

Scientific Section
HENRY A. GARDNER, DIRECTOR
National Paint Varnish and Lacquer Association
I N C O R P O R A T E D
2701 NEW YORK AVE. N.W. WASHINGTON D. C.

APRIL 16, 1934

TO THE MEMBERS OF THE EXECUTIVE COMMITTEE.

Dear Sirs:

In regard to the matter of the chapter on paints in the "Wood Handbook" of the Forest Products Laboratory, which was discussed at the meeting of the Executive Committee in Chicago, I would suggest that you read the letter which I have prepared on the subject and sent to Dr. Browne.

Yours very truly,

H. A. Gardner

APRIL 16, 1934

Dr. F. L. Browne
Forest Products Laboratory
Madison, Wisconsin

NCA 0 02614

Dear Dr. Browne:

I certainly appreciate your kindness in coming over to Chicago Thursday evening to talk with me regarding the painting chapter of the new "Wood Handbook." The members of our committee were all glad to have the opportunity of meeting you at that time. I also want to thank you for letting me take back to Washington the painting chapter so that I could go over it and return to you some suggestions which might be the basis of changes which could be made before the chapter is sent to the printer. I have therefore marked some of the pages with a circle, at the points where changes might be considered.

Page 518. You have indicated that "woodwork is painted usually to improve its appearance." I think you should also state that paint preserves wood from weathering.

Page 519. You state that "paints and varnishes are not effective as preservatives against decay." I would suggest that you qualify this by indicating that "Decay" means the form of disintegration caused by wood destroying fungi.

N 3908

This would clear the matter up in the minds of some readers.

You have also stated on this page that "shingle stains are often made with relatively volatile distillates which lose their toxic properties rather rapidly." I think you will find that many shingle stains are made with high boiling creosotes which remain in the film for very long periods of time.

Page 523. You suggest that "the oily extract in cypress will retard the drying of paints which do not contain white lead." I think you will find certain grades of oily cypress retard the drying of any kind of paint. Doubtless, however, white lead acts to some extent as a drying stimulant.

Page 525. You refer to the fading of colors due to chalking. You might indicate that this is not really fading but an optical effect caused by the chalk which masks the real color of the paint.

On the same page you suggest that "good paints improperly applied might form conspicuous cracks." I think you might modify this statement.

At the bottom of the same page, I think you might modify the statement regarding the fragments of paint on repainted coatings.

Page 530. You state that "paste paints have the important advantage over prepared paints of being easily mixed with any desired proportion of pigment and oil." I think you are in error on this, as it is extremely simple to add oil and thinner to prepared paints in order to get practically any desired proportion or mix. In other words, prepared paints are usually made of a pretty heavy body so that they are receptive to reduction, and they surely are most easy to mix. You also state on the same page that "paste paints are better adapted than prepared paints to two-coat work on new wood and to one-coat repainting." I do not think this statement conforms with the generally accepted knowledge of the subject. Prepared paints certainly are as well adapted as paste paints to the types of work referred to. I would strongly recommend that you reconsider the statements referred to on this page.

Page 531. You refer to straight white lead paint, and then you state that "all other reliable white paints contain a mixture of zinc oxide with one or more other white pigments." There are, of course, some paints that do not contain zinc oxide. Some are made with mixtures of white lead and titanium oxide.

You also state on this page that "the outstanding merit of pure white lead is that upon weathering it breaks up into fragments smaller than those of paints containing zinc oxide." While this statement might have been true of many mixed paints containing zinc oxide, it certainly is not true of paints containing some of the modern mixtures of white lead, zinc oxide, and titanium pigments. These latter mixtures, in my own tests have weathered for many years without breaking up into large fragments. As a matter of fact, the titanium seems in many cases to overcome the checking and cracking of the lead and zinc pigments, and it is possible that some of the newly developed pure zinc sulfides might have the same effect.

Page 532. You state that "neglected surfaces of white lead paint can usually be restored to presentable condition with less labor and expense than similar surfaces coated with other white paints." I do not check on this

entirely. If white lead has not been properly mixed, and if it alligators heavily, it is difficult to restore. On the other hand, certain mixtures of white lead, zinc oxide, and other pigments may weather down to a chalked surface but not checked surfaces, that are easy to repaint. I believe, therefore, that you might to advantage modify this statement.

On the same page you state that "paints containing a moderate amount of zinc oxide take longer than a pure white lead paint to become fissured, retain tints more satisfactorily, and give better protection to the wood against weathering, but if they contain too much zinc oxide the fissures of deterioration are conspicuous, and the fragments of coating that subsequently fall off are large. For that reason the zinc oxide should amount to no more than 30% by weight of the total pigment." ... I think in general your presentation of this is very clear and might be somewhat similar to that of many other observers. On the other hand, I have seen many paints containing more zinc oxide than 30%, which have been satisfactory. As a matter of fact, one of the modern paints put out at the present time contains 20% of zinc oxide and 20% of titanium oxide, ground in a tung oil liquid. This paint has already given interesting results in early tests. In some of my own tests during the past four or five years, I have exposed paints with as high as 90% zinc oxide, with fairly interesting results, but, of course, I believe that quantity is entirely too high. Nevertheless, the trend in zinc oxide paints is towards the use of a very coarse zinc oxide. Paints made with the coarse oxides seem to weather very satisfactorily as compared to paints made with the very finely divided zinc oxides. It is possible, therefore, that in the future, we may see developments in this direction, which will be worth while.

On the same page you refer to various compositions for mixed paints, and I think your statement might to advantage be modified along the following lines. You might, for instance, state as follows:

"It is probably unwise to enter into a discussion as to what constitutes the best paint, but it may be stated that insofar as high grade exterior paints are concerned, those put out in this country usually contain from 80 to 100 percent of lead and zinc, or of lead, zinc and titanium pigments, when furnished in white; and reinforced with colors that add to the durability of the paint, when they are furnished in tints. Zinc sulfide is another pigment which has recently come into use in compositions of this character. Antimony oxide is an additional pigment which has been employed in prepared paints, and it has characteristics somewhat similar to those of white lead."

Page 533. You state that "the deeply colored paints are usually much more durable and often cheaper than white or light colored paints." This may in some instances be true. I presume you refer to iron oxide paints. On the other hand, there are certain colored paints, such as pure chrome yellow paints or specially bright reds, which are very much more expensive than white or light tinted paints. You might, therefore, modify this statement.

Page 534. You state that "in general the best paint of a chosen color is the one containing the least proportion of inert pigments" etc. This statement might be modified, as certain greens containing inert may be more durable than the C. P. greens, in certain liquids.

NCA 0 02616

On the same page you state that "ordinarily stains are cheaper and more durable than paints." I think you will find that stains are generally less durable than paints. Moreover, your recommendation regarding the oil content of stains might be modified, as the amount of oil you have recommended might produce a glossy surface which would not be desirable under certain conditions.

Page 536. There is a little question in my mind as to your statement to the effect that "over old coatings that are fissured sprayed paint may not prove so durable as brushed paint." You might look into this a bit. Possibly the thicker coating produced by spraying would make an even more durable film on some surfaces.

Page 537. On this page you have presented a rather extensive chart showing the reductions for the first, second and third coats for paste paints that are to be used for painting new wood surfaces, and on page 540 you have presented a similar chart for paste paints that are to be used for repainting old surfaces. It seems to me that these charts might be eliminated entirely, as they might be entirely incorrect for different kinds of paste paints. While the recommendations might be satisfactory for pure lead and oil, it is not stated whether the lead and oil is of the old type, namely, 90 lead and 10 of linseed oil, or of the new type which contains very much more oil. Moreover, there are many other paste paints on the market, which the consumer might purchase, and these mixed pigment paste paints might require entirely different reductions than straight white lead. Would it not be proper to eliminate these charts and merely state that the purchaser will find proper reduction directions on the label of the paste paint which he buys, and that he should follow as closely as possible the reductions recommended by the manufacturer?

Page 538. Your suggestion that three coats of prepared paint should always be applied to new wood would, in my opinion, apply also to white lead and to other paste paints. I doubt if a satisfactory job on any new surface will result with only two coats of paint.

On the same page you suggest that paint is more durable on certain kinds of refractory woods, if the wood is primed with aluminum paint. It might be well to modify this to state that certain types of special primers are also desirable on such woods. In other words, there are special primers on the market, other than aluminum, which might be used with the same good results that are obtained with aluminum.

Page 539. You suggest that repainting should be done when fissures appear in the coating, and should never be deferred beyond the earliest beginning of flaking. Possibly you could work in the fact that repainting often should be done when the surface gets dull and chalky and before it gets to the point of failure by checking or flaking.

At the bottom of the same page you will find it might be well to bring in my previous criticism regarding the use of the manufacturer's directions for reducing all kinds of pastes, semi-pastes, and ready mixed paints, rather than to use the special tables of reductions which you have presented.

On page 546 you present some photographs which indicate the superiority of aluminum paint as a primer for certain kinds of wood. I am wondering if you have any other photographs you could present, indicating the good results that are obtained on the same kinds of refractory woods with the other special

primers available on the market. Moreover, there is another photograph of four panels, indicating in your tests very much better results with white lead than with some special mixed paints. I am wondering if these are representative of your final conclusions, as the result of all of your tests. For instance, some of the photographs do not appear to check at all with the experience I have had with some of these mixtures.

Page 548 presents a rather elaborate table showing the greater moisture excluding effectiveness of aluminum paints. There is a question in my mind, of course, as to what this means from the standpoint of the primer on certain kinds of wood. It might be desirable to boil this table down to a brief statement, as the average consumer would not be able to understand all the technical terms used therein. Possibly a generalization would be worth while.

Page 551. You suggest that when architectural design calls for a weather-beaten appearance on a wood surface, the wood should be allowed to weather naturally, "especially since uncoated exterior woodwork is not necessarily lacking in durability." I think you might modify this statement, as uncoated dwellings would soon show warping, cupping and distinct signs of weathering that would not be especially attractive.

On the same page you suggest the greater life of interior finishes. I think you can modify this to state that interior finishes have good life inside, but they do not wear outside as long as exterior paints.

Page 552. In your suggestion that interior surfaces might be painted with the same materials as used for outside surfaces, it would be well to remember that exterior paints are usually off-color as compared to the modern types of flat and gloss enamels used for interior work. The pigments used for the interior paints, are, of course, very much whiter and of clearer tone.

In the same paragraph you refer to enamels being less opaque than paints. As a matter of fact, modern enamels made with titanium oxide and zinc sulfide may in some instances be very much more opaque than exterior paints.

Page 553. You suggest priming inside surfaces with white lead. You might also suggest the use of special enamel undercoaters which are available for this purpose.

Page 554. In speaking of stains for interior surfaces, you might refer to the newly developed stains which contain solvents which do not raise the grain of wood.

Page 555. Your reference to the superiority of shellac over certain varnishes for sealing properties might be modified.

Page 556. Dull surfaces may be produced with ready made varnishes and lacquers of the dull type.

Page 557. You might modify your statement regarding coatings for floors that carry heavy traffic.

I hope you will not think that I have been too critical of your article. I am quite sure that the new "Wood Handbook", when it appears, will be of tremendous value to the general public, and I sincerely trust that the chapter on paints will be modified so that it will be of the greatest service.

HAG-P

Yours very truly,
(Signed) H. A. Gardner

NCA 0 02618

Scientific Section
HENRY A. GARDNER, DIRECTOR
National Paint Varnish and Lacquer Association
INCORPORATED
2201 NEW YORK AVE., N. W. WASHINGTON, D. C.

April 24, 1934.

To the members of the
Executive Committee.

Dear Sirs:

Dr. Browne's Wood Handbook

Dr. Browne wrote me under date of April 20th in the form of an eight page letter, a copy of which you will find herewith. The last paragraph of his letter appears to sum up his attitude.

Please note my reply to Dr. Browne, dated April 24th.

Yours very truly,

H. A. Gardner

HAG-P

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SCIENTIFIC SECTION
NATIONAL PAINT, VARNISH AND LACQUER ASSOCIATION
Washington, D. C.

April 24, 1934.

Dr. F. L. Browne,
Forest Products Laboratory,
Madison, Wis.

Dear Dr. Browne:

I want to thank you for your comprehensive letter of April 20th.

You have gone to a lot of trouble to answer my suggestions, but I really think you have failed to grasp the significance of this matter. A pamphlet such as you propose, if issued under authority of the U. S. Government, would carry tremendous weight with the users of paint. Unfortunately, however, the results of the panel tests which you have made in different parts of the country do not in general bear out the practical results obtained by painters and other paint users who have applied the products of our industry on full size painting jobs, as well as repainting jobs, for many years. In other words, paint manufacturers have designed both paste and ready mixed compositions which have given satisfactory service on the majority of large painting jobs that were in condition to receive paint. It is conceivable, therefore, that entirely erroneous results might be obtained from small size test panels such as you have used and such as our own laboratory has employed in the past. Results from such small size tests are of interest, but they mean very little as compared to practical tests upon full-size dwellings.

I think you would be doing the public a great service if you would advance some general statements regarding various woods and their paintability, their selection, their resistance to weathering, etc. On the other hand, I think it would be an error to attempt to instruct the painter or the paint-using public as to just how to reduce paint and just exactly what the composition of the paint should be. It would constitute misleading information and would be harmful to the painting public and to the American paint industry as well.

I hope to see you in New York next week, at which time we can possibly talk this matter over more thoroughly. In the meantime, you might care to stop off at Cleveland on your way east, and see Stove Nail and thus secure some practical pointers that would be helpful.

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I hope you will receive the above suggestions in the friendly way that they are made, and that my comments will not in any way disturb the friendly relations which have always existed between the Forest Products Laboratory and our own.

With best wishes,

Yours very truly,

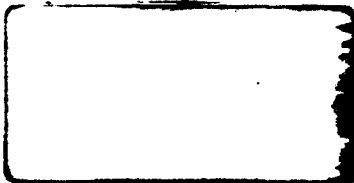
(Signed) H. A. Gardner

HAG-P

NCA 0 02621



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U. S. DEPARTMENT OF AGRICULTURE

Forest Service

Madison, Wisconsin

April 20, 1934

Dr. H. A. Gardner
2201 New York Ave., N. W.
Washington, D. C.

Dear Dr. Gardner:

Thank you for the comments in your letter of April 16 with which you returned the chapter on painting for our Wood Handbook. I enclose copies of some further correspondence with Mr. Kohr that I should like you to read before going on with the discussion of your specific criticisms that follows:

Page 518: The behavior of woodwork on weathering is discussed elsewhere in the Handbook and there is a section on uncoated exterior woodwork on page 551 of this chapter. Since the objection to weathering is usually a matter of appearance primarily I feel that the statement covers the ground satisfactorily as it is. To alter it as you suggest would involve a serious reorganization of the chapter that would be less desirable from the point of view of architects and engineers.

Page 519: The meaning of "decay" in this sentence is clearly defined by inference. The Handbook contains two whole chapters on decay and wood preservation. Some of our critics feel that the matter will be all too clear to readers as it is.

My knowledge of the composition of shingle stains is mostly second-hand. Your criticism comes as a surprise in view of the advice I have received from others. Perhaps specific discussion of distillation ranges would bring a closer understanding but time does not permit that at present. I think the situation can be met by changing "generally" to "sometimes" because I am sure that many stains contain creosotes that we consider relatively volatile.

Page 523: There is no doubt that white lead markedly stimulates the drying of paint on oily cypress. We have examined this question rather thoroughly and obtained samples of exceedingly oily cypress for the purpose. White lead paint never failed to dry reasonably promptly on any of them and always much faster than lead-free paints which on white pine dried fully as rapidly as the white lead paint. I think that the facts are expressed by the present reading as fully as is necessary and that further elaboration would give the subject undue importance.

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Dr. H. A. G.

Page 2

Page 525: Explanation of the mechanism of fading seems unduly technical for this purpose. Architects and engineers are concerned only with fact of change in color. The mechanism interests paint technologists but their needs are not important for this publication.

You do not indicate how you suggest modifying the statement that "good paints improperly applied may form conspicuous cracks." I have in mind Judge Rosenberry's house in Madison, painted with white lead, another house in Madison painted with a good prepared paint, and practically all the wood buildings along the Rock Island-Southern Pacific lines from Kansas City to Los Angeles, painted with colored paints. Detailed elaboration of the conditions leading to such conspicuous cracking seems unnecessary in view of the specific directions given in the chapter for using the paints properly.

I do not understand what modification you wish for the statement about fragments of paint on repainted coatings.

Page 527: A circle is drawn, but no comment given about a paragraph that reads: "Piny resins consist of a solid rosin and a volatile liquid such as turpentine. They affect paint unfavorably in two ways, (1) by reacting chemically with certain paint pigments, notably zinc oxide, forming soaps that tend to make coatings more brittle, etc." As to the fact that the pines definitely discriminate against paints containing zinc oxide our evidence is so abundant and consistent ever since we began our work that it must be accepted. The explanation offered is in accord with prevailing ideas about metallic soaps in paint and therefore seems justified. I think it more helpful in this case to give the explanation than to let the statement of fact ride without it.

Page 528: A circle is drawn opposite Table 57, which gives our classification of softwoods for painting but I find no comment in your letter.

Page 530: A number of well informed paint men hold that the final coat of paint should have 28 to 30 percent pigment volume. A number of second grade prepared paints, particularly lithopone paints, are sold with 28 percent pigment volume and Sears Roebuck's "Longlife" paint has materially higher pigment volume but I do not know any first grade prepared paint that passes 28 percent pigment volume and very few that approach it. In other words, most prepared paints of good quality are already overloaded with linseed oil. If the paint settles reasonably well it is, of course, possible to pour off some of the oil but I have never seen that practice recommended. It certainly is usually undesirable to add oil to the finish-coat of prepared paint and in that case the second-coat paint must be mixed with as low a pigment volume as the final coat. To the best of my knowledge all sellers of paste paint recommend a second-coat mixture of materially higher pigment volume than the third-coat mixture. All of our craftsmen's knowledge as well as theoretical

consideration point to the desirability of a very high pigment volume for second-coat paint. The desirable relations in pigment volume are easily obtained with paste paints but they cannot be obtained with such prepared paints as Sherwin-Williams, Lowe Bros., Du Pont's and Pittsburgh's unless part of the vehicle is poured off and replaced with volatile in mixing the second coat.

Similar reasoning applies to the use of paste and prepared paints for two-coat initial painting and one-coat repainting. The mixtures of paste paint that I recommend for these purposes cannot be matched with respect to pigment volume and spreading rate with any high grade prepared paints with which I am familiar and without these necessary conditions of pigment volume and spreading rate I have been unable to make any two-coat initial paint job compare favorably in serviceableness with a three-coat job.

I consider these matters of very great importance. Next to moisture failures of paints the most common causes of unsatisfactory paint service in my opinion are the overloading of paint with linseed oil and application of too little paint. The competitive situation makes it difficult for any paint manufacturer to advise his customers against these practices and for that reason we are particularly obligated to make ourselves clear about it. I think that it would be a great mistake for prepared paint manufacturers to recommend their paints for two-coat initial painting and one-coat repainting.

Page 531: I know that experiments have been made with mixtures of white lead and titanium pigments but I do not know of any linseed oil house paints of that formula that have been sold long enough to be recommended as reliable house paints. It is my understanding that special vehicles are considered necessary with such pigment mixtures. If I am wrong I should like very much to have the names of any that bear formula labels and to see tests or houses that show them in their final form of disintegration.

I have long been very enthusiastic about paints containing titanium pigments, white lead, and zinc oxide. It has been my experience that they do take longer to become fissured and to start flaking than lead and zinc paints but I have yet to see one that does not ultimately reach this condition. If there were such a formula our present effort to modify linseed oil to prevent embrittlement and obtain equal serviceableness on southern pine and redwood would be quite unnecessary. Zinc sulfide, however, is quite unlike titanium dioxide because it is definitely a checking pigment like white lead. I have rarely found typical paint checking in a white paint that did not contain either white lead or zinc sulfide. In other words checking seems to be a property imparted by hydrophobic pigments.

Page 532: I think that you overlook the care-fully emphasized adjective "neglected". Lead and zinc paints that are chalking but have not yet reached the stage of flaking are not yet neglected. If repainted at this time they can be repainted with one coat more easily than coatings of white lead of the same age but if flaking is once allowed to go very far the conditions become very different, particularly if such neglect is practiced after each of several repaintings.

The limit of 50 percent for zinc oxide is of course arbitrary and based on Federal Specification TT-P-36. The paint with 80 percent zinc oxide to which you refer is not a linseed oil paint and is not yet old enough to enter into this discussion. While I am aware of the evidence that coarse zinc oxides can be used more generously than fine zinc oxides that fact cannot alter a recommendation of this kind until either the kind of zinc oxide becomes part of the formula label or the coarser types of zinc oxide displace generally the types now in use. I do not think that the statement should be made general enough to admit 99 percent zinc oxide and 1 percent white lead as a satisfactory pigment for linseed oil paint.

Page 533: The fact that chrome yellow and bright red paints are as expensive or more expensive than white paints is specifically stated on this page.

Page 534: In view of the limitation of the discussion to linseed oil house paints, conflicting advice from other sources, and the comparatively minor importance of your point with reference to reduced greens in certain liquids I do not believe that further elaboration is advisable.

My own work with stains has been very limited but I have been observing the practice of homeowners with both stained and painted woodwork. I note that, as a rule, the trim is repainted two or three times to every time the shingles or siding is stained. I have no standard of durability for stains as I have for paints and it may be maintained that homeowners habitually neglect staining more than they do painting but until a standard of durability for staining is set up I think that it is inadvisable to make such distinctions. My statement about the proportions of oil in good stains is taken from the National Lead Company, whose advice on the subject seems to me the most rational I have seen.

Page 536: We have a barn in Madison on which badly fissured old paint was repainted by a contractor using brush and by a contractor using the spray. The work was very carefully supervised and record kept of the paint consumed. The results are very definite.

Page 537: In my opinion these charts or their equivalent are essential. There is no point on which architects, engineers, and painters need more vigorous instruc-

Dr. H. A. G.

Page 5

tion than in the mixing of paint with plenty of pigment and in keeping spreading rates within reasonable bounds. General statements mean nothing. Definite figures must be given. While some variation in the volume relations of commercial paste paints is possible it is very small as compared with the abuse I am trying to correct. The formulas as given are applicable particularly to soft paste white lead and to mixed pigment paste paints but good results will also be obtained if heavy paste white lead is used instead. As stated these formulas can be applied more easily to the mixed pigment pastes, which are sold by volume, than to the white lead pastes, which are sold by weight.

Unfortunately mixing directions are not always given on labels. Paste white lead for example, does not carry such directions on the label and I note that recent shipments of Dutch Boy soft paste do not give even the composition. Our building just now is the scene of much activity by contracting painters and I find that the containers in which the paints are shipped usually fail to give either the composition of the paint or directions for mixing it. These conditions do not favor good painting practice and I feel sure that we must say something definite about the subject if our Handbook is to be useful. I do not believe that anyone will go far wrong in using these formulas for mixing any soft paste paint.

Page 538: That good two-coat initial painting can be done with paste paints can no longer be denied. There must be some hundreds of houses in Madison alone that were painted that way and some of our best builders will consider nothing else. I have repeatedly tested two-coat painting against three-coat painting during the past 10 years and find that, when the necessary conditions for good two-coat painting are met, the results are just about as satisfactory as they are with three-coat jobs. We cannot ignore evidence on such a scale. Two-coat painting, however, must be done correctly because there is no extra coat to make up for deficiencies in priming or stingy application. I do not know how to paint acceptably in two coats with prepared paints.

So far I have seen no special priming paint that is comparable with aluminum primer for retarding flaking from summerwood on southern pine and Douglas fir. I feel confident that, when any of the better known manufacturers has such a primer, his technical staff will want me to try it. So far no maker of such primer has presented it to me for that purpose though they have asked me to test them for resistance to moisture blistering. Such products as Wallhide Exterior Primer and Peel-Kill are not, in my opinion, competitive with aluminum primer at all.

Page 539: I would not repaint my own house when the paint becomes dull and chalky not only because I can't afford to but because it is often dangerous. Too frequent

Dr. H. A. G.

Page 6

repainting is dangerous unless the painting procedure has been guided from the beginning with such purpose in view. The common practice of overloading paint with linseed oil especially when the paint contains zinc oxide to protect the oil, makes it necessary to allow the coating to age well before repainting it. Failure to do so leads to cracking and slipping of zinc-containing paints and to alligatoring of white lead. These troubles are quite common among the more affluent homeowners.

Page 546: For reasons already discussed I can show no photograph of retarded flaking from summerwood obtained with a special primer other than aluminum. Some day I hope to be able to do so but the primer must first be discovered. The other illustration was very carefully chosen to illustrate principles brought out in the text. On redwood all three zinc-containing paints are fully as satisfactory as the white lead. On white pine the white lead is as satisfactory as it is on redwood but the zinc-containing paints show the antagonistic effect of the pine resin in white pine. No paint does as well on southern pine or Douglas fir as it does on redwood. These results are thoroughly typical, making the illustration fully representative. It should be remembered, of course, that in order to show paint failure in a photograph it is necessary to let the exposure continue well into the period of paint neglect. This naturally tends to favor white lead as compared with zinc-containing paints because it is in this period that the good features of white lead are brought out.

Page 548: The data on moisture excluding effectiveness are requested by our correspondents more often than any other one subject in our wood finishing activities. Furthermore this laboratory is practically the only source of such information at present. Omission of the data would justly subject us to very severe criticism.

Page 551: The weathering of unpainted exterior woodwork is adequately described elsewhere in the Handbook and the development of cupping, twisting, and checking is mentioned in the very next sentence. The problem is one about which we are frequently consulted and cannot well be avoided. Since the oldest frame house in America remains to this day unpainted I think that the statement is entirely reasonable.

I do not understand why any reader should suppose that an interior finish could be used satisfactorily outdoors. Introduction of unnecessary statements tends to be confusing rather than helpful.

Page 552: I shall suggest insertion of "better color" among the superiorities of interior enamels over exterior paints.

My sentence about the relative opacity of paints and enamels is qualified by "usually". The high opacity

enamels are not yet used as widely as ordinary enamels for architectural finishes, and I see no probability that they ever will be. The sentence therefore should be satisfactory as it stands.

Page 553: As I understand it, enamel undercoaters are not primers and should be applied after the primer.

Page 554: The new stains are intermediate in character between water stains and oil stains, both in respect to the appearance produced and to grain raising. To bring them in requires another fairly long sentence which does not seem to be justified from the point of view of their importance in architectural finishing.

Page 555: It is not clear to me how you would wish the statement about varnish and shellac as sealers to be modified.

Page 556: The comment is not clear to me since the statement made agrees with the statement in your letter.

Page 557: Once more I am uncertain as to the kind of modification of my statement that you suggest.

Nearly all of the suggestions made deal with issues about which I have thought a great deal for many years and have been reasonably familiar with the varied points of view of many persons. Since I had them clearly in mind while writing this chapter I find myself unable to make many serious alterations. I feel keenly that you do not fully appreciate the extent to which I have to deal with competent criticisms that run directly counter to your own, which makes it necessary for me to rely primarily upon evidence that I have been able to get directly and to be very cautious in allowing the opinions of others to influence my judgment. To one in my position it becomes evident that each industry tends to build up for itself a body of sincere opinion supposedly based upon sound experience but resulting in fact from "wishful thinking." I hope that my inability to accept some of the opinions that have long gone unchallenged in the mixed paint industry will not be considered a discourtesy but will instead lead the industry to a serious effort to re-examine its position and subject some of the postulates it has long accepted to practical test.

Very truly yours,

(Signed) F. L. Browne
Senior Chemist