.
2nd coat, 672 " " " "

Comments. Very slight pull under brush. Finishing coat presents dense, uniform gloss surface.

Inspection September, 1932: Medium chalking. Considerable checking. Mildew spotted. White.

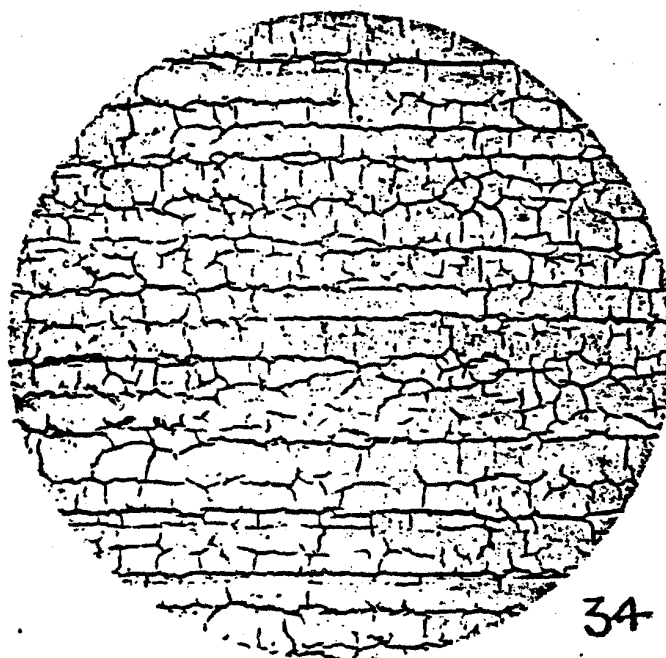
FORMULA 32

Paint No. 1 applied in 2-coat work over 1 coat clear 4-hour Spar Varnish Primer.

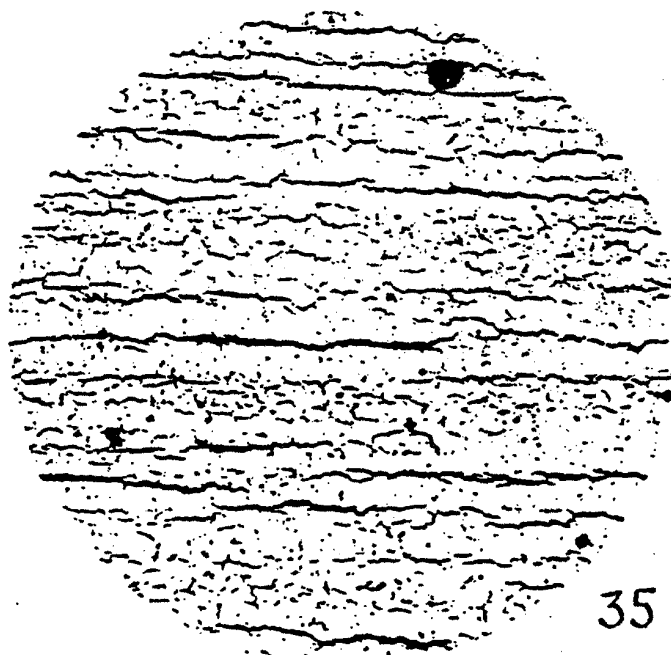
Spreading Rate. 1st coat, 475 sq. ft. per gal.
2nd coat, 685 " " " "

Comments. Works well. Finishing coat presents dense, uniform gloss surface.

Inspection September, 1932: Medium chalking. Considerable checking. Mildew spotted. White.



34



35

326

0007-SWP-000005778

SECOND SERIES OF TESTS

Western red cedar siding panels constructed at Washington laboratory. Two coats of paint applied indoors at laboratory. Each coat dried on roof. White paints only. Panels shipped to Florida and exposed at Gainesville on February 7, 1931.

FORMULA 34

Pigment 64
Liquid 36

Pigment: 60 Leaded Zinc Oxide (35% leaded)
40 Zinc Sulphide

Liquid: 50 Raw Linseed Oil
25 Bodied Tung-Linseed Mixture
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 434 sq. ft. per gal.
2nd coat, 682 " " " "

Inspection September, 1932: Heavy chalking. Interlacing surface checking. Slight mildew. White.

FORMULA 35

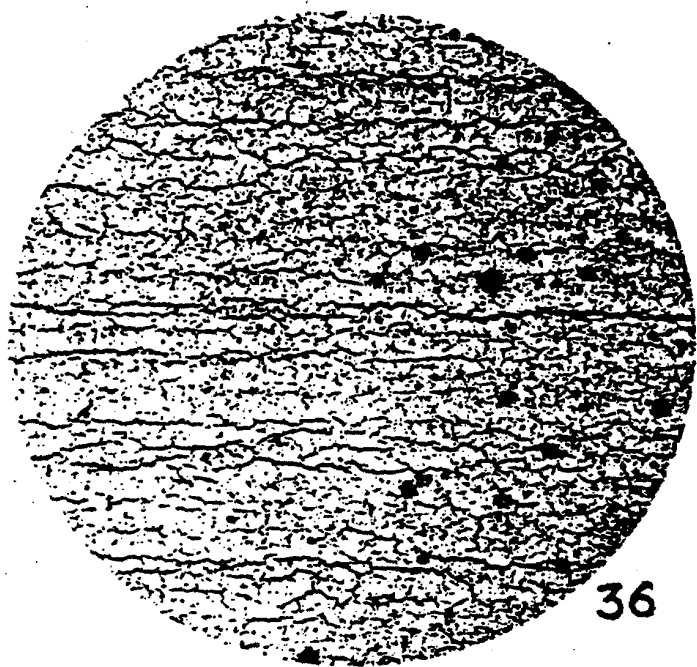
Pigment 64
Liquid 36

Pigment: 20 Leaded Zinc Oxide
40 Zinc Sulphide
20 Silica
20 Asbestine

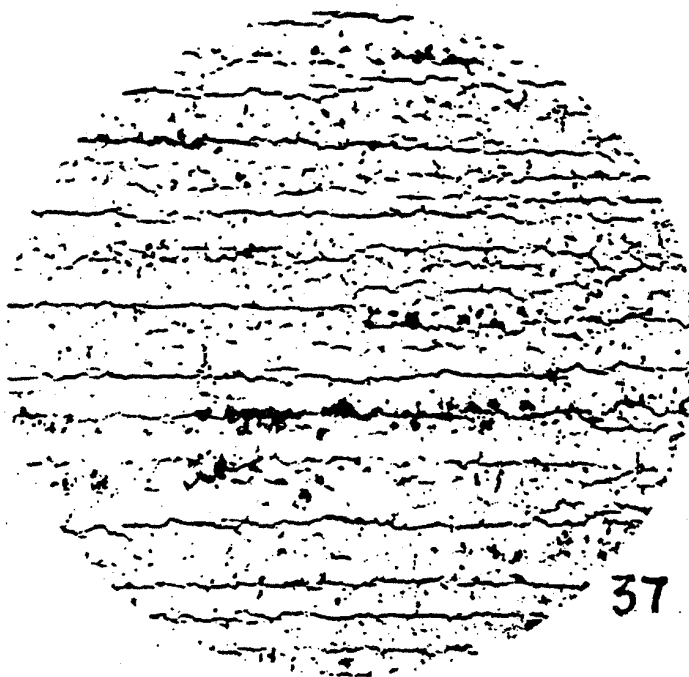
Liquid: 50 Raw Linseed Oil
25 Bodied Tung-Linseed Mixture
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 429 sq. ft. per gal.
2nd coat, 730 " " " "

Inspection September, 1932: Slight chalking. Very badly checked. Surface cracks. Peppered with mildew.



36



37

328

0007-SWP-000005780

FORMULA 36

Pigment 64

Liquid 36

Pigment: 35 Lead Zinc Oxide
45 High Strength Lithopone
10 Silica
10 Asbestine

Liquid: 50 Raw Linseed Oil
25 Bodied Tung-Linseed Mixture
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 506 sq. ft. per gal.
2nd coat, 610 " " " "

Inspection September, 1932: Medium chalking. Some mildew.
Longitudinal cracks. White.

FORMULA 37

Pigment 64

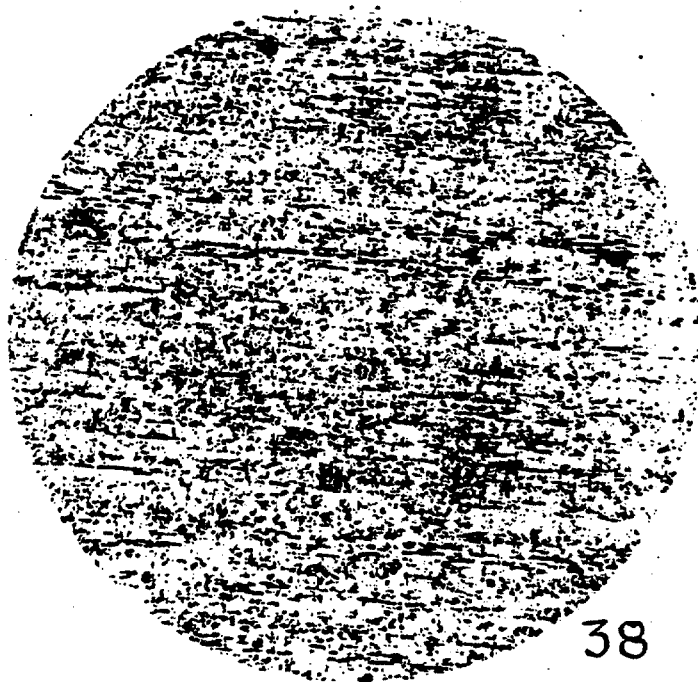
Liquid 36

Pigment: 45.0 Lead Zinc Oxide
40.0 Lithopone
7.5 Asbestine
7.5 Silica

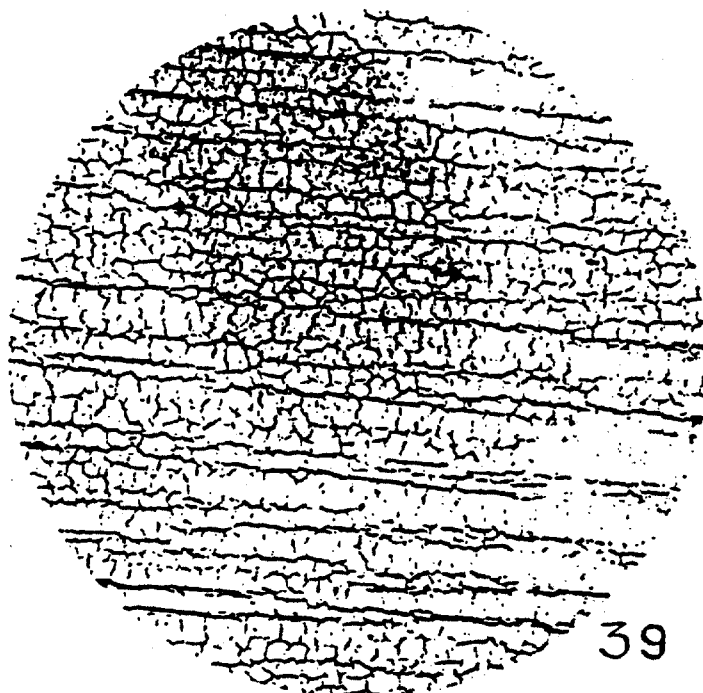
Liquid: 50.0 Raw Linseed Oil
25.0 Bodied Tung-Linseed Mixture
19.0 Turpentine
6.0 Drier

Spreading Rate. 1st coat, 510 sq. ft. per gal.
2nd coat, 767 " " " "

Inspection September, 1932: Medium chalking. Slight surface
cracks and checking. Some mildew. White.



38



39

330

0007-SWP-000005782

FORMULA 38

Pigment 67
Liquid 33

Pigment: 90 Super Sublimed White Lead
10 Titanium Oxide

Liquid: 61 Raw Linseed Oil
8 Bodied Linseed Oil
11 Bodied Tung-Linseed Mixture
15 Turpentine
5 Drier

Spreading Rate. 1st coat, 635 sq. ft. per gal.
2nd coat, 906 " " " "

Inspection September, 1932: Heavy chalking. Very smooth,
sound film. Some mildew.

FORMULA 39

Pigment 64
Liquid 36

Pigment: 40 Zinc Oxide
40 Zinc Sulphide
10 Silica
10 Barytes

Liquid: 50 Raw Linseed Oil
25 Bodied Tung-Linseed Mixture
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 445 sq. ft. per gal.
2nd coat, 700 " " " "

Inspection September, 1932: Slight chalking. Surface check-
ing. Some mildew.

FORMULA 223-O

Pigment 62

Liquid 38

Pigment: 100 Calcium Titanox

Liquid: 50 Raw Linseed Oil

25 Bodied Tung-Linseed Mixture

19 Turpentine

6 Drier

Spreading Rate. 1st coat, 516 sq. ft. per gal.

2nd coat, 790 " " " "

Inspection September, 1932: Completely failed.*

FORMULA 223-S

Pigment 62

Liquid 38

Pigment: 100 Calcium Titanox (Treated)

Liquid: 50 Raw Linseed Oil

25 Bodied Tung-Linseed Mixture

19 Turpentine

6 Drier

Spreading Rate. 1st coat, 566 sq. ft. per gal.

2nd coat, 815 " " " "

Inspection September, 1932: Completely failed.*

* Photomicrographs not necessary.

FORMULA 229-O

Pigment 62
Liquid 38
Pigment: 100 Lithopone
Liquid: 50 Raw Linseed Oil
25 Bodied Tung-Linseed Mixture
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 521 sq. ft. per gal.
2nd coat, 838 " " " "

Inspection September, 1932: Completely failed.*

FORMULA 229-S

Pigment 62
Liquid 38
Pigment: 100 Lithopone (Treated)
Liquid: 50 Raw Linseed Oil
25 Bodied Tung-Linseed Mixture
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 602 sq. ft. per gal.
2nd coat, 815 " " " "

Inspection September, 1932: Completely failed.*

* Photomicrographs not necessary.

FORMULA 230

Pigment 62
Liquid 38

Pigment: 100 Lithopone

Liquid: 60 Raw Linseed Oil
40 Lead Tungate Liquid*

Spreading Rate. 1st coat, 571 sq. ft. per gal.
2nd coat, 800 " " " "

Inspection September, 1932: Completely failed.*

FORMULA 231

Pigment 62
Liquid 38

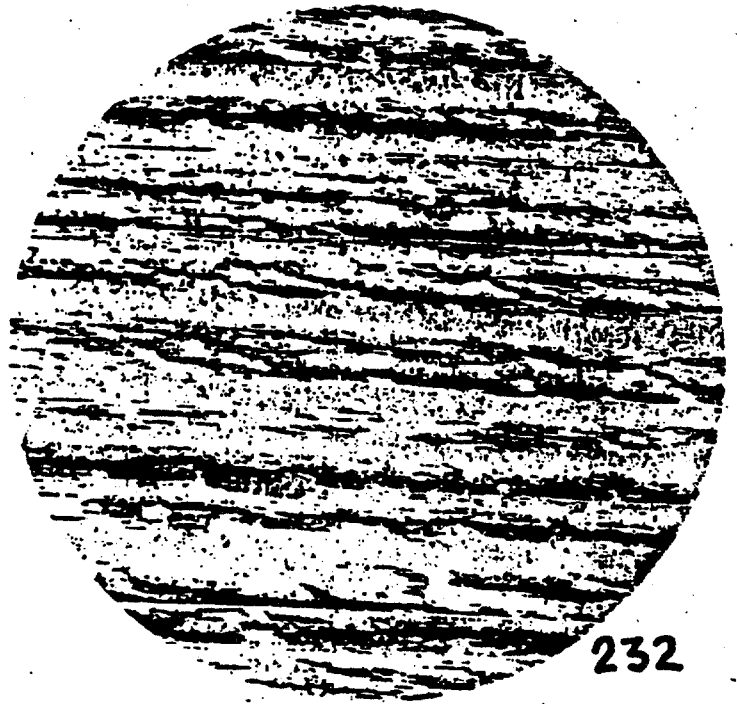
Pigment: 100 Calcium Titanox

Liquid: 60 Raw Linseed Oil
40 Lead Tungate Liquid*

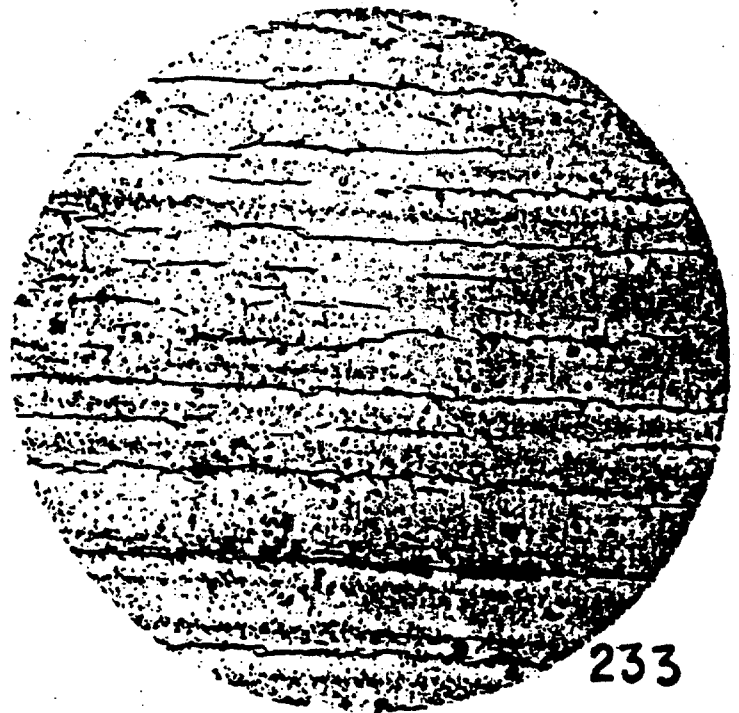
Spreading Rate. 1st coat, 559 sq. ft. per gal.
2nd coat, 614 " " " "

Inspection September, 1932: Completely failed.*

* Photomicrographs not necessary.



232



233

336

FORMULA 232

Pigment 70
Liquid 30

Pigment: 100 Super Sublimed White Lead

Liquid: 60 Raw Linseed Oil
40 Lead Tungate Liquid*

Spreading Rate. 1st coat, 715 sq. ft. per gal.
2nd coat, 773 " " " "

Inspection September, 1932: Badly chalked. Eroded.

FORMULA 233

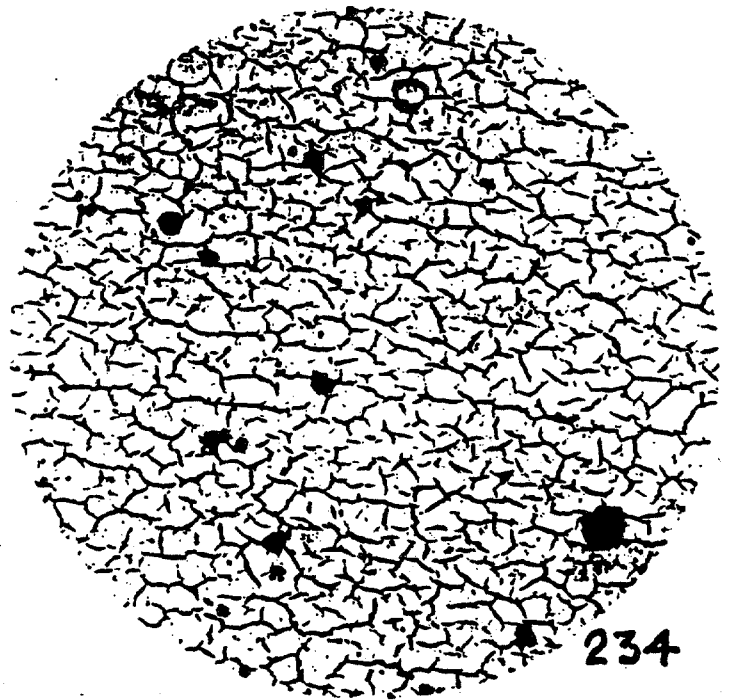
Pigment 65
Liquid 35

Pigment: 90 Low Oil Absorption Zinc Oxide #50
10 Titanium Oxide

Liquid: 56 Raw Linseed Oil
7 Bodied Linseed Oil
10 Bodied Tung-Linseed Mixture
23 Turpentine
4 Drier

Spreading Rate. 1st coat, 525 sq. ft. per gal.
2nd coat, 584 " " " "

Inspection September, 1932: Slight chalking. Long fissures.
Hard film. Some mildew.



234



235

338

0007-SWP-000005789

FORMULA 234

Pigment 64

Liquid 36

Pigment: 40 Basic Carbonate White Lead
40 Super Sublimed White Lead
20 Zinc Oxide

Liquid: 50 Raw Linseed Oil
25 Bodied Tung-Linseed Mixture
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 489 sq. ft. per gal.
2nd coat, 561 " " " "

Inspection September, 1932: Considerable chalking. Surface checking over entire area. Peppered with mildew.

FORMULA 235

Pigment 70

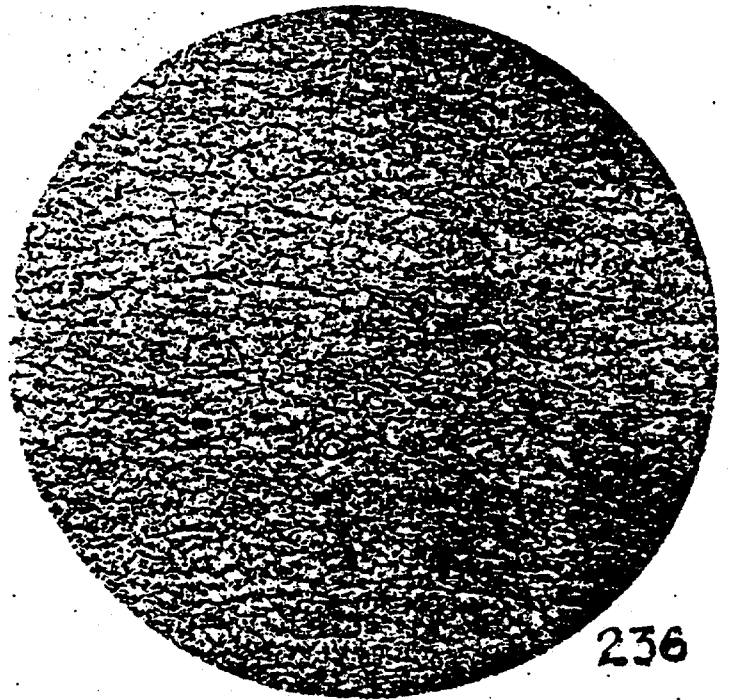
Liquid 30

Pigment: 93 Titanox
7 Solid Lead Tungate

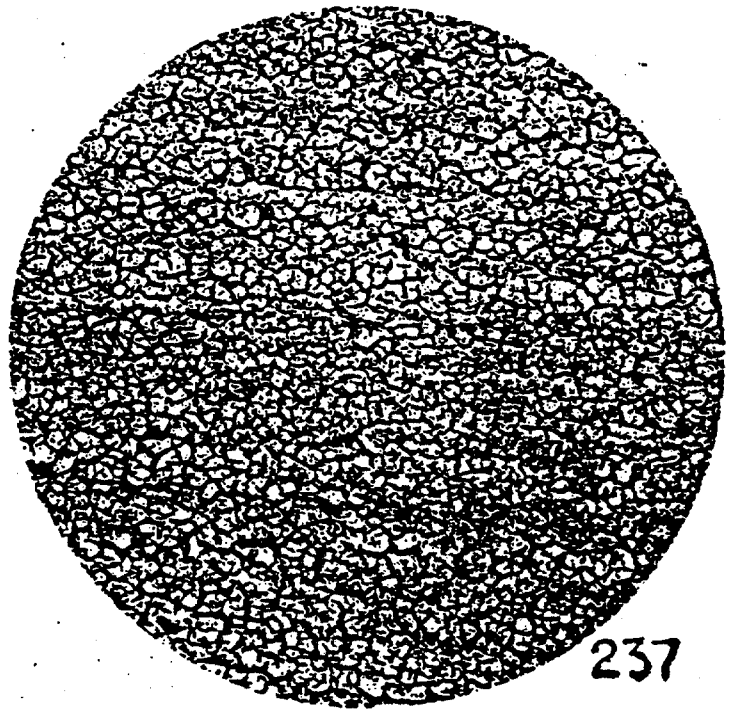
Liquid: 50 Raw Linseed Oil
35 Bodied Tung-Linseed Mixture
19 Turpentine
6 Drier

Spreading Rate. 1st coat, 576 sq. ft. per gal.
2nd coat, 743 " " " "

Inspection September, 1932: Heavy chalking. Slight mildew. Considerable washing, exposing wood in spots. Otherwise superior as compared to other straight Titanox formulas. White.



236



237

340

0007-SWP-000005791

FORMULA 236

Pigment 40
Liquid 60

Pigment: 40 Antimony Oxide
60 Titanium Oxide

Liquid: 100 Four Hour Varnish

Inspection September, 1932: Extremely heavy chalking almost to aluminum primer. Otherwise smooth and sound.

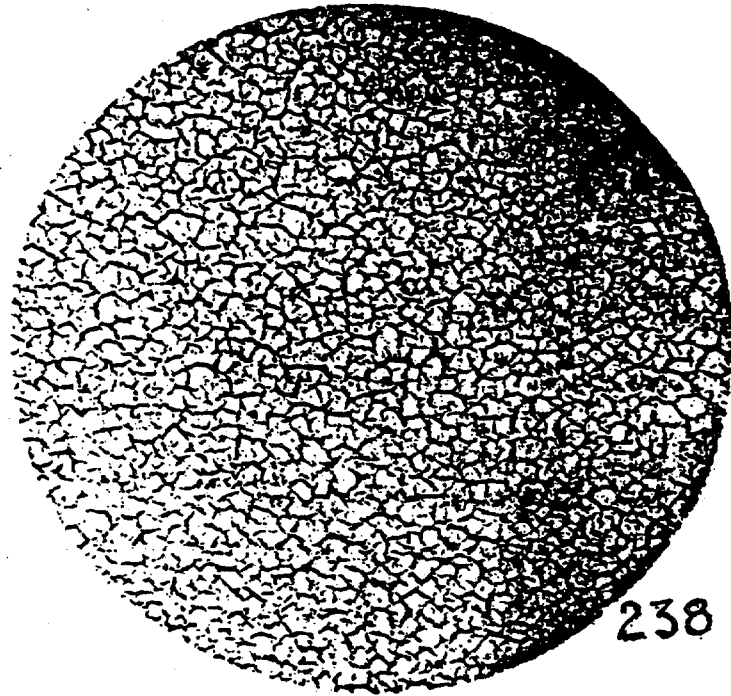
FORMULA 237

Pigment 40
Liquid 60

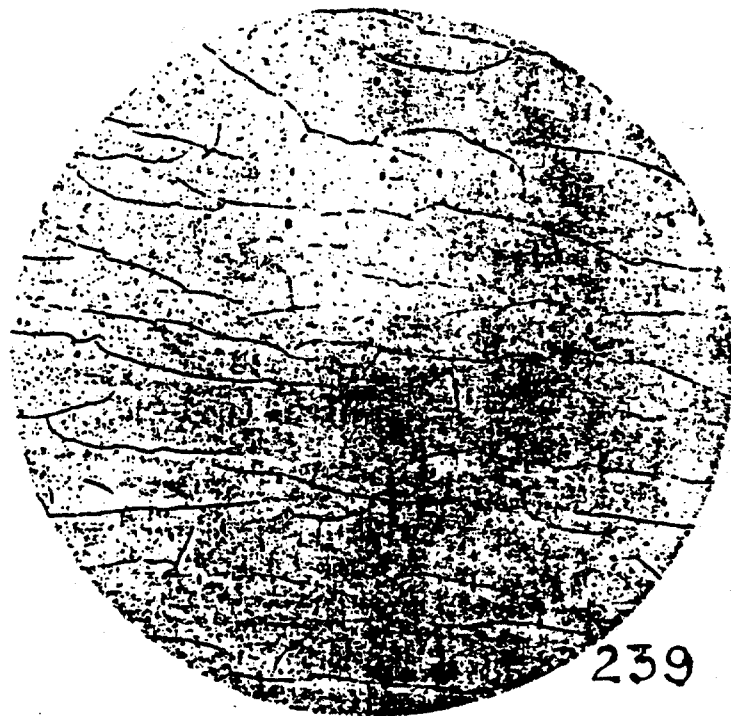
Pigment: 40 Antimony Oxide
60 High Strength Lithopone

Liquid: 100 Four Hour Varnish

Inspection September, 1932: Chalked off largely, disclosing the aluminum primer.



238



239

342

0007-SWP-000005793

FORMULA 238

Pigment 40
Liquid 60

Pigment: 40 Antimony Oxide
30 Titanox
30 High Strength Lithopone

Liquid: 100 Four Hour Varnish

Inspection September, 1932: Chalked off largely, disclosing
aluminum primer.

FORMULA 239

Pigment 40
Liquid 60

Pigment: 40 Zinc Oxide Special #50
60 Titanium Oxide

Liquid: 100 Four Hour Varnish

Inspection September, 1932: Chalked off largely, disclosing
aluminum primer.

THIRD SERIES OF TESTS

White and Very Pale Tints of Quick Drying House Paints

As a result of a study of Circular No. 406, an additional series of tests on quick drying house paints, with a few selected formulas, were exposed at Washington during December, 1931, on a fence 24 feet long constructed of 10 inch Western red cedar siding, 8 inches to the weather. The fence faces south, at an angle of 45° to the vertical. Similar tests were exposed at Miami and at Gainesville, Florida. Two coats of the paints were applied, allowing overnight drying between coats. No reduction was made for first or second coat work, the paints being applied as formulated.

These tests included several of the whites which were originally exposed in Florida and outlined in Circular No. 406, as well as extremely pale tints of gray, green, and cream on the same formulae. The object of these tests was to determine not only the durability of whites but to ascertain whether paints of this character could be tinted to an extremely pale color and still show a fair degree of serviceability and satisfactory tint retention. It is realized, for instance, that linseed oil house paints, when tinted to extremely pale colors, usually show rapid fading. It was our theory that quick drying house paints, because of the more resinous or bodied character of the vehicle employed, might show somewhat greater tint retention than raw linseed oil paints. It is probable that this theory might hold true under certain conditions, but in general it was found difficult in this series to develop bodied oil paints which were satisfactorily resistant to fading under the extremely severe conditions of exposure. For results with resinous liquids which were more favorable, see pages 349-350. Nevertheless, the results of the tests at Washington and in Florida may be of some general interest to paint technologists, and they are presented with the results of an inspection made in September, 1932, after exposure for a period of about ten months.

The best appearance in whites was in the following order: Nos. 2, 316 and 10; in cream, Nos. 2, 1103 and 317; in green, Nos. 10, 100 and 1103; in gray, Nos. 1103 and 100.

In conclusion, it would appear that whenever linseed oil paints or quick drying house paints are applied to dwellings, it is advisable to use strong tints instead of extremely pale tints.



FIGURE 3
View of Washington Q. D. Test

345

0007-SWP-000005796

ACCELERATED EXTERIOR EXPOSURE TESTS

On White and Very Pale Tints of Quick-Drying House Paints

These tests inspected were at Washington, D. C., and at Miami, Fla. A third fence at Gainesville, Fla., gave results quite similar to those at Miami.

PAINT FORMULA		WHITE	CREAM	GREEN	GRAY
No. 352		Chalk: Heavy	Heavy	Heavy	Heavy
Commercial Quick-Drying Product		Check: None	None	None	None
containing:		Fade:	Considerable	Considerable	Considerable
Titanox 60%		Cond.: Good	Good	Good	Good
White Lead 40%		Chalk: Heavy	Heavy	Heavy	Heavy
Bodied Tung Oil Liquid		Check: None	None	None	None
		Fade:	Considerable	Pronounced	Pronounced
		Cond.: Good	Good	Good	Fairly Good
No. 100		Chalk: Heavy	Heavy	Heavy	Heavy
Commercial Quick-Drying Product		Check: None	None	None	None
containing:		Fade:	Slight	Slight	Slight
White Lead		Cond.: Good	Good	Good	Good
Zinc Oxide		Chalk: Medium	Heavy	Heavy	Heavy
Titanox		Check: None	None	None	None
Bodied Tung Oil Liquid		Fade:	Medium	Slight	Considerable
		Cond.: Very Good	Good	Good	Good
No. 2		Chalk: Very Heavy	Very Heavy	Very Heavy	Very Heavy
White Lead 50		Check: None	None	None	None
Titanium Oxide 50		Fade:	Slight	Considerable	Considerable
		Cond.: Good	Good	Good	Good
Raw Linseed Oil 15		Chalk: Heavy	Very Heavy	Very Heavy	Very Heavy
Bodied Tung Oil 43		Check: None	None	None	None
Turpentine 38		Fade:	Slight	Pronounced	Pronounced
Drier 4		Cond.: Very Good	Good	Good	Good
		Dense White			
No. 233		Chalk: Heavy	Heavy	Heavy	Heavy
Zinc Oxide 90		Check: None	None	None	None
Titanium Oxide 10		Fade:	Considerable	Considerable	Considerable
		Cond.: Good	Good	Good	Good
Raw Linseed Oil 50		Chalk: Medium	Heavy	Heavy	Heavy
Bodied Tung Oil 14		Check: None	None	None	None
Turpentine 33		Fade:	Medium	Considerable	Considerable
Drier 3		Cond.: Good	Good	Good	Pronounced

PAINT FORMULA				WHITE	CREAM	GREEN	GRAY
No. 317							
White Lead	90	77%	Washington	Chalk: Heavy	Heavy	Heavy	Heavy
Titanium Oxide	10			Check: None	None	None	None
				Fade:	Medium	Medium	Medium
				Cond.: Good	Good	Good	Good
No. 316							
Raw Linseed Oil	58	23%	Florida	Chalk: Considerable	Heavy	Very Heavy	Heavy
Bodied Tung Oil	17			Check: None	None	None	None
Turpentine	20			Fade:	Medium	Pronounced	Pronounced
Drier	5			Cond.: Good	Good	Good	Good
No. 316							
Titanox B	87	59%	Washington	Chalk: Heavy	Heavy	Heavy	Heavy
Lead White	13			Check: None	None	None	None
				Fade:	Considerable	Considerable	Considerable
				Cond.: Good	Good	Good	Good
No. 10							
Raw Linseed Oil	56	41%	Florida	Chalk: Considerable	Heavy	Heavy	Heavy
Bodied Tung Oil	6			Check: Considerable	Medium	Slight	Medium
Pine Oil	6			Fade:	Medium	Considerable	Slight
Ethyl Abietate	6			Cond.: Fair	Fair	Fair	Fair
Turpentine	11						
Drier	3						
No. 10							
Commercial Quick-Drying Product				Chalk: Medium	Medium	Medium	Medium
containing:				Check: None	None	None	None
				Fade:	Medium	Very Slight	Slight
				Cond.: Good	Good	Good	Good
Titanox and Zinc Oxide				Chalk: Medium	Medium	Medium	Medium
Glycerine Phthalate Liquid				Check: None	None	None	None
				Fade:	Slight	Medium	Slight
				Cond.: Very Good	V. Good	Good	Good
No. 1103*							
Sublimed White Lead	15.0	52%	Washington	Chalk: Medium	Medium	Medium	Medium
Titanox	75.0			Check: None	None	None	None
Asbestine	5.0			Fade:	Medium	None	None
Aluminum Stearate	0.5			Cond.: Good	Good	Slight	Medium
Zinc Oxide	4.5						
No. 1103*							
Glycerol Phthalate	48.0	48%	Washington	Chalk: Medium	Medium	Medium	Medium
Raw Linseed Oil	16.0			Check: None	None	None	None
Water	0.5			Fade:	Medium	Slight	Medium
Pine Oil	2.5			Cond.: Good	Good	Good	Good
Mineral Spirits	28.5						
Drier	4.5						

* Not exposed in Florida.

Very Long Oil Varnish Paints

An interesting series of tung oil varnish type, quick drying house paint tests were exposed in Washington in May, 1932. These paints are referred to as Nos. 1276, 1277 and 1278. They were exposed only in Washington. Aside from chalking, the films are in very good condition after six months' exposure, and the color retention is considered very satisfactory. These paints were all made with a varnish liquid of from 130 to 214 gallons in length. It is probable that paints of this character may be more serviceable and more practical under many conditions than quick drying house paints containing only bodied tung oil as the active quick drying ingredient of the liquid portion. The presence of a small amount of a highly durable resin in conjunction with the tung oil does appear to act in a favorable manner in maintaining light tints.

An examination of the cans after a storage period of five months indicated that there were no skins on cans which previously had not been opened and which were full. Examination of the cans which had been used for the paint tests and which were only partially filled usually showed thin elastic skins on the surface. The paints below showed soft settling but were easily broken up.

An outline of these tests is given in the chart on page 349.

VARNISH TYPE QUICK-DRYING HOUSE PAINTS (COMMERCIAL)

Exposed on Roof of Washington Laboratory, May, 1932

Inspected October, 1932

	WHITE	CREAM	GREEN	GRAY
1276—No. 1				
Titanox B	40			
Basic Carbonate White	20			
Lead	20			
Zinc Oxide	10			
Silica	10			
Barytes	100			
Varnish	38%			
Chalk: Considerable	Considerable	Considerable	Considerable	Considerable
Check: None	None	None	None	None
Fade:	Slight	Medium	Medium	Slight
Cond.: Excellent	Excellent	Excellent	Excellent	Excellent
1277—No. 2				
Basic Carbonate White	60			
Lead	30			
Zinc Oxide	5			
Silica	5			
Barytes	100			
Varnish	36.4%			
Chalk: Medium	Medium	Medium	Medium	Medium
Check: None	None	None	None	None
Fade:	Slight	Slight	Slight	Slight
Cond.: Excellent	Excellent	Excellent	Excellent	Excellent
1278—No. 3				
Basic Carbonate White	60			
Lead	20			
Titanox	30			
Zinc Oxide	10			
Asbestine	100			
Varnish	37.1%			
Chalk: Considerable	Considerable	Considerable	Considerable	Considerable
Check: None	None	None	None	None
Fade:	Slight	Medium	Medium	Slight
Cond.: Excellent	Excellent	Excellent	Excellent	Excellent

Varnish in No. 1276 and 1277 is of 130-gallon length and was made with:

100 lbs. Modified Phenolic Resin
44 gals. Tung Oil
85 gals. Raw Linseed Oil
20 gals. Mineral Spirits

Varnish in No. 1278 is of 214-gallon length and was made with:

100 lbs. Modified Phenolic Resin
44 gals. Tung Oil
170 gals. Varnish Linseed Oil
20 gals. Mineral Spirits