DEVOE & RAYNOLDS CO., INC.

February 20, 1924

WHITE PIGMENTS ETC.

In our previous meetings, we studied the purpose of paint, and emphasized the need of knowing something about the derivation and chemical properties of our materials, and the still greater need of understanding their physical qualities. This is the A.B.C. or the alphabet of paint language, and it is only in this way, that we can reason and understand the construction of the high quality Devoe products, and their proper application.

They teach us the results of intelligently using and of ignorantly abusing good materials.

We have studied the Vehicles, Dryers and Volatile Thinners; heard a few introductory remarks on Pigments, and saw a test made, which showed conclusively the hiding qualities of our Lead & Zinc and Albalith; and the extreme weakness in this respect of Barytes, China Clay, Silica and Whiting. It is our task to-night, to make a brief study of the principal white pigments. Volumes have been written on these, and many conflicting ideas have been spread about. We will endeavor to let you see and reason for yourselves on the properties of these various pigments and extenders and doubt not that you will voluntarily agree with our judgment and conclusions.

However as paint men, in the employ of the Devoe house, and acting as their representatives it is incumbent upon you (though you may at times hold differing personal opinions) to preach the Devoe paint gospel, as the Devoe house believes, and to do this with earnestness and with convincing enthusiasm. It is only with this full measure of conviction and unbounded enthusiasm, that you can get the Devoe paint message across. With a long, strong pull, and all together, the goal must be, and will be won. We shall study first the two pigments, that enter into the composition of Devoe Lead and Zinc Paint. In doing this, we will sketch but briefly the manufacture of the pigments, and pay more attention to their qualities as component parts of our paint.

White Lead - or Basic Carbonate of Lead is regarded as consisting of about 70% of lead carbonate and 30% of lead hydroxide. There are a number of processes of making it, but the one most in use, known as the "Old Dutch Process" is of greatest interest to us. The lead is melted and run into molls, then recast into "buckles" six to eight inches in diameter and about 1/4inch thick as shown in this exhibit.

These buckles are then packed in earthen jars, which vary in size from 4 to 8½ inches in diameter, and 8 to 16 inches high.

In the bottom of the jars is a well, into which is put about a pint of dilute acetic acid. Above the acid, but not in contact with it, are placed the lead buckles, about eleven of the 6 in. buckles to a jar. The filled pots which have been placed side by side in a shack, the floor of which is covered with about 2½ feet of fermenting tan bark, are now covered over with a flooring of rough boards. Upon this is placed another layer of tan bark about one foot thick, followed by another layer of pots.

So the building of the stack continues, alternating between tan bark, pots and boards. A stack is usually eight tiers high, each tier containing 1,800 pots, making a total of 14,600 pots. A stack of this size would contain 1825 gallons of acid, and a little over 80 tons of lead.

The tan bark ferments, producing heat which vaporizes the acetic acid. The tan bark itself generates carbonic acid gas. The acetic acid converts the lead to lead acetate, and the carbonic acid gas converts the lead acetate into basic carbonate of lead, known commercially as white lead. The heat in the stack reaches about 140oF, and the process continues from ninety to 130 days. The stack is then opened and the tan bark and boards removed. The buckles are found in their original forms in the pots, but snow white and swollen and very brittle. The corroded lead is then ground, washed free from acetic acid, passed into settling tanks, and finally pumped into drying pans, when the dry powder is removed, and ground usually in the proportion of 92 lbs. dry lead in 8 lbs. of linseed oil to a paste form, in which shape it is sold as White Lead in Oil, and measures a bulk of about 2.65 gallons of paste lead.

PROPERTIES OF CARBONATE OF LEAD

The Carbonate of Lead produced by the Dutch Process, is composed of both fine and coarse particles, does not absorb very much oil, and is very opaque. Its great virtue is this opacity or excellent hiding quality. Its low oil absorption makes its spreading capacity small. It is not as white as Zinc Oxide, and discolors rapidly under the attacks of sulphur gases which are present in cities, and near manufacturing plants, and railroads. Sulphide of Lead, which is black, is thus formed, and causes the darkening or graying off of white houses. Although a desirable pigment on account of its good hiding qualities, and ease of application, it cannot be used successfully as the sole body pigment in a paint. It sets up a rapid and progressive crumbling or dusting, referred to as "chalking" off, and seldom lasts more than three years.

This necessitates frequent repainting, with the attendant cost of more materials and high priced labor. Let us sum up its merits and its faults. Its merits are,

It hides well
Works easily under the brush

When it perishes, it goes by a chalking off process, which leaves the old surface in good condition for repainting.

Its faults are-

#1 It is poisonous - - - - (Prohibited in France).
2 Darkens by the action of sulphur gases.
3 Does not spread far-which means more gallons on a job.
4 Leaves a soft film, which chalks off too rapidly, which means painting oftener, and a higher cost per year.

In our Lead and Zinc Paint, we retain the virtues of the Lead, and correct its faults by the admixture of Zinc Oxide, which we will now examine.

OXIDE OF ZINC

Oxide of Zinc is a discovery or invention of later date than Carbonate of Lead, as it came into use in France in about 1840. Two pro-

casses are used in its manufacture.

American process) both made in the
French process) U. S. A.

In the American process, the pure zinc ores are pulverized, mixed with powdered coal and charged into closed furnaces with perforated grates. The charge is fired, and a blast of air is forced through the grate. The zinc volatilizes in the heat, and is oxidized by the blast. The resulting fumes are carried through long, cooling chambers, condensed, and solidify and fall like snow.

The French process, is made by heating the metallic zinc or spelter, in a current of air, and collecting the oxide thus formed, as described for the American process. The finest particles are carried farthest before being deposited, and the product is graded accordingly into white seal-green seal, and red seal. The white seal is the finest and whitest, and is used extensively as the sole pigment in high grade enamel paints.

For mixing with white lead in the making of house paints N.J.X.X. American process zinc, will do as well as French Process Zinc, as it has the same physical qualities. When ground in oil, zinc oxides usually contain about 80% oxide and 20% oil, and 100 lbs. bulk about 4.05 gallons.

PROPERTIES OF ZINC OXIDES

Merits
- Non Poisonous
- It is whiter than carbonate of lead
- It is extremely fine in its particles, has strong oil absorption, and its spreading capacity is large.
- It is not darkened by sulphur gases.
- Leaves a smooth hard surface, that does not readily hold dirt.

Faults
- On account of its great oil absorption, it does not hide quite as well as Carbonate of Lead.
- Used as a sole pigment, mixed in linseed oil for outdoor use, it forms too hard a surface, and eventually cracks, and comes off in patches. This necessitates expensive burning off of old coats, to prepare the proper holding surface for the new paint.

BASIC SULPHATE OF LEAD

Also called Sublimed White Lead.

This is another form of White Lead, which has come into use more recently, and concerning its merits and faults, there is considerable controversy. We do not use it in Devoe Lead and Zinc Paint, although many other large makers of paint do so. This pigment is made by heating a mixture of powdered anthracite coal and lead sulphide ore to a high temperature in the presence of air. The lead Sulphide is vaporized into white fumes, which are carried by a current of air through cooling flues, where after condensing it is collected in large bags, the air and gases escaping through the meshes of the fabric.

This pigment varies in composition, but consists usually of 80% Lead Sulphate
15% Lead Oxide
5% Zinc Oxide

PROPERTIES OF BASIC SULPHATE OF LEAD

It is very fine and uniform in its particles. So is Zinc Oxide. It absorbs more oil than carbonate of lead does. Zinc absorbs more. It is not discolored easily by sulphur gases. Does not darken Zinc. It stays in suspension better than carbonate of lead. Zinc does it better. It chalks more freely than carbonate of lead. Zinc corrects chalking.

It has a tendency to liver or stiffen up the paint. Zinc does not do this making it more difficult to spread, it is not as white as carbonate of lead. Zinc Oxide is whiter than either.

NOTE:

Our tests and study of this pigment have proven to us conclusively that carbonate of lead, is a better white lead, as it has better color hides better, and chalks off less freely. We have found also, that Zinc Oxide has all the good qualities of Lead Sulphate, and none of its faults. Furthermore Zinc Oxide corrects the chief fault of carbonate of lead, (its rapid chalking) and has more oil absorbing and spreading qualities than either form of white lead-this means longer wear-fewer gallons. Sulphate of Lead can be bought in dry form only-(not ground in oil) and is not found in paint stores, except as an ingredient of some makers of house paints.

LEADED ZINC

This too is a sublimed pigment, produced from zinc ores containing a proportion of lead sulphide ore. The process is similar to that used in making American Zinc Oxide, and results in a product composed of Zinc oxide and Lead Sulphate, the relative proportions varying according to the composition of the ore often containing about 50% of each.

It is very fine grained, not as white as Zinc Oxide, and lacks the opacity of carbonate of lead ground with Zinc oxide. It is used very largely in cheaper house paints.

LITHOPONE

This whitepigment is also a Zinc pigment containing in intimate chemical union (not mechanical grinding) about 30% Zinc Sulphide and 70% Barium Sulphate.

It is of comparativ modern origin, and has in recent years, been very much improved. It is used chiefly in manufacturing flat Wall Paints and in Enamels. The highest quality of Lithopone so far produced, known as Albalith is the pigment in our beautiful Velour Finish.

Briefly it is made by precipitating together a solution of Barium Sulphide and Zinc Sulphate. These react on each other, and form an intimate chemical union of Zinc Sulphide and Barium Sulphate. After filtering, it is heated to redness, thrown into cold water, which increases its opacity. It is then ground, washed, settled, filtered, dried and powdered. It is fine white, amorphous, and proof against the action of sulphur gases. Unlike Carbonate of Lead it is non-poisonous, which is a very great merit in indoor flat paint, as we will see when we study the great superiority of Devoe Velour over painter's flat paints.

Lithopone generally has the great fault of turning gray when exposed to strong light, but our tests of the albalith brand, prove this one to be light proof. It is not a good pigment for outdoor exposure, as it would chalk too rapidly.

NATURAL OR INERT WHITE PIGMENTS

DEVOE & RAYNOLDS CO., INC.

ALSO CALLED EXTENDERS

These are natural earth products, used quite largely by most of the makers of prepared paints, ostensibly to improve their product. These paint makers all advance ingenious arguments for their individual preferences in the selection of the particular extenders found in their formulas. The facts are however, that these extenders are so much cheaper in cost, than Carbonate of Lead and Oxide of Zinc, that the use of even a small percentage relative to the entire content of pigment in a gallon of paint, will double and even treble their profits on each gallon. You see the temptation to avail ourselves too, of this opportunity for increased profits, is very great indeed, when we see so many large concerns indulging in this practice. But-remember that strong and final sentence of the Devoe formula- And nothing else. It gives us an absolutely unassailable position.

Let us study these inert pigments for a few minutes, at our last meeting, we rubbed up, (in Oil) the Carbonate of Lead and Oxide of Zinc, and compared their excellent hiding quality and whiteness, with the total lack of these important paint qualifications, in Barytes, China Clay, Silica and Whiting. Let us see now what these extenders are.

BARYTES OR BARIUM SULPHATE

Barytes is made from heavy spar, an ore found largely in Missouri, Virginia and North Carolina. The pigment is prepared by grinding and washing. It does not act chemically on other pigments or on the vehicles, and is not affected by sulphur gases. It absorbs about the same amount of oil, as does Carbonate of Lead, and weighs about the same. Its hiding quality however is so poor, that it detracts too much from the opacity of Lead and Zinc and so often necessitates the putting on of an extra coat of paint, or the application of heavier coatings. This means more gallons and more labor on the job, and heavy coatings cause blistering, peeling and alligatoring of the paint coating. There is manufactured also an artificial barytes, known as Blanc Fixe, which we will mention later, in connection with the making of some color pigments.

CHINA CLAY OR KAOLIN OR HYDRATED ALUMINUM SILICATE

Found in this country, chiefly in Alabama and South Carolina. The finer quality is found in Cornwall, England. The pigment is soft and works "greasy" under the brush. It remains well in suspension, and is of value in the manufacture of dipping paints, and some special colors.

It has no whiteness or hiding quality, and like Barytes it reduces the value of Lead and Zinc.

SILICA OR SILEX

Is an oxide of the metal silicon, and occurs in its natural form, as quartz, rock crystal, and sand. It is hard, inert, absorbs considerable linseed oil, but like Barytes and China Clay it has no hiding power.

WHITING OR CALCIUM CARBONATE

This pigment occurs naturally, and is known to us as chalk. These deposits of chalk, are the shell remains of minute marine life which inhabited prehistoric seas. The best chalk is that which comes from the chalk cliffs of the English Channel. To make whiting, the chalk is ground under water, and floated through a series of tanks, which grade the material. That which floats, the farthest, is lightest and purest, and is sold as Paris White. The better qualities, make a pure

You may ask, and the question is justified, what right hasthe Devoe house to set itself up as an arbitrary judge of what constitutes the best house paint, announce as their decision, their formula of 50% Basic Carbonate of Lead 50% Oxide of Zinc
Pure Linseed Oil
Pure Tinting Colors
Turpenting Japan Dryer
and that strong declaration, and nothing else.

How can Devoe offer the most liberal and binding guarantee of quality, and results, if properly applied, and openly assert that any formula, containing material other than those in our own formula, can mean only one of two things, that the manufacturer lakks the knowledge we possess of good paint making, or he has deliberately added these various substitutes, to make a greater profit, at the expense of the unknowing consumer. Our position as judge is justified by our reputation as makers of high grade paints and fine artist's colors. Established in 1754, with a succession to date of many of the ablest and most progressive paint makers in the country, who while they have passed away, have left us the wealth of their experience, which their successors of the present administration use with a spirit that is safely conservative, yet daringly progressive, gives us the highest authority to judge of paint values. The unbroken continuation in business, from a time before the establishment of our republic, dating from the days when we were still a British colony down to the present hyear of 1922, finds us 168 years old in accumulated paint knowledge, and 168 years young in initiative and acceptance of what is best in modern invention, progress, and merchandizing.

We have tried to show you, and impress upon you the properties of the various white pigments and extenders. We have detailed their merits and their faults, in an absolutely impartial manner, so that you can be self-convinced, that our position is impregnable. We have shown you, that we could add considerably to the profits of our immediate sales, by the adoption of some of the practices of our esteemed competitors.

But DEVOE is not in business for this day only. Devoe is not making new agencies, for the purpose of replacing dissatisfied former agents who have left us. Our predecessors, of the earlier days, and their line of able successors, down to the present time, have with honesty laid an enduring foundation, upon which we must in decency, loyalty, and respect for their high ideals and purpose, erect a business structure that must endure. Then when our work is done, into the hands of you younger men, who are now preparing, will be entrusted the good name of Devoe to still further advance the high commercial ideals, and to preserve the solid reputation of our house.

DEVOE & RAYNOLDS CO., INC.

Mar 3, 1924

GB Lansing.
Course 184 St.
9 P.C.

COLOR PIGMENTS

At our last meeting, we devoted our entire time to a brief study of the white pigments, and the so-called extenders. We also touched upon the conflicting opinions among pigment producers and makers of prepared paints, as to the relative merit of their respective products. We were convinced by our study of paint ingredients that the Devoe formula represents as high a quality of prepared house paint as present scientific knowledge of pigments; the most modern and powerful machinery that can be installed, and honest intent and honest performance can produce.

We will go on now with the study of the color pigments; but remember that the bulk of house painting is either pure white, or in those light tints which are composed almost entirely of pure white, with a relatively small percentage of color. I urge you not to neglect the thorough study of the physical properties of the white pigments, namely the hiding quality, the oil absorption, and the wearing quality. Study especially the Devoe position, so clearly and decidedly set forth in our formula and guarantee. Make yourselves proficient in arguing the ideal combination of Carbonate of lead and oxide of Zinc as the two pigments which contain in themselves, the best that has as yet been attained in the making of white pigments, and show that the proper balancing of these two gives us the hiding capacity of lead carbonate.
the spreading capacity of zinc oxide,
and the lengthened wearing quality of their intimate combination. As we proceed in our development of these paint lessons, we shall have occasion to speak again and again, of these white pigments and extenders, in their relation to practical paint application.

COLORS

For most of us it is some time since we left our old school benches, and we retain at best perhaps, only a slight recollection of our study of color. A few minutes devoted to freshening up our memory, will aid us in understanding the physical properties of color pigments. Color is a term which needs to be defined, When a beam of white light is passed through an angle of a triangular prism in a certain manner, the direction of its course is altered, that is it becomes refracted, and the beam of light is separated into a divergent band of several differently colored light rays.

COLORS - Cont'd.

When these are received upon a screen, we have a band of many colors, of which seven can be easily distinguished - viz., red, orange, yellow, green, blue ~~indigo~~, and violet. The rainbow is a spectrum of this kind formed by the refraction of the sun's light during its passage through the drops of water in a shower of rain. In this case, however, the spectrum is seen in front of the drops, not behind them, as it is formed by the rays, which, falling on the drops, pass to the back, and are then reflected so as to emerge again on the side nearest the sun. We see these colors by the effect or sensation of the retina of the eye. We cannot handle them, and, therefore, these colors have an abstract existance only.

On the other hand, we often speak of colored bodies, (that is such as give the sensation of being colored when we look at them), as being "colors", especially when we refer to the materials which we call pigments, which have the power of importing color to other bodies. In this way color is used in a concrete sense.

When light falls upon a substance, the light may be affected in one or two ways, it may be reflected, that is it may be thrown back from the body; or it may be transmitted, that is it may pass through, or in some cases, be absorbed by the body on which it has fallen.

Bodies never reflect or absorb the whole of the light which falls upon them, some of it is absorbed, the most perfectly polished plate of silver does not reflect the whole of the light which falls upon it, while a piece of black cloth absorbs almost all the light, reflecting but little.

It is assumed that colored bodies, have a selective action on the light, which falls upon them, reflecting or transmitting as the case may be, those colored rays to which they owe their color, while they absorb the other rays. This is probably due to the molecular construction of the pigments. If all the rays of light are reflected, the body appears white, if all the rays are absorbed the body appears black. If some of the rays are absorbed, and the rest reflected, then the body appears to be colored, the color as called by us, depending upon the composition of the rays reflected or thrown back to the eye.

Color pigments, are produced as white pigments are, in a dry form, and then ground in various vehicles according to the purposes for which they are intended. For the use of the house painter, they are ground to a paste form, in pure raw linseed oil. For the coach painter in coach painter's japan, as a vehicle; for the fresco painter in water, and for the consumer

COLORS - Cont'd

of prepared paints, enamels, motor car finishes etc., in the oils or varnishes that each purpose calls for.

Yellow, Red and Blue are the primary colors,

In combination with white they will theoretically make every shade. It is necessary, however, to use black and white frequently. As with the white pigments, many are of artificial derivation, while others come to us from nature's laboratory. These natural earth pigments are of great value not only in producing tints with white, but as with umbers and siennas in the production of transparent wood stains. The test of good colors is not wholly in their strength, but also in the values of clear characteristic color, which will retain the same tone from the deepest to the lightest tint. The richness of the color is important. Some colors should excell in their hiding quality, as they are sometimes used as sole pigments without a white base, while others must be tested for transparency, for the use of the stainer and grainer, Let us now take up one by one, the most important of the color pigments, and learn something of their derivation, their characteristics and uses.

LAMP BLACK

Lamp Black is one of the oldest pigments, and owes its name to the fact, that it is a soot such as will be produced by the imperfect combustion of oils in a lamp. Commercially it is now made, by burning petroleum and coal tar oils, fats or greases,under such conditions that they will produce a large volume of smoke.

There are a number of methods of manufacture. It is sufficient for us to know, that this large volume of smoke, produced by burning the before mentioned materials in specially constructed furnaces, then is forced to take a circuitous route through chambers before it passes out, through the chimney. On its way through these chambers, the soot is deposited, the coarser particles in the first chambers, and on the floor of the others, while the finer particles collect on the ceiling of the middle compartments, and all over the end chambers. The portion collected in the first compartment may contain unburnt oil volatilised by the bottom of the furnace, but condensed again. This oil is liable to cause spontaneous combustion in the lamp black, and this oily black must be calcined in a closed furnace, to destroy the oil.

PROPERTIES OF LAMP BLACK.

Chemically, it must be considered as nearly pure carbon in a very fine state of division, insoluble and indestructible as far as light and weather go, and not affected by acids or alkalis.

PROPERTIES OF LAMP BLACK - Cont'd

The pigment is very light in gravity, and does not mix very easily with the vehicles of other pigments. Its oil absorption is very large, a 100 lbs. paste mixture requiring about 72 lbs. linseed oil to 28 lb. dry pigment, and, bulking about 11 gallons. It is a slow dryer, especially so if it contains any unburnt oil. For straight black painting it looks grayish black; not nearly so intensive a black as the high grade Ivory Blacks; for mixing with white to produce tints however, it has far greater coloring strength, and gives us grays of a clear bluish or lead color hue. Refined calcined lamp black, is the sole pigment in our Atrament Rust Preventing paint.

IVORY OR DROP BLACK

This pigment called also Coach Black owes its coloring matter to carbon produced by charring bones in a retort from which the air is excluded. The bone charcoal, which is then ground fine contains 10 to 20% of carbon to which owes its fine black color. The rest is largely calcium phosphate. Because of this its color strength may not be more than one-eighth as great as that of lamp black. The name Ivory Black is derived from the fact, that it was originally made by clacining ivory chips; and Coach Black, because the coach painter finds it a denser and blacker black for painting black carriages, etc. In former years, high grade dry colors for artists' use, were frequently mixed with a gum water, formed into drops and sold in that form. Hence the name Drop Black, as applied in this case.

PROPERTIES OF IVORY OR DROP BLACK

The tints with white are fast to light, and instead of producing the blussh grays of lamp black, it gives us brownish grays. It is desirable in producing pearl grays, and for the darker shades of olive and bronze greens. Its oil absorption is large, yet smaller than that of lamp black. 100 lbs. in paste form, consists usually of about 50% pigment and 50% linseed oil, making a bulk of about 8.7 gallons.

It seems unbelievable but I have found in my selling experience, that many painters, who have been years at their business do not know the difference in the tinting strength and the grays produced by Lamp Black and Ivory Black.

BLUES

Prussian Blue or Iron Blue since the war, called also American Blue, is known chemically as Ferric Ferrocyanide, as the name frequently appears in the formula labels on cans.

It is an intensely strong, precipitated blue. A specified amount of prussiate of potash or soda is dissolved in water in a wooden tank, and the requisite amount of sulphate of iron or copper is dissolved in another tank. These two solutions are brought together in a third tank, where they form a pale bluish precipitate, which is oxidized to a dark shade of blue. The blue is then washed in the tank repeatedly with fresh water and by frequent decantation until free from acids and soluble salts.

It is then filtered, dried and powdered,

There are many closely related varities, such as Water Soluble Blue, Milori, Chinese, Antwerp Blues and others, depending upon details of treatment in their production.

PROPERTIES OF PRUSSIAN BLUE

Prussian Blue is a transparent pigment of great strength, 1 lb. of color giving to a ton or 2000 lbs. of white lead a decided sky - blue tint. With white pigments it should give clear greenish blue tints. It is fairly permanent, but will decolorize rapidly in contact with acid or alkalies. It is very fine in texture, does not settle in the vehicle, and is used by implement manufacturers as a dipping paint for polished steel parts.

Its oil absorption is large as 100 lbs. paste form, contains about 43% pigment and 57% oil, making a bulk in paste form, of over 10 gallons.

ULTRAMARINE BLUE

The original ultramarine blue, was obtained from the mineral lapis lazuli, a semi-precious stone. It is now made artificially in large quantities and at a low cost by heating together clay, silica, sodium, carbonate, sodium sulphate, charcoal, rosin and sulphur and treating the product by rather intricate processes of grinding, roasting and washing. It is not advisable at this short talk to go into the details of manufacture.

PROPERTIES OF ULTRAMARINE BLUE

It is bright, but of low color strength as compared with Prussian Blue. Itstints when mixed with white are of a violet or reddish blue hue. It is quite fast to light and weather, and proof against attacks from alkali or lime, but is affected by even

PROPERTIES OF ULTRAMARINE BLUE - Cont'd.

weak acids. It cannot be used in making bright greens, but makes very fine dark olive greens. It should not be used in connection with white lead or chrome yellows (which are chromate of lead) as the sulphur in this blue forms the black sulphide of lead, when used in such mixture. Its oil absorption is fairly large, 100 lbs., in paste form, requiring about 65% pigment and 35% oil, making a bulk in paste form of about 7-4/5 gallons.

COBALT BLUE

Genuine Cobalt Blue, is a compound consisting of oxides of aluminum and cobalt. This blue can be had for Artists use, put up in collapsible tubes. However, the Cobalt Blue, ground by paint manufacturers for house painters' use, is similar in composition and manufacture to Ultramarine Blue. Cobalt is the lightest and clearest blue which it is possible to attain in this pigment.

PROPERTIES OF COBALT BLUE

It is very fast to light and weather, and proof against alkali and lime. With white it produces pure blue tints, and mixed with yellow gives us clearer greens, than Ultramarine does. Cobalt Blue, has not had the painters' consideration as it deserves, and he should be urged to use it.

Tints made with Cobalt or Ultramarine Blue are perfectly safe to use, on white washed walls.

CHROME YELLOWS

The Chrome Yellows in house painters use, are known chemically as chromate of lead. They are sold as chemically pure, and commercial chrome yellows. Chrome Yellow Medium is generally made by dissolving nitrate or acetate of lead in one tank, and a specified amount of bichromate of potash or soda in another tank. These solutions are made in water, and then run together in a third tank known as the striking tank, which is set lower than the first two tanks. When the solutions come together a reaction sets in, and the lead and bichromate unite as bichromate of lead, which gradually settles to the bottom of the striking tank. It is then washed until free from acid or soluble salts, filtered, dried and powdered. The light shades are made so as to contain more or less lead sulphate or other insoluble lead salt, intimately mixed with the lead chromate.

CHROME YELLOWS - Cont'd.

The deep or orange shades which are basic chromates, are precipitated from alkaline solutions. Commercial chrome yellows are not as strong in tinting power as the chemically pure, but have greater hiding power.

The commercial chrome yellows, such as Devoe Best Chrome Yellows, answer best, as all purpose color for house painters use. They have considerable brilliance, good coloring, strength and opacity, and are fairly durable. Sulphides turn them black, and Ultramarine or Cobalt Blue, should not be mixed with them. They should not be mixed with silicate of soda, lime or other alkaline substances, for these will turn the yellows to orange or red.

YELLOW OCHRE

Yellow Ochre, is an earth pigment which owes its coloring to oxide of iron. They are found in all parts of the world. Ochres contain from 10 to 60% of hydrated oxide, the remainder being either silica or clay. The finest grades of ochre, are obtained from France and are clear and bright in color. The American ochres range from those that are fairly good, though lacking in opacity, brightness, tinting power, and freedom from grit, to those that are simply yellow mud. As a pigment it is inert and very durable. It is prepared for use by grinding, washing and floating.

PROPERTIES OF OCHRE

Good ochre, produced when mixed with white, beautifully clear cream tints, that do not fade out. As a sole pigment, (without lead or zinc), it makes a durable protective coating for barns, freight cars, etc. It should be used wherever possible by the painter, for making yellow, buff or olive greens.

It is proof against alkali or lime.

Ochre was formerly used very largely for priming or first coat on new buildings. This practice has been practically abandoned, because subsequent coats of paint did not adhere well.

We will speak of this use of ochre again, when we study the proper application of Devoe Lead and Zinc Paint.

GOLDEN OCHRE

Golden ochres, are ochres which have been brightened or enriched by the addition of Chrome Yellow. They do not, however, hold this rich tint very well.

CHROME GREENS

The genuine chrome green, known as Oxide of Chromium is an expensive color. It is fast to light, and is not affected by lime. The painters chrome greens, as ground in oil, by manufacturers are practically a combination of the several ingredients used in the making of Chrome Yellow and Prussian Blue.

Chrome greens can be made by grinding these two pigments together by machinery, but in color works the necessary solution to produce Prussian Blue and Chrome Yellow are made up and then mixed together resulting in a far more intimate mixture. Chemically pure Chrome greens, are too intense for use as colors in oil, and the price is too high. The usual method for making commercial chrome greens as well as yellows is to precipitate them on a colorless base, such as barytes, whiting or china clay.

These bases do not impair the color, nor take from the hiding quality, but give them more body and better working qualities. Commercial chrome greens generally contain about 25% of actual coloring matter, and for this reason are safer in the hands of the house painter, than would be the full intense strength of chemically pure color. As solid body colors, they wear far better than chemically pure color, providing they are properly made, on a good inert base, and well ground in pure linseed oil. Chrome Greens are generally sold in three shades, Light, Medium, and Deep, and the tints produced run from the yellowish tones of the light shade, to the blue tones of the darker shades. If well made, the greens are fairly permanent, but should be used on new wood, or old porcus coats of paints, before giving these surfaces a priming or filling coat of a lead color or olive green, made on a lead and zinc base. Greens lose their oil too easily, on absorbent surfaces, and appear faded out, when it is really the loss of oil, that is at fault.

Commercial chrome greens absorb about 12% oil to make a paste, and the 100 lbs. bulks about 4 gallons.

VENETIAN RED.

Venetian Reds formerly consisted of natural earths which possessed a reddish color, due to oxide of iron, but they are now produced almost exclusively by artificial means.

The better grades are made by heating ferrous sulphate (green vitriol). This calcined product is mixed with calcium sulphate or gypsum which has been found most suitable or in inferior grades with barytes or whiting, Venetian reds vary in their oxide of iron content from 20 to 40%.

PROPERTIES OF VENETIAN RED

Its color is the characteristic brick color, and it is used very largely as the sole pigment, where an inexpensive and durable paint is wanted, for brick buildings, barns, fences, freight cars, bridges, etc. High grade Venetian red, when used for tinting purposes with a lead or zinc base, must produce clear reddish tones, even when reduced to a delicate pink. A good venetian red, of about 40% oxide of iron, takes about 22% of oil to grind in a paste form, and bulks about 6 gallons.

INDIAN RED

Indian Red was formerly obtained as a natural iron ore, but like the Venetian Reds, is now made artificially. It is produced by roasting ferrous sulphate, which yields colcothor or rouge of colors from bright scarlet to a purplish red, depending on the heat treatment. Strictly pure Indian Red is of a dark purplish color and should contain at least 95% of ferric oxide.

PROPERTIES OF INDIAN RED

It is not affected by light or other pigments. It is very opaque, and even when extended by the addition of inert pigments, it covers well. When mixed with White, it affords clear red tints of a bluish or plum color tone.

Indian Red in paste requires about 22% of oil, as Venetian red does, but bulks about 4-4/5 gallons.

Tuscan Red, generally used as solid trim color, is practically Indian Red, enriched by the addition of an artificial lake. Permanency of color, depends upon this lake.

SIENNAS

Raw Sienna, resemble ochre in their general composition. They are earth colors, that owe their coloring to hydrated oxide of iron. The best siennas were originally obtained from Sienna, a town in Italy, and these best grades are known as Italian Siennas. Sienna pockets or deposits were formed by the draining of water through beds of iron or manganese ores, and precipitation in beds of clay. It is brought to use, by excavating, washing, floating, drying, and grinding through granite mills. In color, it is a transparent yellowish-brown.

Burnt Sienna is produced by calcining raw sienna. This drives off the combined water, and changes its color to a subdued red-brown. Poor grades of burnt sienna are often "faked up" by the addition of coal tar colors, but this rich tone is fugitive, and as it fades out rapidly when exposed to sun-light, leaves a dingy looking paint on the building.

PROPERTIES OF SIENNAS

High grade siennas must be strong in tinting power, and be as transparent as possible. This latter quality is very important, as both raw and burnt are of the utmost importance to the stainer and grainer, in imitating on cheaper woods, the rich color effects of the more expensive hard woods. Muddy or opaque siennas, would obscure the figure or grain of the wood. Siennas are fairly permanent to light, and not affected by alkali. Raw Sienna in white should produce clear warm cream tints, while Burnt Sienna should produce a range of brownish red tints, down to a delicate peach color. Raw Sienna and Burnt Sienna absorb about the same amount of oil, about 45% oil to 55% pigment and bulk about 7-1/2 gallons in the 100 lb. paste color.

UMBERS

Raw Umbers are natural earth colors, belonging to the same class with ochres and siennas, owing their coloring matter to oxide of iron. Umber takes its name from Umbria a city in Italy. The principal source, however, is Cypruss and it is commonly called Turkey Umber. Domestic Umber is not as good as the Turkey grade. Umber is an oxides of iron in combination with silica, and contains a considerable percentage of manganese dioxide, which gives it good drying quality. It is prepared for use, by washing, floating, and drying at low temperature.

In color, it is a transparent, greenish brown. Burnt Umber is produced by calcining raw umber.

This drives off the combined water, and changes its color to a warm red-brown.

PROPERTIES OF UMBERS

As noted in our remarks on Siennas, the good umbers too, must be strong in tinting power, and be as transparent as possible. Umbers are used considerably by painters and grainers to produce with siennas, vandyke brown, rose pink, and other transparent colors, the oil stains, which are used to stain cheaper woods, and bring out whatever beauty is inherent in the wood.

Umbers are quite permanent to light, and proof against alkali. Raw Umber in white should produce clear, cold, drab-tints, while Burnt Umber should produce rich warm drabs and browns. Umbers absorb oil freely, taking about 46% of oil, to 54% pigment, and making a bulk of about 8 gallons in a 100 lbs. of paste color.

VANDYKE BROWN

Vandyke Brown, is also an earth color, containing oxide of iron and manganese, with other ingredients of an organic nature. Should be transparent to make good walnut stains. As a

VANDYKE BROWN Cont'd

pigment mixed with white, it is very weak, and fugitive. It should not be used outdoors for tinting house paints, or staining.

REDS

American Vermilion or Chrome Red is a basic chromate of lead. It is a scarlet, coarsely crystalline powder. Grinding it fine destroys the color, by breaking the crystals, and turning it to a dull yellow. It is fairly permanent to light, but is blackened by sulphides.

As a protective coating for iron or steel it is said to excel red lead. It is still sometimes used as a color pigment, but is being displaced by coal tar reds.

English Vermilion is a sulphide of mercury. It is very opaque of a beautiful scarlet color, and made in a number of shades. As a color pigment, it is being rapidly crowded out by the organic lakecolors.

LAKES

Lakes are formed by combining the coloring matter of certain dyes, with metallic bases. The organic coloring matter may be obtained from natural coloring matters, such as lac cochineal, quer-citron bark, etc. or from coal-tar colors, which are now generally used. We cannot in this brief study delve deeply into the manufacture of lakes, and will have to content ourselves with saying that they add to color makers line some of the most beautiful, richest, transparent colors for decorative purposes.

Carmine made from cochineal insects with alumina and tin, is an interesting story in itself. Many lakes formerly made from madder-root, are now produced from coal tar. Rose Pink, Rose Lake, Dutch Pink or Yellow Lakes are the more common lakes in use by the house decorator.

Rosin Vermilion also called artificial vermilion, are made from coal tar on a red lead or orange mineral base.

Lithol Red is a coal tar color and quite permanent,

Paranitraniline Reds are really aniline lakes.

The coloring quality of these dyes are so strong that often only 5 to 10% is required to dye a transparent base, like bayrtes or china clay, to make a beautiful rich color.

CONCLUSION ON COLOR PIGMENTS

The paper for this evening although sketching each pigment but briefly has grown to quite a length. I have omitted the minor pigments entirely, and the following, which are of importance but not spoken of in this paper, will be taken up in the future, when we study especially the protection of metal surfaces - viz. -

CONCLUSION ON COLOR PIGMENTS Cont'd.

Graphite, Metallic Red Oxides, Red Lead, Orange Mineral and Litharge.

Remember, the color pigments, we have studied tonight are most times only a small percentage of the paint coating on a house, and are used in this case only as a decorative aid. But if the color is poor, the result is a faded dingy look, that discredits the job, and compels an earlier repainting than the physical condition of the coating would otherwise demand. The colors we have studied are most of them of our own direct importation, or manufactured in our own dry color works. They are used in the unexcelled Devoe Best Colors in oil, in our fine lines of Japan Colors, and Distemper water colors, and for the coloring of Lead and Zinc Paints, Velour Finish and our extensive variety of specialties and special purpose paints.

The details of color manufacture with its many manipulations and complex processes, which must be thoroughly understood and carried out by the dry color chemist not only in his laboratory, but by his factory assistants at the vats, at the filtering presses, the drying rooms, and the powdering machines, would make an interesting story. I hope all of you will eventually (as some of us already have) go through our well equipped Brooklyn Color Works, and come back from your visit, feeling that the Color and Paint business of Devoe is built not alone on Capital, but on Scientific knowledge, industrial art, and thorough factory organization and management.

March 1st, No 2 4

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[redacted]

PAINTING THE EXTERIOR OF A NEW WOODEN BUILDING

WITH 3 COATS OF PAINT.

We will begin today the practical application of painting materials, to the exterior of a new wooden building. I quote from a talk given by one of the most practical and progressive master painters of Pennsylvania: " In regard to the proper application of paint on new wood, I want to dwell particularly on the first or priming coat, which is of such vast importance to the success of subsequent coatings. Unless the master painter is a careful diagnosist, with ability to read and understand structural conditions of the different woods, he cannot prescribe intelligently to meet and overcome the different dispositions. The priming coat, must be modified by the vehicle and thinner, so that it may meet and master the varying conditions in the different woods."

This was 3rd pg. 4 out of order. Coded document according to actual 1st pg.

Years ere practically the only lu ouse painting was an easy mat g lumbers have become exha (as the Southeast has done fo and Cypress. The white pine ile resinous pine and cypress n our turpentine and rosin f e lumber used in the South i sin in the pine which cause c oil "fingers" of the prim pores. The worst spots s streaks. Shellac wil t be sure to thin the shellac t will strike in, and not lea

A heav s will not hold the priming does not strike in, but remains integrate rapidly, because it dries very hard and fixed, without the ability to expand and contract. Charring the resinous spots with a paint burner is oft times done. But rosin often permeates the entire wood, and turpentine dissolves rosin. It follows then, that on this lumber especially, we must use turpentine liberally in our first coat and many Southern painters resort to the use of a small quantity of benzole (a coal tar benzine) on account of its strong solvent qualities. Benzole, however, should never be used in any coat except the priming coat, on unpainted wood only.

Cypress, our next most difficult wood, requires the same treatment as Yellow Pine.

When we studied the action of linseed oil, we learned that it oxidized, and left an elastic film, which would expand and contract in unison with the surface to which it was attached. But how does it attach itself to the wood, and what can we do to secure this safe anchorage on woods of various kinds? If we examine the surface of the wood, we will notice that it is full of little pores, just as is the skin on our bodies. When our first coat of paint, if properly mixed or modified, is thoroughly well brushed in the fluid paint will be driven down into the wood, like millions of little fingers gripping from the under surface of the first coat, into millions of tiny pores, and combined, offer a resistence to removal, equal to many pounds per square foot. When these little fingers let go, the entire paint coat peels or chips off.

The priming coat, is the foundation job, and its proper mix and application cannot be too strongly urged upon the painter. The question of what is the proper mix depends upon the character of the lumber to which it is applied. Determine whether the lumber is hard open or hard close grain; soft open or soft close grain, soft and spongy or compact and solid; very resinous like hard yellow pine with poor absorption, or soft close grain like white pine with good absorbing qualities. To sum up, the nature of the wood, must determine the relation of liquid to pigment, and the relation of oil to valatile thinner. Remember, that turpentine, has a greater thinning power than linseed oil, one gallon of turpentine, being approximately equal to two gallons of oil in this respect. Turpentine helps to open the pores of the wood, and thins the paint, and so gives better penetration for the oil pigments.

A new building cannot be properly painted with less than three coats; each of these coats being tempered for its particular purpose. What are these particular purposes, and how are the several coats designated? The first, called the primer is really the suction coat-the second, called the body coat, is the real hiding coat-third, called the finishing coat, is the real weathering coat. Let us be sure, to memorize these descriptive names, and the purposes of the three consecutive coats, as each plays its part in the permanency of a job. The suction coat, must penetrate and secure anchorage, and largely stop the suction of the wood, so that the oil from succeeding coats, will not be drawn away. The body coat, is so mixed that relation of pigment to liquid is relatively large, and mustdo most of the hiding, and dry with but little gloss, so as to afford proper holding surface for the third coat. The weathering coat, must be rich in oil, as it is the coat which must resist the brunt of exposure.

If left poor in oil, it will loose its binding quality, have largely impaired resistance to weather; and losing its gloss will cause the colors or tints to have a dingy, faded appearance. Of these three applications, the one of most importance, (yet the one most often abused) is the priming or suction coat. It is the foundation of our painting, and unless it is correctly mixed and properly applied over a surface in condition to receive it, the whole job must fail.

Bearing in mind the purpose of each of these coats, we will readily understand the necessity for mixing each of them differently. Let us examine first specifications of the National Lead Co., and compare the several mixings. To the 100 pound keg of white lead in oil, paste form, which bulks about 2-3/4 gallons-they add as follows:-

Priming Coat	Body Coat	Finishing Coat
4 Gal. raw oil	1½ Gal. raw oil	4 gal. raw Oil
2 " turpentine	1½ " turpentine	1 pt. Turpentine
1 Pt. Drier	1 pt. Drier	1 Pt. drier
Yielding about 9 gal. Paint.	Yielding 6 gallons	Yielding 7 gallons

and they say further in mixing the priming coat, the painter may exercise his own descretion in using a larger or smaller quantity of oil, according to whether the wood is oil absorbent as white pine, poplar and basswood, or less permeable, as yellow pine, cypress, spruce, and hemlock.

Note that in priming, the 100 lbs. of lead, are reduced with 6 gallons of liquid, of which 2 gallons are turpentine, to assist in penetration, by thinning the oil and pigment. Note also that in the body coat, we have only three gallons of added liquid, half of which is turpentine. This means a heavier paint with more hiding quality, as the 100 pound lead is distributed through 6 gallons of paint, instead of 9 gallons, as in the primer. The relatively large quantity of turpentine, prevents this coat drying with a high gloss. A finishing coat, applied over a glossy middle coat, will crawl or run, as if you were painting over a greasy surface. The finishing or weathering coat, is reduced liberally with oil containing the same quantity as the primer, (4 gallons) but the two gallons of penetrating turpentine in this primer is reduced to one pint turpentine in the finishing coat. As we stated before this last coat bucks the weather attacks, and must have elasticity, gloss and water repelling qualities of plenty of pure raw linseed oil, but weakened by the cutting or thinning power of turpentine.

But, as we are progressive painters, we are not going to use lead in oil, but the modern scientifically constructed Devoe Lead and Zinc Paint. While lead and zinc paint is a liquid paint, it is not sold as ready for use. It is made in sufficiently thick consistency to permit of reduction according to requirements.

Following the instructions on our sample card for three coat work, we advise as follows: On soft absorbent woods, reduce our paint for priming with one gallon raw oil to the gallon of paint, and on resinous woods with one quart of pure turpentine and half gallon of raw oil. (Personally I would advise the Southern men especially, that on very resinous yellow pine, they would do well to reverse the latter directions and thin with one quart of raw oil and half gallon of turpentine)

The second coat of our paint is to be reduced with one quart of turpentine only, to partially flatten this middle coat and create a holding surface for our last or weathering coat. Our instructions are, to use the paint for last coat as it comes from the can, thinning with raw oil if necessary. My judgment, based on my own use of the paint and the experience of customers, prompts me to say that we are over modest. I believe that we can safely thin our last coat, with one quart of raw oil to the gallon, which means one gallon raw oil to four gallons of paint. This makes five gallons of ready to use paint at a lower cost per gallon, as the extra gallon costs but the price of the raw oil. We hope that we have made clear the importance of reducing properly the several coats of paint, and will give briefly, a few cautious "dont's" which if followed faithfully give added assurance of a good job.

Don't use Yellow Ochre for priming. It is claimed by some painters that Yellow Ochre is a good oil carrier, easily applied, stops absorption and is cheap. Painters frequently buy dry American Ochre, soak it in oil over night and stir it up by hand. When such a mixture is made without grinding under pressure, the outside particles are only coated with oil, and when applied to an absorbent surface, the wood draws the oil away from the pigment. Years ago painters obtained very satisfactory results by using the imported French Ochres, of a silica nature, ground in pure raw linseed oil, and the white pine and poplar then in use held this primer very well. However, these woods have been displaced by the hard yellow pine and cypress, and the French Ochres which were comparatively cheap, have risen in price and the clayey American Ochres have taken their place in painters primers.

We ourselves, some years ago made and sold for use in connection with our Lead and Zinc paint, our #777 Lead and Ochre Primer, which was composed of the highest grade washed French Ochre and pure white lead ground in pure raw linseed oil and the necessary drier. We found however, that many painters prompted by the desire to lessen their cost, frequently purchased from local dealers a cheap ochre ground in adulterated oil, and even petroleum oil, and substituted this for the Devoe Products.

when trouble ensued our lead and zinc got the blame. Cheap American Ochres are not fillers, but as they are clayey, they plaster over the wood, without taking proper anchorage and when the elastic coats placed over them, contract in their continuous drying process, they break loose and peel or chip off in large patches.

Do not forget that confined dampness, fighting for its release, is the chief cause of paint failure. Dampness in the pores of the wood, repels the penetration of the oil and prevents the proper grip of the primer. Nearly all modern lumber is kiln dried, the pores are open and they will soak up moisture from rains or dew like a sponge. This kiln dried lumber contains all the salts and the acids of the wood in concentrated form, and it is advisable to let the building stand a month unpainted to let the rain wash these out. Then too, machine dressed lumber will hold paint better, if the grain of the wood is raised by a few rains. But do not proceed to prime until the wood is thoroughly dry. Look out also, for moisture which may be confined back of the wood. Do not paint while plaster is drying out. Remember a 100 yards of plastering require from 80 to 90 gallons of water, most of which, must free itself in some way. Often this moisture is driven out through the siding causing the paint to blister and peel.

The better the paint, the more certain it is to peal under such conditions. Only good elastic oil paint will offer resistence to the moisture; and as the cohesive coating resists it is pushed outward in a blister. A porous benzine or emulsion paint will allow moisture to pass either way, and consequently has no protective value. Be sure, the cellar of the building is dry, by having a free circulation of air, or the dampness will go up through the house, between the plastered wall and siding and cause the paint to peel.

Look out for leaking house roof, porch roofs and water pipes. They are often the source of trouble. In shellacing knots and resinous places before priming be sure to use pure shellac, well thinned, andbrushed thoroughly into the knots. Use White Shellac, when light tints are used, and Orange Shellac under dark colors. Putting up nail holes, cracks etc. should always be done with absolutely pure linseed oil and whiting putty, after the priming coat is hard, force the putty in well, with a putty knife, and not with the fingers.

DON'T USE BOILED LINSEED OIL.

When we studied vehicles, we were given the reasons for preferring raw oil. We will only reiterate, that Boiled Oil lacks elasticity. It is too heavy and not fluid enough to penetrate the wood well. It drys with a high gloss on which succeeding coats cannot attach themselves; and drying

too quickly on the surface of the paint film, remains soft underneath, resulting in an uneven expansion and contraction, and an early cracking of the coat.

Do not paint during extreme weather.
Extreme cold congeals the oil, and causes the paint to shrivel; extreme heat, makes the oil too limpid and the paint will run in drops or tears.

Do not paint over dirt or over greasy surfaces.
Soft coal soot, is often blown quite some distance from manufacturing plants and railroads, and depositing on buildings, leaves a greasy surface, over which paint cannot adhere, or properly dry.

Use a 3½ or 4 inch wall brush of Congo grade or better, or use a good round or oval brush like our Hindoo Tapered paint brushes. Brush the paint out thoroughly as thick applications will dry on the surface, remain soft underneath and will wrinkle and peel off.

Do not permit the painter to use any thinners, unless purchased from a responsible dealer. Adulterated linseed oil, turpentine substitutes, kerosene, benzine, and cheap rosin driers, may be the ruination of a Devoe Lead and Zinc job.

And remember, that the paint materials, are but part of the finished job. The human factor behind the brush may make or break the job. The painter's knowledge of the directions given and honest application are essential. A good painter with poor paints, will often turn out better work, than an ignorant lazy painter will, with the highest quality of materials.

DEVOE & RAYNOLDS CO., Inc.

March 14, 1925

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~~May 11, 1922.~~

REPAINTING THE EXTERIOR OF A BUILDING TWO COATS OF PAINT.

At our last meeting on May 4th, 1922, we had a concise lesson on the proper mixing and application of 3 coats of Lead and oil, and Lead and Zinc Paint to the exterior of a new wooden building. We urged upon you the importance of studying the characteristics of the lumber, and the necessity of properly mixing and applying the priming coat, in order to get a secure anchorage in the pores of the wood.

To-night, we take up the more difficult task of painting wooden buildings, that have been previously painted. In repainting jobs, we must examine and study carefully, the conditions of the old coatings that are on the building. Our new paint instead of striking into the lumber as on unpainted work, must now attach itself to the old coats. Two coats are generally enough on old work, for the old paint becomes our priming coat.

Remember always in painting, that thorough preparation of the surface to be painted is compulsory if satisfactory work is expected. It is here, that the good mechanic must show his knowledge, judgment, and pride in his skill as an artisan. Unless the house owners are willing to pay the expense of properly preparing the old surface, so that it will furnish a safe foundation for the new coating, the painter in protection of his own reputation and future business, had better have the courage to refuse the job. So far as the sale of Devoe Lead and Zinc is concerned, unless the surface is properly prepared, we do not want our paint to go on. Good paint on a treacherous surface, is a veritable "boomerang" - it comes back at us. Educate your agents, and impress its importance upon painters and house owners, when doing your missionary work.

Remember, that all good linseed oil paint, shrinks considerably in drying, and if old coats are loosely attached, they will pull off the old coats, so causing them to peel. Remember, that all dry porous coatings, absorb considerably, and unless allowance is made for this absorption, the old coats will suck the oil out of your new coatings, and leave them with insufficient binder; little or no gloss, no water shedding qualities, and a faded out, dingy appearance of the colors. This condition is similar to painting new absorbent lumber.

Remember again, that where the old coat is hard and glossy, and there is no absorption to speak of, we have a condition somewhat similar to painting on hard yellow pine or cypress. Our first coat needs thinning with turpentine in order to force penetration and adhesion, and to reduce the gloss. If the final coat is applied over a glossy surface, it will run, or as the painter terms it "crawl" because it cannot get a grip on that kind of surface.

The National Lead Company's specification for first coat on old exterior work, calls for

100 lb. White Lead in oil
2 gal. Raw Oil
2 " Turpentine
1 Pint Dryer

yielding a short 7 gallons of paint.

For second coat, they specify

100 lbs. White Lead in oil
4 gal. Raw Oil
1 Pt. Turpentine
1 Pt. Dryer

yielding a total of 7 gallons of paint.

Compare the differences in the mixing of these two coats. The 2 gallons of oil in the first coat are doubled to 4 gallons in the second coat, and the 2 gallons or 16 pints of turpentine in the first coat is reduced to 1 pint only of turpentine in the second coat. We see in this method of thinning that the object sought in the first coat, is the penetration through the old coats, and creation of a partially dulled surface, to hold the second coat. In this final coat again, the reduction in turpentine and increase in oil, means gloss and water excluding qualities, and the retention of the full color values in the tints.

As you found from the study of our valuable Lead and Zinc booklets, "The House to be proud of", we lay great stress on a thorough examination of the old surface. Repetition of some of the advice given there, will be beneficial. Where the surface is thoroughly dried out and porous, thin Lead and Zinc paint, as follows: First coat, 1 quart of raw oil and 1 pint of turpentine to each gallon. Where the old paint is still glossy and hard, thin first coat, one pint to one quart of turpentine to each gallon. Do not add any oil.

In both of these cases, we direct that for second coat our paint should be used as it comes from the can, thinning slightly with raw linseed oil if necessary. My experience has been that where no radical change of color is being made, our paint will stand for one pint to one quart of raw oil to the gallon, which addition considerably reduces the cost per gallon. Be sure, to impress upon agents and have them instruct their customers, that the addition for instance of one gallon raw oil to 4 gallons of paint, yielding 5 gallons, will somewhat lighten the tints, because the coloring matter used by us, to produce the desired tint in 4 gallons, is thus distributed through 5 gallons of the thin paint.

You see, from the directions we have given for the respective priming coats, we add the oil thinned with turps, to get penetration and stop absorption in the dried out, porous surfaces. On the hard glossy surface we use turpentine only, to get penetration, and to give a dull holding surface for the succeeding coat. As G. B. Heckel, says "No paint is ready for use for all purposes. Conditions of surface vary and each condition requires some variation in the consistency of the paint. Each coat should also vary somewhat in consistency and composition. All manufacturers carefully indicate these differences in their "instructions for use". The intelligent painter understands the requirements and makes additions accordingly. But any paint, whether white lead in oil, prepared paint or enamel, can be and often is absolutely ruined by improper or excessive admixtures. Leaving out out of consideration the damage that a dishonest painter can do, by adding cheapening adulterants, the ignorant painters' bad judgment can cause equal injury"

So let us remember, that if an excess of pure oil, pure turps or best Japan dryer will do harm in a paint, then certainly will the addition of poor turpentine substitutes, adulterated linseed oils, and the cheap benzine dryer, ruin a high quality paint. Bear in mind especially, the action of dryers, which oxidize the oil more rapidly and hasten its ultimate decay. Painters sometimes reason, that the more dryer they add to a paint, the quicker it will dry. This is not true. After a certain limit has been reached, the addition of dryer, will actually retard drying.

As we have said before, paint dries through the oxidation of the oil, and this oxidation is continuous even after hardening, resulting finally in a loss of elasticity and the perishing of the coat. If the old coats have been permitted to go for too long a time, this inelastic coat, goes dead, refuses to expand and becomes alligatored or full of minute cracks. Moisture gets through these cracks and works under the paint, which soon rots out the priming coat, breaking its anchorage in the woods, and causing the paint to let loose. You should examine the peelings of paint, carefully and you will find that they have come off clear to the wood. You will find the impression of the wood on the underside of the peeling and you will also be able to see the color of the old original paint, on the underside of the peeling.

This proves conclusively, that the new paint has been firmly attached to the old paint, but in drying the new paint has pulled off the loosely attached old paint. You will often find that the South and West exposed sides of a building have peeled, while the North and East sides have not. This is because the sun has burned out the life of the oil in the old paint on the South and West sides, and in consequence this old paint was loosely attached to the wood. Then when the new paint was put on and shrunk in drying, the old paint was pulled off. The shade and moisture caused by heavy foliage around a house, rots out the oil in the paint, and causes peeling of new coats. Water running down the side of a house from a gutter leak will cause peeling. We estimate, based on long experience that 90% of the cases of peeling are due to the natural shrinkage of pure linseed oil paint, thus pulling away the worn out coats. As advised in our color card, test the old coats, by slipping a penknife under the paint in many places, and if it flakes off easily, remove it with the aid of a wire brush. In some cases, the paint burner may become necessary. This burning off, had better be done by an experienced man, to reduce the risk of fire. In many cases, fire insurance policies are made void if such fires result from the use of the painters burner. Paint removers are impracticable and too expensive for large exterior house work.

Twenty years ago, our house issued a little booklet called "Bad Paint" and I will quote some of its valuable advice. "Whenever you hear of a complaint of our paint "going wrong" on a house, we wish you to examine it personally, if it be possible, and report all facts in detail to us. Please do not simply advise that John Smith's house

has peeled and must be repainted. There is always some cause for the paint acting badly, and an intelligent investigation will usually disclose this cause. We certainly do not make bad paint one day and good paint another. As you well know, we make our paint in batches of 500 gallons at a time. We distribute 490 gallons of this batch and never hear from it again. The remaining 10 gallons are put on a house and "go wrong". We are certainly justified in saying that there were influences at work, outside of the paint itself, which produce these unsatisfactory results; and it is, of course, very desirable that you should be able to explain, both to the owner of the building and to our agent, what these outside influences were. Please remember, that even if you are able to make these explanations, it does not preclude the possibilities of our re-painting the building. This would be a question of policy which we would take up after we had considered all the facts in the case.

The point that we wish to impress upon you is that you should be able to prove conclusively, both to our agent and the owner, that the paint is not at fault. If you simply advise us that the house has peeled, and we say to our agent "Paint it over again and charge the cost to us," then both our agent and the house owner are impressed with with the idea that the paint was really bad, and our reputation as paint makers is lowered in their estimation. They merely think that we were fairly liberal in correcting our fault of bad manufacturing, but their faith in us as makers of good paint has not been increased or even renewed. Some years ago we figured that on the basis of supplying paint for 20,000 jobs, we had complaints on less than 40 jobs. Considering the opportunities for outside influences, we naturally expect complaints from some jobs.

If we furnished satisfactory paint of 19,960 jobs out of 20,000, we surely did not furnish bad paint for 40 jobs. Don't forget in investigating a poor job, to obtain answers to the following questions:

When was the house painted before our paint was used?
What paint was then used?
What were the conditions of the old paint?
Was it cracked or peeled, or both?
How much of this old paint was burned or scraped off before our paint was applied?

Heckel says, "Too often the dealer accepts the complaint at its face value, without due investigation, and too often also the manufacturer supplies the paint demanded, not because he believes the complaint justified, but because he thinks it good policy to satisfy the dealer and the consumer. But this course of procedure does not really satisfy the consumer. He is naturally glad to get the new paint, but unless he is first convinced that the original paint was not at fault, the ease with which the dealer "comes down" merely confirms his bad opinion of it. It must be distinctly impressed upon the mind of the complaint, that he is a beneficiary and not a deceived or injured party" There are five factors controlling the fate of a job of painting:-

1st. The paint itself.
2nd. The painter and his methods of procedure.
3rd. The character and condition of surface.
4th. The weather at the time of application.
5th. The additions made by the painter in preparing the several coats..

It will be evident from this, that while we make the very best paint possible for us to produce, there are four factors not under our control, which may kill the job. In closing this talk on Lead and Zinc Paint, I wish to say again-Our formula as stated in the sample card, is expressed so clearly, and then padlocked with the concluding sentence, "and nothing else" that it cannot be questioned. Our offer and guarantee based upon proper application, is most liberal and more than fair to the dealer, painter, and consumer. The established reputation of the Devoe house, for high quality, uniform production, and honest commercial practice, compels faith in the truthfulness of these statements. A salesman thoroughly convinced of the real value of the Devoe Lead and Zinc product, and understanding the importance of all five factors necessary to produce a good job, should have no trouble in selling Lead and Zinc to the consumer, and should be able to explain satisfactorily; the abuse of the paint, as the cause of the job "gone wrong."

The following example comparing the relative cost of Lead and Oil and Lead and Zinc Paint, shows conclusively that quantity and wear considered, Lead and Zinc Paint is the cheaper cost. The real cost of paint, is not the cost per gallon but - "How much annual premium must I pay per square foot to put a Devoe weather insurance policy on my buildings".

QUESTION?

Given a country house, painted before, and in fairly good condition

Shall I paint it with 2 coats of Lead and Oil, or
2 coats of Lead and Zinc.

Which costs less, taking into consideration these 3 factors (Price per gallon
(Spreading capacity
(Length of wear

Lead and oil-cost per gal. thinned according to directions of National Lead Company

1st coat.	100 lb. Wh. Lead		12.25-2-3/4	gal. paste
	2 gl. raw Oil	1.02-	2.04-2	" oil
	2 " Turps	1.10-	2.20-2	" turps.
	1 pt. dryer		.25-1/8	" dryer
			16.74 6/7/8	say 7 gallons

7)16.74
2.39 gal. Lead & Oil 1st coat.

2nd coat.	100 lb. Wh. Lead	12.25 - 2-3/4	gal. paste
	4 gal. Raw Oil	4.08 - 4	" oil
	1 pt. turps	.15 - 1/8	" turps
	1 pt. dryer	.25 - 1/8	" Dryer
		16.73 - 7	gallons

7)16.73
2.39 gal. Lead & Oil 2nd coat

So lead and Oil, both coats, without mixing labor - 2.39 gal.

LEAD AND ZINC PAINT

1st. coat
5 gal. L&Z at 3.90 - 19.50 - 5 gal.
add 1 gal. Raw Oil 1.02 - 1 "
½ " Turps. .55 - ½ "
21.07 6.5 gal.
6.50)21.07
3.24 gal L&Z 1st coat

2nd coat.
5 gal. L&Z @ 3.90 19.50
add ½ gal. Raw Oil .51
20.01
5.50)20.01
3.64 gal. L&Z 2nd coat

3.24
an average on 2 coats 3.64
2)6.88 - 3.44 gal. average for L&Z Paint.

Comparison on spreading quality.
Lead and Zinc takes fewer gallons.

Lead and Oil claims to cover 300 sq. ft. 2 coats
So 4200 sq. ft. require 300)4200
14 galls. Lead and Oil

Lead and Zinc covers easily 350 sq. ft. 2 coats
So 4200 sq. ft. require 350)4200
12 gall. Lead and Zinc

(On account of greater)
(spreading capacity of)
(Zinc Oxide)

Lead and Zinc therefore requires 2 gallons less than L&Oil

A painter spreads on the average outside job, about 1 gallon of paint per day. Wages vary in various localities. Let us figure on $6.00 per day.

Lead and Oil job 14 gls @6.00 gal. labor - 84.00
Lead and Zinc " 12 " @6.00 " " - 72.00
12.00

Note: You see we save 2 gall. paint and 2 gallons labor.

Our assertion is that Lead and Zinc wears longer. How much longer? Whatever the life of Lead and Oil may be under varying conditions, on sea-shore or inland - our experience has proven that our addition of 50% Zinc Oxide, and thorough machine grinding, double the life of the paint.

Many thousands of Lead and Zinc jobs, throughout the country, prove this. What bearing has this on the cost?

Cost of Lead and Oil		Cost of Lead and Zinc	
14 gls. @ 2.39	33.46	12 gls. @ 3.44	41.28
Labor-14 gls.....6.00	84.00	Labor (12 Gls)	72.00
	117.46		113.28

Each time we paint Lead and Oil plus labor - 117.46
" " " " Lead and Zinc " " - 113.28

In 12 years we paint Lead and Oil 4 times (3 yrs)-117.46X4-469.84
" 12 " " " Lead and Zinc2 " (6 ")-113.28X2-226.56

Dividing this cost of 12 years of painting, we find

Lead and Oil 469.84 divided by 12 - 39.15 yr)A saving of
Lead and Zinc226.56 " " 12 - 18.88 ")20.27 year
)Favor of Lead
)and Zinc.

This proves the Devoe slogan, fewer gallons - wears longer.

DEVOE & RAYNOLDS CO., INC.

March 14, 1925

VELOUR FINISH

6

Our two meetings preceding tonights meeting, were devoted to a study of the proper application of Lead in Oil, and Lead and Zinc Paint, to the exterior painting of a new and of a previously painted house. We discussed also the use and abuse of paint, the right method of handling the guarantee, and the proper adjustment of claims. The personality and the tact of the salesman are the great factors in a staisfactory explanation of the paint troubles. No arbitary rules can govern, but the paint knowledge, good sense, and judgment of the salesman must be applied in each individual case.

This evening we will treat briefly of the interior finishing of walls with Devoe Velour Finish, as contrasted with the time-honored method of using Lead in Oil, flatted with turps. Our interesting booklet "Making the House a Home" which you have studied, disposes effectually of the wallpaper question. The quotations from the books of famous interior decorators, give us the unbiased opinion of these experts in their art, and we need not dwell on the many faults found with wallpaper decoration.

Calcimine, whether of the boiling water or the cold water type, is being rapidly displaced, (In spite of its low first cost) by the more permanent flat paints. Calcimine is generally based on a whiting pigment and is bound with an animal glue, which deteriorates in the presence of any moisture. Calcimine, even when disguised under a fancy proprietary name, offers no resistence to hard usage, and when soiled cannot be washed. Water immediately dissolves the glue binder, and the calcimine comes off. In recoating calcimine surface, it is safest to wash off the old coating. The water in the new coat is apt to soften the glue in the old coat, and under the friction of brushing the old coat may rub up, Good calcimning requires a practiced hand, as it is not easily applied, and the amateur will do better work with Velour Finish.

Before the introduction of liquid flat paints, (and they are comparatively of recent date) most of our interior painting was done in full oil gloss, either with lead in oil, or prepared paints. When a flat or dull effect is wanted, it became compulsory to engage an excellent painter, one who understood the rather difficult and necessarily rapid application of flatted lead in oil. Let us figuratively paint a plaster wall, in accordance with the specifications of the National Lead Co., with the three coats called for.

1st or Priming coat:

100 lb. White Lead

7 Gal. Boiled Linseed Oil

1 " Turpentine

Note the large quantity of oil specified, and the fact that boiled oil, not raw oil is used. Dry plaster walls are very porous and absorbent, and the object is to use this primer direct on the walls, without a preliminary sizing of glue,

Patent walls size or sizing varnish. Boiled oil is heavier in body than raw oil, more gummy or varnish like in character, and assisted by the given amount of turpentine, penetrates well and stops suction.

The second or Body coat consists of
100 lb. White Lead
1½ Gal. Raw Linseed Oil
1½ Gal. Turpentine
1 Pint Dryer

This coat, is mixed with equal quantities of raw oil and turps, and one pint dryer, in a total quantity of three-one eighth gallons of thinners, instead of the 8 gallons of thinners used in the priming coat. Note, that while the priming coat carries only 12-1/2 pounds of lead to each gallon of thinner, this body coat carries about 32 pounds of lead to each gallon of thinner. It is this body coat, which lays a good foundation for the succeeding finishing coat.

The third or finishing coat, is the flat finish, and is mixed as follows: 100 lb. White Lead in Oil
Absolutely no oil
2½ Galls. Turps.
1 Pint Light Interior Varnish
1/2 Pint Dryer

You note from this formula, and can reason from your previous study on the respective actions of oil and turpentine, that the flat effect or lack of gloss, is obtained by using a minimum of oil, and destroying what little oil there is, by the excessive use of turpentine. The addition of one pint of varnish, does not remedy this defective binding quality. The 100 pounds of paste lead is ground in about one gallon of raw oil, and this oil is attacked by two-one half gallons of turpentine.

We learn that turps relation to oil, has a thinning power of at least two to one, so that in reducing our lead, we are opposing a turpentine power of five to an oil power of one. This excessive thinning destroys the binding quality of the oil, disintergrate rapidly under friction of washing. It also destroys the fluiding of what little oil there is, and necessitates the employment of expert painters. On large surfaces or big stretches a number of men must work in unison in order to meet and connect with each other's wet edges. The paint through the quick evaporation of the large quantity of volatile turpentine, and the inefficient retarding action of so little oil, sets up or becomes fixed very rapidly. When a connection of the second stretch with the first one is made, after the first is set, we get gloss spots or as the painter calls them "shiners".

I think we have sufficiently proven, that a minimum of ordinary linseed oil, reduced with an excessive amount of turpentine, does not give a satisfactory vehicle for flat paint. Now let us determine whether or not, white lead, is the best available pigment for this purpose. We learn from our study of lead, many of its particles are very coarse, creating a rough surface, to which dust and dirt adhere very readily. Lead is easily darkened by gases from kitchens or gas burners, being converted into sulphide of lead. White Lead is poisonous, and where the oil binder has been so weakened, it becomes an unsanitary coating for interior work.

In former times, painters often resorted to part lead and zinc, and sometimes all zinc in their finishing coat. Pure Zinc has none of the bad faults possessed by lead, but does not permit of perfect flatting, being however, the ideal pigment for high grade enamels.

The National Lead Co., recognizing the great merit of well made flat paints, and feeling severely the growing demand for such finishes, with a consequent loss of lead sales, have tried to stem the current, but with small success, They have put on the market, a flatting oil with instructions to the painter, as to the proper method of using it, in connection with their lead. They have tried to hold their store sales, by making a liquid flat lead paint, made of their lead and flatting oil, in white only. However, thoughtflatting oil may have many characteristics of the vehicle used in prepared flat finishes, the objections urged against the use of white lead for this purpose still hold good. Prominent retail dealers, testify that the demand for this lead pigment flat paint is small, and not growing, the old fogy sticks to his primitive method as described before, and the progressive decorator alive to what is best, goes all the way with us.

Well, we have condemned the use of flatted lead and oil, and what do we offer in its place? I had the pleasure recently of reading a phamplet issued by the New Jersey Zinc Company containing an address by Frank G. Breyer, chief of the Research Division. I shall not hesitate to quote freely from this experts able presentation of the subject of interior decoration.

Speaking of the best coatings he says "The man who has a good thing in his day sticks to it, avoids the inevitable mistakes of the early development of new and better products, and does act as a stabilizing influence. When the development stage is passed, however, he wakes up to the fact that the world does move and that he is fighting a losing fight with the progressive younger generation and is intrenched only in the good will and prejudice of the older men, who are indifferent to new practices."

Remember gentlemen, this older generation will pass away and our unprogressive man will be left high and dry, marooned on the rocks of prejudice and old fogyism. The wide-awake decorator must co-operate with the go-ahead manufacturer, have the courage to try out the newer materials, and if their worth is proven, he should scrap his old methods and adopt the new. In daring yet conservative change only is progress possible.

Breyer says, "Raw or boiled linseed oil yellows in interiros to a remarkable degree, and if there is any quantity present in the paint film no light tint much less white, will maintain its purity and pleasant effect. Much of the stuff the old timers pull on you about the wonderful interiors they used to do or know about, are concerned with strong hard colors or with whites that turned dingy yellow."

I will repeat, that the objection to the use of raw oil as the vehicle in flat paints, was the fact that it could not be used in any quantity, because of the gloss produced; and if used in such small proportion, the large amount of volatile thinner, cut out the fluidity or ease of application and destroy the binding and friction resisting qualities, we could use, as most of our competitors a varnish binder, but when this is reduced with sufficient volatile thinner to flat it, we also get a vehicle that sets up too rapidly and worst of all, dries hard but brittle, chipping or flaking off under slight knocks. Neither one of these vehicles will permit of ease in application nor of successful mottletoning.

In our Devoe Velour Finish, we use a specially treated blown linseed oil, of very heavy consistency and light in color. This oil permits reduction with a large amount of thinners and yet retains the flowing and binding quality of the oil. It sets up slowly, giving the inexperienced painter reasonable time to apply it, without showing brush marks or laps. As thinners, we do not use the gum turpentine used in our Lead and Zinc paint, but what is known as high grade mineral spirits, derived from petroleum. This is done deliberately, for a good purpose. Remember that the bulk of our liquid is volatile and as the mineral spirits evaporate slower than turpentine, its use gives us greater ease and time for application. A large stretch of surface, ordinarily requiring the co-operative work of three men, can be carried through successfully by one man. Now let us examine the pigment portion of our Velour. In advocating the use of our lead and zinc paint, we have laid such stress on the good qualities of these two pigments, when in correct combination, that it is only a fair question to ask us, why we do not employ them in Velour.

We have already stated this evening, the faults of [redacted] lead, and the difficulty of producing a good flat paint

from Zinc only. Our formula labels on the cans, show that we use 86.67% of Lithopone and 13.33% of Asbestine or Magnesium Silicate in the White Velour. Lithopone is a zinc pigment made chemically and analyzing about 30% Zinc Sulphide
70% Barium Sulphate

It is made by pouring together very pure solutions of Barium Sulphide and zinc sulphate. Do not confuse this pigment, with the mechanical grinding together of zinc sulphide and Barytes. This latter mixture is deficient in opacity. While Lithopone of high grade, has a hiding quality superior to that of Lead and Zinc, and is also whiter than either of these. It is non-poisonous and shows no reaction when exposed to sulphur or sulphur gases. The high grade Lithopone which we use, is almost as fine as Zinc Oxide. Up to eight or ten years ago, Lithopone had rather an unsatisfactory reputation, because it quickly turned grey when exposed to strong light. This improved product is practically unaffected by light or moisture.

And now, why do we use Asbestine or Magnesium Silicate, which we condemn as an ingredient of prepared house paints. Full linseed oil paints, like our Lead and Zinc, carry less pigment than do the flat paints, where the large quantity of thinner has such great thinning power.

Furthermore, the volatile thinner does not carry the pigment in suspension as well as does the heavier oil liquid, but permits it to settle out more rapidly. In our Lead and Zinc Paint, the zinc white comparatively of light gravity, holds the lead up well, without the use of the non-hiding Asbestine.

In Velour we had to consider that Lithopone was carried but poorly in suspension by the light thinners. Lithopone has tremendous hiding quality in a flat paint, (where the pigment content relative to liquid is large) and we can hold the solid matter in suspension with Magnesium Silicate, and yet not impair this hiding power. So far, we have spoken only of the opacity, durability and flowing quality, as dependent upon the pigments and vehicles employed. Let us say a word on illumination. Breyer says "Brightness is expressed in terms of percentage of the total light reflected. A bright white mixed to a clean tint, gives not only the most light, but the most pleasing effect. There is no disputing the fact, that a diffusedly reflecting surface is the most pleasing and restful to the eye. The best grades of Lithopone white, will reflect as much as 85% of light, while the best grade of white lead, will not do better than 75%.

A light cream drops the reflecting power to 70%, light buff to 65%, light green to 47%, and red to 12% . So you see, that the selection of poor light reflectors, increases the expense of artificial illumination at night, and keeps the room gloomy by day if window openings are few. Interior decoration

color harmony and the selection of appropriate colors, for the differently situated rooms, is a study in itself. Our Velour booklet, gives excellent suggestions on color selection. Read it again.

Remember, the most important things to consider are, How strong is the light that enters the room? For what purpose is the room to be used ? Colors can make us cheerful or depressed colors can soothe or excite us no less surely than sounds. In fact, colors have a direct effect on health and disposition.

Remember, that Velour colors can be intermixed, and can be lightened with White Velour, and that the white can be tinted for light tints, with our oil colors, orfor dark tints with our Japan colors. Bear in mind too, that Velour permits of blending the colors into each other. Mottletoning system, makes possible rare color harmonies, unlimited in number. As you will see from the demenstration this evening, it can be worked as one coat mottled over the undercoating, or applied in several applications over previous mottletones, can be perfectly blended, or worked with a number of harmonious colors, put on in haphazard blotches here and there, and blended together immost beautiful effects.

Dreyer says "The cause of probably 85% of paint failures lies in either the lack of understanding of the principles of paint adherence or the use of supposedly secret or professional methods of ducking these principles. Why won't any paint stick to any surface, if you manage to brush a film on it? Because in practically every case of failure to stick, the paint never touched the real surface of the wood or plaster, but simply lay as a friction or suction coat over the top of a film of condensed water. If the wood or plaster contains water, and you raise the temperature of the building, that water generates vapor, the pressure of which is dependent upon the amount of water present and the particular capacity of the wood or plaster. That pressure must be relieved somewhere, and often at the expense of the paint film.

Water, the great enemy, works in under window sills, and pulls the paint off the sills, while the side of the frames is perfectly good. A slight leak in the roof may get down through a number of walls. A sweating pipe or a leaky water connection, cause trouble sooner or later. Paint may have been ever so adherent originally, but if water has to evaporate through it rapidly, adherence is soon weakened and when the film becomes dry again, it curls off. Films always curl outward because the outer coats of paint being more oxidized try to shrink more than the inner coats, and when released from the wall, the softer less oxidized undercoat, stretches on the outside of the curl, and the tighter harder outer coats from the inside.

Never paint below 40p Farenheit, (Water condenses on wood and plaster rapidly below this temperature) nor on a surface that is too hot to bear the hand comfortably. Be sure, your wood and plaster are smooth, as paint films ----------

are only about three thousandths of an inch thick, and won't cover up cracks and irregular patches. Normal plaster in its green state is full of water soluble lime, which comes to the surface, along with the water and attacks the oil, especially if it is untreated linseed oil, combines with the oil, making a fluid soapy solution, which runs down the walls in ugly dark drops, carrying the tinting pigment with it, and leaving some of base pigment behind, decolorized. When such a job approaches dryness and the film begins to shrink it simply pulls off in flakes. If the paint had contained a harder, less easily attacked varnish, instead of raw oil, the damage would not be visible immediately by running down, but would exist all the same right from the start, and as soon as the shrinkage stresses get strong enough it will peel off, perhaps a year later.

The answer to the question "when does plaster cease to be green," is a long one. Wait as long as you can before painting, and if you have to paint in a short time, wash the walls with a solution of four pounds of zinc sulphate cyrstals to a gallon of water. Brush this on with a wide brush and let it dry thoroughly, Remember, that your priming coat must stop the suction, and if this is not done, then the second and third coats will suffer and your finish will not be uniform. Don't start the second coat, until the primer or undercoat shows a uniform slight gloss all over the surface. Very porous surfaces, should have a second coat of primer, or half undercoat and half velour.

Should the new wall be very hard and non-absorbent, you can reduce the varnish content of your undercoat, by mixing the straight velour with it rather than thinning with turpentine. Be sure not to <u>overbrush</u> Velour, as gloss is liable to result.

Too high a gloss on the undercoat, will prevent proper adherence of the velour coatings, and often cause a gloss to flash through the finishing coat of Velour.

Washing Velour, with a mild soap (of the type of ivory soap) and warm water, and rinsing thoroughly with clear water, is all that is necessary to maintain it for years. Much more could be said on the advantaggs and the application of Velour, but these remarks are supplementary to our Velour booklet and sample card, which give explicit directions for use, and shoud be well studied.

The demonstration on mottletoning, blending and stenciling which we will see now, should convince every one present of the great possibilities of this Devoe Product.

DEVOE & RAYNOLDS CO., INC.

March 16, 1925

MIRROLAC FINISHES AND RELATED SPECIALTIES

At our last paint talk, we studied several methods of finishing interior plaster walls, paying special attention, to the composition, application and great decorative value of our Devoe Velour Finish. As nothing was said about the use of Velour over canvas, burlap, wallboard and wood-trim we advise you to read carefully again, our valuable booklet, making the House a Home, as well as the directions on our Velour sample card.

To-night, we will crowd into our short session, a brief survey of the art of interior wood-finishing, with stains, varnishes and enamels, including our high quality Mirrolac Finishes, the third of the great Devoe triumvirate of Lead and Zinc, Velour, and Mirrolac.

I have found in my experience with new men, studying and selling Mirrolac over our retail counters; that they are often badly confused by the fact, that many of our related specialities seem to be duplicated in, or even displaced by the Mirrolacs. In order to dispel this confusion, and to show clearly the value and need of each of the seemingly conflicting products. I will begin with the A. B. C. of wood finishing. This will show us how best to get full value, by the proper selection and right application of each material. In painting with Lead and Zinc, and Velour, we have worked with prepared paints based on the use of opaque pigments, our object being, to completely bury or hide the surface over which they were applied.

We laid emphasis continually on the opacity of Lead, Zinc, and Lithopone, and condemned the use by our competitors of the translucent extenders such as Barytes, Magnesium Silicate, and China Clay, which detract to so large a degree from the opacity required in a first grade paint.

Again, in studying our Color Pigments, we learned that certain pigments, like Indian Red, Chrome Greens and Yellow Ochre, had excellent hiding quality, while other pigments such as Italian Siennas, Turkey Umbers, Vandyke Browns, and many Lake colors, are valued not only for tinting strength, but for their translucency. Our desire in staining wood, is not to hide the wood under opaque surface coatings. On the contrary, we wish to preserve and enhance what natural beauty there is in the figured growth of the wood. We can give them the rich colorings of the more expensive hard woods, or hasten the soft warm tones that age produces slowly. We can bring out the beauty of contrasting grain or figure in new wood, and save from the junk-heap the time-worn and discarded furniture that a preceding generation, and our own youth so highly prized.

Let us begin with the treatment of unfinished woods. We obtain the best results by the use of deeply penetration transparent dye colorings, that strike into the wood, causing a change of color below its surface, and not merely on the surface. The wood and its colorings

should then be protected against friction-wear and moisture attack, by surface coatings of hard, tough, transparent varnishes.

It is necessary to study the peculiarities of the different woods, in order to finish them to the best advantage. All woods are composed of filaments either large or small, straight or curly, or contorted. Between each of these filaments is a small duct, through which the sap flows upward from the root to the outer extremities of the smallest branch of the tree. When these small ducts or canals are cut across either squarely or at an angle, they show up usually darker in tone than is shown by the filaments, and are then known as pores. These filaments may be very thick, or very thin, and the canals between them, are either large or small, to correspond with the filaments adjoining them.

This coarse growth is known as open-grained, while the fine close growth is called close-grained. We must consider too, the figure of the wood as brought out in quarter-sawing as contrasted with the same wood sawed straight through the log, full length. The most used open grain woods, are Oak - Ash - Chestnut - Mahogany - and Walnut and to a lesser extent, Elm - Baywood - White Mahogany or Prima Vera, Rosewood and Butternut. The most used close-grain woods are, White Pine Yellow Pine - Cypress - Whitewood or Poplar, Cherry and Birch, and to a lesser degree Oregon Pine - Spruce - Washington Fir - Basswood - Beech - California Redwood - Cedar - Gumwood and Hemlock. All woods should be thoroughly seasoned and well dries, But we are living in a fast age. Until quite recently, it was customary to allow the wood to standseveral years between the time it was cut from the tree, and the time of manufacturing it, into household articles and building materials, by this slow process it would become thoroughly cured, but at present, much lumber is used, that has been cut but a few months.

Poorly seasoned lumber when hurried from the drying-kiln to the work-shop is easily affected by atmospheric changes, and excessive expansion and contraction result under varying temperature. On the surface of such a wood, a lasting finish cannot be produced. When wood has not been properly dried, no matter how well the pores are filled, or how carefully the best varnish has been applied, rubbed and polished, there is sure to result as a consequence of this expansion and contraction, an uneveness and oft times a cracking of the finish, soon after the work is completed.

The old method of drying wood, by storing it in the rafters of the workshop for months, where it was subjected to the circulation of warm, dry air, was the best way. In the present day of hurry and hustle, the old method, will not do, because competition will not permit of tying up capital foo so long a time, and the wood is therefore hurried through the drying-kiln. The softer woods, will shrink beyond normal, only to take on a certain amount of moisture after having been in work. A piece of basswood for instance, kiln-dried excessively and reduced to 9 inch length, will increase in an apparently dry room, to 9½ inches in length. After the wood is dried, it is cut to sizes, and goes to the planer and from him to the sander

who smooths it off, using improved machinery to do this rapidly.

Sanding, whether by machine or hand, must always be done with the grain, using first the coarser grades of sandpaper, then the medium and finishing with the finest. Remember negligent scratches or cuts, particularly cross-wise of grain, will show up decidedly through the finishes. Satisfactory staining, like expert finishing is a matter of study and practice. All stains should be put on quickly. Speed is necessary, in order to obtain a unifrom depth of color. See that you get an even distribution of stain, as an unintentional double coating at any point (what we call laps) will result in darker blotches of color. In color staining, the results obtained, are due to the application of translucent colorings, permitting the color of the wood itself, to show through, in a varying degree. Therefore, a second or third coating, or laps, produce a darker color, by obscuring to a greater degree, the color of the wood underneath.

Stains can be classified as water stains, spirit stains, oil soluble aniline stains, oil pigment stains, chemical stains, and varnish stains. Water stains, which are made of water soluble coaltar colors, dissolved in water, raise the grain of the wood. Therefore the wood, should be sponged first, with luke-warm water, in which asmall quantity of glue has been dissolved. This will cause the fibres of the wood to dry stiff, or to holdup the fuzz. The wood is then sanded down again, sufficiently to cut off the fibres or nap that protrude. If this sponging and sanding is not done, the water stain itself raising the grain would compel sanding afterward, which is liable to cut off too much of the stain coat, leaving an unevenly colored surface.

Preliminary sponging also opens the pores of the woods, and permits of better penetration of the stain. Water stains do not hold their color well, in strong light. Chemical stains, are solutions made from various chemicals, such as soda, potash, copperas, strong ammonia, and such acids as tannic, picric, pyrogallic and others. These stains are very uncertain in the results produced, and only the expert will find them safe. With one and the same stain different results are often obtained, on various woods, or on two adjoining panels of the same kind of wood. An example of a chemical stain, is the application first of a coat of tannic acid, followed by a second coat of copperas, that is sulphate of iron, which will produce weathered oak effects. Some woods contain naturally considerable tannic acids while others do not.

Stain whitewood, or any wood in which the tannin is practically absent, with a solution of sulphate of iron, one ounce to a gallon of water, the result will be negative. Apply the same solution on ash, oak or maple, we get a gray color, and on the oak, we sometimes obtain dark bluish grays to almost black colorings. The sulphate of iron acting on the woods tannic acid, produces tannate of iron to the smaller or larger quantity of tannic acid in the wood. Bichromate of potash dissolved in water, to darken Mahogany, is a commonly used chemical stain.

Of course, these stains dissolved in water, raise the grain. Spirit stains, are alcohol solible aniline colors. They set up very quickly through the quick evaporation of the alcohol, and are difficult to apply. An amateur cannot handle them successfully. The colors are fugitive, they find their chief employment in furniture factories doing hurried cheap work.

Bismark Brown, a coal tar color used in producing Mahogany, is soluble in both alcohol and water, while Nigrosene blacks, are made in two kinds, one for water solution, and the other for alcohol. These water, spirit and chemical stains are not safe in the hands of the amateur, nor the house wood-finisher.

Many manufacturers who formerly made chemical stains, have either discontinued their manufacture, or refuse to take any responsibility for the results.

The Devoe line of high quality stains, comprises the oil pigment stain, the penetrating dye stain, the pigment Marble Floor Varnish Stain, and the Mirrolac Varnish-dye stain. Marble Floor and Mirrolac can be used with good results on new unfinished wood. Often times one or the other of these two varnish stains, is the only stain carried in the necessarily limited stock of the small town dealer. But the application of oil pigment or of the penetrating stains, followed by protective surface coatings, gives us richer colorings and better wear.

Oil stains, which ought to be termed turpentine stains, are made from insoluble pigments, such as umbers, siennas, vandyke browns and transparent lakes, ground in oil to a paste form, and reduced very much, with turpentine or mineral spirits. The pigments will settle out, and the stain should be kept well stirred while in use. It will give good results on soft absorbent woods, but does not penetrate well on hard woods. We are dependent upon our thin vehicle soaking into the wood, and carrying with it, its burden of undissolved pigment. On hard, close grain wood, the liquid strikes in, but is likely to deposit the solid pigment on the surface of the wood, giving us a clouding of the grain and a muddy color.

On close fibred woods, it is better to give two coats of stain to produces the desired depth of color, rather than to attempt to do it, with one heavy application. The strokes of the brush must be carried out thoroughly to prevent piling up of color material, and the stain should be wiped over lightly with a rag, before it dries in completely, in order to even up the color. Use a flat varnish brush, which should carry the stain freely, but not overloaded; that is to say, the brush must carry just sufficient stain to fill it, so that the natural cohesion will not permit the stain to run out of the brush.

When the brush is overloaded, the setting of the brush onto the work, will blot the wood, where the brush is first applied, especially on soft woods. These directions, apply as well to our Penetrating Stains. These stains are so called on account of their excellent penetrating qualities on both soft and hard woods. They are made of oil soluble aniline or coaltar dyes, dissolved in benzole or heated turpentine, and bound with a sufficient quantity of high grade varnish, being further reduced with mineral spirits. These coaltar colors, if not used too excess and not adulterated, dissolve as completely as sugar in coffee. Not having to carry an insoluble pigment, but being really a colored liquid, the penetrating stains, strike in rapidly to good depth, and give us both richer and clearer colorings than we can get from pigment stains. Be careful on very soft woods, lest the penetrating stain strike in rapidly like ink on blotting paper, and produce a result much darker than desired.

On outside work, exposed to strong sun-light, preference should be given to pigment stains as they are more permanent to light. Neither of these stains will raise the grain of the wood. They should not be applied to wood previously finished (where there is no absorption possible) unless the old coats of paint, wax, shellac, or varnish are thoroughly removed with neutral Paint Remover, like Devoe's Remover, and cleaned up then, by a good washing with turpentine or benzine. Even then, do not expect the same result as you would obtain on unfinished wood. Removers, take off all the old surface coatings, but are not equipped with pick and spade to dig the color and filler out of the pores of the wood. Never apply a light color stain over a dark one, as the dark one will show through. Having obtained our desired color, in one application, or by a second or third coating if a deeper tone is wanted, we must allow about eight hours drying time, and then give the selected protective coatings.

If the wood is close grain, we can give a first coat of Devoe Pure Shellac, reduced 50% with denatured alcohol, or a coat of the selected finishing varnish, applied in full strength, or as I prefer reduced with about 20 to 25% of turpentine. Do not use Liquid Fillers, either of Devoe make or others. These are demanded of us by painters, but we advise against them, as they are only thinned out cheap brittle varnishes, with or without, a transparent filling material, You are safer in using thin shellac, or a good gum varnish reduced as stated before. When hard dry, sandpaper this priming coat lightly with fine sandpaper or steelwool, and apply two or three coats of the varnish selected, rubbing these down between coats as directed in our Varnish booklet.

Where the wood is open grained, filling with paste wood filler, is absolutely necessary, for the securing of a good varnish finish. Stain the filler with colors in oil, or some of the stain used on the wood, large pores, are innumerable holes, into which varnish sinks and these holes must be puttied up. Instead of attempting the impossible task of taking a chunk of putty, and filling each hole separately, we reduce our wood filler putty with turpentine to the consistency of heavy bodied varnish, and rub it in well over the entire surface, working against the grain, with a stiff or stubby brush. Be careful not to cover more ground than can be cleaned off again.

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In about fifteen minutes after application. After the filler has lost its wet gloss, clean off with a scraping knife, followed by a thorough rubbing with burlap or coarse cloth, working again, against the grain (A little raw oil, added to the filler, will slow the drying if necessary) Rub off filler thoroughly, to leave it in the pores only, and not to muddy the high lights or flakes in the wood. Examine the filled surface carefully, and if pin holes are disclosed, fill a second time, using a thinner consistency than the first. A good paste filler should not shrink nor absorb any of the finish placed over it.

The Devoe filler is unbeaten by any other on the market. It comes in Light, Dark, and Mahogany colors. Pleasing results are obtained by filling light oak, or chestnut for instance, without the use of any stain, but using the dark filler in the pores. After filling, allow the work to stand about 12 hours and proceed to finish.

Where oil or penetrating stains, are not available for the new work, the Marble Floor and Mirrolac stains can be used with very pleasing results. These are high grade varnish stains or properly speaking colored varnishes. They are not so much penetrators, but rather translucent surface coaters. Marble Floor Stains, resemble oil stains, in their being made with insoluble pigments, while the Mirrolac Stains are made with soluble coal tar dyes.

The Mirrolac stains, give us much clearer and richer colorings, and having no body of undissolved pigment to carry, will spread easier than Marble Floor Stains, and are less likely to show laps or brush marks. On unfinished wood, that is however, old darkened and not in good condition, the Marble Floor Stains, will partly hide these defects and should be used in preference to Mirrolac.

Our excellent booklet " Hidden Beauties of the Home ", which you have studied for to-night, is so explicit in its directions for using Mirrolac, that it will not be necessary to go into these details here. Let me though, emphasize a few points. Looking through a colored varnish, is much the same as looking through a sheet of colored glass, If for instance, we lay a sheet of ruby colored glass over white paper we obtain a certain reddish color; if we cover a portion of this first glass, with a second sheet of the same glass, we get a deeper tone; and if then a third sheet is placed over a portion of the second, a still deeper color results. In other words, the effect of the white paper underneath the colored glass is diminished. Colored varnishes really act like a liquid colored glass, and in their application, produce the effects just described. The user must be careful to secure an absolutely even distribution of the stain, for any lapping over or double coating after the material has once begun to set, will show in dark streakes or blotches. An attempt to remedy this by rubbing out with the brush, will make the result worse.

In finishing furniture, doors, or windows frames, take advantage of every break in the surface. On a door, for instance, do first the panels with their mouldings, being careful not to run outside of them. Then do the in-between rails, and last begin the stile in the upper left hand corner, and carry it around the entire side of the door. In finishing a floor, start at one corner, and work on only three boards at once. Finish as long a surface at a time asv convenient, and work across the entire room, being sure to cut in on the cracks, so as to avoid lapping over on the next set of boards. Use a Devoe chisel-edge bristle varnish brush, of a width suitable to the

size of surface done. Do not overload the brush, yet flow the stain on like varnish.

Do not brush it out, as directed for house painting. Where surfaces of close grain wood are very dry and absorbent, this excessive suction should be partly stopped, with a coat of Devoe orange shellac reduced 50% with denatured alcohol, or better still with a coat of clear Mirrolac varnish. This will prevent the stain going darker than shown on our sample cards. The color of the stains, can also be lightened considerably, by adding clear Mirrolac to the stain, which results of course, from distributing the given coloring matter through a larger quantity of varnish.

On open grained wood, fill first with the paste wood filler, and follow with the Mirrolac stain. Urge the application of a final coat of clear Mirrolac especially on floors, in order to keep the wear off the Mirrolac color.

What we have said about Mirrolac, applies to the use of Marble Floor Stains, as well. Remember though, that where time and interest will allow, the best results are obtained on unfinished woods, by the use of oil and penetrating stains, protected by good Devoe Varnish. Mirrolac and Marble Floor Stains, should be recommended for new work, only where the dealer does not carry our other stains, or where a quick job is desired. Do not use Mirrolac stains on outdoor work. When a varnish stain is required outdoors, use Marble Floor pigment stains, rub down with fine sandpaper or steel-wool, and finish with Vernosite Spar Varnish. The renovation of old surfaces, the restoration of dilapidated furniture and the reclaiming of innumerable minor furnishings throughout the home, are made possible by Mirrolac finishes. The booklet gives you in detail, the method of using Devoe Remover, the application of our opaque ground color, and the very natural imitation of wood-grain made possible by the use of our graining compound and rubber grainer.

This Devoe system and materials, transform the most unimteresting surfaces into the beautiful, when finished properly with the rich, clear colors, and brilliant varnish of Mirrolacs. When desired, the ground color can be modified in color, by the addition of some of the stain. The crack filler should not be used, until after the first coat of Mirrolac has been applied and hardened. Tint the crack filler, with some of the stain you are using. Mirrolac and Marble Floor stains, will not turn white or spot under hot or cold water, are extremely resistant to friction-wear, and protect the surface thoroughly under the most severe usage on floors.

Remember, that both of these products, can be rubbed to an egg shell finish with flour pumice and water, and then brought to a high polish by further rubbing with flour rotten stone and water or Devoe Mirrolac Polish. Derayco Varnish Stains, are dye stains, made with a cheaper quality varnish, and are sold where price competition makes it necessary. The market is flooded with cheap varnish stains, made with brittle rosin varnishes, muddy pigments, and weak adulterated dyes. They give but crude harsh color, and scratch white or powder off. Our Mirrolac and Marble Floor stains, are not good enough varnish stains, but the highest quality of color varnish. Leaving the subject of stains, let us go briefly into a study of our enamels. In making stains, we selected carefully the most transparent colorings in order to bring out the inherent beauty of the wood. Enamels are

similarlya mixture of color in varnish, but we employ here the pigments that combine opacity and fineness with large varnish absorption, as we desire to hide the wood or metal under a protective, gloss coating.

Enamels are necessarily less opaque, than Lead and Zinc, oil paint, or Velour flat finish. The whites and light tints are based on French Process zinc oxide distributed through light color transparent varnish, it becomes essential then, to stop suction in the surfaces, and to build up the finish with enough good undercoats, to get a maximum of opacity and hardness. Do not depend upon the enamel for hiding quality, but consider it a finishing glaze over a perfect flat undercoat. We make a Flat White Undercoat, under aspecial label, as well as Mirrolac Label. Sell the latter in connection with Mirrolac Enamels. The undercoatings are made with lithopone, and a quantity of high grade varnish, sufficient to give good binding quality, and proper support for the enamel, It produces a whiter coating than one made of lead, and being free from oil, does not yellow through the enamel. Forming a hard non-absorbent ground, the Enamel vehicle does not sink into the undercoat, and the enamel retains its full gloss.

Do not use our Lead and Zinc Inside White, as an undercoat, as it is made of all zinc white, and so is the enamel. When a number of coats of zinc only, are used, they dry too hard, and are likely to crack, and straight zinc as an undercoat has not the opacity of lithopone. The old painters method of making enamel or china gloss, was to add three pounds of white lead in oil to a gallon of light colored varnish, generally damar varnish. Another method, was to use French Zinc ground in refined linseed or in poppy oil, or gloss finish, a French Zinc ground in paste form in Damar Varnish. These were then reduced to a brushing consistency with Damar Varnish and turpentine.

But few painters to-day mix their own enamels. While many still hold to their old methods of hand-mixing house paints and flat finishes, they have come across on enamel grinding and varnish boiling, because of the difficulties in making these products really good. Technical factory knowledge and scientific study of materials, have compelled recognition in these lines first, and is rapidly winning out on other paint products.

Mirrolac Enamels, thoroughly ground by improved machinery, are smoother than hand-mixtures and many of our competitors factory made enamels. Their China like, non-absorbent surfaces produce a sanitary finish, resisting dirt, grease, and frequent washings with hot water and soap, far better than any flat finishes or oil paints.

They are quick drying, but set much slower than painters or ordinary store enamels, and work comparatively free under the brush. The darker colors of Mirrolac Enamels, can be applied direct to wood or metal, but for best work, the undercoat should be used and colored with some of the finishing enamel. Enamels, like varnish stains should be flowed on with a fairly full brush.

Flowing on means, not to brush out like house paint, but does not mean to flood on with a dripping brush, so that the enamel will sag down or form curtains on vertical work. Put on the enamel in long even strokes, and do not go over it a second time after it has set. It is not necessary here to go into the details of application, as the booklet gives explicit directions. Roman Enamels, like the Mirrolac are varnish enamels, quick setting and hard drying, and must be spread rapidly. This enamel is produced in white only, of three finishes, full gloss, egg shell and flat. They can be tinted with Japan Colors, or with the colored Mirrolacs. The flat enamel has more hardness and resistance than flat oil paints.

A very pretty and durable egg shell enamel, can be made by mixing Velour Finish and Mirrolac or Roman Enamels in equal quantities. Our other special enamels, need but a brief description. Canoe Enamels, are made with Spar Varnish to give them the resistance to exterior exposure; gloss Carriage Paints and Motor Car Finishes are colors ground in high grade carriage varnishes of great brilliancy and durability. Heat Resisting Enamels, are made with long oil varnish, giving them the ability to expand and contract under extremes of temperature, while flexile and floor paints are also enamel paints, made with varnishes best suited for their particular purpose.

We have however, one enamel made in white only, both gloss and egg shell, that is far superior to Mirrolac and Roman Enamels. The Devoe Holland Enamel, is made with the whitest and finest French Process Zinc Oxide manufactured, and ground thoroughly in a very heavy body, blown linseed oil, selected for quality and light color. This results in an enamel that is snow white and flows out perfectly under the brush, working as freely as oil paint.

While the varnish enamels are excellent for use on smaller surfaces and furniture, the Holland enamel is a veritable blessing, for ceiling and walls. It is sold also, under the label of Holland Yacht Enamel for exterior use. The Holland Egg Shell Enamel produces an attractive dull or egg shell gloss, approaching closely the effect of rubbed work, and the expensive labor of rubbing is eliminated, In regard to the specialities such as Flat Black, Stove Pipe Enamel, Aluminum and Gold finishes, and Screen Enamels, we made all of these, before we made the Mirrolac line of "home makers."

We continue to make them, so they can be sold as separate specialities, where the dealer does not handle our Mirrolac as yet. But, the close consolidation of our best varnish stains, white and colored enamels, these several specialities, our polishing oil, and four most used varnishes in a compact line, under one, makes possible the sale of these as a complete Devoe line, instead of the salesmens' efforts becoming dissipated on separate units. The Mirrolac Varnishes, are of a high quality, and honest value, and in small country stores of diversified stocks, give all the varnishes necessary.

Remember though, that our three standard Devoe Varnishes, are
Vernosite
Pale Interior
and Marble Floor Finish

The experience of many years, have convinced us, that varnishes are best made with, Hard natural gums plus synthetic gums linseed oil plus china wood oil. In this way we get extreme hardness, the toughness and elasticity given by linseed oil, and the quicker setting quality and resistance to water discoloration, given by the china wood oil.

Vernosite dries slower than any other spar varnish made by us, and therefore expands and contracts best under changes of temperature.

It does not crack or disintegrate by powdering off. Zanzirex, Aquaspar, and Mirrolac Spar, dry faster and can be used for hurried outdoor work, and bath rooms, kitchens, laundries etc. wherever much water is used.

Pale interior, a tough varnish, light in color, and easy flowing, is not affected by moisture. It is of a better quality than Mirrolac Clear, Hard Oil Finishes or Furniture Varnishes. It can be rubbed to an egg shell, or brought to a high polish. Marble Floor Finish, Transparent, contains less oil and more gum than Pale Interior and so gives us the greater resistance to hard friction under foot, which is really the most severe test on varnished surface. Mirrolac Linoleum Varnish, is quicker drying, and therefore much sought for. While of excellent wearing qualities, it does not rank as high as Marble Floor.

Last but not least, in our Mirrolac booklet, we find an old tried friend, the Devoe Polishing Oil, under the name of Mirrolac Polish.

The market is flooded with innumerable haphazard furniture polishes. Some of them will remove dirt quicker than ours will, But they contain sharp acids or abrasives that either eat into or grind off the varnish. Others polish with less rubbing effort, but contain solutions of brittle gums, which form a film over the varnish, and soon after break up into a net work of hair cracks, and then turn white and powder off.

The Mirrolac polish, if applied as directed, a little oil and a liberal rubbing, will restore new life to a varnish that is not too far gone. The all important point is, that its continued use over many years, will absolutely not injure the varnish, but keep it full of life and brilliancy.

We close as we began by placing the Devoe Mirrolac Line, alongside of Devoe Lead and Zinc and Devoe Velour, as the great home-makers and home-preservers of a home loving people. As this is the last meeting this Spring, of our Thursday night classes, I wish to thank

you all for the good attendance and the attention paid. The papers had to be written rather hurridly, but they are at least an effort to give a more intimate knowledge of our line.

This makes the eighth paper, and we hope shortly to give you two more, one on the manufacture and application of Varnishes, and the other on the manufacture, use, and care of brushes. We will send these to you, if by that time some of you may have returned to your home stamping grounds.

V A R N I S H E S

Its Manufacture and Application.

In the course of our Thursday evening meetings, we had the pleasure of hearing an instructive lecture by Mr. E. S. Phillips, based on his experience as a practical varnish maker in our Newark works. It is our purpose in this paper, to review as briefly as possible the essentials of varnish making, and give you some knowledge of the proper selection and application of the many varnishes we make.

We have dealt in our previous talks, with the manufacture and application of paints, such as are made with tough, elastic vehicles and opaque pigments, for the purpose not only of protecting the wood and metal against moisture attack and friction wear, but to hide the surface completely under a decorative coating.

Our purpose in varnishing wood, is to some extent very similar. We aim to give the same protective qualities that we demanded of our paint, but instead of the hiding power derived from opaque pigments, we strive to secure the greatest possible transparency, in order to show clearly and to enhance the inherent beauty of the figured wood. This we achieve by the use of transparent varnish resing in place of the pigments to contrast them with each other. In paint we had a composition of oxidizing oil, bodied up by opaque pigments, reduced with volatile thinner, and intimately mixed by powerful grinding machinery.

In varnish we have a composition of oxidizing oil, bodied up however with transparent resins or gums, reduced with volatile thinners, and thoroughly amalgamated by heat.

Up to a few years ago, the only oxidizing oil used in these oil varnishes, was a high grade well settled and clarified linseed oil. This oil, the varnish makers heated, and to it he added the requisite amount of Oxides of Lead and Manganese, such as used in the making of boiled oil and dryers. However, a strong rival has come into use in the last few years. China Wood Oil, also known as Tung Oil, is used in varying quantities in most of the present day varnishes, generally in conjunction with our old friend, Linseed oil.

China Wood Oil, is extracted from the fruit of the Tung tree, which grows in China and Japan. The fruit, which is about the size of a small orange, contains 5 divisions, each holding a small kernel or nut, about the size of a nutmeg. The fruit is dried and the kernels removed, placed in a crusher and the oil pressed out. China Wood Oil has the peculiar odor of hog fat, and when exposed to the air thickens up rapidly. When spread on a non-absorbent surface like glass, it dries in its raw state to an opaque wax-like film, with a "flat" rough surface. It dries more rapidly than linseed oil, and throughout the film at the same rate.

For use in varnish it must be carefully heated either with resins or drying agents such as compounds of lead, manganese or cobalt and thinned with turpentine or mineral spirits. The varnish maker heats the oil to about 360oF, for if heated high it coagulates and is converted into a jelly like mass, that cannot be redissolved. China Wood Oil is more water repellent than linseed oil, but is less elastic. The volatile thinners used in varnish making depending upon the resins used the purpose of the varnish, and often on the price paid per gallon, are turpentine, mineral spirits, benzine and alcohols.

Let us examine briefly the origin, source of supply, and the characteristics of the most used varnish gums and resins. With the exception of a synthetic gum produced in recent years, they are of natural origin, being exudations from various species of trees. The resin flows out of the trees in the form of drops. If it solidifies quickly it retains this form as for example mastic; if it solidifies slowly it forms tears or cylindrical pieces like sandarac, and if the process is still slower, and runs until it collects on the trees or drops on the ground, it forms knotty masses of varying sizes and shapes, as we find in Kauri, Zanzibar, Congo, Copals and others.

Resins differ considerably in appearance. Zanzibar is clear and transparent, but has a peculiar rough surface, like a goose skin. Other resins have a clear lustrous appearance, while some look waxy. They range in color, from the almost colorless damar gum, through pale straw and shades of brownish yellow as found in the copals, down to the deep brown almost black asphaltums. They differ widely in their hardness and their fusibility. Some resinsrequire a heat of 60oF, to melt them, while others will soften in the heat of the hands. The source of supply from which varnish resins are procured, are Africa, Australia, South American and the Phillipine Islands.

Varnish resins may be divided into two broad classes, namely, fossil and virgin resins. The fossil resins had the origin in trees that flourished and fell centuries ago. These resins, having been hardened through the slow process of time make the most durable varnishes and are for that reason, the most desirable.

However, fossil resins are becoming scarce and the consumption of varnish is rapidly increasing. In accordance with the law of supply and demand, the price of fossil resins has become very high. Consequently the varnish maker of today cannot use fossil resins, excepting in the highest quality product, and he has been forced to study and experiment with other scientific mixtures, in order to replace his former source of supply.

The principal fossil resins used, are Zanzibar, derived from the island of Zanzibar and neighboring mainlands. Kauri derived from New Zealand and Congo Copal from the African West Coast. Amber, from the Baltic coats of Europe is used too a small extent and yields an extremely hard varnish.

Fossil resins, generally are found in patches, buried in the soil to a depth of 1-1/2 or 10 feet below the surface, and covered with a crust of soil and decayed vegetation.

During the rainy seaon, the ground is soft and the natives probe the ground with a long sharp pointed steel rod, about 1/2 inch diameter. They feel in this way for the resin, and when they locate it, dig down to it with a spade, and bring it up.

Trenching the ground is another method of securing some of the fossil resins. Virgin resins, are obtained from living trees and are softer. The trees when cut, bleed profusely and yield a pale viscid fluid, which on exposure to the resin, exuded from a tree known as Damara Orientalis found in Batavia and Sumatra. Its chief merit, is its pale color, being usually clear and transparent nearly white with a faint straw color tint. It breaks easily with a powdery fracture. As a varnish it never dries thoroughly hard, and should not be used where subjected to weather or handling. It finds its chief use, in the manufacture of white enamel paints, as it dries hard in mixture, with zinc oxides. It is sometimes mixed with the darker hard drying copal varnishes, in order to produce varnishes of a fairly light color and medium hardness.

Asphaltum is a black or brownish black resinous mineral, and when melted mixes readily with linseed oil, melted rosin or any oil varnishes. Asphaltum seems to be between soft bituminous coal and liquid petroleum. Egyptian asphaltum and that obtained from Utah, known as gilsonite are said to be the hardest, while that obtained from Trinidad is extremely soft.

Asphaltums are sometimes made as spirit varnish, dissolved in turpentine or benzine, without the addition of oil. Thus made they dry rapidly through evaporation of the solvent, but become brittle and soon perish. If mixed with rosin they crack off quickly, many so called asphaltums are made from coal tar pitch, and these are very inferior.

However, if asphaltum varnishes are made from high grade gum, and properly combined with linseed oil, as is done in the manufacture of best grade clear oleo-varnishes, we obtain a slower drying but very durable varnish. Such varnishes are used as Smoke Stack Blacks, where resistance to weather and the expansion and contraction due to alternating heat and cold are necessary. Another gum very largely used and of great importance in industry is the gum shellac. This gum is really of animal origin. It is the hardened secretion of an insect about 1-40th of an inch in length, which swarms in great numbers on the "lactrees" of India and Siam.

These tiny red insects live less than a year, during which they eat, propagate, and secret the shellac. When settled on the branches of the trees they pierce with their beak through the bark into the meat of the tree, and by a process of absorption suck the sap of the trees up through their bodies and feed themselves to death. At the same time the process of propagation goes on. The sap in passing through the body, undergoes a chemical change, and is exuded, forming a hard shell like covering over the entire swarm, as the secretion is acted on by the air.

The female is really the shellac producer, while she is producing the shellac liquids, she also produces a fluid in which her eggs are matured, and from which in the next six months, the future supply of lac bugs come. These go into searms, only to repeat the operation of propagation eating and chemical transformation of the sap into shellac. The great mass of bugs on the trees become inactive as the shell like covering hardens over them, and they die. When the young break through the lifeless mass they swarm to other trees, moving as much as 12 feet in a day. They are also carried by the wind, birds and insects.

After the young are gone, the natives gather the old shell like crust, known as Stick-lac. The incrustations are broken off from the twigs, and crudely ground between two great stones. The sticks and dirt are removed and the lac is sifted. It is now known as Seed-lac.

This Seed-lac is then treated by washing and soaking for about 24 hours to free it of its natural coloring matter. It goes again through a grinder, is placed in cloth bags about 12 feet long, and only two to three inches in diameter. These are then heated before a fire, while the natives twist the bags and wring out the melted lac. The melted lac is caught on wet plantain leaves, and while still warm is stretched into thin sheets, allowed to get cold and is then broken up into flakes. This comes into the market as Orange Shellac of various grades sold as T. N. O. V. S. O. - D. C. and other quality designations.

What we know as White Shellac, is made from Orange, by desolving in a hot water solution of borax or soda. While in solution chlorine gas or similar bleaching agent is introduced until the orange color is bleached out. The shellac is then precipitated by means of an acid, and dried by placing the wet gum, broken into small pieces on flat trays and putting these in a moderately heated room. Hank White Shellac is bleached shellac, which instead of being broken and dried, is twisted into hanks. It contains about 30% of moisture. White Shellac should be thoroughly dried, before placing in alcohol and should not be left exposed to the air as it is likely to become insoluble.

Shellac is not soluble in turpentine, but can be made into a solution with ammonia water, or with borax. Rosin is the usual adulteration. Devoe Pure Shellac and Derayco Shellacs, are both absolutely pure. Derayco is a thinner shellac, containing less gum to the gallon of special denatured alcohol.

Shellac gums are hard but brittle, and being dissolved in alcohol only, they do not have the toughness of oil varnishes.

The alcohol which acts simply as a temperary means of keeping the gum in a liquid form and permitting of spreading it, evaporates quickly and leaves this film of shellac gum, just as hard and brittle as it originally was. As it is brittle, and chips easily, shellac should not be used on floors, unless necessary haste compels it. It should never be used outdoors, as contact with water will turn it white and cause it to perish.

Nor will it stand heat, as it lacks elasticity and will not expand and contract with the changes of temperature.

Shellac is a valuable friend, however, in some cases.

It is used to hold back the resin in knots and in yellow pine; it makes a good sealing coat for interior cypress; and when reduced with more alcohol can be used to stop suction in plaster and also as a liquid filler for close grain woods. It is frequently used on maple floors, where it is desired to retain the light natural color of the wood. Direct contact of oil varnishes with wood turns the wood darker, with a tendency to grow still darker in time. Repeated coats of thin white shellac, or one coat of the shellac followed by several well rebbed thin applications of Devce Wax Polish, will retain the natural color of the wood and all its beauty.

Shellac varnishes are used very largely in Europe, especially in a modified form, and a method of application, called French polishing, but the American practice of using the slower oil varnishes, if given sufficient time for hardening between coats, gives us far more durable results. Other resins of minor importance in varnish making are Sandarac used principally in spirit varnishes and Mastic which is a soft resin somewhat of the nature of Damar Gum.

Deagon's Blood and Gamboga are used for their peculiar color extracts. Last, but not least, is the great American resin, known as colophony or rosin. This is the cheapest of all commercial resins, and is used in large degree not only in professedly rosin varnishes, but as a cheapener in other varnishes masquerading as copals varnishes. This resin is the non-volatile residue left after the distillation of turpentine. Varnishes made from rosin scratch white and powder very easily, and do not withstand weather exposure. Ordinary sizing varnishes are probably the cheapest varnishes made, and are generally

a solution of rosin in benzine. Slightly better grades are often sold as liquid wood fillers, and as cheaper copal furhiture and house varnishes.

The addition of 2 to 10 per cent of lime to rosin while melted, hardens it. This rosin dissolves easily in oil, and while it dries with a hard brilliant surface, it looses lustre in a short time, forms minute cracks, which gradually enlarge and cause the varnish to crack off. In present varnish making much rosin is used by combining it with glycerine and forming the "rosin esters".

Varnishes made of these "esters" and part resin, incorporated properly with china wood oil, furnish lime of durable water resisting varnishes. However, they seem to lack the elasticity of well made linseed oil spar varnishes.

Leaving the subject of varnish ingredients, let us review briefly the manufacturing process. Oil varnishes can be sub-divided into two classes, "long-oil" and "short-oil".

When a varnish is intended for conditions requiring a tough elastic water repelling film, as for exterior exposure, it must contain a liberal quantity of oil relative to the amount of resih used. It must be "long" on oil. Our Vernosite Spar Varnish is our best example of this type of varnish.

When the varnish is intended for interior purposes, such as floors, woodwork of room etc., or as a "rub" undercoat for long oil finishing varnishes, it must be made "short" on oil, and contain more resin. We need hardness rather than elasticity, resistance to friction-wear rather than weather attack, and we desire quicker drying. Varnish cooking must be thoroughly understood. While correct materials and proportions are very necessary, the proper manipulation of the resin melting, oil mixing, and thinning, are matters that rest in the practical knowledge and experience of the individual varnish maker.

Good varnishes require a superior quality of linseed oil. This is pumped into tanks, and kept for some time at a temperature of 90 to 110F, allowed to clear itself by slow precipitation of vegetable and foreign matter. It is then generally heated to a temperature of 500o for a very short time, with a small amount of manganess, lead oxides of both. In "running" or melting the resin the customary quantity used is 100 to 125 lbs. at a time. A glowing coke fire is made in a fire pit and the resin is put into a clean kettle which fits over an opening in the platform of an iron hand truck. The kettle is covered with a loose cover, having a hold in it, through which the varnish maker stirs the melting resin with an iron rod. When the resin is melted, so that there are no lumps, the kettle is withdrawn from the fire. Ten to twenty-five percent of the weight of resin, passes off or is lost as an inflammable vapor. The melted resin foams and must be carefully matched.

Should it come too near the top the kettle must be quickly withdrawn from the fire.

The operator by means of his stirring rod and guided by his practical experience, determines the condition of this melting resin. The temperature is rarely below 650F when the melting is completed. The kettle is now withdrawn, the contents allowed to cool some, and the foam to settle. The oil, which has been previously heated to about 500oF in another kettle, is now slowly added and stirred in. The kettle is again drawn over the fire, and the temperature and length of time for cooking will vary according to the kind of varnish. A long oil varnish may be cooked 6 or 8 hours, and a short oil varnish, perhaps an hour or two.

When sufficiently cooked, the kettle is again withdrawn, and the contents allowed to cool some. The volatile thinners are now added carefully and slowly, while the operator stirs the varnish going vigorously. Highly inflammable vapors are formed and care must be used, that these vapors do not ignite. Benzine and Mineral spirits, as well as Turpentine are used as thinners. Benzine evaporates too quickly, and thus kills the flowing quality of the varnish, and impairs its spreading capacity. Turpentine and Mineral spirits evaporating slowly, permit the little ridges of varnish caused by brushing, to flow out and level themselves.

Every factory makes certain "key" varnishes, which can be intermixed, to produce themany kinds, that custom and prices demand. Our Vernosite and Yacht Spar are old fashioned long-oil varnishes, they are the most elastic varnishes we make and while more susceptible to white discoloration by water, than is our Aquaspar, they will expand and contract better under varying temperatures, and will not crack or disentegrate rapidly as a powder.

Zanzirex dries faster than the above, having less oil, but therefore not as durable. It is sooner proof against dust and rain, and some conditions, make the use of a quick drying varnish, compulsory. Aquaspar and Mirrolac spar contain considerable china wood oil, and are excellent water resistant varnishes, especially on bathroom and kitchen woodwork and floors, they are not as elastic as Vernosite and Yacht Spar, but excellent varnishes for exterior house work, like front doors etc.

Motor car finish is a durable varnish made of high grade resin but less oil than Vernosite. While less elastic, it dries with more brilliancy. We cannot always house our boats when not in use, nore take the front door in overnight, and such surfaces being constantly exposed, the all important question, is weather protection. So we reduce the amount of resin and increase the quantity of oil in our Vernosite. An automobile spends a large portion of its time in the garage, but when on the road, must be able to withstand the cutting action and impact of sand and

and stone. Therefore we increase the amount of resin, and decrease the quantity of oil, in our Motor Car Finish. We thus sacrifice some elasticity, for greater brilliancy and hardness Our Motor Car Gear, One Coat Coach and cheaper spar varnishes are made to sell at a lower price. Remember, when you take it out of the price, the maker must take it out of the price, the maker must take it out of the quality of his product.

The foregoing varnishes are comparatively speaking, long oil finishing varnishes. Let us examine a few shorter oil varnishes, such as rubbing and interior finishing varnishes. It is at times necessary to remove the gloss of a varnish, as for instance between the successive coats. Then again an egg shell or a polished surface is desired of the last coat. While long oil varnishes can be rubbed dull with ground pumice and water, the gloss is likely to return, due to the large amount of oil in the body of varnish, coming through to the surface. This is called the "sweating" of varnish. This "sweating" may be due at times to the fact that the successive coats of varnish have been hurried too much with the result that the under coat which have been shut off from oxygen too soon by the succeedingapplications, have not hardened through.

Good rubbing varnishes are our Pale Interior, Marble Floor Finish, Cabinet Finish and others. Pale Rubbing and quick Rubbing under proper drying conditions and intelligent application, can be rubbed in 36 to 48 hours without sweating. Piano Forte Polishing, made of Zanzibar resin and little oil, is our best high polish varnish. It sets up very fast, and must be applied rapidly. A varnish of this type is not very elastic, as this quality is necessarily sacrificed to high brilliancy and hardness. Piano Varnishes are sensitive to high temperatures as caused by the cencentration of the sun's rays coming through the glass of a window, and quick changes from heat to cold, will check and crack the varnish.

Pale Interior, is a happy medium. Made from hard resins, it contains less oil than Vernosite and more than Piano Pol. Varnish. It works very freely under the brush, and levels itself well. It is not as elastic as Vernosite, but accomodates itself to varying temperatures, better than Piano Forte Polishing.

Marble Floor Finish, which on account of its particular use, requires extreme hardness and toughness even at the expense of maximum elasticity, contains less oil and more resin than Pale Interior.

Rosin varnishes are hard but brittle, and even the improved China wood oil rosin varnishes are not equal in wearing quality to the Devoe Marble Floor Finish. In regard to our cheaper interior varnishes, while each of them, represents full value for the price paid, common sense will tell you, that the

quality is decreased. Allow me a brief explanation of the present day value of some varnish names. Time was, when Copal Varnish designated a varnish made of highest quality copal resins. To-day this label applies to cheap furniture varnishes made from rosin.

#1 Coach and similar "coach" varnishes. To-day these varnishes are unfit for exposed work, and are used mainly for cheap interior trim. Hard oil Finishes, originally the highest quality of interior house varnishes are to-day, at the best, but medium grade interior finishes. This loss of values, was brought about by strong price competition, with the result that qualities were forced down to a point where the names no longer commanded confidence.

Reputable manufacturers, continued these designations as cheaper varnishes, and then put up the high quality goods, under special proprietory names, coupled with their firm names backed by established reputation as reliable makers. Devoe Pale Interior for instance is our high quality Copal Varnish. Let us define a few special varnish terms.

RUBBING VARNISH, must be a short oil, hard varnish, that will rub well under pumice or rotten stone. It must not soften with the warmth generated by friction heat, nor be injured by water or oil employed in rubbing.

POLISHING VARNISH, practically a high grade rubbing varnish.

FLOWING VARNISH, A long oil varnish, that spreads easily under the brush, and remains fluid long enough to level out and show no brush marks.

DIPPING VARNISH, a varnish that will dry quickly, due to its content of quickly evaporating solvent. They are generally thin varnishes that set up rapidly and so prevent the sagging of the varnish on dipped work.

SPRAYING VARNISH, applied by spraying by air pressure. The varnish is similar to dipping varnish.

BAKING VARNISH, This varnish usually contains considerable oil, which permits its subjection to heat, without becoming short oil inelastic and brittle. The baking process produces a harder, tougher and more uniform film.

We must not forget, that varnishes, are not used only as transparent coatings, but are frequently the vehicle employed in the manufacture of high gloss paints, such as enamels, motor car finishes and floor paints.

Leaving the subject of raw materials and manufacturing and knowing something now, about the characteristics of the several varnish mixtures, let us spend a little time on the proper application of varnish. Read carefully our valuable booklet, entitled "The Secret of Rich Rooms," it is extremely interesting, and above all, practical.

We cannot impress too strongly upon the salesmen, that in varnishing as in painting, the manufacturer's products are too often wrong-fully blamed for poor results, when the ignorant or carelessness of the user is really the cause of trouble. Salesmen must have confidence in their goods, and while no maker is infallible, it is only fair to assume that the manufacture on proven formulas, and under rigid supervision leaves less chance for errors, than is likely in application by all kinds of mechanics and laymen, under all sorts of adverse conditions.

Have backbone to stand firmly by your goods, yet be fair to the consumer, and tactfully seek out the causes of failure. Convince him if possible, that your goods are right, and hold his confidence and good will. In our paper on Mirrolac, we went into details in describing some of the characteristics of different woods; how to treat close grain and coarse grain lumber with the proper fillers and stains.

Look at a section of freshly cut wood, and you will see that it looks clean and bright, and shows the grain clearly. Leave it unprotected, and it will turn dull rapidly, and the grain become obscured. Oxygen and moisture of the atmosphere will attack and rot the fibres.

On exterior exposure, the fibres are destroyed, the grain completely lost, and the wood turned black. But protect the wood thoroughly with good varnish, and you surround it with an air-tight and moisture resisting case, and exidation cannot take place. The first essential in producing good results, is to see that cleanliness is practiced in every step of the work. The surface to be varnished should be thoroughly cleaned, some of the material to be used should be poured carefully out of the original container (without agitating the varnish) into the working cup and the original can tightly sealed. Be sure, that your brush, to use painters parlance is not "lousy" that is free of particles of old hardened varnish from previous use.

The varnishing room, should be dampened down, to lay the dust, but this does not mean to flood the room. If possible the varnisher should not permit the entrance of unnecessary persons, as their moving about, is likely to stir up the dust. In places where windows permit dust laden air to enter, such windows should be properly screened, to allow of ventilation, and the carrying off of the volatile varnish vapors, yet shut out this undesirable dust. Unless this is done the

user will be likely to complain that the varnish was dirty, or contained undissolved gum. Remember that varnishes, especially the slow setting durable kind are perfect dust cathers.

Another very important preliminary, is the question of temperature and weather conditions. Varnish should never be applied in a lower temperature than 70oF, and the varnish itself should be near that degree of warmth. Furthermore, the surface to be varnished, should be warm. Varnish will flow more freely when warm, and used in a warm room, but if the surface to be varnished is cold, the varnish will contract and not stay properly "put".

Humidity is another factor, that enters the question of proper drying. Tour barometer will record this condition indoors, as well as outdoors. In hot weather, especially then, is apt to carry a large amount of moisture, and will retard the drying. A varnish will dry better in moderately cool dry air, than it will in warm moist air. Avoid varnishing or lacquering on muggy days. Be carefuly too of rapid changes of temperature. Ventilation is necessary, but a draft of cold air, will contract the varnish quickly, and cause checking.

Too often in the winter consumers take a can of varnish from a cold attic room, into a closed garage just heated with an oil stove, and the metal car still cold, and then a complain about poor materials. Make sure, that the surface to be varnished is in fit condition to receive same. If the surface is coated with old varnish coatings, that are cracked, they must be removed. Non-drying of varnish is often caused by application of the new material over surfaces previously waxed or oil polished. Frequently where the use of remover has not been followed by a thorough washing of turps or benzine, trouble of non-drying is caused, because wax is used in removers, to prevent the too rapid evaporation of the active liquids solvents, which are extremely volatile.

This wax must be removed. Avoid the use of patent surfacers, liquid wood fillers, substitute shellacs, and if possible even pure shellacs. Let your first coat of varnish, be of the same good quality as the last, but reduce it, with 20 to 25% of pure turpentine.

When turpentine is added to varnish, it is best to shake the mixture thoroughly, and let it stand 24 hours, in a warm place, before using it. Good work cannot be done with poor tools. It demands just as good a brush for one small job as it does for a number of large jobs, if that job is to be done well.

Our Soudan, Montauk and Huron Varnish Brushes, as well as our high quality oval varnish brushes, will turn out Al work when spreading quality varnish, by a man who knows how. The first coat of varnish should be allowed to dry thoroughly hard,

before a second coat is applied and shuts off the oxygen necessary to properly harden the first. The same care should be excercised with the second coat, before the third is applied. Each intermediate coat should be well hardened, or it will have a tendency to keep the succeeding coat soft. The rushing of a job oft times, causes a tacky condition in the finishing coat.

The undercoats of varnish, should be rubbed when hard with ground pumice stone and water, or #1 steel wool, just enough to remove the lustre. Rubbing creates a series of very fine scratches, hardly visible to the naked eye.

These scratches break up the light reflection and cause a dull appearance, at the same time giving us a holding surface for the following coat of varnish. On exterior work, the last coat is generally left in its natural gloss.

Interior work is frequently rubbed down on the last coat to a dull finish as described for undercoats. For a satin finish, the surface should be rubbed up with an oil like our Mirrolac polish. Sometimes a high polish is desired, as in piano work. This is done by following the pumice rubbing, by a final rubbing with flour rotten stone and water. In extra fine work, this rubbing is completed by rubbing the varnish with a small quantity of very fine rotten stone on the bare hand, moistened with water.

Rubbing should be done, by taking the material up on a piece of so called rubbing felt, and the operation should be carried out in a long even stroke, being careful not to use too much nor an uneven pressure. The last polishing rub with the hand, should be done with a circular motion.

Good piano polishing is an art that can be acquired only through the close observance of work performed by expert polishers, and the patience necessary to try again and again in the face of failure. Do not advise an amateur to attempt this high class work without warning him fairly that experience is necessary in fairness to varnish used. Where an egg finish is desired, and the expensive labor of rubbing is to be eliminated, our Rubbed Effect Varnish can be used as a last coat. Best results are obtained however, by proper rubbing down of high gloss varnishes.

Shellac seldom requires any rubbing. Contact with water must be avoided. Between coats, if necessary to efface brush marks a light rubbing can be given with fine steel wool.

In conclusion, let me call attention to some of the terms and their meanings applied to some of the varnish "deviltries" and give also an example of the comparative cost of quality varnish and price varnish.

Blurring of varnish is an appearance of spots or dirty looking streaks.

Blooming is a plum color, cloudy appearance. These troubles are generally due to wet weather, and can often be cured by washing with cold water and standing in the sun.

Blooming is sometimes caused in short oil varnishes by their inability to resist the action of moisture or of various fumes and gases.

Checking or Cracking Checks are but the beginning of cracks, which sometimes widen until the varnish particles stand out like bark on wood. This is due to the perishing or disentegration of the varnish, due to its final oxidation and loss of elasticity. Being no longer able to expand and contract it tears apart. A poor quality varnish will reach this condition quicker than good quality paint will.

Checking is due often to the action of coal gas or ammonia fumes, as also by washing with hot water or by the action of alkaline soaps.

Chilling of a varnish, kept in extreme cold, will cause a separation of its ingredients and cause it to work "specky".

Chipping or flaking off, if it occurs in short time, is often caused by using brittle varnishes.

Sinking or Deadening, is frequently the result of applying varnishes over an absorbent surface, like a porous paste wood filler, or when the coat of varnish is applied over an undercoat that is not hardened and so is partially absorbed.

An expert wood finisher sums up as follows: "For varnish to dry and harden properly require light, ventilation and moderate temperature. Very hot weather, very cold weather and humidity all interfere with drying. Best results are gotten in dry atmosphere and a temperature ranging from 65 to 80oF.