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BY

ARTHUR SEYMOUR JENNINGS,


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PREFACE TO THE SIXTH EDITION.

With the present edition, this book reaches a total issue of 15,000 copies—an unusually large number for a technical work.

Originally the book was intended merely as a guide to painters who were more or less deficient in the knowledge of the art of paint mixing and colour mixing. From this point of view it was a great success, and as subsequent editions were produced, a great many new colour names and specimens were added. The instructions for mixing different colours will, it is hoped, be found to be clear and exhaustive.

Experience proved that the book appealed very strongly to master painters, who found it most useful to show to their customers, in order to ascertain their tastes in the colours which they wished used in the decoration of their houses. Having been instructed to use any particular colour given in the book, it was a simple matter to order it from a paint manufacturer, who would probably have a copy of the work on hand, so that, by quoting the number of the plate and specimen, the exact colour required would be known.

A further use of the book to paint manufacturers has been found as a guide in mixing and naming new tints and shades.

The author hopes, therefore, that this edition will be even more successful than those previously issued. All the plates are quite new, and some of the text has been enlarged and re-written.

ARTHUR SEYMOUR JENNINGS.

Office of "The Decorator,"
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January, 1921.
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CHAPTER I.

PAINT AND COLOUR MIXING: INTRODUCTION.

The Composition of a Paint.—Clearly the first thing to be done before studying the subject of paint and colour mixing is to define "paint" and "colour." Without attempting to give a hard and fast definition, it may be said that a paint consists of any pigment, or pigments, such as white lead, tinctured or used plain, mixed with linseed oil, and thinned by means of turpentine to render it in such a condition that it may be readily applied to the surface of wood, iron and other work by means of a brush. Paint serves the purpose, first of preserving the material to which it is applied, and sometimes, but not always, a second purpose, namely, that of decoration or adding to the beauty of the object to which it is applied.

The principal pigment used in paint mixing is white lead, but there are many others that are also employed. Many painters look upon paint as necessarily consisting of white lead, to which has been added sufficient colouring matter to give the desired tint. As a matter of fact, white lead may be wholly absent from a paint. For example, yellow ochre or sienna may each be used by itself. Iron oxide in the shape of Indian red, purple brown, or Venetian red, form in themselves good paints if the colour is not objectionable. Red lead used by itself is a useful paint. Again, in the white and lighter paints, we sometimes have white lead replaced by zinc oxide, lithopone, Charlton white, Orr's white, and other white pigments, which may be used alone or be mixed with a small proportion of barytes, asbestine and other materials.

The oil used in mixing paint is principally used
to combine or unite together the particles of which the pigment is composed. It is also employed to
give a glossy surface and to bring the material to a
proper consistency. Turpentine could be used for
the latter purpose by itself, but the result would
be what is termed a "flat" surface, or an absence
of gloss. The turpentine, too, evaporates almost
wholly. It is generally conceded, among those who
have given close attention to the subject, that the
durability of a paint depends largely upon the oil
used; indeed, it has been likened to the life blood
of the paint. Recent investigation has shown that
it depends also and to a very great extent upon the
fineness of the particles. A perfectly pure, but
coarsely ground pigment, when made into paint,
will not last nearly so long as one which is finely
ground.

There is not much doubt that the best pigments
may be replaced with others somewhat inferior without
so much detriment to the quality of the paint as if
linseed oil is replaced by some other oil. It is quite
necessary that pure linseed oil be used in the manu-
facture of all paints, and although there are one or
two substitutes on the market which may be employed
in very cheap work, no attempt should be made to
execute a really good job unless pure linseed oil is
used. The purpose of the oil in giving a gloss is
sometimes assisted by the addition of a small quantity
of oak varnish. This is a growing custom among
painters, as the gloss produced is decidedly improved
by the addition of the varnish, and the work shows up
well, while the varnish does not in any way detract
from the durability of the paint, but rather adds to it.
This practice is employed more on outside than inside
work, where the execution of the painting requires
more care than it does inside, owing to the severe
atmospheric conditions, which cause any paint work
not properly prepared to soon decay.
INTRODUCTION.

For our present purpose "colour" may be defined as a pigment possessing a hue or colour in itself which it imparts to the white lead or other white pigment with which it is mixed, thus producing a series of "tints" according to the proportions employed. It is for this reason that colours in painter's parlance are frequently called "stainers," although the word is not quite correct, as it implies an effect similar to that which would be produced by the use of a stain or dye. As a matter of fact coloured pigments, when mixed with white ones, do not actually stain, but the particles lie side by side and become merged into each other when viewed at a little distance.

In mixing a paint the base, such as white lead, having been selected, a colour is mixed with it in order to produce the desired hue or tint. Frequently, however, a colour is made by the mixture of several colours, which are added to the base, or sometimes a single colour may be used by itself, or several colours without white at all may be employed.

The colour having been determined, oil, turpentine, and driers are then added. The object of the driers is that of causing the paint material to dry quickly. There are several kinds of driers on the market, but the two best known are termed "patent driers," which is sold in solid form, and the "liquid driers" or "japanners." Whichever is used, the actual quantity employed will depend very largely upon the pigment. Some pigments, such, for instance, as red lead, may be considered in themselves driers, and the addition of any other is unnecessary. Others, like Vandyke brown, dry slowly, and much more driers will be necessary than is the case with white lead. Further on we give some idea of the proportions of materials to be used, but it will be understood that no exact information on the subject will be possible, for reasons that will be explained. It is of the utmost importance to remember that an excess of driers is most objection...
PAINT AND COLOUR MIXING.

able. It often retards, instead of increasing, the drying quality, it causes cracks and blisters, and above all, it proves very destructive to the paint itself.

The quality of patent driers varies very greatly, some of the cheaper grades consisting largely of material which possesses no drying properties whatever. Indeed, at the present day there is so much patent driers on the market that is largely adulterated that the author prefers to always use liquid driers, provided, of course, that its good quality has been clearly established. When the latter is used the proportions can very readily be ascertained and the danger of using an excess is avoided.

Another effect of using driers in excess is a somewhat peculiar one, and is worthy of mention here. The paint dries hard in rather less than the usual time, but after a week or two it gradually becomes soft, adhering to the hand or anything placed against it. The reason for this is that the paint dries only on the surface, owing to the excess of driers, and that the soft paint afterwards works through.

Pigment and Thinners.—It being now clearly understood that a paint consists of pigment such as white lead, mixed with oil in order to bind the particles together, and thinned with turpentine in order to render it of a suitable consistency for application by means of a brush, we may add a few remarks under each of these heads.

Pigments.—The principal pigments used by the painter are, as already stated, white lead, zinc oxide, oxide of iron, and the various colours used for tinting purposes. White lead is manufactured either by what is known as the "old Dutch" process, also known as the "stack" process, or by one of the many new methods which are designed to effect a saving of time. Speaking broadly, the old Dutch process yields the best lead, although there are one or two exceptions, notably Brimsdown lead, which is manufactured by a new
INTRODUCTION.

process. It is a beautifully white and fine lead which is rapidly gaining great popularity among painters.

Genuine white lead, i.e., lead which is not adulterated, is always marked on the package, "Genuine White Lead." If any proportion of adulterant is added, the package is then marked "Reduced White Lead," so that the reader need have no hesitancy in purchasing lead, because the mark will tell him what its quality is. If any merchant or manufacturer sells adulterated white lead as pure, he renders himself liable to heavy penalties for contravening the provisions of the "Merchandise Marks' Act," and the White Lead Corroders Section of the London Chamber of Commerce order prosecutions in cases of the kind which come to their knowledge.

Zinc Oxide has, in recent years, made great advances in popularity among painters. Compared to white lead, it is as white to yellow. It is indeed beautifully white, very fine, and easily worked. The whiteness of importance in mixing paints, as the purity of colour is retained, while when mixed with lead the yellowish cast to some extent destroys the purity of the original colour. The fact that oxide of zinc is non-poisonous is a point in its favour of very considerable importance. It is claimed that painters who take care to wash themselves frequently are not likely to contract lead poisoning. This is doubtless true enough, but as a matter of fact, the best of painters are at times careless, while in the rush of work, it is often impossible to take the precautions required.

The most important quality of zinc oxide is its extreme durability. Properly mixed it will last, say at a moderate estimate, twice as long as lead, especially in large cities where the air is impregnated with sulphur derived from burning coal. Lead, in such circumstances, turns yellow or black and quickly decays, and some places, such as stables, where sulphuretted
PAINT AND COLOUR MIXING

hydrogen abounds, it is useless to paint with white lead, and if zinc is used these disadvantages are avoided.

The practical reader will probably think, when he reads the foregoing, that while our remarks are true enough so far as they go, yet he will say that zinc oxide is open to the objection that it is lacking in "body."

In another chapter will be explained at length what "body" is, and it must be acknowledged that white lead is superior in body to most, not all, other pigments. In fact, it is this quality which has caused it to be used for so many years, notwithstanding its other shortcomings. Zinc oxide has a very good body, probably as good as white lead. If a proper comparison be made, and if both be thinned out to a consistency suitable to be applied by brush, it is true that zinc will apparently not have so good a body as lead, but it will spread much farther. If an exactly equal quantity of lead and zinc are both painted on an exactly equal area, zinc will cover a little better than lead. In this state, however, the consistency of the zinc paint would be rather too thick for application with a brush, but it can, of course, be thinned very readily by adding oil.

A careful consideration of these facts will show the practical painter that he will require really less zinc than he will lead to perform a good job, and when the durability is also taken into consideration as well as the beauty, it will not take long for him to make up his mind as to the superiority of zinc.

There is one point, however, about its use which must be very clearly explained. Zinc oxide is, when compared with lead, quite light in weight, or, in other words, its volume is much greater than lead. Now, it being an entirely different product, it must not be treated in the same way as lead would be. The painter, perhaps, takes some zinc, mixes it with raw oil, with a liberal amount of patent driers and a more
INTRODUCTION.

liberal dose of turpentine, and then he grumbles because it does not show up to advantage. What he does is to destroy its inherent good qualities. To repeat then, zinc oxide must not be treated in the same way as white lead. Anchovy sauce is excellent for fish, but would be rather distasteful with a chop or steak. So with these two important white pigments.

The proper way to treat zinc oxide is to mix it with refined boiled oil, *i.e.*, no driers should be used, and only just sufficient turpentine to bring it to the required consistency. Refined boiled oil may be had without difficulty from a number of makers. Being pale, it does not destroy the whiteness of the zinc, while it certainly aids considerably in drying. It is paler than raw linseed oil, and hence it does not destroy the most delicate tints, however light. It will be observed that the words "zinc oxide" have been used in the above paragraphs instead of "zinc white," the term by which the pigment is usually known among painters. The reason for this is that the latter term is not infrequently applied to an entirely different class of pigments of which Orr's white, Charlton white, and lithopone are the best known examples.

THINNERS.—Linseed oil is the principal vehicle used by painters. It is expensive, but no other oil can compare with it for good service. It is used both raw and boiled. Frequently a proportion of each is used in paint. Boiled oil is linseed oil, which has been heated to about 350° to 500° F. This causes the oil, when cool, to dry much quicker but dryers are with the same object usually added while the oil is hot. Boiled oil should dry hard in about twenty-four hours, and a good test is to paint a little on a watch glass. At the end of twenty-four hours it should have dried quite hard. There is a great difference of opinion among painters as to the proper use of boiled and raw oils. Some prefer to use boiled oil
almost always, while others are of the opinion that the less used the better. The author's opinion is that good boiled oil may safely be used if mixed with the proper proportions of raw oil, depending upon the class of work to be done, and that this produces far better work than it is possible to obtain by the practice so frequently carried on of adding driers in excess to paint.

**Turpentine.**—It is very important that the turpentines used in paint be pure. American turpentine is mostly used. Owing to its high price it is sometimes adulterated, with disastrous effects upon the paint. It should be perfectly white in colour, and its purity can roughly be tested by dropping a little on a sheet of writing paper. If it is adulterated, a greasy spot will remain, while if pure it will wholly disappear in a few minutes. When the adulterant is mineral oil it can usually be detected by the peculiar blue colour it gives to the turpentine.

Although American turpentine has for so many years enjoyed a practical monopoly among English painters, the Russian product has of late become very much more popular, and bids fair to prove a very formidable rival. The old adage that "necessity is the mother of invention" may aptly be applied to the condition of things concerning turpentine in recent years. American turps were very high in price, with no prospect of their lowering, as the pine forests are rapidly becoming exhausted. Painters therefore are compelled to look for something to take the place of American turps. One or two enterprising firms took up the question of Russian turpentine. Painters who have tried this have objected to it on account of its smell, but experience proved that it was quite possible to remove this objection almost wholly, and to obtain a turpentine practically water white which should answer for the purpose of American turpentine, in fact, be identical with it in appearance, behaviour, flash point and specific gravity, with perhaps a slight
INTRODUCTION.

...difference in smell, but nothing in the least objectionable. The most satisfactory substitutes at present on the market may be divided into three groups (a) The Russian and French turpentines; (b) Spirits of petroleum origin, and (c) Liquids produced by distillation of various pine products other than crude American turpentine. To these might be added the various mixtures which consist simply of blends of pure turpentine and petroleum spirit in proportions depending upon the price at which they are to be sold.

Spirits of petroleum origin have proved very successful and are now used to the extent of many thousands of gallons a year. Ordinary petroleum, such as lamp oil, would be useless in a paint because it possesses no drying properties, while the lighter distillations of the same product, such as benzine, would be suitable if they did not evaporate so quickly. The efforts of the manufacturers have produced petroleum spirits which possess neither of the objections mentioned, and they are increasing in use every day.

The term "White Spirit" is usually employed in connection with these thinners. They cost approximately one-third the price of pure American turpentine and may be relied upon for all ordinary work. They are, however, not suitable for thinning Brunswick black or any japan made on a base of bitumen or asphalt. Their use should also be avoided for flat work done in hot weather.

Paint Mixing.—For ordinary quantities of paint, the following is the method usually employed in mixing. A can or kettle is most usually employed for mixing the white lead or other base, and this is first thinned out and mixed with the driers and oil, the colour being afterwards added to it. It saves time to well beat up the lead with a wooden spatula, shaped like an oar or spade, before adding thinners of any kind. This having been done, a little oil is first placed in the can, which is twisted around so that the
oil covers every part of the inside surface. This prevents the lead sticking against the tin. A sufficient quantity of oil and the patent, or other driers, is then added. The lead is stirred and beaten against the sides of the tin until the whole is of the same consistency, and more oil is added until the thickness is not sufficient to support the stick standing upright. Turpentine may now be added to further thin the mixture, and then the colour is added. It may be noted here that the result is not so satisfactory if the turpentine is added before the oil.

A simple but effective home-made mixer for beating up lead is shown in the illustration. The leverage obtained by the simple means indicated greatly facilitates the operation. Messrs. Postans and Morley, of Birmingham, marketed an apparatus of this kind some years ago, the upright stick being a strong bamboo cane.

The best way of mixing tinting colours is to place them on a stone, thoroughly amalgamating one with the other by means of a spatula. When the colour is what is required it is added to the white. To take a simple case of a gray, a little black would be beaten up on the stone, and when quite thin added to the pot of white. This would then be stirred up thoroughly and the grey colour observed to see whether it was sufficiently dark. Then a very little red and blue might be prepared on the stone and this be added to the pot, the mixture being again stirred. Two very
important rules must be observed at this point. The first is that the colours ground in oil should be used and not dry colours. If dry colours are employed, oil must be added to them on the stone and not in the pot. We may repeat, by way of emphasis, that under no circumstances must dry colours be added to the pot of colour. This is a rule to which there is no exception. The second rule, and one which is equally important, is to add only a small quantity of colour to the pot of white at the time. Taking the case once more of the grey, a little black being added and the mixture well stirred, it can be seen at a glance whether the desired depth of shade is obtained. On the other hand, it would be quite impossible to take any of the black from the mixture, and should it be too dark, the only way to lighten it would be to add more white, and this would probably mean mixing much more paint than was required for the job.

It will be understood that the above description of mixing refers to ordinary jobs such as are required in painting a house. When a considerable quantity of paint is to be mixed at the same time, a mechanical mixer may be used with great advantage. It is remarkable that painters do not use these paint mixers more frequently. They certainly effect a great deal of saving of time, and the outlay of a few pounds would be quickly repaid.

Since the first edition of this book was published in which it was recommended to use a machine for mixing paints, considerable progress has been made in this direction and many contractors now realise that whenever a large quantity of paint is to be mixed, it pays far better to use a machine than it does to use the old fashioned method. The author's opinion is that excepting, perhaps, in very small shops, it would pay every employing painter to purchase a good paint mixer.

Paint Mixing Machines.—There are on the
market several types of paint mixing machines. One known as the "Wee Macgregor" is represented in Fig. 1, and is suitable for painters’ use. It consists of a cylinder which contains the paint, and in this are three bent knives or paddles. The handle attached, on being operated, turns the cylinder in one direction and the knives in the opposite direction, these knives in the meantime revolving around on their own axes. The paint is thus mixed very quickly, and as the cylinder may be had to hold 2½ gallons, in the case of bridge work, wall work, or other positions where a very large quantity of the same paint is required, the purchase, for a few pounds, of such a machine may mean a saving of a considerable amount of labour.

Fig. 2 shows a similar machine when the handle is thrown back which lifts the mixing blades out of the cylinder, leaving it free to be lifted in order that the paint may be poured out.
INTRODUCTION.

The mixers illustrated in Figs. 2 and 3 are manufactured by Torrance and Sons, of Bitton, near Bristol. In many shops, where large quantities of stone colour and other paints have to be turned out, such a machine would soon repay its cost. As they are light in weight they could easily be moved from job to job.

The paint mixers above mentioned, although excellent of their kind, are not quite suitable for mixing very small quantities of paint or colour, and they are also almost too expensive for a small painter's shop. Messrs. Torrance and Sons, Ltd., have, however, recently brought out another mixer, the price of which is only £2, and it is admirably adapted for its purpose, mixing the paint very thoroughly and quickly. As shown in Fig. 3a, it consist of a conical cup or container resting upon a three jawed stand. The inside of the...
container is turned perfectly true, and has a polished surface. Against this surface rolls a heavy pestle or conical roll, which is shown in Fig. 4, suspended by a rod while out of use. The white lead, oil, etc., being placed in the container the pestle is rolled around and gives something akin to a grinding action at the same time that it mixes the solid and liquid together. There is nothing complicated to get out of order, and everything can be wiped clean very easily. The colour being mixed the container is raised by the handles and the contents poured into the paint pot or through strainers ready for use. The author is writing from experience with this mixer, which he has pleasure in strongly recommending, not only to painters, but also to paint manufacturers who can use it to advantage in mixing samples and for other purposes where a larger mixer would entail much more time in cleaning.
"THE DECORATOR" MIXER.

This is a handy little machine, which was brought out at the author's suggestion, by Messrs. Torrance & Sons, Ltd., Bitton, near Bristol. It is made in two sizes, both of which are shown in Figs. 5 to 8.

The conical form contains half a gallon, and the capacity of the second form is one gallon. The container is turned and polished bright, the mixing blade of polished gun-metal. By means of these machines, paint can be thoroughly mixed in a few minutes. The contents can be emptied in the painter's kettle by tilting the container, as shown in Fig. 8.
PAINT AND COLOUR MIXING.

The "Decorator" Paint Mixer.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.
STRAINING PAINT.

CHAPTER II.

STRAINING PAINT.

The straining of paint is such an apparently simple and everyday sort of process, that it seldom receives a second thought, except from the few who are out to do better than their fellows, and to do it in the most efficient manner and in the least possible time.

The paint strainer may prove to be either a good friend to the painter, or a "pal" to the smudge pot, and a prolific producer of bad results, according to the discrimination of its choice and the manner of its use.

Paint, which for the purpose of these remarks, includes enamel and varnish, and all the various mixings of pigment and vehicle, may be vastly improved, or it may be absolutely ruined during the process of straining.

The object of straining paint is to free it from all particles which exceed a certain dimension, the maximum of size being determined by the bulk of pigment in use at the moment, and the surface to which it is to be applied.

For instance, a paint intended for rough exterior work need not be so finely strained as one which is to be used as a finishing paint on a staircase wall or a drawing room door. For the former, a mesh of 50 per inch would suffice, for the latter, 100 mesh would be none too fine.

For every kind of paint according to its composition and purpose, there is a strainer of the correct "mesh" through which that paint will pass by gravitation alone,
without the aid of brute force or the coercion of a paint brush.

The painter must first learn to recognise the correct mesh required to successfully strain the various mixings with which he has to deal. He must also understand that a paint strainer was never designed with the object of serving as a receptacle in which to break up dried skins and masses of pigment. He must realize the folly of attempting to push a one-inch piece of solid matter through a hole one hundredth part of an inch in diameter, the only result of which is to obtain some fine hard grit, and a choked strainer.

![Image: Paint mixing diagrams]

One can hardly imagine a man in his right senses snatching a strainer, consisting of a portion of woollen underwear tied on a frame, out of a pail of dirty water, hastily scrape away some of the gritty exudations of the last operation, and calmly proceed to push through some white enamel, aided by a moulting, lousy brush. Yet we have seen it done. Not once, but many times. That
same man will turn round and say, "I strained it, and then it was gritty," and he is firmly convinced the material was at fault.

The operation of straining a pot of paint should be one of a few minutes only. If the paint is well broken up from materials which have not been allowed to dry up and waste, the simple act of pouring it through the correct meshed strainer is all-sufficient.

When the paint is extra charged with skins, it is a great saving in time to use two strainers. The first could have a mesh of 50 per inch. This would catch all the skins and larger particles, and prevent the finer-mesh clogging when the paint was passed through it.

No brush need be used to aid its passage, but a square-ended knife should be kept handy for removing skins should they accumulate too rapidly.
There are two distinct types of straining gauze in general use, one of fabric, such as muslin, silk and stockingette, and the other of metal, such as iron wire, copper and brass gauze.

Of the fabrics, there is only one which we consider perfect, and it is sold under the name of "silk chiffon." It is even in mesh and free from fluff or loose particles. Owing to its price, however, it can only be looked upon as a luxury to be indulged in for the very finest gloss finishes. The method adopted by some of the super-

coach painters will readily appeal to those anxious for perfection.

Sufficient material, whether it be enamel or varnish, to cover the job in hand is taken out into a hand pot, and covered over with a piece of silk chiffon, held in place by a strong elastic band (a cleaner and quicker method than tying with string). It is then poured out through the chiffon into a second pot, a small quantity at a time, from which it is used. This method prevents the
material getting gritty or fatty, and ensures a clean job, provided, of course, that equal care has been taken in other directions. When once used the chiffon is thrown away, hence its extravagance.

Of the other fabrics, a fine muslin is probably the best for ordinary paints, as being the most even in mesh and with most freedom from fluff. Any of the stockingette or woollen types are an abomination, and should not be allowed a place on the paint bench. One has only to handle a piece of this type of material in a strong light and note the quantity of loose fluffy stuff which floats away from it to realize that it is worse than useless, and a positive danger on a decent job.

The metal gauzes are far and away the most reliable as well as the most economical in use. They can be obtained in a variety of meshes and are particularly easy to keep clean. Those with a removable gauze are to be preferred, not only to facilitate cleaning, but because they enable the painter to vary the mesh at will to suit the job in hand.

Probably the best of these is one invented by Mr. Percy Beaumont. These are provided with removable gauzes which engage the frame in much the same way
as a lever lid is pressed into position. This provides a sound strainer with a perfect joint, and no fear of the bottom falling out with the weight of colour. Upon removal the gauzes may be thrown into a tin containing turps or paraffin, from whence they will emerge ready after a wipe over for any kind of colour.

This is claimed to be the best, strongest, and most advantageous paint and distemper strainer on the market, especially as a workman can use the refill for straining purposes without the large cone at all for small quantities. The cone being seamless throughout, otherwise, stamped in one sheet of metal, there is no corrosion of paint anywhere, and the same can be burnt out at any time without fear of damage. It is sold in three sizes.

It is interesting to note that a most efficient little strainer may be obtained at the penny bazaars scattered throughout the country. They answer the purpose well for small quantities of paint or enamel, and should find a place in the kit bag of every well-intentioned painter.
Specimens of "WALLPAX" Patent Oil-Flat Wax Paint, supplied by courtesy of Messrs. Samuel Wills & Co., Ltd., Bristol.
STRAINING PAINT.

Some enterprising British manufacturer would do well to develop this type in various sizes of frame and mesh. There is also the strainer with the loose bottom rim held in position by three clips. The gauze is inserted between the frame and the loose rim, and it offers the distinct advantage of adapting itself to any kind of gauze, either fabric or metal.

Two very useful little appliances of service to the paint mixer are shown in Figs 14 and 15. The first is an iron mixer, which possesses many advantages over the ordinary wooden paddle. The second consists of small attachments for a paint can, by which a piece of calico or other fabric may be kept in position for the protection of the paint so as to exclude dust. Both are made by the Ridgely Trimmer Co., of Clerkenwell Road, and cost but a few pence.
A useful form of stirring knife is shown in Fig. 16, and another form, made to shut up, for carrying in the pocket, in Fig. 17.

![Fig. 16.](image)

The long-handled brush, shown in Fig. 18, is useful for certain work, as for example, when painting the backs of radiators, as well as for other work difficult to reach in the ordinary way. It is quite inexpensive, and is made in various forms.

![Fig. 17.](image)

![Fig. 18.](image)
CHAPTER III.

COLOURS OR STAINERS.

We come now to a consideration of colours or stainers that have to be used in the mixtures given in the following chapters.

As a rule, one or several colours are added to the base, producing a tint, shade or hue as may be required. Sometimes, but not often, colours are employed as "body colours," that is they are employed just as they are purchased ground in oil, excepting that they are thinned down with the requisite quantity of oil and turpentine and mixed with dryers.

We may now give consideration to actual colour mixture, but must first make one or two points clear so that the lists which follow may be properly understood.

First, then, it should be said that colours vary in appearance according to the light in which they are viewed. For example, a colour, when looked at in the light of a sunny day in the open, has a very different appearance to that which it presents when viewed in a dark room. This will be explained at greater length further on. The mixtures here given refer principally to oil colours, and it must be clearly understood that the same results will not always be obtained with artists' water colours. In the case of the latter, tints are obtained by the addition of water just as they are produced in oil colours by the addition of white lead or other white pigment. Separate chapters on artists' water colours and water paints or dis-tempers are included.
In examining the lists which follow, the reader may ask why we do not give the actual proportions of the different parts. The answer is that this is impossible for two reasons, the first being that colours vary so largely in quality that the proportions would be useless unless some particular make of colours was taken as a standard, while the second is that the names of the same colour vary also largely. Let us consider this point at once.

The Nomenclature of Colours.—If half-a-dozen practical painters, experienced in colour mixing, were asked separately to mix a given colour, say a sea green, it is almost certain that when the six colours were compared there would not be two alike. Each of the six painters might have had precisely the same make of colours to work with, and yet the "sea green" would in each case be different. The explanation, of course, is that opinions differ as to what is a "sea green."

In giving the samples of colour which are contained in this work the author was, under the circumstances, somewhat puzzled to know exactly the right names to give each. His idea as to what was a bronze green, for example, might differ materially from the opinion of others, indeed, as it has already been explained, no two practical men would probably be found to agree as to the exact colour of two or three dozen differently named colours. Under these circumstances, he decided to follow what appeared to be the general rule in the trade. With this object he obtained the colour cards issued by all the leading paint manufacturing firms in the country, as well as some from abroad. He then took the colours which he thought would be most useful to his readers, and then very carefully, and with a considerable amount of labour, compared each colour with similar colours in the different colour cards, taking note of the different names which different manufacturers called them.
The result was very surprising, because it was found that in many cases there were as many names as there were manufacturers' cards represented. When, however, the same name was used by several manufacturers, that name was selected for the purpose of this work. The reader may, therefore, take it that the names employed here are those which are most general in the trade. As an instance of the variation of these names we may cite a few examples.

Bronze green was called by different manufacturers dark green, olive green, and sage green. In this case bronze green occurred more frequently than any other name.

Tea green was called also olive green and Queen Anne green.

Apple green was called very light sea green and Eau de Nil green.

Sage green was called also olive and pale Quaker green.

Venetian green was called also Imperial French green, light green, Shamrock green, bright green, mountain green, middle green, and engine green.

Light chocolate was called dark maroon, red lake, metallic brown, and in one case the sample given of burnt sienna was almost identical.

Olive green was called also sage green, deep olive green, and Quaker green.

Dark green was called also medium green, Brunswick green, middle green, and deep coach green.

Moss green some manufacturers evidently thought was the same thing as bronze green.

Pea green was called also sea green and Eau de Nil green, called bronze green, sage green, Quaker green, olive green.

Slate was called also Quaker blue and dark lead.

Pearl grey was called also light grey.

Lilac was called also French grey.
Warm grey was called also deep stone, French grey, and light stone.

Silver grey was called also lavender.

Steel grey was called French grey in several instances, but we prefer to use the other term, as it appears to be nearer to what is usually known in this country as a French grey, that is, one which has a touch of red and blue in it.

Another instance of the variation in the names of these colours is shown by light stone, which one would think was sufficiently well known to remove any doubt about it, but this was called smoke grey, French grey, and dove.

Middle stone was called also light drab.

Moss grey was called also silver grey.

Cream was called Manilla, light stone and deep deek.

Dark oak was called also dark drab and yellow bronze green.

Dove colour was called also deep stone.

Colonial yellow was called also straw, light stone, and deep cream.

Deep drab was called also dark stone, light drab, dark drab and fawn; one sample of raw Turkey umber was almost identical.

Dark drab was given also as dark lava and middle drab.

Dark oak was called also copper brown, light oak, and Imperial brown, whilst in one case a sample of dark ochre was almost identical.

Deep cream was called also cream and lemon.

Primrose yellow was called also mustard yellow, canary and straw colour.

Straw was called also Naples yellow and deep Naples yellow.

Sandstone was called also dark stone.

Stone colour was called also ecru and light stone.

Smoke colour was called rustic drab and drab.
COLOURS OR STAINERS.

Signal red was called also vermillion, geranium red and poppy red.
Snuff brown was called also light brown, sepia, dark ochre, umber brown and Arabian brown.
Sienna brown was called also teak brown, coffee brown, deep Indian red and terra cotta.
Amber brown was called also bison brown, sepia, and dark oak.
Autumn leaf was called also leather lake, mast colour, middle oak, old gold, and light fawn.
Fawn brown was called light drab and light lava.
Light drab was called also middle drab and doe colour.
Buff in one case was called yellow ochre.
Acorn brown was called also umber, dark oak, dark brown, light brown, dark Indian brown, chestnut brown, middle chocolate, and Portland brown.

With the above instances before him the reader will not, we think, take any exception to the names we have chosen for our sample colours. The same is true concerning the instructions for colour admixture. If a reader makes a mixture according to those instructions and finds the result disappointing, the reason will probably be that his conception of the particular colour differs from that of the author, or it may arise from the fact that the colours used are of inferior quality. And it should be mentioned again, here, that every one of the mixtures has been made in oil colours, checked and checked again.

For many years past efforts have been made by scientists and others to formulate a permanent nomenclature for colours, tints, shades, and hues, but it cannot be said that so far any success has been met with. Should the efforts made prove ultimately successful, there is no doubt it would be a great boon to decorators, painters, and others; for example, if a decorator wanted to order from his manufacturer a certain tint or colour, all he would have to do would be to send
in the name. Prang, of Boston, in his work, "The Standard of Colour," endeavoured to systematise the subject, and he did this in the following manner. He produced sheets of colour divided up into several hundred squares. On the first sheet at the top was the spectrum of pure colours divided up, and beneath this, similar squares with similar colours, to which had been added a small portion of white. The line below this was the same again with more white added, and so on till the bottom of the sheet was reached, when the colours were greatly reduced by the white, the tints being naturally very light ones. The second sheet was exactly the same as the first, but a small portion of black had been added to all the colours and tints. The third sheet was the same thing again, with more black added, and the fourth sheet more black still, and so on to the end of the work. The colours were distinguished with letters, and the lines indicated the amount of white added by numbers. To anyone who possessed a copy of the work it would be a comparatively easy matter to order any colour from the book by number and letter, but the reader will readily perceive that this work falls short of the requirements of practical decorators, inasmuch as it does not provide for the admixture of different colours, but only those pure colours which are in the spectrum. It is true enough that all colours are as a matter of fact included in the spectrum, but it is not so easy a matter to separate them for practical purposes.

The variation in the names of colours above referred to has proved so inconvenient alike to manufacturers and decorators and other colour users, that an effort was made during 1906 by one leading firm of paint manufacturers to remove the difficulty by standardising sixty of those colours which are most used. With this object, the firm in question offered prizes aggregating £100, and took a vote of several thousand competitors which included many eminent decorators
and colourists, besides architects, technical teachers and others. The firm in question was Messrs. Pinchin, Johnson and Company, Ltd., and the plan they adopted in carrying out their competition is worthy of record, because it demonstrates the value of the standard sheet so obtained. They first communicated with some 200 prominent decorators and other colour experts, and from them obtained a list of what was generally considered to be the sixty colours most in use. It may be observed here that there is no reason why sixty colours should have been taken any more than fifty or 100, but, obviously, the work and expense of conducting this competition was very great and it was necessary to decide upon some specific number, and it was felt that sixty colours standardised would mean, at least, a big step in the direction of a general colour nomenclature.

Having then settled as to which sixty colours should be included in their list, they next sent to everyone of the several thousands of competitors four painted samples of each colour or 240 colours in all. They also sent a sheet divided up into small squares, each square being printed with the particular name of the colour that was to be stuck down upon it. The competitor, therefore, was called upon to take any one colour, say sea green, and to select from the four samples of different shades or tints of sea green the one which in his opinion was best entitled to that name. This he stuck on the space allotted for it. He then proceeded to do exactly the same thing with the other fifty-nine colours and then sent the whole sheet to Messrs. Pinchin, Johnson and Company, Ltd. They employed a staff to go through each of these sheets to find out which of the four shades of different colour had received a majority of votes, and in this way evolved the winning shade—sixty of which formed the standard colour card.
Twenty-four of the standard colours are shown on plate III, with the tints of one colour by way of example. It will be seen by comparing these colours with others which appear in the book that they vary a little in some cases from those of other manufacturers, but it must be remembered that they represent the opinion of the majority of some 3,000 experts on the question.

The whole subject of Colour Nomenclature is dealt with in the next chapter.

The Economy of Using Good Colours.—It may be taken as a safe rule for the painter to follow that where a good job is required the best materials only should be employed, but the reader may answer to this that the price paid to him for his work will frequently not permit of his doing this. We may leave the subject an open one which has really no place in these pages, except in so far as it relates to tinting colours, and here we can definitely and positively assert that it pays the painter best to use the best qualities of colour, quite irrespective of whether he gets a high price or a low price for his work. To explain: Let the reader assume that a large surface is to be painted a very light Prussian blue. The price for the work is fixed and the question to be determined is whether it will pay to use cheap Prussian blue or one of high quality. Assume that a high quality blue costs 2s. per pound, and that just one pound of it is sufficient to tint the whole white to the required shade. We are purposely giving a simple case so as to make the matter clear. Now a Prussian blue can be bought for, say 1s. 3d. a pound, but it would probably consist of at least one half of barytes or some other adulterant, which is of no value whatever as a stainer. If this colour is half strength it is obvious that two pounds of it would be required to tint the white for the work in hand, and this would cost 2s. 6d., against 2s. for the better class colour. This homely example should be taken to heart by every painter. He has only to experiment to find out
that it never pays to use inferior tinting colours. Of course there is another reason why the best quality should be used, and that is, the appearance of the inferior colours is always muddy and unsatisfactory.

Hue, Tint and Shade.—There is a good deal of confusion among some painters as to the meaning of the word "hue," "tint," and "shade," although there is no reason why any confusion should exist. The word "hue" is often employed to mean practically the same thing as "colour," but strictly it means the particular cast or individuality, so to speak, of a colour. Thus we talk of a scarlet of a yellowish hue or a crimson of a bluish hue. A colour may consist of any mixture of other colours, or may be a pure colour itself. Now when white is added to any hue or colour a tint of that colour is produced. If black is added a shade of that colour is produced. In the decoration of our rooms we shall see that as an actual fact we obtain shades of the colour by the partial omission of light, because the addition of black as a pigment to a colour acts in the same way as shutting off light. In mixing colours it is important to remember that black should not be used to lower the tone of a colour excepting in rare instances. It only has the effect of producing a muddy appearance. A yellow that is too bright can be reduced, or made less staring, a painter might say, by adding a little blue and red. If a blue is too bright a little red and yellow should be added; or if a red is too bright it may be toned down by the addition of a very little blue and yellow. This is a most useful rule to observe, and as long as the quantity of the colours added is not too great, the results will please.

In practice umber is a most useful colour to employ for lowering the brilliancy of a colour, but only a small quantity is necessary for the purpose. If the requisite tone cannot be obtained with a little umber and the mixture is still too bright it may be taken that
the proper colours have not been employed and the mixture should be changed.

The very large range of colours prepared for the use of artists and decorators might lead one to suppose that mixtures of them would not often be required. Of course, as a matter of fact, an artist's palette is usually very restricted and consists of only a dozen or so colours from which he obtains all the tints, hues and shades he requires. Occasionally he may use a little of some additional expensive colour when a special effect is desired.

The same thing is true in regard to the house painter and decorator, with the difference that the cost of colours is much more important to him than it is to the artist, because he uses comparatively such large quantities. Still, when pure tints are required, either rich or subdued, to give a finish to, or produce an unusual effect in, a piece of decoration, it will frequently be found cheapest in the end to procure a tube of some expensive colour than it would be to endeavour to imitate it by an admixture of pigments of an inferior quality.
CHAPTER IV.

COLOUR NOMENCLATURE.

WHAT HAS BEEN ACCOMPLISHED

Since the first edition of "Paint and Colour Mixing" was published, considerable progress has been made in naming colours and settling a standard for colours by the publication of three important books. Although all of these are intended broadly for colours for every use, yet they may be said to be specialised in reference to their application. For example, the first is "Color Standards and Color Nomenclature," by Robert Ridgway, M.Sc., Curator of the Division of Birds, United States National Museum, Washington, D.C. This book, of which a full description appears below, was produced primarily for standardising the names of colours of birds, animals, insects and objects of natural history generally, but, as already stated, there is no reason why the standard should not be adopted for all colour purposes.

The second book is "Repertoire de Couleurs, par la Société Française des Chrysanthèmesistes," published in Paris. This book consists of two portfolios, comprising 365 plates with explanatory text in French. In this case the colours were selected particularly in connection with the colours of fruit, flowers and foliage, but here again a general application would be quite practicable.

The third book to which attention may be drawn is the "Standard Colour Card of America," issued by the Textile Colour Card Association of the United States of America Incorporated, of New York. The purpose of this colour card was to standardise textile and allied
industries so that the standard name or standard number will always signify the colour so designated on the card. These colours are intended for the textile and allied industries, and a description of this book is also given on another page.

**Mr. Robert Ridgway's System.**

It should be stated that this book includes fifty-three coloured plates and eleven hundred and fifteen named colours. The arrangement of these colours is the solar spectrum, with its six fundamental colours and intermediate hues, augmented by the series of hues connecting violet with red, which the spectrum fails to show. Mr. Ridgway gives the following explanation. If, with the red-violets and violet-reds thus added to the spectrum hues, the band forming this scale be joined end to end, a circle is formed in which there is continuously a gradual change of hue, step by step, from red through orange-red and red-orange to orange; orange through yellow-orange and orange-yellow to yellow; yellow through green-yellow and yellow-green to green; green through blue green and green-blue to blue; blue through violet-blue and blue-violet to violet; and violet through red-violet and violet-red to red—the starting point—with intermediate connecting hues. In the solar spectrum, both prismatic and grating, but especially the former, the spaces between the adjoining distinct colours are very unequal; therefore, for the present purpose an ideal scale must be constructed, so that an approximately equal number of equally distinct connecting hues shall be shown.

Distinctions of hue appreciable to the normal eye are so very numerous that the criterion of convenience or practicability must determine the number of segments into which the ideal chromatic scale or circle may be divided in order to best serve the purpose in view. Careful experiment seems to have demonstrated that
COLOUR NOMENCLATURE.

thirty-six is the practicable limit, and accordingly that number has been adopted.

If the number of intermediate hues were equal in all cases, there would in this scheme be five between each two adjacent fundamental colours of the spectrum, but a greater number of recognizably distinct hues is obviously necessary in some cases than in others; for example, spectrum orange is decidedly nearer in hue to red than yellow, and, therefore, the number of intermediates required on each side of the orange is different, being in the proportion of four for the red-orange series to five for the orange-yellow, and similarly six are required for the violet-red series, while four suffice for the blue-violet hues.

There is no known means by which we can measure the proportion of two or more pigments in any given mixture, "because colour-effect cannot be measured by the pint of mixed paint or the ounce of dry pigment," but, fortunately, we have a very exact method in the colour-wheel and Maxwell discs, by which the relative proportions of two or more colours in any mixture may be precisely measured. This method has been used in the painting of every one of the 1,115 colours of Mr. Ridgway's book, by means of one disc to represent each one of the thirty-six colours (both pure and "broken"), together with a black, a white, and a neutral gray disc, the last being a match in colour to the ray, resulting from the mixture of red, green, and violet on the colour-wheel; the neutral gray disc, however, being used only for the making of discs for the broken series of colours and for the scale of neutral grays. These coloured discs are slit in one side from centre to circumference, and, therefore, interlocking two or more they may be adjusted so that either occupies any desired percentage of the whole area, which may be very precisely determined by a scale of 100 segments shown on outer edge of a larger disc, on which the coloured discs superimposed.
When connected with the colour-wheel and adjusted as may be desired and then rapidly revolved, the two or more distinct colours resolve themselves into a single uniform composite colour, whose elements are shown in their relative proportion by the scale surrounding the discs. It should here be explained that the first 12 of the 53 plates in Mr. Ridgway's book show the pure full spectrum colours with four different tints of the same colours above them produced by adding 9.5, 22.5 and 45 per cent. respectively of white, while below the pure colours are four specimens of shades obtained by adding 45, 70.5, and 87.5 per cent. of black. The remaining plates show these same thirty-six colours or hues in exactly the same order and similarly modified (vertically) by precisely the same progressive increments of white (upward) and black (downward), but all the colours are dulled by admixture of neutral gray; the first series containing 32 per cent. of neutral gray, the second 58 per cent., the third 77 per cent. and the fourth 90 per cent. The last three plates show the six spectrum colours (also purple, the intermediate between violet and red) still further dulled by admixture of 95.5 per cent. of neutral gray, these being in reality coloured grays; to which are added a scale of neutral gray and one of carbon gray, the former being the gray resulting from mixture of the three primary colours (red 32, green 42, violet 26 per cent.; which in relative darkness equals black 79.5, white 20.5 per cent.) the latter being the gray produced by mixture of lamp black and Chinese white, and the scale a reproduction of that in Mr. Ridgway's first "Nomenclature of Colours." It should be emphasized that in all cases except the scale of carbon grays, only the discs representing the middle horizontal series of colours (both pure and broken) have been used, in combination with a black and a white disc, respectively, to make the colours of the vertical scales of tints and shades.
Specimens showing the Wall Paint "Vernasca."
CHOICE OF NAMES FOR COLOURS.

Mr. Ridgway gives the following useful remarks on this subject:

While it is true that the naming of colours as usually employed has so little to do with the purely technical aspects of chromatology or colour-physics, that, as Von Bezold remarks, "we are in reality dealing with the peculiarities of language," it is equally true that a collection of colour standards designed expressly for the purpose of identifying and designating particular colours, can best attain this object by the use of a carefully selected nomenclature. In other words, the prime necessity is to standardize both colours and colour names by the elimination of the element of "personal equation" in the matter. In no other way can agreement be reached as to the distinction between "violet" and "purple," two colour names quite generally used interchangeable or synonymously, but in reality belonging to quite distinct hues, or that any other colour name can be definitely fixed. Various methods of handling the matter of colour in zoological and botanical descriptions, etc., by the avoidance of colour names and substitutions therefor of symbols, numerals, or mechanical contrivances (as colour wheel and spectrum analyses, colour-spheres, etc.), have been devised, but all have been found impracticable or unsatisfactory. The author has taken the trouble to get an expression of opinion in this matter from many naturalists and others, and the preference for colour-names very greatly predominates; consequently, whenever it has been possible to find a name which seems suitable for any colour in this work, it has been done, leaving as few as possible unnamed, and for these some other means must be devised for their designation.

The selection of appropriate names for the colours depicted on the plates has been in cases a matter of considerable difficulty. With regard to certain ones, it may appear that the names adopted are not entirely
satisfactory. But to forstall such criticism, it may be explained that the purpose of these plates is not to show the colour of the particular objects or substances which the names suggest, but to provide appropriate, or, at least, approximately appropriate, names for the colours which it has seemed desirable to represent. In other words, certain colours are selected for illustration, for which names must be provided; and when names that are exclusively pertinent or otherwise entirely satisfactory are not at hand, they must be looked up or invented. It should also be borne in mind that almost any object or substance varies more or less in colour; and that, therefore, if the "orange," "lemon," "chestnut," or "lilac" of the plates does not exactly match in colour the particular orange, lemon, chestnut or lilac which one may compare it with, it may (in fact does) correspond with other specimens. Without standardization, even if arbitrary, colour nomenclature must, necessarily, remain in its present condition of absolute chaos.

Even the standard pigments are not constant in colour, practically every one of them being subject to more or less variation in hue, or tone, different samples from the same manufacturer sometimes varying to the extent of several tones or hues of the present work; indeed, in every case where two or more samples of the same colour have been compared, it has been found that no two are exactly alike, the difference often being very great. For example, of five samples of "Vandyke brown," only two are approximately similar, each of the other three being widely different, not only from one another, but from the other two, one being a blackish brown, another reddish brown, the third a yellowish orange-brown. Of eleven samples of "olive," no two are closely similar, the colour ranging from a shade of dull (grayish) blue-green to orange-brown, dark brownish gray, and light yellowish olive; and the same, or nearly the same, degree of variation is seen in absolutely every
COLOUR NOMENCLATURE.

colour examined, showing very clearly the utter worthlessness of colour name unless fixed or standardized.

In order to obtain as many colour names as possible for standardization, it has been necessary to draw from all available sources. Several thousand samples of named colours have, therefore, been collected, and for convenience of reference and comparison, gummed to card catalogue cards, with the name, source and other data thereon. These include the colours from many standard works.

"For obvious reasons," Mr. Ridgway says, "it has been necessary to ignore many trade names, through which the popular nomenclature of colours has become involved in really chaotic confusion rendered more confounded by the continual change of new names, many of them synonymous and many of them vague and variable in their application. Most of them are invented, apparently without care or judgment, by the dyer or manufacturer of fabrics, and are as capricious in their meaning as in their origin. For example, such fanciful names as 'Zulu,' 'serpent green,' 'baby-blue,' 'new old rose,' 'London smoke,' etc., and such nonsensical names as 'ashes of roses,' and 'elephant's breath.' An inspection of the sample books of manufacturers of fancy goods, such as embroidery silks and crewels, ribbons, velvets, and other dress and upholstery goods, is sufficient not only to illustrate the above observations, but to show also the absolute want of system or classification and the general unavailability of these trade names for adoption in a practical colour nomenclature. This is very unfortunate, since many of these trade names have the merit of brevity and euphony, and lack only the quality of stability.

"In any systematically arranged scheme, unless the number of colours shown is practically unlimited, it will, necessarily, be impossible to find represented thereon a certain proportion of colours comprised among even a very limited number selected at random, or only roughly
classified. Hence many (thirty-six, or more than five per cent.) of the colours shown in the old "Nomenclature of Colours," fall into the blank intervals of the present work, being intermediate either in hue or tone, or chrome, sometimes all.

"The question of giving representations of metallic colours in this work was at one time considered; but the idea was abandoned for the reason that these are in reality only ordinary colours reflected from a metallic or burnished surface, or appearing as if so reflected. The actual hue is precisely the same, though often changeable according to angle of impact of the light rays, and relative position of the eye, this changeableness being sometimes due to interference. Colours, again, vary without actual difference of hue, in regard to quality of texture or surface; that is to say, the colour may be quite lustreless, appearing on a dull, sometimes velvety, surface, while, again, it may be more or less glossy, even to the degree of appearing as if varnished. To deal with these variations, however, requires simply the use of suitable adjectives. For example, to indicate a colour which has no lustre or brightness, the adjective matt (or mat) may be used, in preference to dull, which implies reduction in purity or chroma: other adjectives appropriate in special cases being velvety, glossy, burnished metallic, matt-metallic, etc."

The French Chrysanthemum Society's Book.

This splendid work consists of 365 separate plates, arranged on the plan mentioned below with tints of each colour.

The work of compiling it was carried out under the auspices of the French Chrysanthemum Society, by M. H. Dauthenay, with a number of old collaborators who attempted a repertory to aid in the determination of the colours of flowers, foliage and fruit.

Apart from the method of Chevreul—which is based on the solar spectrum—he acknowledges that there is
COLOUR NOMENCLATURE.

no good plan of nomenclature. Since the discovery of the coal tar colours, there has been a complete revolution in the colour industry. The nomenclature employed by the colour makers, however, usually conveys no exact meaning except to specialists. Moreover, synonyms abound and the names of the dyestuffs are still further complicated by the fact that they include words which have nothing to do with colour, for instance, patent blue, cloth red, chrome violet, Perkin's mauve. At the same time, whenever the name of a colour derived from its origin seems to strike the imagination, Dauthenay has adopted it.

The ink makers use a number of names derived from the dyes that are used in making the inks. Hofman violet, methylene blue for instance. Others refer to the quality as light yellow, fast red, etc., or to the effect they will produce, brilliant lake, steel blue, etc. Some are merely commercial names, Washington yellow, Senegal red, but there are others which give an idea of the colour they represent, tobacco brown, for instance.

The painting industry, ranging from artists to the house painters, give the greatest number of names of colours derived from their origin, and the majority of these are familiar to the public. Dauthenay adopts such of these as have become classic, so to speak.

As regards the colours used in describing silks and satins, he rejects them as inapplicable or too fantastic. It is another matter with the humbler textiles; many of the colours given to woollens and cottons are familiar household words and strike the imagination, Nankin yellow, Cardinal red, Navy blue, for instance.

Taking all usable expressions from these industries, Dauthenay was still at a loss for names for colours. In the case of each shade still without a denomination, he therefore chose the best known flower, and the least variable one, or the commonest foliage or fruit to use in his nomenclature. In the industries mentioned, there are many colour names derived from the vegetable
kingdom; lemon, lilac, mauve, heliotrope, moss green, etc. Some colour names from the same source have long since passed into the familiar tongue, orange, rose, chestnut, violet, etc. There are few of these words among the blues, because as a matter of fact very few flowers are really blue; they turn more or less towards violet. Most of the blues are of mineral origin and their names are derived from this.

On the other hand there are plenty of vegetable names among the greens. The green hues of foliage are of very complex tints and shades. To aid in naming them Dauthenay chose a certain number of the best known plants and used them as types of green to apply to the foliage of other vegetables. For instance, ivy, holly, eucalyptus and spinach greens.

To sum up Dauthenay’s system is to denominate colours by means of the most usual terms in the ordinary language, and those most capable of striking the imagination, justifying their use by a few words as to their origin, etymology or signification.

**Dauthenay’s Method of Classification.**

Basing his method on that of Chevreul, Dauthenay takes as basis of classification the degrees of clearness of the colours, taking count of Chevreul’s observation, “yellow is the most similar colour to white in its clearness and lack of intensity, as blue is the most analogous colour to black; red, the most of intense colours is placed between yellow and blue.”

He therefore commences with pure white, following with tinted whites, or at least lowerings of other colours towards white of which the clearness is greater than the first yellow. From yellow he passes through orange to red, following the order of the solar spectrum. Then from red to blue by way of violet, in this way effecting the conjunction of the two extremities of the solar spectrum. He leaves aside green yellow, the clearness of which is comparable with that of the light reds. On
COLOUR NOMENCLATURE.

the other hand, he introduces between the reds and the violets a clearer series, that of the pinks.

As a fact, pink is simply a lowered red. The carmines are the link between the reds and the pinks, the violet pinks connect up the purples which thus form the transition between the reds and the violets. Passing from violet to blue there are many transition hues, as almost all the flowers which it is the custom to call blue are more or less violet. From blue to green the transition is naturally by way of blue green. The series is terminated with green yellow.

The cycle of free colours (unshaded with black) is thus terminated. As for the shades, that is old rose, olives, browns, ochres and chestnuts they are in two parts; 1, the slightly shaded colours, in which the free colour is so much in excess that they can be included in the preceding series without offending the eye; 2, the shades, which could not be included in the preceding series without offending the eye.

The first category are put among the free colours in the places where their presence seems most natural. Thus lemon yellow, canary yellow, and madder red seem much more in their place among the yellows, oranges and reds than among darker shades. The old reds and old pinks naturally follow the reds and pinks, because it is easy to make transitions between the old reds and the carmines which follow them, and also between the old pinks and the lilac pinks.

As for the deep shades they are in two special sections, making a natural transition between green yellow and pure black. The first commences with the olives and passes through the ochres to the bistre browns; the second leaves the ochres, passes by the fawns, then by the chestnuts to touch on impure blacks and these lead to pure black, the lowered tints of which give the pure greys. In this last series the greys are lowered until the tint approaches pure white. They are in a way whites shaded with grey.
These last terminate the repertory in such a way that plate 365 can be put side by side with plate 1.

The Repertory thus contains 12 series.

I. Pure tinted whites.
II. Yellows and golds.
III. Oranges and salmons.
IV. Reds, old reds and carmines.
V. Pinks, old pinks and lilacs.
VI. Purples, Garnets, and amaranths.
VII. Lilacs, mauves and violets.
VIII. Blues.
IX. Greens.
X. Bistres (Bronzes) and ochres.
XI. Fawns and chestnuts.
XII. Blacks and greys.

The plates can therefore be arranged in circle.

The first condition in determining colour is that the observer must not be afflicted with Daltonism or chromotopsy. Colour confusion and colour blindness are commoner defects than is ordinarily imagined: about 5 per cent. of the candidates for railway employment are rejected for these causes.

The second condition is that the colour must not be influenced by neighbouring colours. When a colour is placed side by side with another, it assumes a different hue or tint to the eye. When a green is placed alongside a blue, the green appears yellower and the blue more violet than they really are. If a turquoise blue is put between a cobalt blue and a navy blue, and also between an apricot tint and a green yellow, the apparent difference is very striking to the eye. The turquoise blue is greener in the former case and bluer in the latter than it is in reality. A lilac placed between a flesh tint and a pink seems to be more intense than the same colour placed between a dark green and a violet. Black and white rectangles, when side by side, are more intense than when they are isolated on the grey ground.
COLOUR NOMENCLATURE.

The third condition is to arrange the colours so that their reflects are not seen or seen as little as possible. Certain things, says Chevreul, such as dyed woollens and porcelain coloured in the furnace, do not reflect the sunlight. It is otherwise with flowers, and they must be examined in diffused light, and in a position where the direct rays of the sun do not strike the eye.

Chevreul's plan of ascertaining the colour of a flower applies equally to any other object. 'If a flower,' he says, 'is supposed to be violet because when it is placed by the side of this colour there is no contrast, it should be compared with the hue that immediately precedes violet (5 blue violet), and with that which follows it (1 violet). It should appear redder than 5 blue violet and bluer than 1 violet.'

The repertory is to be used in the same way. The nearest approach to the colour under examination must first be sought, and this being found, it must be contrasted with the neighbouring hues. This should be done in the diffused light, not only for the reasons already stated, but also to preserve the colours of the plates.

THE STANDARD COLOUR CARD RELATING TO TEXTILE AND ALLIED INDUSTRIES OF THE U.S.A.

This extremely useful attempt to standardize colours for the textile trades consists of folding plates, comprising in all 106 specimens of coloured ribbons, each one of which is numbered and named. The system of standard numbers has been established, giving each colour a number consisting of four figures, which express as nearly as can be done the character of the colour according to the following scheme. The first, second and third figures indicate the relative proportions of the component parts of a colour which are as follows:—

1. White
2. Red.
3. Orange.
4. Yellow
5. Green.
48

PAINT AND COLOUR MIXING.

8. Grey. 11. No change.

As the actual strength of a colour may, of course, vary, the 4th figures indicate such strength as follows:
1. Lightest.
2. Second lightest.
3. Light.
5. Medium.

To illustrate by two or three examples:—Amethyst is numbered S7185, the "S" (for standard) being prefixed to the number in order to avoid possible interference with the established number. On reference to the above table, it will be seen that 7 indicates violet as the principal colour, 1 the addition of white as the principal blend, 8, grey as a secondary blend which gives the colour, while the 5 indicates that the strength of the colour is medium.

The reference number for plum is S7187, which it will be observed is exactly the same as Amethyst, but that the 7 indicates that the strength of the colour is dark. To take another example, strawberry is numbered S2185, 2 being red, 1 white, 8 grey, while 5 shows that the tint is a medium one. The colour of old rose S2183, is identical, excepting that the 3 shows that it is a light tint.

In some cases where the primary or spectrum colours are used without admixture, we have no change, for instance, emerald is S5005. Emerald green, of course, is as near a spectrum colour as one can get, and 5 shows that the particular green is indicated, while the 2 ciphers following indicate that there is no change, the final 5 shows that the strength of the colour is medium.

This plan appears to be a very practical one, which has distinct possibilities, and doubtless something of the kind will be issued before long in connection with decorators' and artists' colours. It may be added that copies of the card may be obtained from the Textile Colour Card Association of U.S.A. Incorporated, 354, Fourth Avenue, New York, price $1.05, including postage.
Measuring Small Quantities.—To the student who is just commencing experiments in colour mixing, the question of working accurately in minute quantities is one of great importance to avoid waste and unnecessary expenditure.

Probably the easiest way for him will be to measure his quantities rather than weigh them, and the first step towards this is to reduce all colours to a uniform liquid condition. He can then make a preliminary trial by taking a number of drops of each until the correct result is obtained. From that he can progress to a more ambitious method of measuring, by the use of a measuring glass, which need not be a costly affair, but is easily made at home from any kind of glass tube or jar, the gradations being first marked out on a strip of paper and pasted to the outside of the glass (see sketch). Another simple way of measuring liquids is to mark a piece of wood in sections, preferably of 100 in order to deal with percentages. This measure will stand in any kind of vessel used for mixing in, and is particularly useful for measuring thinners in various proportions.

Colour Mixing.

The Theory of Colour.—In theory, all colours may be made by mixing certain proportions of red, blue and yellow, and these are termed the Primary colours, because they themselves cannot be made from any mixture of other colours.

In practice, the colourman will not find it so convenient to confine himself to three colours only, for nature, and the paint chemist, has provided him with a choice range of combination colours, which will save him a great deal of trouble. In addition to this, it would be unwise to suppose that any shade of colour may be obtained from any one kind of red, any one blue, or any one yellow. There is as much variety in the primary colours as there is in the effects to be obtained from them.
No Pure Colours.—There are no absolutely pure colours at any rate in the form of paint pigments, though this may not be true when speaking of light. Red pigments incline towards blue, and are termed crimson red, or they incline towards yellow and are termed scarlet reds.

Blue pigments incline towards red and are termed violet blue, or they incline towards yellow and are termed greenish blue.

Yellow pigments incline towards red and are termed orange yellow, or they incline towards blue and are termed greenish yellow.

Peculiarities of the Primary Colours.—The first thing for the student to do is to acquaint himself thoroughly with the peculiarities of the primary colours and the principal stainers, to recognise them by their hue, in order to know how to choose them for specific purposes.

To obtain a pure green by mixing a blue and yellow, for instance, the blue must incline towards yellow, and the yellow must incline towards green. Should either of these colours incline in the opposite direction, the effect would be similar to adding grey to the colour, and the brilliance would be lost. Similarly, in choosing the colours for making a rich purple, the red must be one inclining toward blue, and the blue have a reddish hue.

Again, a pure orange colour could only be made from a red inclining to yellow, and a yellow with a reddish hue.

Some method must be adopted of working systematically and keeping a proper record of all the various mixings, so that these can be referred to at any time.

Probably the most simple and inexpensive way is to use a number of pieces of white cardboard, cut to a standard size, and lined out in sections, as per the sketches shown. These cards should be "sized" with gelatine, or white of egg, to stop suction.

The first set will be used for primary colours and pure stainers only, and each colour will have a separate card, so that the various stainers which come under the same name may be compared.
The colours must be applied to the card in such a way that any difference in hue or cast may be seen and compared. This is best done by following the method adopted by some manufacturers of artists' water colours. A little of the colour is taken on the middle finger, and applied fairly thick in the form of a disk, and then gradually worked downwards with a circular motion, until the colour on the lower portion of the disk is worked out almost to nothing. The white background showing through this will at once emphasise the variation in hue.
Having made a record of all the known stainers under the title of red, blue and yellow, and carefully named each one for reference, further experiments should be made of adding to each, first various proportions of white, and then various proportions of black, and recording the result on the second series of cards, with the proportions carefully noted.

### RECORD CARD

**A**

**NAME OF COLOUR**

**EQUAL PARTS A & B**

<table>
<thead>
<tr>
<th>2 PARTS A</th>
<th>2 PARTS B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 : B</td>
<td>1 : A</td>
</tr>
<tr>
<td>4 : A</td>
<td>4 : B</td>
</tr>
<tr>
<td>1 : B</td>
<td>1 : A</td>
</tr>
<tr>
<td>8 : A</td>
<td>8 : B</td>
</tr>
<tr>
<td>1 : B</td>
<td>1 : A</td>
</tr>
</tbody>
</table>

### RECORD CARD - SECOND SERIES

**MIXING PRIMARY PIGMENTS ETC**

This experiment must be extended to all the stainers which come to hand ready for use, commencing with the three principal ones used by the house painters, the ochres, umbers and siennas.

**SECONDARY COLOURS**—We now come to the actual mixing of two primary colours in order to produce a third, these being known as secondary colours.

Red and yellow produce orange.
Yellow and blue produce green.
Blue and red produce purple.

According to the hue of the primaries used, so will the result be seen in the hue of the secondary colour produced.

The student will obtain much useful information from these experiments. For instance, he will find that by combining certain primary colours, he will produce a third which has always been familiar to him under some trade name, but of its composition he was quite ignorant until he produced it in this way.

An excellent example of this is the making of the well-known Brunswick Greens by mixing pale lemon Chrome and Prussian Blue in varying proportions.

The secondary colours may be intermixed in the same way to produce a third series of colours. These are more complex, containing some portion of the three primary colours in each.

Orange and green produce citrine.
Green and purple produce olive.
Purple and orange produce russet.

These mixings are perhaps more instructive than useful, as the resulting colours can be obtained by a much shorter process and a more simple mixture, the addition of black or grey to the primary and secondary colours giving us all the colours of the third series.

If a record of these colours be made in the manner suggested, together with a series of tints formed by the addition of varying proportions of white, and a series of shades formed by adding varying proportions of black or grey, they will form a useful and reliable guide towards determining the composition and proportion of any colour sample.
CHAPTER V.

MATCHING AND MIXING COLOURS.

The actual process of matching a colour, apart from any consideration of the various stainers which enter into its composition, varies to some extent, according to the form in which the sample appears.

To match a liquid sample is far more simple than matching a dry painted pattern, for reasons which shall be explained later.

To match a gloss paint to a flat sample or pattern, or vice versa, is always more difficult than matching flat to flat and gloss to gloss.

To match a colour which is in close proximity to other colours, and forms part of a colour scheme, such, for instance, as a single colour chosen from an elaborate wallpaper design, is really far more difficult than matching a similar colour which stood alone, and which was not influenced by other colours.

The matching of silk or other fabrics, which present a variety of shades, is always a difficult task, excepting to those of long experience, or who have adopted some definite lines upon which to work. There are many little aids to success which may, with every advantage, be adopted by the would-be colourist, and we shall try and indicate some of the best of these. At the same time, we strongly urge the student to try not only the ways indicated, but any others which may be presented to him, and to adopt that which helps him best to attain the desired end.

Before commencing these, we would like to throw out a suggestion, which will probably save him a great amount
Specimens of "FASTAINS" on Veneer, by courtesy of Messrs. Naylor Brothers (London). Ltd.
of wasted material—Do not start to make a colour with
the full amount of material which you have calculated the
job will require. If you do, you will probably find that
by the time you have added your stainers, you have a
great deal more paint than you require. Commence by
taking one-half the estimated amount, whether it be
white-lead, zinc-white or one of the colour pigments, and
proceed to add your stainers as directed, keeping an eye on
the quantities used of each, until you arrive at the correct
colour. If you happen to add too much stainer you can
lighten up with a portion of the reserve pigment. Having
arrived at the correct shade with the first portion, it is
fairly easy to deal with the second half, seeing that you
now know which stainers to use, and the approximate
amount of each. It sometimes happens that a great deal
more stainers have to be added than at first thought
necessary, to produce the correct shade, either from bad
judgment of the sample, or because the stainers employed
are of low staining value, and the first mixing is found to
produce enough paint, without touching the reserve
portion.

In order to ensure that subsequent mixings shall be
exactly the same as the first, we would direct attention
to the method given under the heading of "adding
stainers."

We will now take the various forms of matching,
which the colourman is likely to have to deal with in the
ordinary routine of the painter's business.

Matching a Liquid.—The liquid sample should be
well stirred and shaken up to ensure freedom from
sediment and perfect mixture.

A small quantity should be applied to the centre of a
painted pattern board. Just a circle of the colour
applied with the finger will do, and the pattern board
should be painted white for preference. This will first
give you an idea of the composition of the colour, and
whether it has been made up in turps, oil or varnish,
according to the gloss it retains upon drying. Proceed
to match it according to instructions given on another page, and as you proceed you put a touch of the colour you have made, next to the pattern on the board, in order to see that you are working in the right direction.

When you have obtained a colour approximating to the sample, you can make a comparative test to see what difference, if any, there is between them. To do this, take a small clean palette knife, and dip it first into the sample, and then part way into your mixing. Any variation in shade is at once discernible if the light is at all good. If you are matching a gloss paint to a gloss sample, or a flat paint to a flat sample, and can see no difference between them on the knife, you may rest assured that the colour is sufficiently close for all ordinary purposes.

If the job is a very particular one, it would be well to make a further test, by painting out a pattern of your colour and the sample on the same board, so that they just touch, but do not overlap. This must be left an hour or two for the colours to set before taking a final decision. It is a pretty well-known fact, though two mixings may be exactly alike in the liquid there will be a slight variation between them when dry, through one sample developing a stronger colour than the other. Part of this is due to the oxidation of the colour used, and part to insufficient grinding, the finer colour pigment showing the least change, so it is always the safer plan to paint out the samples and let them "set" before accepting.

Matching Gloss to Flat and Vice-Versa.—When making up a gloss paint to match a flat sample or pattern, or vice-versa, the knife test is not sufficient at any time. It will do for a preliminary trial to see that your colour is somewhere near the sample in tone and shade, but they must be painted out on the same board and allowed to set.

The difference will be at once very noticeable. The one drying flat will have lost much of its richness, and probably appear lighter than when in the wet state.
MATCHING COLOURS.

To bring a flat paint up to the colour of a gloss pattern you must add a stainer which will impart the richness of tone which the oil or varnish gives to the gloss material. There is no rule by which this may be determined. Sometimes it means the use of a proportion of richer and deeper colour of the same series as that forming the base of the gloss colour. For instance, you may be matching a rich red of, say, deep vermilion. To obtain the richness in the flat colour you must add a proportion of scarlet lake. With the majority of blue colours, the rule is just the opposite, and instead of adding a richer blue you will find it necessary to use either yellow or green as a toning influence. To bring a gloss paint to an exact match of a flat sample it is necessary to adopt quite the opposite tactics, and modify its brilliance by toning down with white or grey, or other colour as occasion may require, in order to impart to the gloss paint that degree of softness which the flat paint possesses.

MATCHING IN A BAD OR PECULIAR LIGHT.—We are probably all aware that a good north light is the most suitable for matching colours, in order to see them at their true value, but such a light is not always to be obtained. Too strong a light is bad for some colours, especially the lighter ones, while for others, such as deep blues and invisible greens, the direct sunlight will best reveal the latest difference in shade or tone, just as it will in the black pigments.

It sometimes happens, however, that neither a good north light nor direct sunlight is available, but there is a peculiar reflected light present, which makes it very difficult to judge the colours clearly. The best way to overcome this is to apply a small patch of each colour, the sample and the one you are making, side by side and just touching each other, on a piece of thin clear glass or celluloid, and inspect them from the reverse side. Any difference in shade or tone will be at once detected.
Matching a Dry Pattern.—It is more difficult to match a dry pattern than a liquid sample, because of the deepening of colour which takes place during the process of drying. This deepening is more pronounced with some pigments than with others, and is particularly noticeable with certain blues and with greens which are derived from a mixture of blue and yellow. This may be due in part to the difference in weight or specific gravity of the two pigments, as well as to a habit which the blue has of "floating" in certain vehicles, particularly varnish, but there is no doubt that the principal cause is to be found in the continued development of the blue pigment through oxidation during the process of drying.

This bad habit on the part of certain colours makes the work of the colourman all the more difficult, because he has nothing but experience to guide him as to what allowance he must make for the deepening of the colour he is making in order that it shall dry down to match the pattern, and the only safe plan for him to follow is to paint out a portion and allow it to dry before taking a final decision. There is one method which may be applied with satisfactory results provided some account be kept for future guidance. The colour must first be exactly matched, then lightened up about two or three shades by the addition of the white or other pigment which forms the base of the colour. The quantity required for this varies with different colours, and should be recorded.

On applying a touch of the colour obtained to the dry pattern it will appear much too light, but as the colour sets or oxidises it gradually darkens to the correct shade.

Matching a Colour in Wallpapers.—When a single colour is chosen from a group of colours, such as in a wallpaper design, it is not always correct to produce an exact match, but the general effect according to the influence of the contrasting colours must be taken into account.

To view a colour which forms only a small part of an elaborate colour scheme is quite a different thing
from seeing it in large masses, and the more faithfully
the colour was copied the worse match would it appear.

It is invariably necessary to tone the colour with some
contrasting colour appearing in the wallpaper, and further
to lighten it up to counteract the bulk effect.

The wallpaper from which the colour is chosen
should be hung up in a good light, then the colour can
be matched, and painted out on a fairly large pattern
board and hung beside the paper. It will at once be
apparent to what extent this overshadows the colour
as it appears in the paper, and the necessary toning
influence to use. As an instance we might imagine
a design embracing some green leaves with a blue flower,
on a light ground. If the blue flower were faithfully
matched, and the colour applied to the woodwork, it
would look altogether too strong and overpowering,
and it would be found necessary to tone it considerably
with the foliage green, and lighten it with the background
cream, before harmony could be established. If a second
panel is painted with the corrected colour and hung beside
the wallpaper, the improvement is at once obvious.

**Matching Silk and Varied Shade Material.**—
Silk varies in light and shade according to the position
from which it is viewed in relation to light. As this
peculiarity cannot be imparted to the paint, the matching
of silk becomes purely a matter of imitating effect rather
than colour. The lightest and the darkest shades appear-
ing on the silk should be matched separately, and by
combining these two in the proportion of two of the light
to one of the dark an approximate match is obtained.
This should be painted out on a panel and hung up beside
the silk so that they can be viewed together, and the
general effect noted. Any toning required to bring them
into harmony can then be done.

It is well to note that fabrics which possess a "sheen"
such as silk has, can be more faithfully matched in a
semi-gloss colour than is possible in a dead flat, and an
even more striking resemblance may be obtained from a gloss finish, which is finally "felted" down with pumice stone powder and oil. There is a silkiness obtained in this way which mere brush work does not possess, and a richness of colour far in excess of that obtained by flat finishes.

**ADDING STAINERS.**

**STAINERS IN LIQUID FORM.**—The quickest, cleanest and most reliable way of adding stainers to a paint mixture is to first reduce them to liquid form of paint consistency, with turpentine.

If they contain any trace of skins or lumps they should be strained through muslin, silk chiffon or copper gauze, before adding to the paint. The use of stainers in a lumpy or skinny condition is a constant source of bad colour matching and waste material, as the full strength of the stainer is not obtained until the final straining of the paint, when these lumps are broken up, and a stronger tint obtained than was desired or expected.

If the stainers are thinned and strained into lever lid tins they are ready for immediate use and there will be no waste.

**COMBINING ALL STAINERS FIRST.**—A method which has much to recommend it is the combining of all the necessary stainers before adding to the paint. It is, however, only possible to carry this out economically when some idea of quantities required is available, and a record should therefore be kept of all the standard mixtures, so that they can be repeated with accuracy.

The stainers having been mixed, a test is made by paletting up a small quantity with the base pigment and noting the colour.

Having once obtained the correct mixture, it is possible to make up two or more batches of paint, to the exact shade. It is only necessary to put aside some of the combined stainers in a lever lid tin, carefully marked,
and the colour can be repeated at any future date, either for re-doing the same, or for work which has to be similar. It is a much better way than putting aside the actual paint which in time becomes fatty and unfit for use. It also enables the colourman to mix just the bare quantity of paint he will require for any particular job, without troubling about a safety margin, which on the average job means so much waste.

This method is particularly applicable to such stock colours as buffs, stone colours, etc. which have to be regularly repeated, and when the tins containing the mixed stainers are properly labelled and the proportions of each stainer used written plainly upon them, they form an invaluable guide for the future, not only for the colourman who recorded them, but for anyone else who for any reason has to pick up his work, or repeat his mixings.
CHAPTER VI.

REDS, AND HOW TO MIX THEM.

Having proceeded through a course of study and experiment the student will now require the actual mixtures necessary to produce the various named colours. These are given in this chapter and those immediately following.

Note.—All colours marked * can be purchased ready made.

Acacia.—This may be described as a dark maroon. It is made by mixing five parts of black, three of Indian red, and one of Prussian blue. Less of the black will give a more pleasing shade.

*Alizarin Crimson.—A lake colour prepared from alizarin or coal tar colours. Alizarin crimson and scarlet are other varieties. They are not so brilliant as genuine madder colours, made from the madder root.

Amaranthine.—This is a crimson which can be made by mixing three parts of vermilionette with one of Prussian blue.

Anemone.—This is a reddish purple, and may be made by mixing two parts of black, one of white, six of a bright red, and six of Prussian blue.

*Antwerp Crimson.—A fast red of a rich dark hue made by Messrs. Mander Brothers.

Apricot.—Mix middle chrome yellow with a little vermilion and add a very little lake.

Armenian Red.—Mix one part of yellow ochre with two parts of Venetian red.
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Aurore.—A dull pink shade, which can be produced as follows: Mix together one part of Indian red, two of orange chrome, a little lemon chrome, and two of blue, lightening up with white.

Bay.—Mix together three parts of black, three of Venetian red, and a little orange chrome.

Begonia.—A dark red purple, which may be obtained by mixing four parts of lamp black, five of bright red, and four of Prussian blue.

Black Maroon.—Take four parts of black and mix them with one of a bright red and a little Prussian blue.

Blood Red.—Any bright red toned down with a little black will produce a shade sometimes called by this name.

Bordeaux Red.—Take one part of black and mix with it two parts of orange chrome and one of Prussian blue. Indian red glazed with lake gives the best effect. A colour is made under this name by Messrs. Mander Brothers.

Brick.—Use two parts of French ochre to one part of Venetian red and one part of white lead, adding more ochre if required to lighten the colour. This gives a good tint, sometimes called "brick red," and is suitable for outside work.

Bright Scarlet.—Mix twenty parts of vermilion, seven parts of pale chrome, and one part of golden ochre. A good vermillionette slightly toned down with yellow answers the same purpose.

Bronze Red.—This is a red toned down with about a fourth part of black, a little bright yellow or orange being added.

*Brown Madder.—A permanent lake colour made from the madder root. Nearly fast both in oil and water.

*Burnt Carmine and Burnt Lake.—These are two names of the same water colour which is also called "Purple Lake." They are not permanent.
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*Burnt Ochre.*—Another name for light red; also called "Burnt Roman Ochre."

**Cambridge Red.**—Vermilion, to which is added about one twentieth part of Prussian blue, gives a colour sometimes called "Cambridge Red."

*Carmine.*—This colour is usually made from cochineal if it is to be made into a water colour, in which case it is quite fugitive. Carmine, when ground in oil, is usually made from alizarin and is nearly permanent. It is very useful for glazing in order to produce a rich red.

*Carminette.*—This is the registered name of an excellent colour manufactured by Messrs. Mander Brothers. It is a bright strong red, which is useful when protected with two coats of varnish. It is of no use, however, for tinting purposes, or in distemper.

**Carnation Red.**—Three parts of carmine lake and one part of white lead give a carnation colour, but a better result is obtained by taking pure vermilion as a base and adding carmine and zinc white until the desired rich colour is obtained. This colour is not suitable for use outside.

**Carnation Rose.**—White lead tinted with Indian red or vermilion, or Rubinette, made by Messrs. Goodlass, Wall and Co., Ltd., of Liverpool. A beautiful colour can be obtained by simply tinting white with Lewis Berger's permanent crimson madder.

*Chinese Vermilion.*—This is the name usually given to the deepest shade of vermilion.

**Cherry Red.**—Mix together crimson lake, burnt sienna and azure blue, or two parts of vermilion and one part of carmine.

**Claret.**—Mix two parts of carmine with one of ultramarine blue. A little vermilion may be added if desired, and this may render a little yellow necessary to tone down the colour. A less rich colour may be made by mixing Venetian red and yellow ochre, and glazing with crimson or madder.
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Coral Pink.—This colour is useful only on inside work. It is made by mixing five parts of vermilion, two parts of white lead and one part of chrome yellow. Another recipe for producing shades of coral pink is one part of white, three of red, five of orange, and three of blue.

*Crimson Lake.—A bright red colour made from cochineal (see Carmine). It is used both in oil and water, but is not permanent.

*Crimson Madder (Permanent).—A beautiful and very useful colour manufactured by Messrs. Lewis Berger and Sons, Ltd., of Homerton, London; and shown on the plate facing title page of this book.

*Dragon’s Blood.—A rich, deep red made from the resin of that name. The genuine colour is fugitive and an imitation for use in water only is made by mixing burnt sienna, cochineal, lake and gamboge.

Dregs of Wine.—This shade is produced by mixing Venetian red with a little lamp black and white lead.

Egyptian.—A dull yellowish crimson made by using five parts of black, one and half of white, two of orange, and one of blue, and a very little red.

*Extract of Vermilion.—Another name for Scarlet Vermilion.

*Fast Maroon.—A speciality of Messrs. Goodlass, Wall and Co. A useful colour for shop fronts, door panels, etc. Very rich in hue, and permanent.

*Fast Red.—A series of bright scarlets usually of the vermillionette type. Messrs. Goodlass, Wall and Co. make one of the best known.

*Fire Red.—A brilliant red used instead of deep vermilion, to which it is superior.

Flesh Colour.—One hundred and twenty parts white lead, two parts yellow ochre, and one part Venetian red will produce an excellent flesh colour. Or mix eight parts of white lead, two parts of orange chrome yellow, and one part of light Venetian red.
An increased proportion of red may be employed where desired. A mixture of orange and white in the proportion of one part of the former to three parts of the latter may also be used, or a mixture of medium chrome yellow, ochre, and Venetian red added to white.

**French Red.**—Use equal parts of Indian red and vermilion, and glaze with carmine or Berger’s permanent crimson madder.

**Gazelle.**—To obtain this mix Venetian red, lamp black and Indian red, and add sufficient white lead to produce the desired shade.

**Geranium.**—To produce this colour use nine parts of bright red and one of blue. Or Indian red may be used, afterwards glazing with madder lake for good work. Most of the larger colour manufacturers make geranium red which is better than one can obtain by mixing.

**Indian Pink.**—Tint white lead with a little Indian red.

**Indian Red.**—This is a good permanent iron oxide pigment and is most useful in mixing with other colours. It is sometimes called “Mars’ Red.”

**Italian Pink.**—An artists’ colour, also called “Yellow Carmine,” “Yellow Madder,” and “Yellow Lake.” Not permanent.

**Light Red.**—This term might be applied to any tint of red lightened up with white. It is, however, a definite name of a water colour which is also called “Burnt Ochre,” “Burnt Roman Ochre,” and “Terra Rosa.” It is obtained by burning yellow ochre, and is quite permanent. An excellent light red for decorator’s use is made by Messrs. Mander Brothers, which may be used for all paint work, including distemper.

**Light Pink.**—Tint white lead with a little pure vermilion. The word “pink” does not bear any very definite meaning, as almost any bright red such as carmine or crimson added to plenty of white give a good pink just as vermilion does, but of another hue.
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A very pretty and useful pink is made by adding white to permanent crimson madder, as shown on the plate facing the title page of this book.

LIGHT SALMON.—Tint white lead with raw Italian sienna, burnt Italian sienna, and burnt Turkey umber. Or tint white with any bright red, toning down with sienna.

LILAC.—A great deal of difference of opinion exists as to this tint. One part of ultramarine to one part of bright carmine, added to eighty parts white lead, give a very good lilac. A cheaper way is to use Indian red and lamp black as a tinting colour, or rose pink may be added to the lead only. Yet another method for producing a lilac is to mix three parts of bright Indian red, three parts of white lead, and one part of ultramarine blue, but less white lead is preferred by some painters. A touch of yellow will help this colour if too raw for the purpose.

*Madder Lake.—This is principally used by artists, but it is useful to the house decorator for glazing the best work where a bright red is required.

MAGENTA.—Carmine and vermilion, with a little ultramarine blue, produce this colour.

Mahogany Lake.—A pure lake of the maroon character.

*Maroon.—This colour is obtained by mixing carmine and blue black, and adding a small quantity of medium chrome yellow. It may also be made by mixing one part of ultramarine blue with three parts of Tuscan red. This gives a tint that is often considered a little too red, but this defect may easily be remedied by adding more blue. Some painters add ivory black and a little chrome yellow to carmine.

*Markeaton Red.—This well known speciality is a very bright red which lasts as long or longer than vermilion, but is considerably cheaper. It is made by Messrs. Ellam, Jones and Co., of Derby, and is used by many of the big railway companies, Post Office, etc.
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*Mars' Orange.—Another name for Venetian red, which see.
*Mars' Red.—Another name for Indian red, which see.

Mexican Red.—Mix one part of red lead with four parts of Venetian red.

Mikado.—Three parts of blue and seven of red, mixed with a little white, give this purplish red shade.

Moorish Red.—Mix together three parts of vermilion and one part of rose pink.

Mulberry.—This is a very dark purple obtained by adding a little blue and just a tinge of red to black.

*New Persian Red.—Messrs. Mander Brothers make a bright red of good body which is sold under this name. It costs only 7d. a lb., and is fairly fast although it lasts better if protected by a coat of varnish. It must not be used for distemper.

Old Rose.—Tint white lead with French ochre, Indian red, and lamp black, or Venetian red and a very little lamp black may be used if desired.

Opaque Pink.—Tint white lead with red lead.

Opera Pink.—Tint white lead with a mixture of five parts of vermilion and one part of medium chrome green.

Oriental Red.—Mix one part of red lead with two parts of Indian red.

Orange Scarlet.—This colour may be obtained by adding two parts of orange lead to one part of white lead.

*Orange Vermilion.—The pale shade of vermilion orange lead comes nearest to this colour. The tone may be made by adding chrome to vermilion.

Peach Bloom.—This is a mixture of white lead and Venetian red. Or it may be produced by adding sufficient Indian red to white lead to give a warm tint and mixing it with equal proportions of white lead, lemon chrome yellow, ultramarine blue and light Indian red. Or a mixture of three parts of Indian
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red with seventeen parts of white is sometimes used.

*Persian Red.—A bright scarlet.

Pink.—White lead tinted with orange lead gives a bright pink. See also "Light Pink."

*Pink Madder.—A lake colour made from the madder root. It is made only in water.

Plum.—Mix with equal parts of white lead, Indian red and ultramarine blue in the proportion of two parts of lead to one of each of the other colours. This makes a dark plum that is only suitable for inside work. If a light tint is desired add more white lead. A very rich plum may be obtained by mixing together ultramarine blue and carmine, and adding a little white and a little yellow.

*Pompeian Red.—Small quantities of bright red and orange are mixed with black to produce this shade, but Tuscan red tinted with red gives a better result.

Poppy.—Blue and vermilion mixed in the proportion of one of the former to twenty-four of the latter give this shade. Some colour mixers prefer to add a bright yellow instead of the blue.

Purple.—Light Indian red, four parts; white lead, three parts; ultramarine blue, two parts; or a purple may be obtained by mixing Indian red and white. A mixture preferred by some painters is made by mixing ultramarine and vermilion with a little white. A little crimson lake gives richness to the colour.

*Purple Lake.—A beautiful water colour called also "Burnt Carmine," and "Burnt Lake." It cannot be relied upon to stand light.

*Purple Oxide.—The correct name of purple brown or dark iron oxide.

Red Ochre.—This earth colour is cheap, and can be readily bought in most places. It can be imitated by mixing Indian red and chrome and adding a little vermilion.
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RED TERRA COTTA.—Use equal proportions of burnt sienna and white lead. The tone may be varied by the addition of either of the umbers and the chromes. A good bright terra cotta is also made by using Venetian red as a base and colouring up with ochre and a touch of lake.

REGAL PURPLE.—Mix together four parts of white lead, two parts of cobalt blue, and one part of carmine lake.

ROAN.—Mix black with half its quantity of red and add a very small proportion of blue and white.

ROSE.—Five parts of white lead mixed with two parts of carmine give a rose colour that is suitable for inside work only. An admirable rose colour may be obtained by using zinc white instead of white lead, as the zinc is a much purer white than the lead, and hence gives a purer tint.

ROSE CARNATION.—Mix together one part of rose madder and eight parts of oxide of zinc. This is a beautiful colour, but the madder is too expensive for use except by artists. A very successful colour can be produced from Lewis Berger’s Permanent Crimson Madder.

*ROSE MADDER.—A lake colour made from the madder root. It is suitable both for oil and water, but is not quite permanent.

ROSE WOOD.—To produce this colour bright red is mixed with about six times the quantity of black and a very little green. The shade given is a very dark red.

ROYAL PINK.—Mix together two parts of zinc white and carmine lake. This will only do for inside work.

*ROYAL PURPLE.—Mix one part of vegetable black, one and half of rich red, and seven of Prussian blue. Some manufacturers make this colour ready for use.

SALMON.—Six parts of white lead, one part of vermilion, and a little lemon chrome yellow. This
SANITARY DISTEMPER

PLATE VI.

Samples by courtesy of Messrs. Naylor Brothers (London), Ltd.
mixture produces a colour somewhat bright. Another salmon colour is made by a mixture of raw sienna, burnt sienna, and burnt umber. A tint preferred by some is produced by adding to the white, Venetian red, burnt umber and French ochre. Another method is to add vermilion and golden ochre to white, which gives a nice bright colour. Venetian red and chrome, added to white, gives a duller colour. Still another mixture is Venetian red, vermilion, yellow ochre and white.

*Scarlet Lake.*—This colour is manufactured from a mixture of vermilion and alizarin crimson. It is suitable both for oil and water, and is permanent. A colour very similar may be obtained in one of the many vermilionettes on the market. It will be convenient to remember that all vermilions should be lightened by the use of pale chrome instead of white lead. Lead takes down the brilliancy of the colour, producing a pink.

*Scarlet Red.*—This is bought ready made. It is the name given to the brightest of the oxide paints.

*Scarlet Madder.*—A permanent but rather weak alizarin with which many beautiful tints can be obtained.

Shell Pink.—This colour is sometimes made by adding a little good Indian red to white, but some decorators prefer to use vermilion with a little chrome yellow and burnt sienna.

Shrimp Pink.—Mix Venetian red, burnt sienna and white lead, and add a little vermilion.

*Signal Red.*—This is usually scarlet vermilion, but may be imitated by mixing orange lead, vermilion ette and Paris white, or orange lead by itself may be tinted with vermilionette. "Signal Red" is a well known speciality.

Salmon Pink.—Tint white lead with equal parts of orange chrome and vermilion. If zinc white is used instead of lead the colour will be found brighter.
**Sunlight Red.**—A specialty of Messrs. Mander Brothers. It is a deep crimson shade, is of good body, fast in light, and suitable for metal or wood signs, shop fronts or work exposed to the light, especially if varnished.

**Terra Cotta.**—Mix together two parts of white lead to one part of burnt sienna. One of the best ways to produce a good terra cotta wall is to give a good under coat of white lead, orange chrome and a little Venetian red, and when dry to apply a finished coat made from Venetian red and a little orange chrome to which has been added a little white. See also under "Red Terra Cotta."

**Terra Rosa.**—Another name for Light Red, which see.

**Turkish Crescent Red.**—Mix equal proportions of Indian red, vermilionette and rose pink.

**Tuscan Red.**—This can be bought ready made, and may be imitated by mixing ten parts of Indian red with one part English rose pink. Indian red is very similar in colour but somewhat darker. It is also cheap.

**Venetian Pink.**—Tint white lead with a little Venetian red.

**Venetian Red.**—This colour is an iron oxide and is sometimes called "Mars' Orange." It is one of the most useful that the house painter has, being cheap, and having good covering power and body. It may be used both in oil and water, and is quite permanent. It is not very good for tinting purposes. It would not, of course, be often imitated, but Indian red—a very similar pigment—could be tinted with red. Or it may be imitated by mixing vermilion, yellow ochre, madder carmine, and a little Cappagh brown, which is an artists' colour, and is rarely used by house painters.

**Vermilion.**—This bright red is a mercuric sulphide, *i.e.*, a combination with sulphur and mercury. It cannot be imitated by an admixture of ordinary
pigments, but there are many excellent substitutes on the market, most of them being vermilionettes. The pale variety of vermilion is known also as “Orange Vermilion” and “Pale Vermilion.”

*Wagon Red.—Messrs. Mander Brothers make a beautiful colour under this name in two shades, “pale” and “deep.” The latter is quite fast in light. Messrs. Manders’ Wagon Red is not a vermilionette. It is not intended for distemper.

Wine Colour.—Add a little ivory black to a mixture of carmine and vermilion. Or use Indian red mixed with a little black or umber, and glaze with madder. See also the chapter on “Glazing.”

*Yellow Lake, Yellow Madder, and Yellow Carmine, are three names given to the artists’ colour which is more frequently known as “Italian Pink.” It is very fugitive.
CHAPTER VII

BLUES, AND HOW TO MIX THEM

NOTE.—All the colours marked * can be bought ready made.

*Antwerp Blue.—This colour may be described as a weak Prussian blue. It is also called "cyanine blue" and "Leitch blue." If necessary to imitate it, mix one part of bright green with two parts of ultramarine; add a very little zinc or other white, but not lead. Brunswick blue is frequently used in the place of Antwerp blue. It may be used both in oil and water and is nearly permanent.

*Azure Blue.—Also called "new blue" and sometimes used as a synonym of cobalt. To imitate mix one part of ultramarine blue and forty parts of zinc white. Another shade may be obtained by mixing forty-four parts of white, twenty-nine of green, and twenty-seven of blue. Or celestial blue and a little red on a base of white will give an azure shade. Cobalt and white may also be used.

*Berlin Blue.—This is only another name for Prussian blue.

Blue Grass Tint.—One part Prussian blue, three parts of emerald green, seven parts of white lead.

*Bremen Blue.—This is a colour to be bought only ready made. It is not now much used, and is not suitable for an oil colour.

*Bronze Blue.—A dark blue colour, which may be made by mixing three parts of black with one of Prussian blue.
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*Brunswick Blue.—This is bought ready made, and can be imitated by adding white lead to Prussian blue in sufficient quantity to obtain the desired tint.

*Cœurlean.—This is an artist's colour of a light and somewhat greenish blue tone. It is a stannate of cobalt. An imitation may be made from ultramarine and white, with a little yellow, although the colour is a difficult one to imitate successfully.

*Cœruleum.—A colour introduced by Messrs. Rowney and Co. It contains tin (stannic) oxide, cobalt oxide, calcium sulphate, and silicic oxide (silica). It is permanent both in oil and water colour.

Celestial Blue.—About equal parts of Prussian blue, chrome green and white lead will give this colour, but there should be most white, and the tint should be more blue than green.

*Chinese Blue.—Another name for Prussian blue, which see. Usually the term Chinese blue is applied to a high grade Prussian blue, but sometimes the reverse is the case.

*Cobalt.—This colour is alumina tinctured with oxide of cobalt. It is one of the best artists' colours, and cannot be successfully imitated. It is a beautiful and most useful colour, but unfortunately, it is expensive, and it is therefore only used in the finest work. It is quite permanent, both in oil and water.

*Cyanine Blue.—Another name for Antwerp blue, which see.

Dark Blue.—Obviously this is no very definite colour. Manufacturers often use one part of white, two of chrome green, and seven of Prussian blue. But ultramarine, or indeed any blue, may be used, and this may be first lightened with white, and black added as may be desired.

Fog Blue.—Equal parts of burnt sienna and Prussian blue, lightened up with about twenty parts of white lead.
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French Blue.—The name is applied to the best quality of artificial ultramarine, which is sometimes termed "French ultramarine. It is permanent both in oil and water.

Forget-me-Not.—This can hardly be termed a name of a colour, although it suggests a clearer idea than many of them. It can be obtained by adding white to cobalt.

Gobelin Blue.—Mix together four parts of ivory black, two of white, one of chrome green, and three of Prussian blue.

Granite (Blue).—To produce this shade mix two parts of black with six of white and one of ultramarine blue.

Heliotrope.—This colour is obtained by using two parts of zinc white, three of bright red, and four of ultramarine blue.

Implement Blue.—This is made simply by mixing ultramarine with white. Barytes and zinc mixed are frequently used for the white, as lead cannot be employed in the presence of ultramarine.

Indigo.—This dark blue is a natural vegetable pigment, being extracted from the Indigo plant. An imitation may be produced by using nine parts of black and four of Prussian blue, but this will not look like the real thing. Indigo should not be mixed with lead or lead chromates. It is, however, a very useful colour, although not quite permanent, especially in oil.

Lavender.—Three parts of ultramarine blue and one part of carmine, added to zinc as a base, give a very good lavender tint for inside work. Ivory black mixed with a little carmine and ultramarine and added to white lead may be employed for outside work.

Leitch Blue.—Another name for Antwerp blue, which see.

Light Blue.—This is simply an ultramarine blue tint produced by the addition of zinc; or the colour
may be obtained by tinting white lead with Prussian blue.

*LIME BLUE.—This is a colour much used formerly for mixing distemper, but artificial ultramarine has to a great extent supplanted it. It must not be used in oil. The colour usually sold for lime blue is a variety of ultramarine.

MARINE BLUE.—A very dark blue, which is obtained by mixing one part of ultramarine blue with nine of ivory black.

MASCOT.—This is a very dark blue shade, which is got by mixing black and blue in the proportion of seven parts of the former to one of the latter with a very little green.

*MAUVE.—Is made from aniline, and is not permanent either in oil or water. Four parts of cobalt blue, twelve parts of oxide of zinc, and one part of carmine lake give an excellent mauve, or the colour may be obtained by mixing yellow ochre, blue black, and Venetian red with a little white lead. Another shade is obtained with blue, red and white mixed in the following proportions: blue, three parts; white, two parts; red, one part. Or white may be tinted with ivory black, carmine and ultramarine.

METHYL BLUE.—Mix green with twelve times its quantity of blue and a touch of red.

MOUNTAIN BLUE.—One part of ivory black, two parts of rose madder, three parts of cobalt blue, and four parts of white lead. This colour is only intended for artists' use.

NAVY BLUE.—Ivory or drop black mixed with one-fourth the quantity of blue will give this shade.

NEUTRAL BLUE.—A series of neutral blues may be made by tinting white lead with Prussian blue and adding burnt umber, the quantity of blue and umber being varied according to the tint required. Good neutral blues may also be made by tinting white with raw umber and a little Prussian blue. Add either a
little burnt sienna if a warm neutral blue is required, or a little black if one cool in appearance is desired.

*New Blue.*—Another name for azure blue, which see.

Nile Blue.—Mix a little white with Prussian blue and chrome green, using rather less of the latter than the former. The result is a pale greenish blue.

Normandy Blue.—To get this greenish blue shade mix green and blue in about equal proportions with white.

Oriental Blue.—One part of lemon chrome yellow, two parts of Prussian blue and twenty parts of white lead.

Peacock Blue.—This colour is one upon which opinion varies considerably. A splendid colour is made by taking cobalt as a base and adding a little white and a little Chinese blue.

*Perfect Blue.*—Some manufacturers produce this beautifully rich colour. It is very like cobalt, but slightly darker.

*Permanent Blue.*—A pale variety of the best quality of French (artificial) ultramarine.

Pompeian Blue.—This is made by tinting white with ultramarine and adding a little vermillion and Italian ochre.

Porcelain Blue.—To get this shade mix one part of zinc white and chrome green with four parts of ultramarine blue and a touch of black.

*Prussian Blue.*—This colour is certainly the most important blue the house painter has. It cannot be imitated. It works well in both water and oil, and is transparent. It is very strong and care must be exercised in using it lest too great a quantity is added to a batch of paint, which might be spoilt in consequence. It is a ferro-cyanide of iron obtained by mixing together solutions of a ferric salt and an alkaline ferro-cyanide. Prussian blue is also called
“Chinese blue.” It is not quite permanent, and must not be used in distemper.

**Quaker Blue.**—Add a little black to Prussian blue, and lighten up with white.

**Robin’s Egg Blue.**—Use white for base, tint with ultramarine until a fairly strong blue is obtained, and then tinge with a little lemon chrome green.

**Royal Blue.**—This is made by adding a little white to Prussian blue with a touch of crimson lake. Some manufacturers make a very rich blue, which they sell under the name of Royal blue.

**Sapphire Blue.**—One part of Chinese blue mixed with double the quantity of oxide of zinc. This should not be used for outside work.

**Sea Blue.**—Two parts of Prussian blue, three parts of raw sienna, thirty parts white.

**Sky Blue.**—This is the blue sold as “new blue.” To imitate one part of Prussian blue added to one hundred and twenty parts of white lead give a sky blue, but some prefer cobalt, and this is for many purposes doubtless the best. Still another method of obtaining sky blue is to tint white lead with a little lime blue, adding a very little middle chrome, but the latter is more suitable for a distemper colour than it is for an oil paint, as lime blue is not very lasting in oil.

**Steel Blue.**—Zinc white tinted with lime blue gives this colour for distemper.

**Stone Blue.**—One part of raw umber, twice the quantity of Prussian blue on a base of white lead will give this colour.

**Transparent Violet.**—Mix together four parts of ultramarine blue and one part of crimson lake. This is suitable only for artists’ use.

**Turquoise Blue.**—Two parts of cobalt blue, one part of emerald green, twelve parts of white lead.

**Ultramarine (Artificial).**—This is one of the chief blues used by the painter, and must be bought ready made. It is quite permanent, both in oil and
water, and cannot be imitated, but it can be bought in many different qualities and shades, such as purple, cobalt, etc. It must not be mixed with chromes or white lead, as it contains sulphur, and there would on that account be a likelihood of discolouration. Natural ultramarine is very expensive. It is made from selected parts of the mineral *lapis lazuli*.

*Ultramarine Ash.*—An expensive artists' colour made in the same way as genuine ultramarine, but of a paler shade, owing to the larger proportion of stone allowed to remain.

*Verona Blue.*—This beautiful colour is manufactured by Messrs. Lewis Berger and Sons, Ltd., of Homerton, London, and is most useful for high class decoration.
CHAPTER VIII.

YELLOWs, AND HOW TO MIX THEM.

Note.—*All the colours marked * can be bought ready made.*

Alabaster.—This is a yellowish white in colour. Mix four parts of white with one of middle chrome yellow.

*Alizarin Yellow.*—A comparatively new yellow lake made from the coal tar colours.

Amber.—An imitation of amber can be produced by mixing equal portions of burnt sienna, burnt umber, blue black and orange chrome yellow, and adding a quantity of white lead until the desired tint is obtained.

Antique Bronze.—Add ivory black to orange chrome yellow in the proportion of about five parts of black and one part of orange.

Asiatic Bronze.—One part medium chrome yellow, two parts raw umber, and lighten with white lead.

*Aureolin.*—An artist’s water colour, often termed “cobalt yellow.” It is a double nitrate of cobalt and potassium and was originally introduced by Messrs. Winsor and Newton.

*Aurora Yellow.*—A speciality of Messrs. Winsor and Newton, introduced by them in 1889. It is an opaque and brilliant variety of sulphide of cadmium of greater body than ordinary cadmiums and a much better drier. It is as bright as the best chrome, but is quite permanent.
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Biscuit Colour.—The purest tints may be obtained by tinting zinc oxide with Naples yellow. Ochre added to white with a touch of umber may be used.

Brass Yellow.—This may be obtained by mixing forty parts of white lead, twelve parts of light chrome yellow, one part raw umber, and one part burnt umber. Or a mixture of French ochre and medium chrome yellow, added to a little umber, with a touch of blue, may be used to tint white as a base.

Bronze.—Take fourteen parts of black and add one part of yellow and two of green. See also under "Green."

Bronze Yellow.—Mix together five parts of medium chrome yellow, three parts of white lead, and one part of raw umber. A mixture preferred by some painters is obtained from chrome yellow, French ochre and a little burnt umber.

Buff.—Two parts of white lead and one part of yellow ochre produces a good buff, or white lead may be tinted with French ochre alone. Other shades are obtained with mixtures of two parts of black, four of white, one of red, and one and one-eighth of yellow.

Buttercup.—White lead tinted with lemon chrome gives a nice buttercup yellow.

* Cadmium Yellow.—This is an artist's colour of considerable value, but is, generally speaking, too expensive for house painters. It should not be mixed with chrome yellow, emerald green, or any pigment containing copper or lead, and tints should therefore be obtained by using zinc oxide. It is made in four shades: pale, medium, deep, and orange, and it cannot be successfully imitated. The palest shade is sometimes called "Radiant yellow." Cadmium yellow is sulphide of cadmium and is quite permanent in oil and nearly so in water.
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CANARY.—This is practically another name for straw tint, and it may be mixed in the same way. The proportions for an ordinary shade of canary are three parts of lemon chrome yellow to one part of white lead, but less yellow is often preferred. Another shade is obtained by mixing two parts of white, six of yellow and two of green. Some manufacturers make an extra light chrome yellow which they call by this name.

CHAMOIS.—A dull yellow made by mixing four parts of white, five of yellow ochre and one of green.

*CHINESE ORANGE.—Another name for Alizarin orange.

CHAMOLINE.—Mix together five parts of white lead, three parts of raw sienna and one part of lemon yellow.

CITRINE.—Although this is a tertiary colour, and theoretically can be made from green and orange, opinions as to the exact shade somewhat differ. It may be made by mixing four parts of medium chrome yellow and one part of raw umber; or five parts of lemon chrome yellow and two parts of raw umber.

CITRON.—To produce this colour use Venetian red as a base and add one part of Prussian blue, two of chrome yellow and two of white.

*CITRON YELLOW.—This is strictly zinc chrome or lemon yellow, but the name is sometimes used for chrome yellow (pale), which see.

*COBALT YELLOW.—Another name for aureolin, which see.

COLONIAL YELLOW.—Medium chrome yellow mixed with white lead and a little dark orange chrome yellow gives this tint.

CREAM.—The best and purest tints of cream are obtained by tinting zinc oxide with a little Naples yellow. A good shade is obtained by mixing eight parts of white lead, two parts of French yellow ochre and a touch of Venetian red. French ochre and lead alone are often employed Equal parts of raw
PAINT AND COLOUR MIXING.

Sienna and orange chrome used to tint white gives a nice cream. There are many other methods of obtaining this tint. Note.—Light buff, medium buff and dark buff may all be obtained in the same way by adding more or less of the French ochre or white.

*Chrome Yellow.—Normal chromate of lead produced by precipitation. These yellows are cheap and very useful to the house painter, but although permanent in sunlight they darken when exposed to pure air. There are five different shades known as primrose, lemon, middle, orange and scarlet chrome. The latter is sometimes called orange chrome, deep.

Daffodil.—Lemon chrome mixed with a little Venetian red will give this colour.

*Daffodil Yellow.—This name is sometimes given to the palest tint of cadmium yellow.

Deep Cream.—This colour is made by tinting white lead with yellow ochre and a little Venetian red. (See Cream.)

Ecru.—Tint white lead with French ochre and medium chrome yellow. A tint which is sometimes called stone colour is produced in the same way. Another shade of ecru may be obtained by mixing three parts of black, eight parts of white, three of medium chrome yellow, and one of Brunswick green.

*Gamboge.—This is an artist's colour. It is a gum resin, is somewhat fugitive, and is useless for the purpose of the house painter. A preparation called "Gamboge" is ground in oil, but it is an alizarin yellow.

Gold.—To obtain the colour known as "gold," white lead may be tinted with five parts of golden or yellow ochre and one part of vermilion, or a mixture of light chrome yellow, French ochre and vermilion may be used instead to tint the white lead. The quantity of yellow used should be considerably more than the ochre.

*Gold Ochre.—Another name for Roman ochre
HAY COLOUR.—French ochre, medium chrome yellow, and lamp black used as tinting colour for white lead will give a hay colour, or raw Italian sienna and lamp black may be employed if desired.

*INDIAN YELLOW.—A rich yellow made from "purree," the dung of camels, etc. It is chemically a magnesium salt, and if properly prepared by repeated washings is practically permanent. It is permanent both in oil and water.

*ITALIAN LAKE.—A colour made from quercitron bark. Also called Italian pink, yellow madder, or yellow carmine. It is not permanent.

IVORY.—Varying tints of ivory are best obtained by tinting zinc oxide with Naples yellow. The addition of a very little medium chrome yellow to white lead also produces an ivory or a very little golden ochre may be used. Another way is to tint white very slightly with middle chrome and a touch of black.

JONQUIL YELLOW.—Tint white lead with medium chrome yellow to which has been added a very little vermilion red. One of the favourite methods is to employ sixteen parts white lead, one part of indigo and two parts of light red, adding as much chrome yellow as may be desired. Another way of making jonquil yellow is by simply mixing with a little green about forty times the quantity of yellow.

*KINGS YELLOW.—This was formerly arsenious sulphide, but as that colour fades so rapidly pale chrome yellow is usually employed.

LEGHORN.—This is a pale yellow shade, which is obtained by mixing white and medium chrome yellow in about equal proportions.

LEMON.—For this colour, lemon chrome yellow is used alone, but the tint may be made by using white lead for a base and adding medium chrome yellow until the desired tint is obtained. The tint that is usually preferred is obtained by mixing five parts of
chrome to two parts of white lead, and adding a little green. However, lemon chrome yellow purchased ready made is the best. In artists' colours a lemon yellow is made which is also called "strontium yellow," and sometimes "yellow ultramarine."

**Light Buff.**—A little yellow ochre added to white lead gives a good buff colour, the tint varying with the quantity of ochre.

**Light Deck.**—This colour may be produced by mixing medium and lemon chrome yellow with white.

**Light Stone.**—Tint white lead with French ochre and lamp black.

* **Lemon Chrome.**—This is the palest shade of lemon chrome yellow. Some makers produce a still lighter shade which they designate "canary chrome." It is very useful for preparing the lighter shades of yellow, and may be imitated by adding cadmium yellow to zinc white.

* **Lemon Yellow.**—Is also called "Barium Yellow," and is a preparation of Chromate of Barium. In the deeper shades a little chromate of strontium is often used. The pale variety is also called yellow ultramarine or permanent yellow. Care should be taken to distinguish between lemon yellow and yellow chrome. Pure lemon yellow is permanent both in oil and water.

**Maize.**—Mix yellow and white in the proportion of about three parts of the former to one of the latter to get this light yellow shade.

* **Mander's Yellow.**—This is intended to be used as a substitute for old Oxford ochre, but is claimed to be superior. It is based on ochre and is of great strength and body.

**Manilla.**—This colour is sometimes called "deep deck." It is made by tinting white lead with French ochre and chrome yellow. Or a mixture of white with four times the quantity of yellow will produce a shade of manilla.
Specimens of "PARIPAN" FLAT ENAMEL, by courtesy of Messrs. Paripan, Limited.
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Marigold.—This is obtained by mixing a very little bright yellow with orange chrome.

*Mars Yellow.—Another name for Roman ochre, which see. It is quite permanent, both in water and oil.

Melon.—Mix equal quantities of black and white. Add twice the bulk of orange chrome and a quantity of medium chrome equal to the mixture of black and white.

Mushroom.—A dull yellow shade, which may be obtained by adding one part of orange and two of yellow to eight parts of black.

Middle Stone.—Mix as described under "Stone," but use more umber and ochre.

*Naples Yellow.—A permanent yellow made from an admixture of oxide of zinc and cadmium yellow. In oil colours it may be imitated by mixing lead or zinc with cadmium and adding a little ochre. Naples yellow, when mixed with varying proportions of zinc oxide, yields pure tints of cream, ivory and biscuit.

Neutral Orange.—A water colour made from a mixture of cadmium yellow and Venetian or light red.

Old Gold.—Use middle chrome with a little vermilion and burnt sienna, and add a very little cobalt. A cheaper colour may be made by mixing ochre and burnt sienna. One part of green and three of bright yellow mixed with a little white will give an old gold shade. Or it may be obtained in the same way as "Gold" (which see), but a little burnt umber may be added. Some painters prefer to tint white lead with a mixture of chrome, raw sienna and vermilion. White tinted with a little orange chrome and burnt umber also gives a good old gold tint.

Olive Yellow.—This colour is sometimes called olive brown. It is made by mixing three parts of burnt umber with one part of lemon chrome yellow,
a larger quantity of yellow being added if a lighter shade is required. Another method is to mix ten parts of black, one of orange, twelve of yellow, and five of green.

**ORANGE.**—Mix white, yellow and orange in the following proportions: one part each of yellow and white and eighteen parts of orange. Or another shade is got with seventeen parts of orange, six of yellow and two of white. Orange chrome yellow can be easily purchased, however, and gives this colour without any admixture being necessary.

*Orpiment.—Another name for pale chrome yellow.*

*Oxford Ochre.—Another name for yellow ochre but usually applied to a good grade.*

*Permanent Yellow.—Another name for lemon yellow (pale), which see.*

**Persian Orange.—Mix fourteen parts of orange chrome, five parts of yellow ochre and one of white.**

**Pompeian Yellow.**—Tint white with Italian ochre and add a very little ultramarine and vermilion.

**Portland Stone.—Mix equal parts of yellow ochre and raw umber, and lighten up with white until the desired tint is obtained.**

*Primpolve Yellow.—Lemon chrome used by itself answers admirably. Another variety is called "citron yellow."*

**Primrose.**—Ten parts of white, three parts of green and four parts of yellow will give this light greenish yellow. Another shade is got by mixing one part of orange, two parts of green and five parts of yellow.

*Radiant Yellow, — Another name for pale cadmium yellow.*

*Roman Ochre.—A bright coloured ochre often called "gold ochre," and sometimes "Mars yellow." It is quite permanent, both in oil and water.*
YELLOWS.

Spruce Yellow.—Add a little Venetian red to a mixture of French ochre and white lead.

Stone.—This colour, so much used in London, is usually made by mixing together five parts of white lead, two parts of French yellow ochre and one part of burnt umber. By adding a little raw umber, the tint may be varied as desired. This colour is suitable for outside work. Another method for obtaining the shade is to tint white with medium chrome yellow and burnt umber.

Straw Colour.—Lemon chrome mixed with raw umber.

Straw.—White lead tinted with a little chrome yellow produces an excellent straw tint, but some prefer to add a little French ochre. Or medium chrome yellow may be used as a base, and a mixture added of white, French ochre and Venetian red.

*Strontium Yellow.—A name given to the deepest shade of lemon yellow.

*Yellow Lake.—This is a very fugitive colour which has but little body, but is useful for glazing. It is also called "Italian lake," "yellow madder," and "yellow carmine." To imitate it use equal parts of burnt umber and white lead and tint with chrome yellow and lake. Or mix umber and white in equal proportions and add Naples yellow and scarlet lake. To obtain this colour in its full richness it is quite necessary to glaze either admixture with yellow lake.

*Yellow Ochre.—The ochres are natural mineral pigments, consisting of clay and ferric earth, which are among the cheapest and most useful at the command of house painters. They can be used in any vehicle and are quite permanent, while they do not affect any other colour with which they may be used. Oxford ochre is generally accepted to be the brightest of the series, while it is distinguished also for the depth of its covering power.
YELLOW ULTRAMARINE.—Another name for lemon yellow (pale), which see.

*ZINC YELLOW.—This is a chromate of zinc which is quite fast in light, and possesses the advantage of permanence even in the presence of impure air, sulphuretted hydrogen, etc. It may be mixed with other colours, without adversely affecting them. It is also known as "zinc chrome" and "citron yellow."
CHAPTER IX.

GREENS, AND HOW TO MIX THEM.

Note.—The greens marked * in the following list may be purchased ready made.

*Alizarin Green.—This series of greens is manufactured from the coal tar colours and may be regarded as lakes. They are practically permanent, and take the place of sap green, Hooker's green, and Prussian green.

Aloes.—A pale sage green shade. To obtain it mix six parts of black, three of white, one of chrome yellow, and three of Brunswick green.

Apple Green.—The simplest way to obtain this is to mix medium chrome green with about thirty times the quantity of white lead, but other greens may be employed with the addition of a little Prussian blue when necessary. Or a little orange chrome yellow may be added to the medium chrome green and white lead. A very good shade can be produced by mixing one part of white with four of yellow and nine of green.

Autumn Green.—Mix one part of chrome yellow with seven of black and two of emerald green.

*Bice.—A water colour called also "Green Lake."

Blue Green.—Equal proportions of deep chrome green and cobalt, or three parts of chrome green and one of Prussian blue, added to white lead in the proportion of about four times the quantity of lead to the mixture of green and blue, will give a tint which is sometimes called "Blue Green."
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**Bottle Green.**—Mix together five parts of medium chrome green and one part of blue black. A similar colour may be obtained by adding Prussian blue to blue black and lemon chrome. Another shade is made by using four parts of black and one of green.

*Bronze.*—A water colour made of a mixture of chrome greens.

**Bronze Green.**—The usual method is to mix black with chrome yellow (deep), but indigo may be used instead if desired. A much brighter colour is obtained by a mixture of medium chrome yellow, Prussian blue, and burnt sienna. Or the following recipe may be used: Middle chrome green, five parts; blue black, one part, burnt umber, one part. A light bronze colour may be obtained by adding more green or by using light instead of medium green. Other shades of bronze green may be got by adding a little lamp black to dark chrome green, or by taking medium chrome green and adding lamp black and a little raw umber.

*Brunswick Green.*—This colour is sold in three shades. It may be imitated by a mixture of Prussian blue and chrome yellow. Chrome green is really the same colour, the latter being the name used by artists’ colourmen.

*Cobalt Green.*—A useful, permanent colour manufactured by tinting oxide of zinc with oxide of cobalt. It is permanent both in water and oil.

**Chartreuse.**—This is a light yellowish green colour. Mix four of chrome yellow and five of chrome green, lightening up with white.

*Chrome Green.*—This colour is bought ready made, and is by no means permanent. It is not suitable as a water colour. To produce it by admixture, add Prussian blue to lemon chrome yellow in the proportion of about one part of blue to eight parts of yellow.

*Chromium Oxide.*—This is a beautiful, rich and
permanent green of an emerald green hue. Chemically, it is a sesquioxide of chromium. It is an artist’s colour.

*CINNABAR GREEN.—Similar in composition to chrome green, but darker, owing to a deeper variety of chrome yellow being employed. It is not used in water, and is not quite permanent in oil.

EAU DE NIL.—Tint white lead with medium chrome yellow, emerald green and a touch of Prussian blue.

EGYPTIAN GREEN.—Add two parts of raw umber and one part of lemon pale yellow to white lead. Give the green tone to it by means of a little Prussian blue.

ELEPHANT GREEN.—A dark green, obtained by adding emerald green to black.

ELECTRIC GREEN.—Mix blue black and lemon chrome, add a little cobalt and lighten up with white. Another method is to use emerald tint, and to add a little blue to it. Usually, the term is a very vague one, and is applied to almost any greenish blue.

*EMERALD GREEN.—This beautiful, bright green cannot be successfully imitated. It must not be mixed with ultramarine. The pigment is chemically an acetarsenite of copper, is a great favourite with some painters, while others never use it. In America, the pigment is known as “Paris green,” but it is not there used to any extent by painters, although it is used as an insecticide. In the absence of the real thing, more or less presentable imitation may be obtained by mixing eight parts of white lead and one part of medium chrome green, or a light shade of chrome green may be used without lead. Emerald green, although so bright, has very little body, but it is very useful for glazing, i.e., a thin finishing coat is given over a good green ground to brighten it. Very near imitations of emerald green are made by most colour houses,
and are sold under various names such as emerald tinted green, emerald tint green, etc. They are not, however, suitable for distemper. Emerald green stands better in oil than it does in water.

**Foliage Green.**—One part of blue black may be mixed with four parts of lemon chrome. Use medium chrome yellow if a darker shade is required.

**French Green.**—This is a bright yellowish green, which may be obtained by adding to emerald or deep chrome green about one-tenth part chrome yellow. Yellow ochre is sometimes used instead.

**Gage Green.**—This is a variety of sage green. It may be made in the same way as pea green, and when this is reached a little black should be added to bring it to the required sage colour.

**Genuine Green.**—This is usually to be had ready mixed, but it varies considerably in name as well as in the exact tint. It comes very near to what some manufacturers call "Deep Royal Green," while it is not far removed from an olive.

**Grass Green.**—The colour sold as "extra light chrome green" makes a splendid grass green without any addition, but if it is not available, lighten up medium or dark chrome green with chrome yellow.

**Green Bice.**—See Bice.

**Green Slate.**—Tint white lead with a bright green toned down with ochre and lamp black.

**Green Lake.**—A water colour also called "Green Bice."

**Green Stone.**—Twelve parts of white lead tincted with one part medium chrome green and one part of raw umber give this tint, or the tinting colours may be French ochre and emerald green with a little lamp black.

**Grey Green.**—Use ultramarine blue, lemon chrome yellow, blue black and white lead.

**Guignet's Green.**—Another name for Viridian which see.
*Hooker's Green.—An artist's colour made in three or more beautiful shades and called also "Alizarin Green." Originally Hooker's green was made from an admixture of pigments, but its fugitive character has led to the alizarin being substituted by some firms.

*Holly Green.—A useful colour made by Messrs. Thomas Fewster and Son, Ltd., of Hull.

Invisible Green.—A dark green made by mixing nine parts of black and one of bright green.

Ivy Green.—This is produced by a mixture of French ochre, lamp black and Prussian blue.

Leaf Bud.—This colour is suitable for inside work. It is made by mixing orange chrome yellow, light chrome green and white lead in equal proportions.

Light Green.—Equal quantities of white and blue and rather more than twice the amount of green give a very good shade.

Light Olive Green.—Mix three parts of middle chrome, two parts of black, and one part of burnt sienna and lighten up with white lead until the desired colour is obtained.

*Lime Green.—This is a very fast colour which is bought ready for use, and is only suitable for distemper, etc. It cannot be used with oil.

*Malachite Green.—A prepared native carbonate of copper.

Manse Green.—This is produced from a mixture of a bright green, medium chrome yellow and French ochre.

Marine Green.—Mix one part of middle chrome green with four of black.

Medium.—A green of this name may be purchased ready made. It is very similar to middle Brunswick green.

Mignonette.—This is a dark green shade, obtained by mixing one part of chrome yellow and one of Prussian blue with three parts of chrome green and fifteen parts of black.
Muscovite.—This is a dark sage yellow greenish shade. It may be obtained by mixing six parts of Prussian blue, thirteen of chrome green, three of orange chrome, eight of white, and twenty of black.

Moss Green.—Tint white lead with French ochre, a bright green and a little lamp black.

Moss Rose.—This pale greenish shade is obtained by mixing chrome or Brunswick green, bright yellow and white in the proportions of one part green, four of yellow and three of white.

Mountain Green.—Add to medium chrome yellow sufficient cobalt to produce the desired hue, adding a little white if necessary.

Myrtle.—Three parts of dark chrome green, one part of ultramarine blue, and a little white lead will give an excellent myrtle colour.

Night Green.—Seven parts of chrome green and three parts of yellow ochre will give this shade.

Nile Green.—Five parts of white, nine of emerald green and six of Prussian blue will give this shade. This may also be mixed in the manner described in "Eau de Nil."

Olive.—Mix together ten parts of lemon chrome yellow, one part of ultramarine blue and one part of light Indian red. Another method is to use eight parts of lemon chrome yellow, one part of blue black, and one part of Prussian blue. Or the following proportions give very good shades: Three parts black, four parts white, four parts red, two parts yellow, and eleven parts green; or, fifteen parts of white, twenty of red, twelve of yellow, and fifty-three of green. Some painters add equal portions of Prussian blue and lamp black to lemon chrome yellow for a base, or the base may be ochre instead of chrome, and a little of the yellow be added.

*Olive Green.—The colour sold under this name is made from quercitron lake and ultramarine. In
**GREENS.**

water colour it consists of a combination of Indian yellow, umber and indigo.

*Olive Lake.*—An artist's colour more familiarly known as "Sap green," and sometimes "Olive green."

**Oriental Green.**—Is made by mixing equal proportions of raw umber and lemon chrome yellow.

**Peacock Green.**—A mixture of seven parts of white, fifty parts of emerald green and forty-three of Prussian blue will give this shade. A little yellow is sometimes added. The colour is best produced by giving a final transparent coat over a ground colour. For the ground mix a rich green, a very deep Brunswick green and middle chrome. Over this apply a very thin coat of a deep bluish green made from Prussian blue and lemon chrome.

**Pea Green.**—Forty-eight parts of white lead and one part of chrome green will give this colour, or emerald green may be used if desired. Some makers mix medium chrome green and white lead in the proportion of five parts of the latter to one part of the former to obtain a pea green, but the proportions may be varied according to the exact shade required.

**Persian Green.**—This is only another name for emerald green, the vivid and somewhat staring hue being sometimes employed in Oriental decorations and being then termed "Persian green."

**Pistache.**—This is a yellowish green shade. It may be obtained by mixing seven parts of black, one of yellow ochre and one and half of chrome green. Or chrome yellow may, if desired, be substituted for the ochre.

*Privet Green.*—A useful green, guaranteed not to face, made by Messrs. Goodlass, Wall and Co.

*Prussian Green.*—This is sometimes an alizarin green. More often it is made of a mixture of gamboge and Prussian blue for water and quercitron lake and Prussian blue in oil. It is fairly permanent both in
water and oil. To imitate, mix five parts black, three darts chrome yellow, and twelve parts emerald or medium chrome green.

**Quaker Green.**—Mix equal proportions of Venetian red and medium chrome yellow, and add blue black. Add to this mixture a quantity of chrome green equal in bulk to the three. This will give an excellent Quaker green.

**Queen Anne Green.**—A useful neutral green made by Messrs. Mander Brothers.

**Reed Green.**—Mix white, chrome yellow and chrome green in about equal quantities to produce this shade. The name, however, has no special significance, and an admixture of almost any yellow and green, lightened up with white, might be used instead.

**Royal Green.**—A rich green usually made in three or four shades.

**Sage Green.**—This may be produced by tinting white lead with four parts of light chrome green and one part of ivory black, or the white lead may be tinted with a mixture of French ochre, lamp black, and Prussian blue. Another recipe is as follows: Add raw umber and chrome green in the proportion of about one part of the former to two parts of the latter added to white lead until the desired shade is obtained. A pale Brunswick green and a very little black used to tint white also gives a good sage green.

**Sap Green.**—An artist's colour known also as "Olive green." The colour was formerly made by the admixture of various pigments and was by no means permanent, but now the alizarin colours are usually employed both for water and oil. Mix with white lead, medium chrome yellow, and a very little lamp black.

**Saxon Green.**—A useful colour of lead base.

**Sea Foam.**—Tint white lead with medium chrome yellow and emerald green, or if too bright, use medium chrome green instead of the emerald.
GREENS.

SEA GREEN.—This colour is obtained by adding deep chrome to white lead. Another sea green, and a very good one, is obtained by mixing light Brunswick green, raw sienna or ochre and white.

SEERED GREEN. — Tint white lead with French ochre, medium chrome yellow and a little bright green.

STARLING'S EGG GREEN. — A mixture of light chrome and Prussian blue, lightened up with white, will produce this colour.

*SUFFIELD GREEN.—A series of beautiful greens made in nine shades by Messrs. Mander Brothers, Wolverhampton. They are a decided improvement on Brunswick greens, standing the light much better. They are made in various useful art shades, and the author, who has used them, considers them to be worthy of the highest praise from a decorator's point of view.

TEA GREEN.—Medium royal green, chrome yellow and lamp black, added to white lead will give this colour.

TERRE VERTE. — A natural green earth found in Italy and elsewhere. A yellowish variety is sold called olive terra verte. It is quite permanent both in water and oil.

VELVET GREEN.—Mix three parts of burnt sienna five parts of light chrome green and eight parts white lead.

*VERONESE GREEN.—See Viridian.

VENETIAN GREEN.—Lighten up dark chrome green with white lead.

*VIRIDIAN.—A beautiful transparent green; also called Veronese green. It is a hydrated chromium sesquioxide and was originally introduced by Messrs. Winsor and Newton. It is useful to the decorator for glazing, and is permanent both in water and oil.
**Water Green.**—Raw sienna mixed with a little deep chrome green and added to white lead gives a water green tint.

**Willow Green.**—Tint white lead with medium chrome green, and add a little burnt umber or ivory black.

**Zinc Green.**—A bright colour intended to take the place of Brunswick green as it stands the light and impure air better.
CHAPTER X.

BROWNS, AND HOW TO MIX THEM.

There is no definite line of demarcation between the browns and the darker yellows any more than there is between the blues and the greens, or the reds and the oranges. One colour may be said to merge into the other. Still, Vandyke brown may be taken as a typical brown, and should, therefore, be experimented with. Umber is another valuable brown which yields tints of a somewhat greenish hue. In comparing different browns it is well to mix not only white with them, but also Venetian red, orange, and yellow in various proportions. Then add a little black, and then ochre, and perhaps sienna.

The colour mixer who has worked conscientiously through this book thus far, will probably be surprised at finding the number of rich browns obtainable by these means.

ACORN BROWN.—This is very similar to a rich chocolate, and may be made in the same way.

ALDERNEY.—This is an orange brown in hue, and may be made by mixing fourteen parts of black, one of white, two of orange, and three of yellow.

*AMBER BROWN.—Mix together six parts of burnt umber, four parts of medium chrome, and three parts burnt sienna.

ARABIAN BROWN.—This is a dark terra-cotta, and may be made by adding white and black to Indian red.
ARGUS BROWN.—This is a very dark brown, and may be made by mixing six parts of black with two parts of orange and one part of yellow.

AUBURN TAN.—This is also called "auburn brown." Mix together one part of burnt umber, three parts of golden ochre and twenty parts of white lead or zinc oxide.

AUTUMN LEAF.—This is also called "leather lake." It may be made by mixing on a base of white lead, French ochre, orange chrome yellow and Venetian red.

BISMARCK.—A shade of this name may be produced by using two parts of black, one of red and one of orange, which mixed together form an orange brown.

*BISMARCK BROWN.—This colour is obtained by mixing with six parts of black, one part of orange and one of yellow.

*BISTRE.—This colour is made from soot obtained by burning wood. It is principally used by artists, and must not be mixed with oil. It is not always reliable for its permanency. It may be imitated by mixing together ten parts of black with two of red and a little green.

*BITUMEN.—A dark colour called also asphaltum. It is not ground in water and is liable to cause cracks in paint.

BRONZE BROWN.—Black coloured with a little orange chrome and bright green.

BROWN.—The methods of obtaining different browns will be found under the headings of the respective names, such as "Chestnut," etc. A good average brown may be obtained by mixing together three of Indian red, two parts of lamp black and one part of yellow ochre. A lighter colour is obtained by using more ochre and less black, in fact, a large variety of brown tints may be produced by varying the proportions of ochre and black.
GLOSS PAINTS

1. Cream
2. Eau de Nil
3. Salmon Pink

4. Oak
5. Primrose
6. Sea Green
7. Signal Red

8. Light Slate
9. Buff
10. Light Green
11. Venetian Red

12. Dark Slate
13. Light Stone
14. Middle Green
15. Light Purple Brown

16. Black
17. Dark Stone
18. Dark Green
19. Chocolate

20. Pale Blue
21. Drab
22. Bronze Green
23. Russet Brown
24. Dark Blue

Samples by courtesy of Messrs. Naylor Brothers (London), Ltd.
Brown Ochre.—Also called "Roman ochre," which see.

Brown Pink.—A lake made from quercitron bark. It is fugitive.

Burnt Rose.—This is a dark red brown shade. To produce it use two parts of black, one and half parts of red, two parts of orange, and one of blue.

Burnt Sienna.—This is a sienna calcined, the effect being to produce a darker shade. It is quite permanent, both in oil and water. The colour is a most useful one, and will be found in many of the mixtures in this book.

Burnt Umber.—This is a rich dark greenish brown, but the shade varies considerably in different qualities. It is made from natural earths by calcining, and is permanent both in oil and water. Turkey umber is the richest. Umbers should always be purchased ground ready for use.

Cafe au Lait.—To produce this shade mix five parts of black, three of white, one of yellow, and a little orange. A little red may also be added if desired.

Caledonian Brown.—A natural earth in which the colour is due to ferric oxide. An imitation may be made by mixing Vandyke brown and sienna.

Cappagh Brown.—This is an artist's colour of a reddish brown colour, being very like umber. It contains manganese.

Cassell Earth.—Another name for Vandyke brown, which see.

Chestnut.—This rich brown may be obtained by mixing four parts of medium chrome yellow and two parts of Venetian red. One part of yellow ochre may be added if desired. Equal parts of chrome and vermilion with a little black may also be used.

Chocolate.—Five parts of burnt sienna and one part of carmine or lake give a rich chocolate. A less expensive colour is obtained by mixing Indian red
and lamp black with a little yellow ochre. A touch of vermilion will clear and brighten this mixture. Another way to produce chocolate is to mix black with red, but this gives a more or less muddy shade. White and burnt umber also yield a chocolate brown.

**Cinnamon.**—Six parts white lead, two parts burnt sienna; and one part of golden ochre make a good cinnamon; or French ochre, English Indian red and a little lamp black will produce the same colour. Another way is to mix Italian sienna and burnt umber.

**Clay Drab.**—Mix equal parts of white lead, raw umber and raw sienna, and add a little chrome if desired. Some painters prefer to add a little medium chrome yellow.

**Cocoa-nut Brown.**—This shade may be obtained by mixing one part of white lead or zinc oxide with double the quantity of burnt umber.

*Cyprus Umber.*—Another name for raw umber.

**Coffee.**—To produce this colour mix together five parts of burnt umber, two parts of yellow ochre and one part of burnt sienna.

*Cologne Earth.*—Another name for Vandyke brown. It is permanent in oil, but fades slightly in water.

**Copper.**—Tint zinc white with French ochre, Italian sienna and lamp black to obtain the shade shown in the sample. A very good copper shade is obtained by mixing two parts of medium chrome yellow, one part of Venetian red, and one part of drop black or two parts of lamp black, three parts of medium chrome yellow and six parts of Venetian red.

**Cork Colour.**—Tint white lead with French ochre, Indian red and a little lamp black, or with raw Italian sienna and burnt umber.

*Cyprus Umber.*—One of the best grades of umber possessing a greenish hue, which is liked by artists.
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Dark Drab.—French grey, Indian red and lamp black added to white lead give this colour.

Dark Lava.—Mix French ochre, Indian red and lamp black, and lighten with white lead.

Dark Oak.—Add French ochre and Venetian red to white lead as a base.

Doe Colour.—This may be produced by mixing raw Italian sienna and burnt umber with white lead, or French ochre and mineral brown with a little lamp black.

Dove Colour.—White lead, with a little Prussian blue and a touch of ivory black will produce an excellent dove colour; but French ochre, Indian red, and lamp black may be employed; or a mixture of raw and burnt Turkey umber and Italian sienna.

Drab.—A good drab is made by using burnt umber and white lead in the proportion of one of the former to ten of the latter, but raw umber and a little Venetian red may be used instead.

*Dutch Pink.—A useful brown for scenic artists, but cannot be used in oil.

Fawn.—This might also be called deep drab. It is produced by tinting white lead with a mixture of French ochre, Indian red and lamp black, or raw Italian sienna and raw Turkey umber. Another shade of fawn is obtained by using eight parts of white lead, one part of chrome yellow, one part of Indian red, and one part of burnt umber; or eight parts of white lead, two parts of medium chrome yellow, one part Venetian red, and one part of burnt umber.

* Fawn Brown.—A colour somewhat like raw Turkey umber, but richer. It was originally introduced by Messrs. Mander Brothers.

Fawn, Light.—Tint white with sienna and a touch of raw umber.

Foliage Brown.—Mix burnt umber with raw and burnt sienna and lighten with white as may be necessary.
French Ochre. — This colour, of course, is bought ready made, and it must be observed that, in addition to the fineness, the particular tone of this colour is very important, especially to grainers.

Golden Brown. — Sixteen parts of white lead are mixed with one of burnt sienna and three parts of yellow ochre. A more brilliant colour is obtained by substituting zinc oxide for white lead.

Indian Brown. — Mix equal parts of Indian red, lamp black and yellow ochre.

Lava. — An orange brown lava shade can be got by mixing fifteen parts of black, five parts of orange, four of yellow, and a very little white.

Leather Brown. — Four parts of yellow ochre, three parts of Venetian red, two parts of white lead, and one part of blue black give a rich leather brown. If a lighter tint is required less black should be used. Or the following recipe may be used: mix white with three times the quantity of red and the same amount of yellow. Some painters use French ochre for a base and tint with burnt umber or Venetian red.

Light Lava. — A mixture of raw umber and raw sienna added to white will give this colour.

Lime Chocolate. — This is a speciality of Messrs. Mander Bros. It is suitable for mixing in water or oil and is very useful for all purposes of the decorative artist.

Light Oak. — Add French ochre and Venetian red to white as a base.

Lizard Bronze. — Fifteen parts of black, one of orange, five of yellow, and four of green will produce this dark greenish yellow shade.

*Madder Green. — A reddish brown madder shade is produced with one part blue, three parts each of orange and red, and six parts black.

Mahogany. — Mix orange and yellow in equal proportions with five times the quantity of black.

*Mander's Yellow. — An ochre colour made by
Messrs. Mander Bros. and intended to take the place of Oxford ochre.

*Mars' Brown.*—An artist’s colour, also called “Verona brown.” It is an earth colour and is permanent and owes its colouring to ferric oxide and the degree of heat to which it has been subjected.

Mast Coloured Paint.—The following recipe gives good results. Mix twelve parts of genuine dry white lead with two parts of French ochre, two parts of grey barytes, and one part of genuine oxide of iron.

Nut Brown.—Equal quantities of red and yellow mixed with ten times as much black will give this shade.

Old Wood.—To get this shade mix one part of blue and red, two of orange and five of black.

Olive Brown may be made by mixing three parts of burnt umber and one part of lemon chrome yellow; or another shade is given by mixing equal quantities of orange and green with about twelve times as much black. Some painters add lemon chrome yellow to raw umber for a base. Lemon yellow and burnt umber gives a richer hue.

Orange Brown.—Two parts of orange chrome yellow mixed with three parts steat.

Pomegranate.—A golden brown shade sometimes called by this name is given by mixing three parts of red, six of orange, four of yellow with twenty parts of black.

*Prairie Brown.*—Mix together equal parts of orange chrome and Vandyke brown.

*Purple Brown.*—The name of a well known cheap oxide. To imitate mix four parts of dark Indian red with one part of ultramarine blue and of lamp black. The addition of white lead will usually make a more satisfactory tint; if the shade is too purple, a similar quantity of blue should be added; if too red, more black may be used, or a little yellow added, but purple brown pigment is cheap.
**Raw Sienna.**—Siennas are valuable earth colours most useful for staining or tinting, but practically useless as body colours. The degree of transparency determines to some extent the quality.

**Raw Umber.**—A valuable earth colour. Also called Cyprus umber.

**Roman Ochre.**—Also called "brown ochre." Red ochre toned down with black yields a substitute.

**Rural Brown.**—This is a useful and good wearing brown and is obtained by mixing three parts of Indian red, two parts of lamp black, and one part of chrome yellow.

**Russet Brown.**—Indian red lightened with white produces a tint sometimes called by this name.

**Russet.**—A very good russet shade is got by mixing twenty parts of black, twelve parts of red, ten of orange, three of yellow, and five of green. Or medium chrome green, raw umber, and a little orange chrome yellow added to white as a base will give an excellent russet.

**Sandstone.**—A tinting colour made by mixing raw and burnt umber will produce this colour.

**Seal Brown.**—Four parts burnt umber, one part golden ochre.

**Sepia.**—This is a natural colour used chiefly by artists and is made from a secretion of the cuttle fish. It cannot be imitated and it must not be used in oil.

**Seville Brown.**—A useful and cheap colour originally introduced by Messrs. Mander Bros. It may be used both in oil and water.

**Siberian Brown.**—Mix together equal parts of white lead and raw umber and brighten with a little Oxford ochre.

**Sienna Brown.**—This colour is variously called "sienna brown," "teak brown," and by other names. It is made by mixing burnt Italian sienna and French ochre with pure zinc.
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Snuff Brown.—French ochre and Indian red added to zinc white will produce this colour. Another way to produce a snuff colour is to mix four parts of medium yellow and two parts of Vandyke brown, or burnt umber may be substituted for the Vandyke brown if desired. Another snuff colour may be obtained by mixing burnt umber and yellow ochre, tinged with a little Venetian red.

Tan.—Mix ten parts of burnt sienna and four parts of medium chrome yellow with three parts of raw umber. White lead and burnt sienna, to which has been added a very little lamp black, will also produce a tan colour. A very rich tan colour may be made from ochre, burnt Turkey umber and a little orange chrome with white lead.

Thrush Brown.—One part yellow ochre, three parts burnt umber, twelve parts white lead. The addition of a little black with less umber is sometimes used.

*Turkey Umber.—The richest variety of the many umbers on the market.

*Vandyke Brown.—This is an important brown to the decorator and is nearly permanent in oil, but fades a little in water. It cannot be imitated though a little red added to umber produces a colour somewhat similar to it. It is also called "Cassell Earth" and "Cologne Earth."

*Verona Brown.—An artist's colour, also called "Mars' Brown."

Vienna Smoke.—The best burnt umber should be tinted with lemon chrome yellow and a little Venetian red.

Wallflower Brown.—This beautiful brown may be made by a mixture of medium chrome yellow and brown lake. Or crimson lake and burnt sienna may be mixed with medium chrome.
CHAPTER XI.

GREYS AND GRAYS.

Although the dictionaries do not usually distinguish between the spelling of "grey" and "gray," and although many decorators use the two words indiscriminately, there is a distinct difference which it is both convenient and advisable to recognise. A "grey" is an admixture of black and white, and may vary from the smallest quantity of black added to white to the other extreme, where there is almost as much black as white. Anything between the two would be termed a "grey." Examples of this are found in the list which follows under heads such as: Dark lead, dark slate, lead, etc. When a colour is added to the black and white the admixture is called a "gray," provided, of course, that the black and white predominate; for example, a French gray is made by tinting white with a little ivory or drop black and adding a little carmine or crimson lake or ultramarine. It will be seen that the addition of the lake or ultramarine gives it a peculiar warmth which distinguishes French gray, and changes the spelling from "grey" to "gray." Gray drabs are those in which a grey is coloured up to produce a yellowish tinge. Black being usually a strong tinting colour, care must be taken that it is used in moderation, and here the importance of adding a small quantity at the time, as already observed, will impress itself on the operator. After the shade desired has been obtained the colour should be added until the desired warmth is arrived at.
The experiments advised in previous chapters may be continued with advantage in respect to blacks which will be found when mixed with white to possess certain characteristics which should be known to every colour mixer. The blacks which should be experimented with are ivory black, vegetable black, lamp black and blue black. It will be noticed that pure ivory black, for example, gives a distinct bluish cast, while lamp black is of a somewhat browner hue. Gas black, which is often mixed with other blacks, gives a brownish cast.

**Argent.**—A reddish gray tint, which can be produced by mixing together nine parts of black, sixteen of white, one of red, and a little orange.

**Ash Gray.**—Lamp black and a little French ochre added to white lead give this colour. Another mixture is as follows: two parts of burnt sienna, three parts of light ultramarine blue, sixty parts of zinc white.

**Black Slate.**—Mix together black and Prussian blue in the proportion of about thirteen parts of the former to one of the latter and add white.

**Charcoal Gray.**—Another name for Blue Black, which see. Sometimes it is a special grey prepared from charcoal and is then only suitable for water.

**Dark Gray.**—Mix eight parts of black, one of white and a touch of red or blue to produce this shade; but practically any admixture of black and white in which the former predominates and to which has been added a little colour will give a dark gray.

**Dark Lead.**—This is a dark grey, being produced simply by adding lamp black to white lead.

**Dark Slate.**—This also is black added to white. The admixture under "Black Slate" would answer.

**Davy's Grey.**—This colour is made by Messrs. Winsor and Newton from soot and is recommended as a reducing agent as it does not, like the blacks, sully the colours with which it is mixed, but gives pure and translucid effects and is a capital drier.
PAINT AND COLOUR MIXING.

DEEP LEAD.—Black, a little bright blue and Indian red mixed with white lead produces this colour.

FRENCH GRAY.—This can be made by tinting white with a little ivory or drop black and adding a little carmine or crimson lake and ultramarine. This produces a very slight violet tinge. White tinted with a little ultramarine and Venetian red also gives a good French gray. Celestial blue or cobalt may be used instead of the ultramarine if desired. Another good mixture is made by tinting white lead with one part of black and two parts of orange chrome. Perhaps the simplest method of all is to thin white with bright Indian red.

GRANITE.—French ochre and lamp black added to white lead produce this colour.

GRAYSTONE.—Mix five parts of black with three of white and three of blue and add a little red.

GRAY DRAB.—Mix five parts of black with four of white and a little deep chrome yellow.

GRAY (WARM).—See warm gray.

GREEN SLATE.—Same as lead, but with more black and blue.

IRON GRAY.—Mix eight parts of black with two of white and a little orange.

JASPER.—This may be described as "a pepper and salt shade." Mix nine parts of black with two of white, with a touch of deep chrome.

LEAD.—This is simply a dark gray, and is made by adding lamp black to white lead with sufficient blue.

LIGHT GRAY.—Mix together one part of Prussian blue, one part of lamp black, ten parts of white lead. By adding more or less white lead a darker or a lighter shade may be obtained if required. Another shade is obtained by mixing two parts of black, eight parts of white and one part of blue.

Mastic.—This is a dark gray shade. To produce it mix twelve parts of black with one of white, rather less than one of yellow and just a touch of orange.
*Mineral Gray.*—An artist’s colour sometimes called "Ultramarine Ash."

Moss Gray.—Tint white lead with French ochre, a bright green and a little lamp black.

Mouse Colour.—Eleven parts burnt umber, to which has been added one part of Prussian blue, mixed with about twenty times the bulk of white lead, will give this tint. Another shade may be had by mixing sixteen parts of white, three of black and one of blue. Some painters tint white with lamp black and add a very little Venetian red and burnt umber.

Neutral Tint.—An artist’s water colour is sold under this name. It is somewhat similar to Payne’s Gray, and is made from a mixture of carbon black, ochre and French ultramarine.

Olive Gray.—Three parts of lamp black one part chrome green, with about forty times the quantity of white lead, will give this colour.

Opal Gray.—One part of burnt sienna, two parts of cobalt blue, and thirty parts of zinc white.

*Payne’s Gray.*—Is an artist’s colour, which may be described as a gray having a lilac tinge. See neutral tint.

Pearl.—This is the same as French gray, but is much lighter.

Pearl Gray.—Forty parts white lead, five parts of vermillion and one part of deep chrome green. Some decorators tint white lead with lamp black and call that pearl gray. Strictly speaking, however, it should be called pearl grey, there being no colour present. Six parts of white lead, two parts of Venetian red, and one part of lamp black gives a somewhat dark pearl gray, but a lighter tint may easily be obtained by adding more lead. Ivory black answers equally as well as lamp black.

Quaker Drab.—This greenish gray shade is produced by mixing two parts each of yellow and green and five parts of white.
RUSTIC DRAB.—Tint white lead with French ochre and lamp black.

SILVER GRAY.—Tint white lead with French ochre and lamp black, or yellow may be employed instead of the ochre if preferred. White lead tinted with a little lamp black and indigo gives an excellent silver gray.

SLATE.—See "Dark Slate."

SMOKE GRAY.—Tint white lead with French ochre and lamp black.

STEEL GRAY.—Tint white lead with a mixture of lemon chrome and medium chrome and lamp black.

STONE GRAY.—Add black and chrome to white lead.

*ULTRAMARINE ASH.—An artist's colour sometimes called "Mineral Grey."

VERDANT GREY.—Two parts of oxide zinc and one part of terra verte.

WARM GRAY.—Tint white lead with French ochre and lamp black or sienna and lamp black. A better mixture is produced by taking white as a base and adding a little burnt sienna and raw umber with a very little burnt umber and a touch of Prussian blue.
CHAPTER XII.

WHITES AND BLACKS.

Although neither blacks or whites can strictly be called colours, yet they are both used largely in paint mixing. A list of the principal varieties is therefore included for reference.

Blanc Fixe.—Artificial barytes, or sulphate of barium. A white pigment which enters largely into the composition of Orr's white, lithopone, etc., and is principally used in paper making, and in the manufacture of wall-paper colours.

Charlton White.—See Orr's zinc white.

Chinese White.—Another name for zinc oxide, but applied to the water colour, i.e., zinc ground in water.

Constant White.—Similar to blanc fixe. It consists of sulphate of barium ground in water. It is not suitable for grinding in oil, being very deficient in body.

Cremnitz White.—Another name for flake white (q.v.) but strictly applied to even a finer preparation than ordinary flake white.

Blanc d' Argent.—See Flake White.

Dutch White.—Is a mixture of three parts of barytes to one part of white lead. Note the difference between Dutch white and Dutch process white lead.

Flake White.—This is the name usually applied to white lead which is specially prepared for the use of artists. Chemically, it is basic carbonate of lead, or hydro-carbonate of lead. It is not used as a water
colour as it discolours very rapidly. The best flake white may be taken as a perfect example of white lead, and is often used for comparison. Flake white is also known as Cremnitz white, Blanc d'argent, and silver white.

**Foundation White.**—A mixture of high-grade white lead as used in the manufacture of artists' flake white, with another white lead of inferior quality. Although a pure white lead, it is not equal in density to flake white. It is, however, cheaper, and is sometimes employed by artists as a foundation on their canvases.

**Freeman's White.**—A mixture of sulphate of lead, zinc oxide, and barytes.

**Miscellaneous Whites.**—Zinc oxide is sold ground in refined linseed oil, about thirty-five gallons being required to the ton. It is also sold mixed with barytes, china clay, sulphate of lime, etc., in varying proportions according to the price it is to be sold at. The same is true with white lead. Genuine lead requires about a gallon of refined linseed oil to one cwt. of lead. White barytes in various proportions are mixed with it to produce reduced white leads.

**Orr's Zinc White.**—A white pigment consisting of zinc sulphate and zinc oxide, combined with about 70 per cent. of artificial barytes or barium sulphate. It is largely used in the manufacture of washable water paint by wall-paper manufacturers, etc. It is substantially the same as Charlton white.

**Oxide of Zinc.**—A white pigment which possesses the advantage of being much whiter and finer than lead, and being also free from poisonous effects. It is unaffected by sulphureted hydrogen and other gases, and is used in growing quantities in recent years.

**Pearl White.**—Basic nitrate of bismuth.

**Permanent White.**—Another name for zinc oxide when ground in oil. The term is sometimes applied to blanc fixe or artificial barytes.
WHITES AND BLACKS.

PROCESS WHITE.—A special white ground in water, and essentially the same as blanc fixe (q.v.) It is prepared by Messrs. Reeves and Sons, principally for use in drawings prepared for reproduction, and is permanent.

SULPHATE OF LEAD is sometimes called Sublimed Lead.

VENICE WHITE.—Venice white is made by mixing equal parts of barytes and white lead.

WHITE LEAD.—This is the most important white used by painters. It is now made in a variety of ways, but no method seems to supplant that which is known as the old Dutch "stack" process, which is carried out strictly by such firms as Walker, Parker and Co., Foster, Blackett and Wilson, Alexander Fergusson and Co., John Hare and Co., the Mersey White Lead Co., and several others. A great deal of white lead is imported from the Continent, and it is mostly of inferior quality, being as a rule coarsely ground. Chemically, white lead is basic carbonate of lead, and an analysis of an average example shows that it contains roughly speaking two-thirds of lead carbonate, and one-third hydrate. The method of testing white lead will be found described under the head of testing colours.

ZINC WHITE.—Pure oxide of zinc, also called "Chinese White," "Constant White," and "Permanent White." The term is sometimes applied to a class of whites of which Orr's zinc white, Charlton white, and lithopone are examples. See also Oxide of Zinc.

ZYLOTHIN.—A white manufactured by Messrs. Baiss Brothers and Stevenson, Ltd.

BLACKS.

The chief blacks used by decorators and artists are lamp black, ivory black, and blue black. Painters who realise the desirability of using pure tinting colours generally, sometimes seem to think that any
black may be used, irrespective of whether it is ∙ are or not. This is a great mistake, as it is just as essential that blacks be pure, as any other stainers. It may be added that some manufacturers make certain of their bone blacks, usually sold as “Drop Black” from selected parts of the same description of an animal. Thus a drop black sold by a well known American house is guaranteed to be made only from the skull and shin bone of the sheep.

Animal Black.—This is made by burning various animal products.

Blue Black.—Blue black in water colour is sometimes called charcoal gray, which see. This black should be made from shoots of vine, beech, and other woods, but more frequently it is simply a bone black, or a lamp black, to which has been added a little indigo.

Bone Black.—This is made from various bones, charred, ground, dry washed, then ground in oil.

Carbon Black.—This is a very intense black, which is rarely sold under that name, but is used by some paint manufacturers to give strength to other blacks. It is derived from the combustion of petroleum residue.

Drop Black.—This is another charcoal black sold in the form of drops, or irregular cones. Some painters appear to consider that this particular form prevents the adulteration. As a matter of fact, the drops are produced by the pigment dropping slowly from the mill as it is ground, and if it were desired to adulterate, the material could be added in the mill.

Frankfort Black.—This is another name for drop black.

Ivory Black.—This is made, as the name implies, from charred ivory chips. Most of the so-called ivory blacks on the market, however, are a fine grade of bone black.

Lamp Black.—This useful black is made by the combustion of waste oils, principally those derived
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<th>Sample Colours of Solignum (REGD.) Wood Preserving Stain</th>
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<td>1</td>
<td>Light Brown</td>
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WHITES AND BLACKS.

from coal-tar distillation. Lamp black gives as a rule, a warm and somewhat brownish hue, and is quite permanent both in oil and water.

MINERAL BLACK.—Mineral black may be described as powdered coke. It is used principally in cheap black paints.

VEGETABLE BLACK.—Vegetable black may be described as a superior class of lamp black.
CHAPTER XIII.

TWO HUNDRED STANDARDIZED COLOURS.

As explained elsewhere, the French Society of Chrysanthemumists have issued an elaborate and most useful set of plates of standardized colours of fruits, flowers and foliage. These are, of course, equally suitable for the use of decorators and artists.

All the colours in this collection of plates which do not occur in the foregoing chapters have been carefully matched by Mr. C. E. Oliver in conjunction with the author. The pigments employed to produce these colours are set out below. Although the proportions cannot be stated, for reasons which have already been given, some idea of them may be gained by the order in which they are stated. The largest amount used is named first, the second largest second, and so on. Thus, where several pigments are employed, the one mentioned last would be used very sparingly.

Note.—The term "Zinc White" in any case means pure zinc oxide. This is used in preference to white lead, because the purity of tint is considerably enhanced.

Reddish Apricot.—Zinc white, burnt sienna, orange chrome.

Bistre.—French ochre, orange chrome, burnt sienna.

Deep Bistre.—Bistre, deep, French ochre, zinc white, burnt sienna, toned with black.

Greenish Black.—Black toned with middle chrome, green and zinc white.

Purple Black.—Black toned with crimson lake and vermilion.

Reddish Black.—Black, burnt sienna.
STANDARDIZED COLOURS.

VIOLET BLACK.—Black toned with crimson lake and French ultramarine.

CORNFLOWER BLUE.—Zinc white, French ultramarine toned with Prussian blue.

DELT (or DUTCH) WARE BLUE.—Zinc white, black, Prussian blue, mid chrome green.

FLOSS FLOWER BLUE.—Zinc white, French ultramarine, crimson lake, toned with black.

LAVENDER BLUE.—Zinc white, French ultramarine, crimson lake, toned with black.

LOBelia BLUE.—Zinc white, French ultramarine, crimson lake.

NORMAL BLUE.—French ultramarine, zinc white, toned with Prussian blue.

SEVRES BLUE.—Emerald green, zinc white, Prussian blue toned with black.

SMALT BLUE.—Zinc white, Prussian blue toned with vermillion.

VICTORIA BLUE.—French ultramarine, zinc white, Prussian blue.

PALE BLUSH.—Zinc white, French ochre, orange chrome.

BLOOD RED BROWN.—Vermilion, orange chrome, black, crimson lake.

MADDER BROWN.—Zinc white, burnt umber, burnt sienna, madder lake.

MINERAL BROWN.—Zinc white, burnt sienna, burnt umber.

BUFF.—Zinc white, French ochre, mid chrome yellow, burnt sienna.

PALE BUFF.—This might be called "Nankin Yellow." Zinc white, orange chrome, burnt sienna, mid chrome yellow.

CADMIUM LEMON YELLOW.—Zinc white, mid chrome yellow toned with mid chrome, green and orange chrome.

ORANGE CADMIUM.—Zinc white, orange chrome, pale chrome yellow.
PAINT AND COLOUR MIXING.

YELLOW CADMIUM.—Pale chrome yellow, zinc white, chrome yellow deep.

DEEP CADMIUM YELLOW.—Zinc white, orange chrome, pale chrome yellow, scarlet vermilion.

CADMIUM YELLOW LIGHT.—Pale chrome yellow, zinc white, chrome yellow deep, toned with Ripolin yellow.

MADDER CARMINE.—Crimson lake, carmine, zinc white, orange chrome.

SALMON CARMINE.—Zinc white, scarlet vermilion, orange chrome, crimson lake.

DEEP CERISE.—Zinc white, crimson lake, vermilion.

CHAMOIS.—Zinc white tinted with French ochre.

CLARET.—Crimson lake, zinc white, vermilion.

BROWNISH DRAB—This might be called TOBACCO BROWN.—Zinc white, burnt sienna, burnt umber, toned with black.

PALE ECRU.—Zinc white, French ochre, orange chrome.

FLESH COLOUR.—Zinc white, burnt sienna, vermilion.

PALE YELLOWISH FLESH.—Zinc white tinted with French ochre and burnt sienna.

GALLSTONE.—Middle chrome yellow, orange chrome.

GARNET BROWN.—Crimson lake, zinc white, mid-chrome yellow toned with black.

GARNET DULL.—Crimson lake, zinc white, scarlet vermilion, French ultramarine.

PURPLE GARNET.—Zinc white, crimson lake, vermilion, French ultramarine.

ARTICHOKE GREEN.—Zinc white, French ochre, mid-chrome green toned with black.

BISTRE GREEN.—Zinc white, French ochre, pale chrome yellow, toned with black.

BOX GREEN.—Middle chrome green, deep chrome deep.

CEDAR GREEN.—Zinc white, mid-chrome green, black, deep chrome yellow.
STANDARDIZED COLOURS.

CYPRUS GREEN.—Mid chrome green, mid chrome yellow, toned with black.

JASPER GREEN.—Chrome green deep, chrome green pale.

LETTUCE' GREEN.—Zinc white, mid chrome green, pale chrome yellow, oxford ochre.

MINERAL GREEN.—Zinc green light, zinc white.

RUSSET GREEN.—Zinc white, French ochre, pale brunswick green, mid chrome yellow.

SKY GREEN.—Zinc white, zinc green light, pale chrome yellow.

SLATE GREEN.—Zinc white, French ochre, mid brunswick green.

SPINACH GREEN.—Mid chrome green, mid chrome yellow, toned with black.

VERDANT GREEN.—Zinc white, middle chrome green, middle chrome yellow.

VERDIERIS.—Zinc white, mid chrome green, Prussian blue.

VERONESE GREEN.—Zinc white, emerald green, prussian blue.

YELLOW GREEN.—Primrose yellow and zinc white, mid and orange chrome, mid chrome green.

GREENISH GREY.—Zinc white, black, middle chrome green.

IRON GREY.—Zinc white, black burnt umber, toned with mid chrome green.

PAYNES GREY.—Zinc white, black, toned with crimson lake.

HAZEL.—French ochre, zinc white, middle chrome yellow.

GREYISH INDIGO.—Zinc white, black, prussian blue.

PLATE INDIGO.—Zinc white, black, prussian blue, mid chrome yellow.

BROWN LAKE. This is really a lake brown.—Orange chrome, burnt sienna, crimson lake.

CARMINE LAKE.—This might be called a CARMINE LAKE TINT.—Crimson lake, carmine, vermilion, and zinc white.
GERANIUM LAKE.—Crimson lake, vermilion.

MADDER LAKE.—This might be called MADDER LAKE TINT—Vermilion, crimson lake, madder, zinc white and orange chrome.

DULL PURPLE LAKE.—Zinc white, crimson lake, vermilion, French ultramarine.

YELLOW LAKE.—Middle chrome yellow, burnt sienna, prussian blue.

RED LEAD.—To imitate red lead, orange chrome toned with vermilion.

DEAD LEAF.—Zinc white, burnt sienna, toned with French ultramarine.

BLUISH LILAC.—Zinc white, crimson lake, French ultramarine, vermilion.

REDDISH LILAC.—Zinc white, vermilion, crimson lake, French ultramarine.

SALMON LILAC.—Zinc white, vermilion, crimson lake, toned with ultramarine.

VIOLET LILAC.—Zinc white, crimson lake, vermilion, French ultramarine.

MOUSE COLOUR.—Zinc white, black raw umber, burnt sienna.

CHINESE ORANGE.—Orange chrome, middle chrome yellow.

COPPERY ORANGE RED.—Zinc white, orange chrome, mid chrome yellow, burnt sienna.

NEUTRAL ORANGE.—Orange chrome, burnt sienna.

RUSSET ORANGE.—Orange chrome, vermilion, zinc white.

SCARLET ORANGE.—Orange chrome, vermilion.

PEACH BLOSSOM.—Zinc white, scarlet vermilion, toned with black.

HYDRANGEA PINK.—Zinc white, scarlet vermilion, toned with black.

ROSY PINK.—Zinc white, crimson lake, vermilion, orange chrome.

FRENCH PURPLE.—Crimson lake, zinc white, French ultramarine.
STANDARDIZED COLOURS.

VINOUS PURPLE.—Zinc white, crimson lake, ultramarine toned with black and vermilion.

PUTTY COLOUR.—Zinc white, French ochre, toned with raw umber.

ANTIQUE RED.—Zinc white, burnt sienna, crimson lake, scarlet vermilion.

CARDINAL RED.—Scarlet vermilion, crimson lake.

CORAL RED.—Zinc white, vermilion, orange chrome.

COPPERY RED.—Zinc white, scarlet vermilion, burnt sienna, crimson lake.

CURRENT RED.—Vermilion, zinc white, crimson lake.

ETRUSCAN RED.—Zinc white, scarlet vermilion, burnt sienna.

FIERY RED.—Vermilion toned with orange chrome.

LINCOLN RED.—Scarlet vermilion, crimson lake.

PEACH RED.—Zinc white, burnt sienna, scarlet vermilion, crimson lake.

RASPBERRY RED.—Zinc white, vermilion, crimson lake.

ROSE NEYRON RED.—Zinc white tinted with carmine. A slightly inferior tint from madder lake.

STRAWBERRY RED.—Crimson lake, vermilion.

TOMATO RED.—Vermilion, crimson lake, orange chrome.

TURKEY RED.—This might be called ORIENT RED. Vermilion, madder lake, or vermilion, crimson lake, orange chrome.

RESEDA GREEN.—Zinc white, French ochre, pale Brunswick green, raw umber.

LILAC ROSE.—Zinc white tinted with crimson lake.

MAUVE ROSE.—Zinc white, crimson lake, orange chrome.

BRONZY OLD ROSE.—Zinc white, crimson lake, scarlet vermilion toned with black.

BLUE SLATE.—Zinc white, black, mid chrome green, Prussian blue.
PAINT AND COLOUR MIXING.

Slate Violet.—Zinc white, vermilion, crimson lake, toned with black.

Stone Colour.—Zinc white, French ochre, pale chrome yellow, raw umber.

Tan Colour.—Burnt sienna, middle chrome yellow, orange chrome.

Bluish Violet.—Zinc white, French ultramarine, crimson lake.

Bright Violet.—Zinc white, crimson lake, French ultramarine.

Parma Violet.—Zinc white, crimson lake, French ultramarine, toned with black.

Plum Violet.—Crimson lake, zinc white, French ultramarine.

Reddish Violet.—Zinc white, crimson lake, French ultramarine.

Violet Slate.—Zinc white, vermilion, crimson lake, toned with black.

Amber White.—Zinc white, pale chrome yellow, ochre, mid chrome green.

Creamy White.—Zinc white, French ochre, pale chrome yellow.

Fleshy White.—Zinc white tinted with French ochre and burnt sienna.

Greenish White.—Zinc white, pale chrome yellow, pale chrome green.

Lilac White.—Zinc white tinted with French ochre, crimson lake, and cobalt blue.

Milk White.—Zinc white tinted with French ochre.

Purplish Tinted White.—Zinc white, burnt sienna, French ultramarine.

Rosy White.—Zinc white tinted with ochre, orange chrome and crimson lake.

Sulphury White.—Zinc white, pale chrome yellow, pale chrome green.

Sky Coloured White.—Zinc white, French ochre, pale chrome green.
STANDARDIZED COLOURS.

YELLOWISH WHITE.—Zinc white, yellow ochre, mid chrome yellow.

COPPERY YELLOW.—Mid chrome yellow, mid chrome green, zinc white, burnt sienna.

HONEY YELLOW.—Zinc white, French ochre, mid chrome yellow.

PYRETHRUM YELLOW.—Primrose yellow and zinc white.

SAFFRON YELLOW.—Zinc white, orange chrome, pale chrome yellow, scarlet vermilion.

SUNFLOWER YELLOW.—Pale chrome yellow, zinc white, chrome yellow deep, Ripolin yellow, permanent Dutch pink.

YOLK YELLOW.—Lemon chrome, orange chrome, mid chrome green.

SULPHUR YELLOW.—Zinc white, mid chrome yellow, mid chrome green, orange chrome.

WEDGWOOD GREEN: This colour may be described as a light neutral green having a warm grey tone. The stainers necessary for producing the colour are very simple, being French ochre, middle chrome, green and black. These should be combined to form an olive green, and then be added to zinc oxide. A fair quantity of ochre, but very little of the middle chrome green and black will be required. Another method would be to stain zinc oxide with ochre to produce a light buff, then to add sufficient green to give it a green cast, and finally to tone it down with black. When using this colour in large masses, it is well to keep the colour well on the light side.

WEDGWOOD GREY is produced in the same way as Wedgwood green described under the head of "Greens," but the proportion of green actually added should be very small indeed. When used in large masses, it is advisable to keep this colour well on the light side.
CHAPTER XIV.

GROUND COATS AND FLATTINGS.

There is a considerable difference of opinion as to the correct method of making up a ground coat suitable for flatting, and what difference in colour if any, there should be between the two.

Some affirm that the ground coat should be two or three shades deeper than the flatting, while others say they prefer it to be lighter.

Except in a few special instances which we shall presently mention, we do not agree with either of these.

In the first place, it is a waste of time to make up two lots of colour for one job, and there is no reason why sufficient paste colour should not be stained for both the ground and the flatting, before the thinnings are added. A portion of this can be thinned with, say, half and half oil and turps and applied as a ground coat, while the second portion is thinned with turps for the finish.

There will be just sufficient difference in colour to show where the brush has gone, because all colours deepen to some extent during the time of drying. On applying the flatting, it will appear a trifle lighter than the ground, but will go down to it and produce a solid job.

Should any slight alteration in hue be necessary, it can be seen when the ground coat is on and rectified in the finish without much danger and with a greater
degree of certainty than would be the case were the
colour to be made entirely the second time.

The same system may be employed for an oil finish,
the only difference being that the coatings are reversed
and the flatting goes on first.

The principal exception to this method of procedure
is in the production of transparent or semi-opaque
finishes, when as explained elsewhere, the ground coat
must be solid, and invariably be several shades lighter
than the finishing colour.

THE CHOICE OF A STAINER.

The majority of colour samples may be matched
by more ways than one, and it is always a good rule
to follow, to choose the most simple mixture that will
produce the correct result.

There is one point to consider however when one
has the choice of two or more stainers, and it has reference
to the question of the opacity or the transparency which
any particular colour possesses, and which, to some
extent, determines its suitability for a given purpose.

Opacity versus Transparency.—When making
up a paint which it is desired shall cover well, or produce
a good solid ground coat, the stainers employed must be
chosen with that end in view, and transparent colours
be omitted as far as possible.

On the other hand, it is necessary at times to choose
stainers which are not opaque, and the effects to be
obtained are due entirely to the degree of transparency
which the stainers possess. For a graining colour, and
for semi-transparent stipple effects, a stainer coming
under the head of semi-opaque would be the most suitable.
For stains and glazes the transparent colours would be
chosen.

The following list will serve as a guide:

Opaque Colours.—Chrome pale, middle, deep and
orange. Yellow ochre, vermilion, Indian red, Venetian
red.
PAINT AND COLOUR MIXING.

Semi-opaque Colours.—Raw sienna, raw and burnt umber, Turkey red, Tuscan red.

Transparent Colours.—Prussian blue, ultramarine cobalt blue, burnt sienna, crimson lake.

When a large quantity of transparent pigment enters into the composition of a finishing paint which is intended to produce a solid effect, it is most important that the ground colour be exactly right. It should be as near the finishing colour as it is possible to attain by the use of solid or opaque colours, but it should be two or three shades lighter, to allow for the darkening effect which always attends the use of transparent paints.
CHAPTER XV.

PUTTY, HARD STOPPING, KNIFE AND BRUSH FILLING.

It is important that the right materials be used for puttying, stopping and facing-up the work, and that these should be mixed in the correct proportions to suit the job in hand.

Especially is this the case when the number of coats of paint to be applied to any particular surface is reduced to a minimum.

One can easily imagine the result of using a soft, slow drying putty for making good on old hard surfaces which have to be finished with a touch-up and one coat. In a very short time the paint will sink in wherever the putty has been used, and present quite a different appearance to the rest of the surface.

Putty, hard-stopping and filling-up material generally should be made up at all times to coincide as nearly as possible in colour, hardness of texture and degree of porosity, to the surface to which it is applied.

It would be courting disaster to apply a very hard stopping on to a soft undercoating, and in the same way it would be useless to expect a soft putty to form a suitable foundation for the reception of a hard drying top coating.

The use of an oil putty on work which had to be followed up quickly has spoiled many an otherwise good flatting job, by sweating out into shiny patches.
The use of an inferior oil putty often causes discolouration and peeling.

There are probably as many varieties of putty and stoppings as there are of coatings which precede and follow them. A putty which is intended for sandpapering is quite a different composition to one which has to be rubbed down with pumice stone and water.

We can see how important it is that the student should have a clear idea of the composition and characteristics of the various stoppings in general use, and understand the method of production for specific purposes.

**Composition of Putty.**

Ordinary putty is, or should be, composed of genuine linseed oil and whiting. An average mixture consists of $5 \frac{1}{2}$ parts by weight of whiting to 1 part by weight of linseed oil.

Putty is made on a manufacturing scale in large quantities in an edge-runner mill, but small batches may be made by hand. After making it should be set aside to mature and again beaten up before use.

The whiting should be a fine clean quality, perfectly dry and well sifted before the oil is added. It is used in this condition principally for the glazing of wood sashes, and probably could not be superseded for this purpose.

For the many other uses in the painting business it is too slow in hardening to be used alone, and various mixtures have to be resorted to, many of which we give below.

**Putty for Glazing Iron Sashes.**

Linseed oil putty, bodied up with dry red lead to a consistency as stiff as it can conveniently be used.

**Stopping up on the Priming.**

Linseed oil putty, 3 lbs.; tub white lead, 1 lb. Bodied to an easy consistency with dry sifted whiting.
PUTTY HARD STOPPING.

FACING UP ON SECOND COLOUR.

Tub white lead stiffened with whiting. When a second colour other than white has been used, this facing-up stuff may be also coloured by the addition of suitable dry colours in place of the whiting.

PASTE FOR KNIFE FILLING-UP.

To rub down with sandpaper. Make a smooth paste of dry sifted whiting and equal parts of Japan gold size, linseed oil and turpentine. To each lb. of paste add 1 lb. of tub white lead.

This is intended for filling or facing-up with the broad knife on walls or woodwork which have been previously painted.

PASTE FOR KNIFE FILLING-UP.

To rub down with pumice stone and water. Tub white lead, 3 lbs.; slate "filling" powder, 1 lb. (Harland's or Manders, etc.).

Make these into an easy paste with the following mixture:—Japan gold size, 3 parts; hard drying varnish, 2 parts; turpentine, 1 part.

For a brush filling intended to be rubbed down with pumice stone and water, the above paste should be thinned with turpentine to a heavy brush consistency.

Another knife filler, to be rubbed down with pumice stone and water:—10 lbs. linseed oil putty; 10 lbs. dry white lead; ½ lb. fine pumice powder.

Bring to a workable consistency with a mixture of Japan gold size, 3 parts; hard drying varnish, 2 parts; turpentine, 1 part.

Quick stopping. To follow up in an hour or so. Make a stiff paste of dry white lead and Japan gold size. A few spots of turpentine will make it still quicker setting, but will add somewhat to its porosity.

For stopping and facing-up direct on old paint. Equal parts of tub white lead and dry white lead, thinned with equal parts Japan gold size and hard varnish.
Distemper filling. For broad knife work. Strong jellied distemper bodied with sifted whiting. To each 3 lbs. of above add a gill of hard drying varnish. Palette well together and apply the same as a lead paste filler. Can be sandpapered when dry.

Note.—Many of the well-known water paints make excellent filling-up material for use with the broad knife on woodwork and wall surfaces. The addition of some sifted whiting not only brings them to the proper consistency, but it renders them easy to rub down with sandpaper. They have the additional advantage of being ready to use, and possess very little suction.

Alabastine possesses many advantages for the purpose named.

Fig. 23.

In Fig. 23 is shown one form of a stopping knife. As the width of the knife which is most useful will depend upon the kind of work in hand, it is convenient to have several widths at hand. In Fig. 24 is shown several blades on a ring. A single handle does for them all.
PLATE X.

THE MINERVA STANDARDIZED COLORS AND TINTS THEREFROM.

| No. 9 Standard Carnation Red | 3 parts Minerva Gloss White added | 7 parts Minerva Gloss White added | 15 parts Minerva Gloss White added | 31 parts Minerva Gloss White added |

Each MINERVA STANDARD COLOR shown below is capable of definite reduction as sample above, and when the proportions given are accurately adhered to, exactly the same tint is produced each time.

- Stand. Lemon Chrome
- Stand. Carnation Red
- Stand. Signal Red
- Std. Lt. Brunsk. Green
- Stand. Middle Chrome
- Stand. Venetian Red
- Stand. Raw Umber
- Std. Mid Brunsk. Green
- Stand. Orange Chrome
- Stand. Raw Sienna
- Stand. Burnt Umber
- Std. Dark Brunsk. Green
- Stand. Old Gold
- Stand. Burnt Sienna
- Stand. Grass Green
- Std. Ultramarine Blue
- Stand. Yellow Ochre
- Std. Lt. Purple Brown
- Stand. Emerald Tint
- Stand. Prussian Blue
- Stand. Maroon
- Std. Mid Purple Brown
- Std. Mid Bronze Green
- Black

CHAPTER XVI.

Colours made with black japan.

A large series of most useful colours can be made by mixing black japan with ordinary painter's colours of bright hue. Black japan is made of asphaltum mixed with linseed oil and sometimes gum animi and other materials, including red lead and litharge. It is not used by house painters to the extent it deserves, although it is a great favourite with carriage painters. Black japan should always be semi-transparent, and is applied on a ground of best black ground in turps. Its duty is to give additional depth to the black and counteract the greening or greying tendency of the varnish.

It is due to its transparency that it makes such an excellent stain when thinned down, and provides such nice tints or shades when mixed with other colours. The following list gives a few of the principal colours that may be made, but any bright colour may be mixed with black japan in varying proportions to obtain useful colours. The reader who is interested in the subject should experiment in the same way as he has done with the other ordinary colours as described in the foregoing chapters. Take a bright red and add a very little black japan; then add to another small sample of red a little more black, and so on, mixing each and comparing one with the other. Next take a bright green and follow the same plan, then yellow, blue, etc. Excepting with the very light grades no great result will be obtained with
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blues, in fact, ultramarine when added to black japan gives a very good solid black.

Perhaps the most useful colour that can be made from black japan is the series of colours suitable for scumbling. For example, when finishing relief material some very excellent tones may be obtained, especially if the colour is thinned with turpentine. Black japan has not much body, and if this is desired drop black should be added.

The reader is recommended to mix some of the colours named below in the way there indicated, and to use them over bright red, buff, or yellow grounds. If a coat of colour is given to such a ground and the surface is gone over with a dry brush some novel and pleasing effects may be produced. Such effects may be produced in an even more satisfactory manner by using "Matsine" and some of these are shown in Plates XII. and XIII.

**Rich Dark Red.**—Mix Indian red with a little black japan.

**Rich Dark Brown.**—Mix crimson lake and black japan, varying the amount of each according to the depth required.

**Chocolate Brown.**—Mix orange chrome with black japan.

**Leather Colour.**—This is obtained in exactly the same way as chocolate brown, excepting that rather more chrome is used.

**Bottle Green.**—Mix together Prussian blue, Dutch pink and black japan.

**Invisible Green.**—Use the same mixture as for bottle green but use less japan.

**Light and Dark Reds.**—A series to which there is no end, may be obtained by mixing either vermilion or vermilionette with black japan in varying proportions.

**Neutral Green.**—This is produced by adding lemon chrome to a little black japan.
STAIN FOR WOODWORK.—This can be obtained by using any of the foregoing colours sufficiently dark, that is with enough black japan added, but taking care to thin down according to the depth required.

NOTE.—As a rule black japan receives a final coat of varnish, but if a dull surface is required it may be obtained by giving two coats of japan and rubbing down each with felt and pumice stone, taking care to use plenty of water.
CHAPTER XVII

GLAZING.

Although the art of glazing in painted work is not strictly a part of paint and colour mixing, yet it has a direct bearing on the subject, because of the effects which may be produced by its use. Glazing may be defined as a method used in oil painting by which a brilliancy of finish is obtained by means of a coat of a bright but transparent colour applied over another colour having much less brilliancy but much more body.

A simple example of the principle of glazing is found in the finish of ordinary green work, which is to receive a final bright coat. Here the painter usually gives two or more solid coats of slate or gray colour, and upon this paints his green, the slate showing through the final green coat to some extent, and a good solid green is the result. If green had been used from the foundation up, one or two more coats would have been needed.

The following are some of the effects which can be produced by means of glazing. A series of beautiful reds, such as wine colour, may be obtained by giving three coats of Indian red mixed with orange chrome in proportions varying according to the finish required, and finally giving a glazing coat of crimson lake, madder or carmine.

The reader will readily see that a great variety of colours may be obtained by varying the ground; thus,
GLAZING

a bright orange glazed over with crimson lake gives a very bright effect, while either Indian red, Venetian red, Tuscan red, or other deep reds may be mixed with yellow or used plain as an underground for the glazing colour.

Sometimes a reddish, purplish colour is desired in the finish. This can be obtained without difficulty on a ground of Indian red mixed with a little orange chrome, and a glazing colour of purple madder. Various rich effects in blue may be obtained by applying a thin wash of Chinese blue over a deep green ground. Here again by varying the tone of the ground still different results may be obtained.

Some beautiful peacock greens and blues may be obtained on a ground of Brunswick green and chrome, by glazing with Prussian blue and lemon chrome. Deep amber may be obtained on a ground of middle chrome and a glaze of burnt sienna and orange.

A word may be said here as to the scumbling and glazing. Both processes are similar up to a certain point, which is that in both cases one colour is placed over another of good body. In glazing the top colour is transparent; in scumbling, it is solid, and a portion of the top is usually wiped off or removed, so as to expose a part of the colour beneath. The simplest example which can be given of scumbling is grained work, which is really wholly a process of scumbling; but a better example is the finish so often given to relief decoration, when a mixture of the brown, say, sienna and umber, is applied over a much lighter ground finished, say, to an ivory finish. The top colour being wiped off at the edges of the relief and elsewhere, an antique effect is the result. In ordinary plain painting, this effect is sometimes produced in panelled work, and some pretty effects may be produced. For example, a rich ultramarine blue painted over with a thin glazing of yellowish white and partly removed, gives a very pretty effect.
It is a little surprising that glazing is not used more among decorators than it is. It is true that often glazing colours are expensive, such as, for instance, carmine and madder, but the actual amount of colour used is small, so that the cost of materials when compared to the excellence of result obtained is trifling.

The student of colour effects in decoration is recommended to experiment on the lines above indicated. Much will depend, of course, upon the artistic sense of the operator, but by experimenting with different transparent colours on various grounds, many unexpected and novel effects will be produced, which become valuable in the execution of high class work, particularly so in these days when plain and often sombre hued wall coverings are so much in vogue.

From what has been said it will be clear to the reader that some excellent results may be obtained by a good colourist by a judicious use of a brilliant glazing colour over a more subdued and perhaps cheaper colour of good body beneath. But there are other effects obtainable by means of an ordinary brush and the use of colours, specially adapted for the purpose. Graining may be looked upon as a description of glazing as already stated, because one colour shows through the other. The particular point which it is desired now to make clear is very well illustrated by Plates XII. and XIII., which show "Matsine" applied over various coloured surfaces. This material is made by the well known paint and varnish house of Messrs. Mander Brothers, of Wolverhampton. It is a transparent, semi-flat thickish material, and is made in thirteen colours. The remarkable effects that can be obtained by its use need very little explanation to the practical reader, who has Plates XII. and XIII. before him, but it will be seen that the effects are excellent while it will be found that the labour involved is trifling.
GLAZING.

It will be observed that with these colours, one might say, hundreds of different effects can be produced according to the ground employed. If, for example, the samples of Spanish mahogany and Spanish mahogany on dark ground on the sheets are compared, and it is remembered that exactly the same "matsine" is used in each case, it will be clear that many different effects can be produced with a minimum of labour. Good colourists of ingenuity can by means of this material and a variation in their grounds produce novel effects for which they might locally obtain a reputation, but even novices could use the material with advantage, the simplicity of the application being remarkable.

MATSINE UNDERGROUNDS.

The following list gives the grounds for each of the colours of matsine named:

<table>
<thead>
<tr>
<th>No.</th>
<th>Colour</th>
<th>For</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Light Buff.</td>
<td>Mahogany Matsine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Old Oak</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fumed Oak</td>
</tr>
<tr>
<td>2.</td>
<td>Yellow</td>
<td>Pitch Pine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dark Brown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tulip Wood</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Light Oak</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blue</td>
</tr>
<tr>
<td>3.</td>
<td>Dark Buff.</td>
<td>Walnut</td>
</tr>
<tr>
<td>4.</td>
<td>Dark Orange.</td>
<td>Crimson</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red Brown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spanish Mahogany Matsine</td>
</tr>
<tr>
<td>5.</td>
<td>Green</td>
<td>Green Matsine.</td>
</tr>
<tr>
<td>6.</td>
<td>Crimson</td>
<td>Spanish Mahogany Matsine</td>
</tr>
</tbody>
</table>

The grounds above mentioned may be made as follows:

<table>
<thead>
<tr>
<th>Colour</th>
<th>Grounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Buff.</td>
<td>White, Chrome, Ochre.</td>
</tr>
</tbody>
</table>
PAINT AND COLOUR MIXING.

Yellow. Chrome, White.
Dark Buff. White, Chrome, Umber.
Orange. Orange Chrome, White.
Green. Celestial Blue, Chrome, White.
Crimson. Deep Wagon Red.
CHAPTER XVIII.

GRAINING AND MARBLE GROUNDS AND COLOURS.

These grounds should all be made up to dry a semi-flat, and are best hardened off by adding a little hard drying varnish in the place of oil. This will enable the graining colour to be rubbed in more evenly and with less drag, and it will be found specially advantageous when graining in water colour or beer, as it lessens the tendency to "cissing," and saves a considerable amount of time usually spent in damping down the surface.

**Maple.**—White lead tinted with a very little vermilion and about an equal quantity of lemon chrome. Some prefer yellow ochre only; others ochre and raw umber in the proportion of four ounces ochre and one ounce umber to thirty pounds of lead.

**Medium Oak.**—Add French ochre to white lead in the proportions of about one hundred and twenty of lead to five of ochre; add a little burnt umber.

**Mahogany, Dark.**—Four pounds of medium Venetian red, one pound of orange chrome yellow, and one pound of burnt umber, or a little less burnt umber may be used according to the strength.

**Mahogany, Light.**—Mix six pounds of pure white lead with one pound medium Venetian red and five ounces of burnt umber.

**Light Oak and Birch.**—Eighty parts of white lead to one of yellow ochre produces a good ground, but sixty pounds of white lead, half a pound of French ochre, and one ounce of lemon chrome is sometimes preferred.
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DARK OAK.—Sixty parts of white lead and one part of golden ochre may be used, or the following mixture if preferred. Six pounds of white lead, one pound of French ochre, two ounces medium Venetian red and two ounces of burnt umber.

SATINWOOD.—Mix six ounces of lemon chrome to fifteen pounds of pure white lead and add a little deep English vermilion.

POLLARD OAK.—Tint one hundred pounds of white lead with twenty-seven pounds of French ochre, four pounds of burnt umber, and three and three-quarter pounds medium Venetian red, or mix Oxford ochre, Venetian red, and white lead in proportions to form a rich buff, ground together with equal parts of boiled and raw linseed oil and turpentine with the necessary driers added, or white lead, chrome yellow and vermilion will answer equally well.

PITCH PINE.—Tint sixty pounds of white lead with half pound medium Venetian red, and quarter pound of French ochre.

ITALIAN WALNUT.—One pound of French ochre mixed with ten pounds of pure white lead and four ounces of burnt umber and four ounces medium Venetian red give this ground.

AMERICAN WALNUT.—Thirty pounds pure white lead tinted with nine pounds of French ochre, four pounds burnt umber, and one pound medium Venetian red.

ANTIQUE OAK.—Thirty pounds pure white lead tinted with nine pounds of French ochre, four pounds burnt umber, and one pound medium Venetian red.

ASH.—White lead tinted with a very little vermilion and about an equal quantity of lemon chrome. Some prefer yellow ochre only, others ochre and raw umber in the proportion of four ounces ochre and one ounce umber to thirty pounds of lead.

BIRCH.—Eighty parts of white lead to one of yellow ochre produces a good ground, but sixty pounds
GRAINING GROUNDS AND COLOURS.

of white lead, one-eighth of a pound of French ochre and one ounce of lemon chrome is sometimes preferred.

KNOTTED OAK.—Sixty pounds of white lead, nine pounds of French ochre, and three and half pounds burnt umber. Same as Pollard Oak.

WAINSCOT OAK.—Mix white lead, yellow chrome, and Venetian red, or white lead, chrome yellow and vermillion. Strain the colour before using.

BIRD'S EYE MAPLE.—Add a little Oxford ochre to white lead or a little Venetian red, or Vermilion will answer equally well, but only very little must be used.

BIRCH.—Add a little Oxford ochre and a little Venetian red to white lead, rather more ochre than red, to produce a very light buff colour.

ROSEWOOD AND DARK MAHOGANY.—Four pounds of medium Venetian red, one pound of orange chrome yellow, and one pound of burnt umber, or a little less burnt umber may be used according to the strength.

The examples of graining grounds given in the coloured plate with their mixtures must be taken as an average arrived at from comparison of the methods employed by different painters in various parts of the country. No doubt some readers will not agree with them, and will think that the colour should be lighter or darker as the case may be. As we have explained, the mixtures given are those which may be considered an average, and a variation of them may be made according to individual taste and judgment.

GRAINING COLOURS.

Having given the ground colours, we now proceed to give those which are used for graining. It will be understood that the method of obtaining a graining colour varies just as much as it does in the case of the ground colour, according to the opinion of the painter. The following are given as what may be safely followed to get an average good result.

LIGHT OAK.—Mix one-third burnt umber with two thirds raw sienna, and add a very little drop black.
LIGHT OAK AND BIRCH.—Burnt umber lightened with Oxford ochre is frequently used.

BIRD'S EYE MAPLE.—Mix raw umber and raw sienna with a little Vandyke brown or ivory black. Three parts Vandyke brown and one part raw sienna will give a brown tint, but this must be modified according to whether brown, yellow or grey maple is to be imitated.

ASH.—Same as light oak.

AMERICAN WALNUT.—Burnt umber to which is added a little Vandyke brown will give a good graining colour for walnut.

MAHOGANY.—Burnt umber, burnt sienna and Vandyke brown, with the addition of a little crimson lake for over graining, will answer well for mahogany.

ROSEWOOD.—Vandyke brown, with the addition of a little black, should be used, and rose pink may be added if desired.

MAHOGANY.—In producing the colour for ordinary use, such as, for instance, Anaglypta or lincrusta or other relief material, mix Venetian red with equal parts of burnt umber and burnt sienna, and even add a little orange chrome to give brightness.

POLLARD OAK.—Mix burnt umber, Vandyke, raw and burnt siennas, and add a little black or ultramarine. Same as wainscot oak, which see.

CHERRY.—Use raw and burnt siennas and raw umber.

CHESTNUT.—Mix raw sienna, Vandyke and raw umber with a very little burnt sienna.

WAINSCOT OAK.—Mix burnt and raw Turkey umber with a little megilp to prevent running. If a dark oak is required add a little black in oil or a little purple lake.

BIRCH.—Equal parts of Vandyke brown and raw sienna.

KNOTTED OAK.—Same as wainscot oak.
GRAINING GROUNDS AND COLOURS.

MARBLE GROUNDS.

The marble grounds shown in Plate 11 may be produced in the following manner:

WHITE.—A dead white ground should be used mixed to dry hard and smooth.

SIENNA.—White blended with a mixture of white and raw sienna in irregular patches.

PINK MARBLE.—The ground may be the same as that used for sienna, but a little Venetian red should be added to give it a pinkish cast.

ALABASTER.—Light cream ground made by adding a little middle chrome and vermilion to white.

ROUGE GROTTIE.—This is a very beautiful marble which contains a large number of different colours. The ground may be either white or Venetian red, mixed with a little chrome yellow.

GRANITE.—There are several varieties of granite, the principal being termed "grey" and "red" respectively. To mix the former ground, add a little black and Prussian blue with just a touch of Indian red to white. The grounds for red granites can be produced by mixing Venetian red and white.

ROUGE ROYAL.—A mixture of Indian red, Venetian red and vegetable black, with a little white, will make the correct colour for the ground of this beautiful marble. It is very necessary that the ground be quite "solid," and to produce this, two, or even three, coats may be necessary.

EGYPTIAN GREEN.—The ground should be a dead black.

VERD ANTIQUE.—The same as above.

DEVONSHIRE MARBLE.—Venetian red and ochre with a little white to produce a light terra-cotta ground.

BLACK AND GOLD.—A dead black ground should be used.
Dove.—In this case a white ground without gloss may be employed, but a grey is better, such as that produced by tinting white with Prussian blue, a little black and a very little Indian red.

Grey.—The same as "dove."

St. Anne's.—A dead black ground should be used.
CHAPTER XIX.

Mixing Paints and Colours on the Manufacturing Scale.

With the object of giving information to that large and increasing class of paint users who desire to have an intimate knowledge of their materials, and who wish from time to time to be in a position to manufacture on a larger or smaller scale certain of the standard grades of paint materials, this chapter is added.

Although it cannot claim to be absolutely exhaustive (the subject being an exceedingly wide one) it will at the same time afford a certain amount of information and point out the main principles of the subject under consideration.

Raw Materials Used in Paint Grinding.

It must not be lost sight of that the manufacture or preparation of a finished paint ready for application on any surface takes place in a variety of stages. The first stage is the preparation of the pigment or mixture of pigments, that is the dry powder or powders which form the pigmentary base of the paint. The preparation of pigments forms an important branch of industrial chemistry and is quite outside the scope of a volume like the present. The manufacture of dry white lead, dry zinc white, the oxides of iron, carbon black, ultramarine blue, the chromes, Chinese and Prussian blue, emerald, Brunswick, Bronze and other greens, lakes, etc., form part of this wide subject.
The second stage in ready mixed paint manufacture is to reduce the before mentioned pigments or powders to the paste form by grinding them in a suitable medium. In the enormous majority of cases that medium is raw linseed oil, but occasionally and for special purposes other media are employed instead of this.

This branch of the subject, that is the mixing and grinding of the dry pigments with oil to form a paste, is termed paint grinding, and is a branch of the industry which is carried on by most of the large manufacturing paint houses, many of whom do not themselves make the dry pigments.

The final stage is the incorporation of the stiff or paste paint with suitable vehicles or media to form ready mixed or prepared paints as used by the painter and decorator. In our present more or less restricted view of the subject we will commence with the work performed by the ordinary paint grinder, and we will in the first instance turn our attention to raw materials used in paint grinding.

These are, as we have indicated above, the base dry colours, but they also include many other materials introduced into the paint for specific purposes. One of the most important purposes is to cheapen the product and in such cases they are termed adulterants. Sometimes, however, materials are introduced into the paint not for the purpose of cheapening or adulterating the finished article, but in order to communicate to it certain specific properties which will increase its value as a decorative or protective agent. The following list includes most of the materials used in paint grinding apart from the true pigment which is the base of the particular paint which it is desired to produce viz. :

**Barytes.**—A heavy white or greyish white natural mineral of crystalline texture consisting principally of sulphate of barium. This article varies in quality
Selection from HYGEIA FLAT WALL FINISH range of Colors, by courtesy of Messrs. Pinchin, Johnson & Co., Ltd., London.
and price according to its whiteness and freedom from earthy and irony matter. The finest grades are used to adulterate white lead, white zinc, and similar high class white pigments. The commoner varieties are introduced as cheapening agents into putty and coloured paints generally. It has been termed the paint grinder's friend, and it is equally his enemy according to the point of view. Its price varies from 35s. to £4 per ton, and a peculiarity of the material is that it requires a very small proportion of oil to reduce it to the consistency of paste.

Whiting or Paris White.—This well known material (which is almost pure carbonate of lime) is used largely in cheap paints to neutralise the heavy and porous nature of barytes; it is more opaque than barytes but it is much lighter and absorbs a much larger proportion of oil. It is, as is well known, the base of common distempers and a peculiarity of the article is that although in a water medium it dries out very white, in an oil medium it assumes a yellow colour. Putty is composed largely of whiting.

Gypsum or Terra Alba.—This material is not much used in Britain in paint making but enjoys a wide use in America, and for certain kinds of paint it has much to recommend it. If it is adopted care should be taken that it should only be employed in the hydrated form, as if it is not used in this form it rapidly absorbs moisture from the air and sets into a hard impervious mass, acting precisely as the well known plaster of Paris. Terra alba of good quality is a very white pigment and amalgamates well with certain of the lighter oxide of iron colours, ochres, etc., forming protective paints of good quality.

China Clay.—This article is never used in large quantities in paint grinding, but a small proportion is sometimes introduced into paints of a spongy or open texture in order to give coherence.

A word or two must be added with regard to the
base pigments with which the foregoing cheapeners or adulterants are mixed. Little need be said of white lead or white zinc, as to completely treat of these well known articles would cover many pages. The following brief notes, however, on the chief colour pigments may be of use, and one remark applies to them all, viz., that in manufacturing paints it is the truest economy to purchase the very best pigments that can be obtained. By best we mean the strongest and brightest, and these properties should in every case be carefully tested against a standard sample.

**Yellow Pigments.** — The ochres are natural earths, and are valued in proportion to their purity of yellow tone, staining power and freedom from materials such as chrome or cheap lakes introduced with the object of giving a fictitious yellow tone. A good quality grinding ochre will fetch a very high price and it is one of the most expensive colours to grind, requiring to be passed through the rollers many times before the grit is finally disposed of. The chromes are well known yellow pigments and are seldom ground otherwise than pure.

**Red Pigments.** — These are obtained in endless variety, the most important being the *iron reds*, the best of which is oxide of iron. Thus we have *Indian red, Venetian red, bright oxide reds*, *purple browns and purple oxides* and many other oxide colours known under fancy names. In purchasing these for grinding purposes they should be examined for staining power and also for the tone of shade produced on reduction with white lead and whiting respectively. The colour produced on reduction with whiting is important for the reason that cheaper grades of paint would be produced in this way and often an unpleasing tint of red is produced on reduction. Freedom from grit is also an important feature. It is a great mistake to purchase a red which is difficult to grind even although it is otherwise cheap, as the saving in price
will be rapidly neutralised in the subsequent grinding operations. Other red pigments are the red lakes and so-called fast reds and aniline reds, which are used in comparatively small proportions for special decorative purposes.

**Black Pigments.**—The most important is perhaps ivory black and a large proportion of black sold under this name to-day is not ivory black at all but simply bone black, the production of ivory black being very limited. Other blacks are vegetable or lamp black and gas or carbon black. The latter possesses great staining power and is useful in giving the requisite amount of blackness to black paints which, paradoxical as it may seem, always contain a large amount of white material.

**Blue Pigments** used by the paint grinder are ultramarine blue, to a very limited extent, and more largely Prussian blue usually in one or other of its reduced derivatives, Brunswick blue (which is Prussian blue struck on a base of terra alba) or celestial blue, (which is composed of Prussian blue struck on a base of barytes). The enormous staining power of Prussian blue will be understood when it is said that a very excellent and strong staining Brunswick blue can be produced by striking Prussian blue on terra alba in the proportions of 12½ per cent. of Prussian blue to 87½ per cent. of white base.

**Green Pigments.**—The great bulk of these consist of the well known Brunswick greens which really consist of a mixture of chrome yellow, Prussian blue, and white base, the latter being usually barytes. In the case of greens it is of the utmost importance to use a very pure and strong staining colour, otherwise it is impossible to reduce them with economy in the mixing and grinding.

Having disposed of the dry colours used in the process of paint manufacture we now turn to the oil employed to reduce the dry colour to the paste or
stiff form. Linseed oil is the only oil of practical importance in this connection, although for artists' colours some other of the drying oils are occasionally used. The proportion of oil absorbed by the various pigments is a matter of great consequence to the paint grinder, and we give the following table compiled by Mr. J. Cruickshank Smith, B.Sc., F.C.S., the figures in which represent the number of parts of oil by weight usually required by 100 parts by weight of the respective dry colours.

**Table of Quantity of Linseed Oil Required in Grinding Pigments.**

<table>
<thead>
<tr>
<th>Pigment</th>
<th>Quantity of Oil Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Lead (English stack made)</td>
<td>6½—7</td>
</tr>
<tr>
<td>(Chamber process)</td>
<td>7½—8</td>
</tr>
<tr>
<td>Oxide of Zinc</td>
<td>20—21</td>
</tr>
<tr>
<td>Sulphide Zinc White</td>
<td>14—16</td>
</tr>
<tr>
<td>Sulphate of Lead (Glasgow White)</td>
<td>8</td>
</tr>
<tr>
<td>Best White Barytes</td>
<td>7</td>
</tr>
<tr>
<td>Second Quality Barytes</td>
<td>8</td>
</tr>
<tr>
<td>Common Grade Barytes</td>
<td>9—10</td>
</tr>
<tr>
<td>Paris White</td>
<td>21—23</td>
</tr>
<tr>
<td>Oxide of Iron Pigments</td>
<td>18—24</td>
</tr>
<tr>
<td>Fine Italian Ochre</td>
<td>87</td>
</tr>
<tr>
<td>Strong Staining Ochres</td>
<td>30 and upwards</td>
</tr>
<tr>
<td>Strong Staining Siennas</td>
<td>95</td>
</tr>
<tr>
<td>Fine Turkey Umbers</td>
<td>85</td>
</tr>
<tr>
<td>Vandyke Brown</td>
<td>95</td>
</tr>
<tr>
<td>Vegetable and Carbon Black</td>
<td>95</td>
</tr>
<tr>
<td>Pure Chromes</td>
<td>12</td>
</tr>
<tr>
<td>Ultramarine</td>
<td>33</td>
</tr>
<tr>
<td>Lime Blue</td>
<td>25</td>
</tr>
<tr>
<td>Pure Prussian Blue</td>
<td>100</td>
</tr>
<tr>
<td>Brunswick Blue</td>
<td>16</td>
</tr>
<tr>
<td>Celestial Blue</td>
<td>12</td>
</tr>
<tr>
<td>Brunswick Green</td>
<td>15—20</td>
</tr>
</tbody>
</table>

The question of oil is all important in paint grinding as the cost of the oil is one of the most serious considerations. It is therefore one of the problems which face the paint grinder to adjust his paint mixing in such a manner as to necessitate the introduction of the smallest possible quantity of oil in the grinding
MANUFACTURING SCALE OF MIXING. 155

At the same time he has to consider that unless there is an adequate proportion of oil present he cannot get the paint to mix properly and therefore he has to hit upon the nappy medium. The general rule is that the heavier the pigment the less oil it absorbs, and a reference to the foregoing table will show that this rule is followed pretty closely, white lead and barytes which are the heaviest pigments, absorbing the smallest proportion of oil, while pigments like sienna and Vandyke brown, which are very light, require almost their own weight of oil. A further important point is that damp pigments always require more oil to grind them than dry pigments.

It is a mistake to suppose that the use of cheap or indifferent linseed oil cheapens the cost of the paint, because it does not do so. Oil containing a large proportion of albuminous matter does not go so far as a clear bright oil. Therefore attention ought to be paid to the quality of the oil purchased and also to the storage tanks to see that they are free from sludge and foots.

The last ingredient we have to revert to in the case of stiff paints is what is sometimes termed the "binder." This material may vary in nature and it is not always required. Its object is to enable the oil to retain the pigment in suspension. Thus, if the paint grinder is grinding a somewhat low quality of Brunswick green, he finds that after the paint is ground and placed in the kegs, the solid matter is apt to settle down with the result that the lower part of the keg contains a hard mass of pigment and the upper part a sloppy mass of mixed oil and pigment. To avoid this inconvenience which at once results in complaints he introduces into the paint in the process of mixing something of a tenacious viscous nature which helps the oil and pigment to remain incorporated together. Boiled oil is sometimes used for this purpose and some old fashioned grinders use a large proportion of
boiled oil in their paint mixing. This practice, however, is rapidly dying out and a better material to use is a small proportion of varnish foots, say 7 to 14 lbs. to the cwt., but care must be taken that the quantity is not too large, otherwise the whole of the paint will set hard in the kegs. Before finally adopting any particular batch of varnish foots or other similar material as a binder it should be tried on a small scale, as these materials often contain large quantities of active driers and other chemical matters which act in peculiar ways on the paint.

MACHINERY AND PLANT USED IN PAINT GRINDING.

After a paint grinder has decided on the relative proportions of colour, cheapening materials, oil and binder, he has to set about amalgamating these into the stiff paint and the first process is that of mixing.

Paint mixing machines are of various types including:

1. The old fashioned pug mill, which consists of a vertical cylinder with revolving spindle carrying usually six knives set at right angles to this spindle which, when the latter rotates, cut through the mass of paint and gradually mix it.

2. The vertical mixer which consists essentially of a horizontal box or chamber containing blades which revolve and cut the paint up after the fashion of a dough mixing machine used by bakers.

3. The improved pan mill of which that perfected by Messrs. Torrence, of Bitton, may be taken as a type. This latter mill possesses many attractions and is especially useful where mixing has to be done quickly, as owing to the construction of this mill the paint undergoes a good deal of grinding as well as mixing.

The second class of mill referred to above is only useful for fairly soft paints. For very stiff paints the first class is said by some authorities to give the best results. The process of mixing paints in any of the
MANUFACTURING SCALE OF MIXING. 157

above mentioned machines is not altogether a hap-
hazard process. For example, in mixing tinted paint
it does not do to throw in all the white colour first
and then dump the staining material in towards the
end of the operation. As a matter of fact the best
results are got by mixing up the tinting matter sep-
ately in another mill and introducing it in the mixed
state into the mixture containing the white colour.
This avoids the formation of lumps and irregular
patches of material which would otherwise manifest
themselves when the mixture was placed upon the
grinding rollers.

In making up tinted paints on a large scale the
order in which the various tinting materials are added
is somewhat important, and if this be not attended
to the result is frequently that a considerable pro-
portion of material is wasted. In this connection the
author strongly recommends anyone who proposes
engaging in the manufacture of tinted paints to under-
take a fairly exhaustive course of study of the actual
tinting and staining properties of the pigments com-
monly used by paint grinders. This side of the
question is very frequently left somewhat severely
alone with the result that it is only after numerous
failures and spoiled batches that the would-be manu-
ufacturer comes to appreciate the relative strengths
and tinting properties of the raw materials which he
's using. A very useful course of study is to take in
rotation the various staining pigments commonly
used by paint grinders, most of which we have already
dealt with in the foregoing paragraphs, and to reduce
these in varying proportions with white lead, white
zinc and whiting. In this way a very fair idea is
obtained of the variety of shades obtained by these
strong staining materials.

In order to indicate a few of the points that have
to be attended to in making up tinted paints in general
we may discuss in some detail the manufacture of
two typical tinted paints, viz.: Slate colour and mast colour paints.

We will suppose that the paint manufacturer is required to produce a slate colour paint in the stiff form, and we will imagine that the exact tint to which his paint is to conform has been given him. Let us suppose that this tint is of a somewhat pale colour of the nature of the so-called "invisible grey" used in the British Navy. Now, every practical man who has gone through a course of training in the staining properties of pigments will see by inspection of this colour that it contains four elements, viz.: white, black, blue and red, and common sense united with a little practical experience will show him that it will be fatal to the ultimate result if he adds too much black to begin with. He will know by practical trial and experience that the most sensitive or easily affected of the four elements just mentioned is blue, and he will be proceeding on correct lines if he adds the blue tinting material first. Let him therefore select his white base, which in the case of a somewhat "clean" or bright looking colour would be oxide of zinc (either pure or reduced according to the required cost with terra alba). Let him then add such a quantity of ultramarine blue as will bring the paint to the same depth of colour as the given sample. By then adding little by little small proportions of black the brightness of the blue will be "killed" and the slate colour or greyness will gradually manifest itself. The object of the red is to neutralise the native "coldness" of the blue and black and the addition of a very small quantity of Indian red will probably suffice to give the necessary cast of colour. The proportion of Indian red will be very small and will vary according to the colour of the ultramarine used as certain grades of ultramarine possess in themselves a distinctly reddish tone.

Suppose for the moment the paint grinder were
MANUFACTURING SCALE OF MIXING. 159

to begin by adding black to the white base. He
would in all probability overstep the mark and would
obtain a dark grey colour which would require the
addition of a very large proportion of blue and pro-
bably of white as well to bring it to the required slate
tone. The general rule, therefore, in adding a mixture
of tinting colour to a white base to produce tinted
paints, is to commence with the more sensitive and
delicate ones and to add the stronger and darker ones
last and in the smallest proportions.

Another example of a tinted paint and the method
of its production is mast colour. In this case the
white base will in all probability be white lead, con-
taining a greater or smaller proportion of whiting,
and, if the quality is a somewhat low one, a proportion
of second grade barytes as well. The tinting colours
will be Oxford ochre, Venetian red, burnt seinea, and
orange chrome. In this case the practical man will
see at once that the ochre is the predominant material
and he therefore commences by adding a sufficiency of this pigment. He then adds sufficient burnt sienna to give the richness and density to the ochre; this he then follows with Venetian red, or in the case of some low grades he would probably use Venetian red right through in place of sienna. Finally, he livensthe whole up by means of orange chrome.

One of the chief points in paint grinding is to judge the proportion of oil that should be added in the mixing process. Frequently the material becomes somewhat heated with the result that it works softer than it ultimately becomes when cold; this has to be allowed for.

Another type of machine largely used for the mixing of paint bodies and the thinning down of same is the "Universal Kneading and Mixing Machines."
MANUFACTURING SCALE OF MIXING.

made by Werner, Pfleiderer and Perkins, Ltd. These have been for very many years adopted by leading paint and enamel manufacturers. As will be seen from the illustrations, these machines consist of a trough or container equipped with one or two horizontal blades, the action being such as to produce the most thorough and perfect mixing obtainable, and in such manner as to prevent any possibility of settling or stratification. Fig. 25 shows the heavier type as used for white lead and zinc bodies, etc., whilst Fig. 26 illustrates the lighter type in use for thinning down, stirring, etc. The "Universal" type of Kneader is also extensively used in the manufacture of the finest grades of putty. These machines are, where required, supplied with arrangements for emptying through the bottom of the trough instead of by the tilting of it.

In the preparation of fine colours and paints in oil, turpentine or water, it is often most economical to mix and sieve the pigments while they are in the form of a dry powder and before they are ground in their medium. For this purpose a very useful machine is the "Rapid" Sifter and Mixer, manufactured by Messrs. Wm. Gardner and Sons (Gloucester), Ltd., and is illustrated in Fig. 27. It may be said to con-
sist of two chambers, one above the other. In the top chamber into which the powdered pigments are introduced is a finely meshed sieve of silk which surrounds a specially constructed spiral brush. This brush very quickly breaks up tiny lumps while the mechanism causes the finely divided powder to pass through the sieve and drop to the chamber below. At the same time any foreign matter, such as small stones, sticks and irreducible lumps, are automatically thrown out of the machine through a spout provided for the purpose. In the mixing or blending chamber below to which the finely sifted powder has descended, an agitator is provided by which the blending and mixing is very thoroughly effected in a short time. A second form of the same machine is shown in Fig. 28.

A still further variety in construction is called the "Quick Change" powder dresser. In this machine the sieve can be changed so that several powders of varying degrees of fineness can be dealt with in the same day. It can also be adjusted in such a manner that two different mixings can be produced at the same time.

After mixing, the paint is transferred to the grinding rollers which now almost invariably consist of what is known as a three-roller horizontal mill. These mills have been brought to a state of great perfection, and by the use of suitable mixing apparatus the amount of grinding is reduced to a minimum. Sometimes two, three or more grinding mills are worked in series and the paint falls from one to the other becoming still further reduced at each operation. As an indication of the difference in grinding required by different pigments we may remark that white lead is usually considered to require one grinding, white zinc two grindings, ochre staining colours three grindings, sienna and some of the harder staining colours, as well as colours for coachmakers and printers inks four to six grindings.
In the first part of this book are given illustrations and descriptions of the paint mixing machines which are suitable for the use of house painters, coach painters and decorators. It will be useful now to include a brief description of some of the larger machines suitable for the use of paint and colour manufacturers. In Fig. 29 is shown a motor edged runner mill for dry grinding and blending; the rolls are carried on separate grinding crank and rise and fall quite independently of each other. The rolls bear all across their entire width of face and are always parallel to bed of pan. The rolls cannot get out of the upright position nor lean over to either side. Ploughshare scrapers are provided which always present the material in a new form to the action of the rolls. It may be mentioned that the mills have been altered and somewhat improved since the block was made.

The quadrant triple roller mill is illustrated in Fig. 30. This machine is made on an entirely new principle; the driving pinions are carried by two quadrants which, while maintaining the proper depth of gear between themselves and the driving wheel in any position, admit of a varying adjustment of gear with the driving wheel fixed upon the roller spindle and by a simple screw
adjustment to accommodate themselves to the diminishing diameter of the rolls. The gear is entirely enclosed and works in an oil bath, and thus effects a considerable saving of power.
The illustration in Fig. 31 shows what is known as the "Vortex" mixer, which has a capacity of 40 to 50 gallons, and is suitable for mixing and diluting all kinds of paints and enamels. The contents can be drawn off while the mixture is working, ensuring uniform consistency from first to last. The propeller blades are all polished and are in knife edged contact with the bottom of the container. They are driven by machine cut gear and work in an oil bath gear case.

Fig. 32.

An excellent type of mixing machine adapted for mixing dry colours in oil as well as for thinning down thick pastes to liquid paints, indeed, for nearly all kinds of mixing when uniform results are required, is the "Torrance" Patent Mixer, which has two sets of blades in the revolving pan. By means of the lever the pan is thrown out of gear, whilst the blades continue to revolve and agitate the contents, which can then be drawn off during agitation, ensuring a perfect uniform consistency.
from first to last. The capacity of this mixer is 30 gallons, and it is a very serviceable machine.

The "Perfect" Mixer is shown in Fig. 33. It is used for practically the same purpose as the former, but is quite different in construction. The object in this case was to produce a machine of extreme simplicity. The whole contents of the container are brought in turn in the action of the revolving blades and the mixing is accomplished in a few minutes. The container may be removed to any convenient place for drawing off the contents. This container is 21 inches in diameter and 14 inches deep, and will mix 12 gallons at one operation. It is fitted with handles convenient for lifting, and with a discharge valve as shown in the engraving. All the above machines are designed and manufactured by Messrs. Torrance & Sons, Ltd., Bitton, near Bristol.
Examples of "MATSINE" on Painted Surfaces.
The mixer shown in Fig. 34 is American made, the proprietors being Messrs. Kaestner & Co., Harrison and Troup Street, Chicago, Ill. The construction is clear from the engraving.

Fig. 34.

In Fig. 35 is shown a sectional elevation of a special mixer made by the same firm, while in Fig. 36
is shown a mixer specially constructed to be suspended from the ceiling. This may be either steam or water jacketed and is manufactured by the above-mentioned house.
MANUFACTURING SCALE OF MIXING.
PAINT AND COLOUR MIXING.

A battery of paint mixers is shown below. This illustration gives a good idea of the mixing machinery in use in a modern paint manufactory. The quantity of paint which can be mixed within say a week is very large. The mixing is very thorough.
MANUFACTURING SCALE OF MIXING.

For more minute information of the grinding of paints we refer the reader to the "Manufacture of Paint," by J. Cruickshank Smith, B.Sc., F.C.S., published by Scott, Greenwood and Son, London.

Prepared Paints.

These are, as we have already indicated, the final stage in the manufacture of paint. The stiff paint prepared as already described is placed in large mixers either of a horizontal or vertical type where the proper proportions of oil, turpentine, driers and sometimes varnish are added. The machinery is set in motion and the mixture is thoroughly beaten up by means of stirrers for several hours, at the end of which time the ingredients have become thoroughly amalgamated. Anyone who has seen a paint mixing mill of this description will at once disabuse himself of any idea he may have possessed that a painter working with a domestic pail and a wooden paddle is equipped with an ideal paint mixing plant. The proportions of the various ingredients employed by manufacturers of prepared paints vary greatly. Much depends upon the consistency of the stiff paint used, the softer this is the more easily it is worked up, and many of the ready mixed paint manufacturers are very skilful in making up their stiff paint so as to require the minimum amount of thinning with oil and turps, which are expensive ingredients. Then again the quality of the stiff paint has considerable influence; the better the quality the more thinning material the paint will stand. Obviously, if the paint is of very inferior quality the addition of the normal quantity of liquid thinners would render the paint practically useless as a covering material. While, therefore, the dominating agent is the nature of the pigment in the stiff paint it is only practical trial with the particular stiff paint that is to be employed, which will indicate exactly how much thinners is required. As to the relative proportion
of oil and turpentine, this also is a matter which will vary according to the necessities of the case. For ordinary outside use one part of turpentine to three parts of oil is ample, and the probability is that when turps reaches a high price this proportion will be reduced, if possible. The question has sometimes been discussed whether really glossy paint can be made without the addition of varnish. Trial has proved that this can be done by using a good bodied boiled oil in place of a proportion of the linseed oil. Indeed the introduction of varnish into prepared paint has little effect upon the gloss, although it has a considerable influence on the wear and vitality of the paint.

The whole question of the advisability of employing varnish as an ingredient of ready mixed paints is one on which contrary views are entertained, and if the question is asked whether or not varnish is a satisfactory ingredient of these products, the answer is that it all depends upon the nature of the varnish and the composition of the paint. Assuming that the paint is made of the very best materials, carefully selected and prepared in the best possible manner, and assuming also that the varnish is selected with due regard to its composition and the composition of the ingredients with which it will be combined, then there can be no doubt that the introduction of a material containing, as varnish does, a proportion of gum resin will add materially to the life and protective qualities of the paint. On the other hand, if paint is manufactured to meet competition and if the temporary appearance of the painted surface rather than the composition of the paint itself has been the object of the paint manufacturer's attention; if, further, the composition of the varnish is a more or less unknown quantity, then it may unhesitatingly be said that varnish will do little good to the finished paint and may in many cases be a source of serious trouble.
A varnish which contains resin should never be used in mixed paints. Not only so, but many of the cheaper gums used as substitutes for the finer copals are not suited for amalgamation with pigments. Again, the presence of certain dry materials in paint often exercises very curious results on materials of a varnish nature, causing what is known as "jellying" and other disastrous results. There is no more technical or intricate branch of varnish manufacture than the preparation of what are known as mixing varnishes, that is to say, varnishes suitable for admixture with paints and pigments, and unless the paint manufacturer is prepared to spend some time in the selection of suitable varnishes he will be well advised to leave them out of the question altogether in the fabrication of prepared paints for decorators' use. Of course, in such articles as varnish paints, anti-fouling compositions, etc., varnish of some kind is the base of the whole thing.

The recent boom in turpentine substitutes has raised the question whether these could be safely used in ordinary prepared paint. The balance of evidence at the present time appears to show that assuming due care and caution have been exercised in the purchase of a turpentine substitute, very good paints can be prepared containing these articles, provided there is plenty of oil in the paint as well; that is to say that while a very good glossy paint can be produced containing a turpentine substitute, it would not be so easy to produce a thoroughly good flat paint.

The question of driers in ready mixed paint also deserves attention. Paint manufacturers as a rule use nothing but paste driers, and these are usually added in a considerable quantity for two reasons.

(1) Because the driers employed are usually very cheap and tend to cheapen the paint.
Because of all the complaints to which the paint manufacturer is exposed that of bad drying in paint is most troublesome, and so long as he gets his paint to dry he is not so particular about other features.

Of late years manufacturers of prepared paints for special purposes, in particular protective paints, have been adopting the principle of using liquid driers, but detailed information concerning their use and proportions is hardly within the scope of this work.

The following are authenticated proportions which have been employed in Britain in the manufacture of prepared paints. The qualities, it will be observed, are by no means first rate, but represent very fairly what may be described as ordinary commercial qualities of tinned paints suitable for re-sale. It is, of course, in the power of the manufacturer to vary these mixings according to his actual requirements.

**Ground Purple Brown (for R.M. Paint).**

<table>
<thead>
<tr>
<th>cwts.</th>
<th>qrs.</th>
<th>lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>Dry Purple Brown.</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>Paris White.</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>No. 2 Barytes.</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Boiled Oil Foots.</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Varnish Foots.</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>Raw Linseed Oil.</td>
</tr>
</tbody>
</table>

**Ground Brunswick Green (for R.M. Paint).**

<table>
<thead>
<tr>
<th>cwts.</th>
<th>qrs.</th>
<th>lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21</td>
<td>Dry Green (pure).</td>
</tr>
<tr>
<td>3</td>
<td>21</td>
<td>Paris White.</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>No. 2 Barytes.</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Boiled Oil Foots.</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Varnish Foots.</td>
</tr>
<tr>
<td>1</td>
<td>21</td>
<td>Raw Linseed Oil.</td>
</tr>
</tbody>
</table>
MANUFACTURING SCALE OF MIXING. 175

GROUND WHITE LEAD (FOR R.M. PAINT).

cwts. qrs. lbs.
4 0 0 Dry White Lead.
6 0 0 Best Barytes.
2 16 Refined Linseed Oil.

COMPOSITION OF ONE TON OF R.M. PAINT ON THE BASIS OF A VARIETY OF SHADES.

cwts. qrs. lbs.
14 1 15 Stiff Paint.
2 2 22 Paste Driers.
2 1 0 Raw Linseed Oil.
2 2 19 American Turpentine.

With regard to the cost of prepared paint per ton, the following is a skeleton cost sheet, including the various items which must be included in such a statement.

COST OF R.M. PAINT PER TON.

<table>
<thead>
<tr>
<th>Description</th>
<th>£</th>
<th>s</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials as above</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cost of manufacture of stiff paint</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>, , of R.M. paint, including filling and labelling</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>, , tins</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>, , labels</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>, , packing</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>, , supervision, office, travelling, and other expenses</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

It will of course be borne in mind that the cost of tins is a very important item in the above. Tins are usually quoted at so much per gross, therefore in the case of paint packed in one pound tins there will be 2240 tins per ton, in the case of paint packed
in two pound tins 1120, and so on, according to the size of the various packages. It has been stated by a prominent ready mixed paint manufacturer that he considers the cost of manufacturing ready mixed paints exclusive of materials and packages, but including labour and packing, at about £8 per ton on an average of all sizes of packages.
CHAPTER XX.

WATER PAINTS, DISTEMPERS, ETC.

For many years distemper colours have been used by painters with more or less success, a large variety of colours being available for interior decoration. In most cases such distemper colours consist of whiting mixed with colour in the proper proportion to produce the desired tint, size being added by the painter to bind the particles together and prevent the colour rubbing off when the hand or clothes are brought in contact with it. Of late years various washable water paints have been put upon the market in a large variety of colours and have gained very considerably in popularity. Not only are they suitable for inside work, but in certain cases they can be employed also on the exterior of buildings. Further than this, some of the water paints may be painted or varnished over so as to produce the effect of oil paint at a considerable reduction in price. The varnish may be applied directly to the distemper or a coat of size may be given first. In the latter case there will be little or no darkening of the colour when the varnish is applied.

A better method than using size is to give a coat of gold size thinned with twice its bulk of turpentine. This costs rather more than the size, but is more satisfactory.
The coloured plates, numbered VI., VII., VIII., IX., and X., show many examples of different water paints, some of them of totally different character, and it is hoped that these will be of service to the reader in selecting suitable colours for his work. Alabastine, shown on Plates IX. and X., as fully explained under the heading of "Description of Coloured Plates," is a class of distemper which is manufactured in a number of colours, and supplied in the form of powder.

Some of these washable distempers shown on the Plates have a world wide reputation. The author feels that he should limit himself here to a description of the use of these water paints, leaving the reader to investigate further as to their respective merits. One point, however, is worth especial note, and that is each manufacturer issues a book of colours or tints which he keeps in stock, and these are freely supplied to painters on request. A small selection of such books will be found of the utmost use in selecting the particular colour required for any job, whether it be a simple cottage or a town hall. Indeed, such books are exceedingly useful to show to one's customer, who can quickly make a selection from them. The latest plan is to supply the books with the samples divided through the centre so that harmonious contrasting colours can be selected.

The use of water paints may be divided conveniently into three parts, (1) for interior decorations; (2), as a substitute for oil paints; and (3), to prevent blistering. We may take these three headings seriatim. For interior work they produce, if properly applied, very beautiful flat surfaces of light or bright colours as may be desired. After a little practice they are not at all difficult to apply, so as to get a flat surface without laps.

Very charming results are obtained by using a different coloured frieze to that of filling and stencilling on a simple ornament. The mistake that many painters
make is to suppose that this class of paint possesses more body than it has, or to put it in another way, because these paints have an excellent body, some painters try to produce with one coat the results that can only be reasonably expected with two. Whiting is not always the base of these paints, frequently lithopone or zinc white is employed, it being well known that zinc white acts well either in water or oil.

As to how far these paints will go, Mr. J. Cruickshank Smith gives the following figures:—For one hundredweight, one coat, 400 yards; two coats 200 yards, and three coats, 120 yards. One of the most used water paints on the market is mixed with a special liquid supplied by the manufacturer, and the painter should be cautioned against making his mixture too thin, and also against adding anything (such as water), other than the ingredients recommended by the manufacturers. In every case explicit directions are given by the makers as to the use of these paints, and the painter has only himself to blame if he departs from them. We give below a few recipes for distempers and water paints arranged by Mr. W. G. Scott, the eminent American writer on paints and painting.

**WALL SUCTION SIZE.**

(a) 2 lb. white glue; soak four hours in ½ gallon cold water; dissolve on water bath.

(b) ½ lb. pulv. alum; dissolve in ½ gallon boiling water.

(c) ½ lb. bar soap (shaved fine); dissolve in ½ gallon boiling water.

Into solution (a) pour 2 gallons of boiling water, add solution (b), then (c); stir well, then add 8 lb. of plaster of Paris. This will stop suction on the coarsest sand wall, and the surface eventually becomes as hard as flint.
SIZE FOR DISTEMPER.

(a) \(1\frac{1}{2}\) lb. soda (carbonate of soda) ; \(\frac{1}{2}\) lb. borax ; dissolve in 3 gallons boiling water ; add a little at a time, \(5\) lb. pulv. resin ; continue the heat until the resin is dissolved.

(b) 5 lb. white glue ; soak four hours in 5 gallons cold water ; dissolve and add 10 gallons hot water.

Mix (a) with (b).

INSOLUBLE WALL FINISH FOR PLASTER WALLS.

(a) 4 oz. chloride of zinc ; dissolve in \(\frac{1}{4}\) gallon hot water.

(b) 2 oz. borax ; dissolve in 4 fl. oz. hot water.

(c) 2 oz. cream of tartar ; 8 oz. common starch ; 16 oz. zinc oxide ; mix with \(\frac{1}{4}\) gallon cold water.

Mix (a) and (b), boil and add (c), stirring a few minutes, then apply hot.

DEXTRINE BINDER FOR WATER COLOURS.

(a) 8 oz. yellow dextrine ; dissolve in \(16\) fl. oz. cold water.

(b) 10 grains thymol ; dissolve in \(8\) fl. oz. hot water.

Mix (a) and (b).

STARCH BINDER.

(a) 3 oz. common starch beat up with \(6\) fl. oz. cold water, then pour into \(64\) fl. oz. boiling water.

(b) 2 oz. gum arabic ; 4 oz. pulv. borax ; dissolve in \(16\) fl. oz. cold water.

Mix (a) with (b).

DISTEMPER AND WHITewASH.

COMMON DISTEMPER.

(a) \(\frac{1}{2}\) lb. white glue, soak four hours in \(\frac{1}{3}\) gallon cold water ; dissolve on a water bath.

(b) 16 lb. dry Paris white or whiting, beat up in 1 gallon boiling water.

Pour (a) into (b), and mix by stirring.

The above formula will make about 2 gallons of distemper, and it will weigh 12 lb. to the gallon.
WATER PAINTS, DISTEMPERS, &c. 181

The covering capacity is as follows: 1 gallon covers on wood, 225 square feet; 1 gallon covers on brick, 180 square feet; 1 gallon covers on plaster, 270 square feet.

The time of applying, using a 4 in. brush is: Rough walls, 22 square yards per hour; smooth walls 38 square yards per hour; flat surface, 40 square yards per hour; ceiling, 25 square yards per hour.

Fence Sign White.

(a) 6 lb. quicklime; slack in 1½ gallon warm water; keep covered while slacking.
(b) 4 oz. white resin; dissolve in 12 fl. oz. boiled linseed oil.
(c) 6 lb. whiting; beat up on 1 gallon skim milk.
Mix (a) with (b) while hot, then add (c).

Weather Whitewash.

(a) 8 lb. quicklime; slack in 2 gallons boiling water.
(b) 1 lb. carb. soda; dissolve in ½ gallon boiling water.
(c) ½ lb. common glue; 1 lb. rice flour or pounded rice; soak 8 hours in ¾ gallon cold water; dissolve on water bath.
Mix (a) with (b), then add (c).

Washable Distemper.

(a) ½ lb. white glue; soak 4 hours in ¾ gallon cold water; dissolve on water bath.
(b) ½ lb. phosphate of soda; dissolve in ¾ gallon hot water.
(c) 16 lb. whiting or other pigment; beat up in 1 gallon warm water.
Mix (a) with (c), then add (b).

Cold Water Paints.

1 lb. casein, 1½ oz. soda ash, mix with 10 lb. whiting, zinc oxide, clay, or other white pigment, or
PAINT AND COLOUR MIXING.

1 lb. casein, 6 oz. Vienna lime, mix with 10 lb. whiting, plaster of Paris, etc., or 1 lb. casein, 1 oz. powdered soap, 2 oz. powdered borax, 3 oz. dry carbonate of soda, mix with 10 lb. dry white pigment.

WASHABLE COLD WATER PAINT.

7 lb. Paris white, 2 lb. zinc oxide, 2 lb. plaster of Paris, 1/2 lb. white dextrine, 1 lb. pulv. gum arabic, 1 oz. pulv. borax, 1 oz. pulv. alum.

LIQUID PREPARED WATER COLOUR.

(a) 12 lb. quicklime slack in 3 gallons water.
(b) 3 lb. silicate of soda, thin with 1 gallon hot water, then stir in 1 1/2 lb. casein; stir until dissolved.
(c) 2 lb. strong white glue; soak 8 hours in 1/2 gallon cold water; dissolve in 1/2 gallon hot water; dissolve on water bath.
(d) 2 lb. pulv. alum; dissolve in 1/2 gallon hot water; then stir in 24 lb. Paris white or whiting.

Mix (a) with (b), add (c), then stir in (d).

COLOURS WHICH ARE FAST TO LIME.

In executing distemper or fresco painting upon ordinary plaster, a number of colours cannot be successfully used as the free lime in plaster acts upon the colour and bleaches it. Following is a list of the principal colours which are fast to lime, and are not affected. Most of the earth colours, such as Vandyke brown, red oxide, yellow ochres, siennas and umbers, Venetian red, Indian red, light red, lithopone, zinc white, whiting, cadmium yellow, ultramarine, cobalt blue, chrome green, emerald green, lamp black, and all black pigments. The crimsons and greens are the most likely to be adversely affected by lime. The following test may be used to ascertain whether any particular colour is fast to lime or not. First mix three parts of plaster of Paris to one part of freshly slaked lime, add water, mix to a paste and place
in a frame or mould about one inch deep. Place the paste in this mould, smooth level on the top, and when set remove the frame. Now take the colour to be tested, painting all the surface of the plaster slab so formed, at the same time paint a small portion of cartridge paper, and when dry, put this away between the leaves of a book, so that the light cannot get to it. Expose the painted slab to strong light for twenty-four hours, and then compare the colour with the colour painted on the cartridge paper. If there is any difference between them, the colour is more or less affected by the lime.

As a further test, place the slab into a dish or other suitable flat vessel, pour in water until it nearly covers the slab, leaving, however, the painted surface just above the top of the water. Leave it in that condition for twenty-four hours, and again compare with the cartridge paper. The water will act upon the lime, and cause it to act in its turn upon the colour. Any water paint which will stand this test may be said to be quite fast to lime.

The substitution of washable distempers for oil paints in order to lessen the cost is becoming better understood among painters every day. The writer is by no means prepared to say that one or two coats of water paint, followed by a coat of oil paint, will produce a better result from the point of view of durability than a good oil paint of carbonate of lead or zinc all through, but he does assert most positively that where it is necessary to lessen the expense, the water paint under the oil paint will produce a far better job than could be obtained by using the adulterated oil paint which would be necessary in order to keep the price within the same limits. There is an immense amount of work done by the painter which does not justify the use of the very highest class materials, for instance, cottage and small villa property, workshops, factories, where a very high finish
PAINT AND COLOUR MIXING.

is not always required, and if the work is primed with water paint and two coats of good oil paint are given on top of it, the job will be a good one. The prevention of blistering by the use of water paint above mentioned is very important and is not so well recognised among painters as it deserves to be. If a really good water paint is used it will cure the most obstinate case of blistering.

Another use for certain of the water paints which are supplied in dry powder, notably Alabastine, is for filling. The importance of having a level surface upon which to paint is well understood among painters, and the necessity is most marked in the case of enamel work, because the gloss would show up every inequality. A simple, cheap filling is made by Alabastine, and the cost is lessened also, because it may be so readily rubbed down.
CHAPTER XXI.

ARTISTS' WATER COLOURS AND HOW TO MIX THEM.

The colours used in water colour painting in most cases bear the same names as those ground in oil for decorators' use, but there are a number of exceptions. For instance, the chrome green of the artists' colourman is similar to the Brunswick green of the house painter. All of the principal names will, however, be found under the head of the various chapters headed, "Red," "Blue," etc. Note is also made in the same places of those colours which are used exclusively in water and are not suitable for use in oil and vice versa. Plate XI. contributed by Messrs. Reeves and Son will repay a careful study.

Considering the large number of artists' water colours on the market it is obvious that no artist would, as a rule, have them all at hand. Indeed, from one to two dozen colours are usually quite sufficient for the use in all ordinary water colour painting. It may be taken as a safe rule that, within reasonable limits, the more restricted a painter's palette is, the better. By the kindness of Messrs. Madderton and Company, Ltd., of Loughton, Essex, manufacturers of artists' and decorators' colours, we reprint from "Notes for Artists," the palettes of several well known artists, and they may safely be taken as a guide.

Bell, Robert Anning, A.R.W.S.—Rose madder, pale cadmium, mid cadmium, deep cadmium, permanent yellow, cobalt blue, French ultramarine,
cobalt green (light), oxide of chromium (viridian), oxide of chromium (opaque), permanent Chinese white, Chinese vermilion, Venetian red (light red), golden ochre, raw sienna (light), trans. golden ochre, yellow ochre (Oxford ochre), terre verte, burnt umber, ivory black, raw umber, Turner brown, verona brown.

MacIntosh, J. M., R.B.A.—Light red, vermilion, rose doré, rose madder, purple madder, Venetian red, cobalt yellow (aureoline), pale cadmium, deep cadmium, lemon yellow, cobalt blue, French ultramarine, ivory black, sepia, yellow ochre, Roman ochre, raw umber, raw sienna, oxide of chromium (viridian), burnt sienna, cobalt green, orange cadmium.

Severn, Walter, R.C.A.—Indian yellow, orange cadmium, aureoline, yellow ochre, orange vermilion, scarlet vermilion, alizarine, crimson, violet mineral, rose madder, cobalt blue, cyanine blue, emerald green, brown madder, transparent brown (dark), Payne's gray, ivory black.

Sir Francis Powell, P.R.S.W.—Pale lemon yellow, aureoline, yellow ochre, transparent orange ochre, raw sienna, raw umber, transparent brown (light), burnt umber, brown madder, burnt sienna, Chinese vermilion, rose madder, alizarine crimson and scarlet, cobalt violet, alizarine violet, cerulean blue, cobalt blue, ultramarine, cyanine blue, transparent green, oxide of chromium, emerald green, ivory black.

Linton, Sir James D., R.I.—Brown madder, purple madder, ruby madder, scarlet madder, pale cadmium, deep cadmium, orange cadmium, cerulean blue, cobalt blue, French ultramarine, oxide of chromium (viridian), scarlet vermilion, burnt sienna, Venetian red (light red), raw sienna (light), Roman ochre, transparent golden ochre, yellow ochre (Oxford ochre), yellow ochre (light), Prussian blue, old terra verte, burnt umber, blue black, ivory black, raw umber, transparent brown (dark).
ARTISTS' WATER COLOURS.

Bayliss, Sir Wyke, P.R.B.A.—Yellow ochre, lemon yellow, aureoline, raw sienna, light red, madder carmine, Chinese vermilion, cobalt blue, ultramarine, ash, Vandyke brown, sepia, burnt sienna, emerald green, ivory black, brown madder.

The following water colour palettes are taken from "The Chemistry of Paints and Painting," by Prof. A. H. Church (Seeley).

Sir John Gilbert, R.A. (15 pigments).—Chinese white, yellow ochre, raw sienna, vermilion, light red, Venetian red, Indian lake, cobalt, ultramarine (artificial), indigo, Prussian blue, Antwerp blue, burnt sienna, Vandyke brown, and ivory black.

Alfred W. Hunt (17 pigments).—Lemon yellow, gamboge, yellow ochre, raw sienna, vermilion, light red, Indian red, madder lake, terra verte, cobalt, ultramarine, ultramarine ash, smalt, madder brown, raw umber, burnt sienna, burnt umber.

A palette that is useful for flower painting for those not well versed in mixing colours is as follows: Raw sienna, burnt sienna, Chinese white, yellow ochre, gamboge, Indian yellow, lemon yellow, Prussian blue, French blue, cobalt, Naples yellow, emerald green, purple lake, crimson lake, pink madder, brown madder, brown pink, sepia, Vandyke brown, scarlet lake, scarlet vermilion, carmine, olive green.

It will be readily understood that from these palettes nearly any colour or hue may be obtained so that the artist has at hand means for obtaining any effects desired. Occasionally it may be found desirable to buy a small tube of some special colour for a special purpose or to obtain a special effect.

Although we have given below a few mixtures by which some colours can be imitated it is more important to the beginner in water colour painting to know the general effects of admixture and the purposes for which they may be employed. Mr. Frederick Oughton has copyrighted a colour chart for water
colour painting which the author recommends strongly to beginners for close study. It is published at 2s. 6d. by Messrs. Winsor and Newton, and consists of a sheet of cartridge paper divided into twenty-one numbered spaces. Upon each is given a wash of two or more colours, pure at the top and blended together immediately below, being lightened off by the addition of water as the colour reaches the bottom. The following colours are used: (1) Indigo, Vandyke brown, and alizarin crimson; (2) French blue and brown madder; (3) Cobalt, sepia, and alizarin crimson; (4) Cobalt and light red; (5) Cobalt rose madder and yellow ochre; (6) Cobalt and raw sienna; (7) Cobalt, rose madder and aureolin; (8) Cobalt and yellow ochre; (9) Sepia and gamboge; (10) Indigo and yellow ochre; (11) Indigo and gamboge; (12) Indigo and sepia; (13) Prussian blue; (14) Prussian blue, burnt sienna and gamboge; (15) Prussian blue and aurora yellow; (16) Prussian blue and aureoline; (17) French blue and alizarin crimson; (18) Cobalt and rose madder; (19) Rose madder and yellow ochre; (20) Vermilion and gamboge; (21) Vermilion and yellow ochre.

The chart indicates at a glance the different colours which are obtained by mixing the various pigments mentioned above after each number. The student might very well prepare for himself a number of such charts based either upon his individual fancies as to a palette, or by taking one or even several of those given above. It would be excellent practice to make a chart on every one of these palettes and to keep all the charts for constant study and inspection as recommended under the head of "How to Learn to Mix Colours."

**How to Imitate Water Colours.**

It will be noted in the following list that white, which is so important an element in mixing oil colours is almost wholly omitted. The reasons for this are
first, that the addition of water to water colours produces a thin wash or a tint in the same manner as pigmentary white in oil colour; next, that if white pigment is added in any quantity to a water colour a chalkiness results and the tone of the colour is destroyed, and third that the paper or ground in water colour painting being usually white this forms an element which must always be considered. Moreover, crude white is very rarely employed in water colour painting excepting, perhaps, for small high lights and cloud effects.

The following brief list gives the mixtures by which some of the colours named may be imitated.

**Alizarin Green.**—Prussian blue and gamboge or aurora yellow.

**Blue Black.**—Indigo and sepia.

**Burnt Sienna.**—A close imitation may be obtained by mixing madder carmine and cappagh or Caledonian brown.

**Cadmium.**—Chrome yellow with a very slight addition of burnt sienna.

**Cadmium Orange.**—Add a little vermilion to medium cadmium yellow.

**Cologne Earth.**—Prussian blue and sienna.

**Grays.**—A large series of grays suitable for skies may be produced by mixing either of the following colours with or without black as may be required: Lake and cobalt; lake and indigo; light red and cobalt; Indian red and cobalt; indigo, lake and burnt sienna; indigo, lake and gamboge.

**Hooker’s Green.**—Prussian blue and gamboge or aureolin.

**Indigo.**—Dark ultramarine with black and add a very little veridian, or mix Prussian blue, crimson lake and black.

**Indian Red.**—Tone vermilion with a very little yellow ochre and add madder carmine and ivory black until a match is made.
LIGHT RED.—Mix together yellow ochre, vermilion and cappagh or Caledonian brown.

Madder Brown.—Vandyke brown and crimson.

Prussian Blue.—Add black and a very little veridian to ultramarine.

Neutral Orange.—Cadmium and Venetian red.

Raw Sienna.—Mix aureolin, yellow ochre, with cappagh or Caledonian brown.

Rose Madder.—Crimson lake with a little Vandyke brown.

Sepia.—Vandyke brown and black.

Vandyke Brown.—Tint cappagh or Caledonian brown with madder carmine and sadden with a very little black.

Venetian Red.—Mix together yellow ochre, vermilion and madder carmine and add a little cappagh or Caledonian brown.

Suggestions for Painters in Water Colour.

Although the above list may be useful under some circumstances the beginner in water colour painting will be more interested in learning the mixtures which may be successfully employed in various parts of a picture and to such the following hints will be useful for study. It must always be remembered that thin washes are, as a rule, intended.

Autumnal Tints (See also skies).—(a) Indian yellow; (b) French blue and brown pink; (c) Cobalt, Naples yellow, and rose madder; (d) Gamboge and rose madder.

Banks, Earthy.—(a) Light red, yellow ochre, and Payne's grey; (b) Gamboge and burnt sienna; (c) Yellow ochre and Vandyke brown.

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Branches of Trees.—(a) Vandyke brown; (b) Brown madder with or without a little French blue; (c) French blue and brown madder; (d) Rose madder and blue black; (e) Sepia and brown madder.

Backgrounds.—It is almost useless to give mixtures for backgrounds, because to put it crudely anything will do for the purpose provided that it harmonises the picture itself or either throws in relief or acts as a foil as the case may require. The following are some useful backgrounds other than plain greys and grays which are so often employed. (a) Cobalt blue, Chinese white and emerald green; (b) Cobalt and brown madder; (c) Cobalt and scarlet vermillion with a little emerald green.

Clouds and Distances.—Mix thin washes, either of the following in varying proportions according to circumstances: (a) Cobalt, yellow ochre, and rose madder; (b) The same, omitting the cobalt; (c) Brown madder and cobalt; (d) French blue, burnt sienna, and crimson lake; (e) Indigo and blue black; (f) Cobalt and light red; (g) French blue and blue black; (h) cobalt, light red and rose madder; (i) Yellow ochre or Indian red with a little rose madder.

Clouds (Stormy).—(a) Blue black and light red; (b) French blue and blue black; (c) French blue, light red, and blue black.

Flowers and Fruit.—It is obviously impossible within the limits of the present work to give anything like a complete list of the different colours used in painting fruit and flowers; indeed, their number is infinite. A few of the most important, however, may be given. (a) Vermilion and gamboge (marigold); (b) Vermilion and yellow ochre; (c) French blue and crimson; (d) Rose madder and cobalt; (e) Rose madder and yellow ochre; (f) scarlet lake and cobalt (Christmas rose); (g) Madder and white or pink madder by itself (pink rose); (h) Scarlet lake and carmine (red rose); (i) Crimson lake and purple lake (dark parts
of cyclamen; (f) Crimson lake mixed with either purple lake, madder brown, Indian yellow or gamboge (carnation).

**Foliage, Grass and Herbage.**—Clearly a wide range of greens, reds, and yellows may be employed for these purposes. The following are some suggestions. 
(a) Veridian and French blue; (b) Gamboge and sepia; (c) French blue and emerald green; (d) Emerald green and gamboge; (e) Indigo and gamboge; (f) Indian yellow and burnt umber; (g) Indian yellow and French blue; (h) French blue, Indian yellow and burnt sienna; (i) Yellow ochre and French blue; (j) French blue, rose madder and yellow ochre; (k) Indigo, light red and yellow ochre; (l) Gamboge, burnt sienna, and French blue; (m) Burnt sienna, Indian yellow and French blue; (n) Yellow ochre, gamboge, French blue, and burnt sienna.

**Foliage and Herbage (Distant).**—(a) French blue and brown pink; (b) Yellow ochre; (c) Brown pink mixed with French blue and either burnt sienna or Vandyke brown; (d) Naples yellow and cobalt; (e) Cobalt and lemon yellow; (f) Naples yellow, yellow ochre, and cobalt.

**Foregrounds.**—(a) Brown pink, either by itself or mixed with burnt sienna, Vandyke brown or gamboge; (b) gamboge and yellow ochre; (c) Yellow ochre and cobalt, with or without a little light red.

**Grass.**—(a) French blue and gamboge; (b) Indigo and gamboge; (c) French blue mixed with gamboge and yellow ochre or Indian yellow; (d) French blue and yellow ochre.

**Grays, Warm and Cold.**—For clouds, hills and distant effects. To get these mix either of the following, depending upon the circumstances:—Mix cobalt with either (a) Light red; (b) Raw sienna; (c) Sepia and crimson; (d) Rose madder and aureolin, or (e) Rose madder and yellow ochre. Mix indigo with
ARTISTS' WATER COLOURS.

Crimson and Vandyke brown or mix French blue with brown madder.

Ivy.—(a) Indigo and burnt sienna; (b) Yellow ochre, brown madder and French blue; (c) Brown madder, French blue, and a little cobalt.

Leaves and Stems of Flowers.—Here again a very large variety of greens might be given, but the following list will be found to suit most requirements: (a) Naples yellow or gamboge mixed with a little emerald green; (b) Cobalt or French blue mixed with carmine and Naples yellow; (c) Prussian blue and gamboge; (d) French blue, gamboge, and yellow ochre; (e) French blue, raw sienna, and gamboge; (f) French blue, scarlet lake, and a little Naples yellow. Note: This gives a delicate bluish mauve suitable for the under part of the leaves of the cyclamen; (g) Indian yellow, gamboge and Prussian blue; (h) Olive green used alone or mixed with a little raw sienna, white or Prussian blue; (i) Prussian blue, sepia and raw sienna; (j) Cobalt gamboge and yellow ochre. This list might be added to almost indefinitely, but inasmuch as several greens are usually to be found in the palettes of most painters further examples are not necessary.

Mountains.—(a) Yellow ochre, cobalt and rose madder; (b) Either two of the three last mentioned; (c) Cobalt, rose madder, and raw umber; (d) Light red, rose madder, and cobalt.

Rivers.—The colours used will depend, of course, upon the state of the river. If it is calm raw sienna with a little Vandyke brown and cobalt will answer. If dark, Indian yellow, sepia, and lake may be used, or Vandyke brown, Indian yellow and lake.

Roads.—(a) Rose madder, burnt umber, and indigo; (b) Light red and blue black; (c) Yellow ochre; (d) Yellow ochre, light red, and either Payne's grey, or a little cobalt; (e) Yellow ochre and Vandyke brown.
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SEA.—(a) Cobalt mixed with either light red, burnt sienna or lake, and yellow ochre; (b) Indigo, yellow ochre, and rose madder; (c) Raw sienna mixed with blue black or cobalt.

SHADOWS.—The colour of shadows will, of course, always depend upon the colour of the object upon which they are thrown. The following mixtures are among the most useful—

(a) Brown pink, French blue and lake; (b) Lake and Indigo; (c) Blue black, lake and burnt umber; (d) Cobalt rose madder and yellow ochre.

SHADOWS, ESPECIALLY OVER FLESH COLOUR.—
Mix cobalt and raw sienna.

SHADOWS (FOREGROUND).—When a purple shadow is required use either (a) Cobalt mixed with rose madder; (b) French blue and crimson.

SHADOWS (GENERAL).—Vary either of the following: (a) French blue, burnt sienna, crimson lake; (b) Cobalt, raw and burnt sienna.

SHADOWS (WARM AND COLD).—(a) Sepia, indigo, and crimson lake; (b) Indigo and light red; (c) Crimson lake and blue black; (d) Light red and blue black; (e) Indigo and Indian red.

SHIPS (HULL).—(a) Burnt sienna; (b) Lake and Vandyke brown; (c) Burnt sienna, brown madder and blue black. SAILS: (a) Raw sienna; (b) Yellow ochre, and umber; (c) Roman ochre; (d) Brown madder and light red.

SKIES.—Skies may vary from differently toned grays to pure cobalt: Under the head of grays on page 110 will be found a number of different mixtures most of which are suitable for sky work. The following are additional mixtures:—

(a) Cobalt and rose madder; (b) Indigo and Indian red; (c) Cobalt and a little Chinese white or (d) Cobalt by itself.

STONE WALLS.—(a) Rose madder and blue black; (b) Yellow ochre and Vandyke brown; (c) Blue black
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(d) Indigo and sepia; (f) Yellow ochre and blue black; (g) Yellow ochre, light red and blue black.

SUNSET AND SUNRISE.—The same as Autumnal Tints, which see.

TREES: DISTANCE AND MIDDLE DISTANCE.—Use either of the following: (a) Indigo and gamboge; (b) Sepia and gamboge; (c) Cobalt and yellow ochre; (d) Indigo and yellow ochre; (e) Indigo and sepia; (f) Cobalt, lake and yellow ochre; (g) Brown pink, indigo, and burnt sienna; (h) Gamboge, light red, and indigo.

TREES (IN THE FOREGROUND).—Either of the following mixtures will serve: (a) Prussian blue, gamboge, and burnt sienna; (b) Prussian blue, and aureolin; (c) Prussian blue and aurora yellow and Prussian blue and burnt sienna; (d) Gamboge, yellow ochre, and indigo; (e) Gamboge, burnt sienna, and indigo; (f) Naples yellow, Indian yellow, French blue, and a little burnt sienna.
CHAPTER XXII.

TESTING COLOURS.

Although to accurately test the quality of a colour requires somewhat elaborate experiments, both chemical and practical, yet there is no reason why the painter should not determine with a sufficient degree of accuracy for his purpose the quality of the colour he uses. Indeed, if this was done more generally, many of the grossly indifferent colours would be driven from the market, and none would rejoice more at such a result than the colour manufacturers themselves. The writer has no connection with, or interest in, these manufacturers, but it is only fair to assert that they are as desirous that the trade should use pure colours as the painters can possibly be. Even the largest houses produce cheap grades of colours, and this they do almost under a protest and simply because they are compelled by painters demanding colours for certain low prices, far below that at which it would be possible to produce the pure article. As a rule such adulterated colours do not bear the name of the maker. Our advice to painters is: Make a careful comparison between pure colours and those you are using. At the same time, compare the prices and then see which is cheaper to use. If even they come out at the same price, remember that by using a pure colour you will have all the benefit of that purity of tone so necessary for the execution of good work.
The first thing to be done in testing any paint material is to have a standard. There must be no doubt about this. Unless we have in each case something with which to compare the particular sample of colour that is being examined, we shall have no useful information concerning it. Take, therefore, good decorators' colours of well known make. If necessary purchase small tubes of the best colours, such as are put up for artists' use. This will be rather a severe trial, but still it will afford a standard. Having such samples and going through the tests we are about to describe, the painter can, after some amount of trouble, arrive at results which are almost as accurate as those which could be deduced by a chemist. An expert on this question some years ago summarised the characteristics of colours which should be considered in making the examination, under the following heads:—

1. Purity of the material.
2. Purity of the tone; brilliancy, richness, which indicate the amount of care in selection.
3. Fineness of grinding or preparation; this means the degree of the division of the particles and upon the completeness of such division the durability will in a great measure depend.
4. Its spreading capacity.
5. Its body. This applies, of course, only to opaque or semi-opaque colours. Body is opacity, and means capacity to conceal the surface to which the paint is applied, and must not be confused with spreading. It is an inherent quality.
6. Its staining power or tinting strength with white or colours.
7. The quality of purity of the tint obtained by mixing with white.
8. If a paste colour, the consistency of the paste.
10. The permanency of the colour.

It will be observed that all of these tests will not necessarily be applied to every colour. For instance, a transparent colour would be tested for its transparency, but certainly not for its body. The one condition is the converse of the other.

We will now consider the above-named qualities separately.

PURITY OF THE MATERIAL.—This is sometimes of considerable importance, as in the case of white lead, whilst in others—for example the earth colours—it can hardly be said that there is a standard of purity. As a rule a knowledge of practical chemistry is necessary in order to determine whether a sample of paint or colour is pure or not.

The purity of white lead, however, can readily be ascertained by the painter who possesses no chemical knowledge, viz., by aid of the blow-pipe. Take a piece of flat charcoal and scoop out a hollow space from it into which place a small piece of white lead to be tested, about the size of a pea. Now direct the flame of a blow-pipe upon it, using an ordinary paraffin candle or a Bunsen burner, taking care that the blue portion of the flame bears upon the lead. Keep up a steady blow for a few minutes and the white lead will be converted into metallic lead, which will show in the form of a bright silver-like button. If the lead is adulterated the blowing will only have the result of making it appear like a cinder. To conduct this experiment successfully requires a little practice with the blow-pipe in order to obtain a steady flame.

Another method of testing is to place a little white lead in a crucible and place this on a hot fire, when, if genuine, it will be converted into metallic lead.

A form of blow-pipe that may be purchased at most ironmongers' shops consists of a wooden handle and a container filled with cotton soaked in benzine. To this is attached a rubber tube with a mouthpiece.
Examples of "MATSINE" on Painted Surfaces.
TESTING COLOURS

This blow-pipe is very easily used, and may be successfully employed in testing the purity of white lead in the manner indicated.

PURITY OF TONE.—Some remarks on this subject will be given under the heads of the various groups of colours. Speaking generally, the richness of brilliancy of tone is easily discernible by placing the sample to be tested side by side with another of well known excellence. In siennas, ochres and umbers the selection of crude material by which the richness of tone is assured is of great importance.

FINENESS OF GRINDING.—The method of testing the fineness of a pigment usually employed by the painter is to rub a little on the finger nail; but this is a crude and unreliable method. If the pigment is dry and it is desired to compare it for fineness with a similar pigment or white lead, the following is as good a plan as any:

Take two tall vertical glass jars, place in them an equal amount of turpentine, and then take a small quantity of the white lead to be tested. Place it in one jar, and an equal quantity of the pigment with which it is to be compared, in the other; thoroughly stir up both and then note the time it takes the samples to settle. If graduated marks are made on the two jars the observations will be taken more readily.

Another test is to weigh out equal quantities of the two leads, and then to take a very small quantity of the same colour, say black, and add to each sample, thoroughly mixing. The lead that is the lightest in colour will be the finest. The explanation of this is somewhat interesting. Suppose that we have a number of cubes of white lead each measuring one inch side. This will give us six superficial inches to be coloured. Now suppose that we break up these inch cubes into half inch cubes, which will give eight half inch cubes to each inch cube. Now as each half inch cube has six faces measuring half an inch by half an
inch, it has a superficial surface of three square inches; and as there are eight of the half inch cubes, there are twenty-four superficial inches to be coloured against six in the inch cubes. It will be seen, therefore, that by increasing the fineness of a pigment a greater surface is presented to be coloured, and hence more colour is required.

Another test for fineness is to paint different samples thinned in turpentine on plate glass; when dry the two specimens may be compared, and the difference of fineness between them will soon be apparent.

Still another test, and one frequently used by painters, is to place a quantity of the colour ground in oil that is to be tested upon a level surface such as a piece of glass, and to run the blade of a spatula or palette knife over it, and then over another sample with which it is to be compared, noticing carefully the difference in appearance of the two samples. By these means the presence of grit is discovered.

**Spreading Capacity or Covering Power.**—The spreading capacity of pigments and their "body" are very nearly related, although of two equal in body, one may possess greater covering power or spreading capacity than the other. A practical method of testing covering power is to mix a small quantity of a standard paint and an exactly similar quantity of the pigment to be tested, taking care to use precisely the same amount of oil and thinners in each case. Then taking a clean brush for each of the paints, paint a door, or other surface that has been primed, on two panels side by side, continuing to paint till all the pigment has been in each case used up. The one that goes farthest has the greater covering power.

In comparing the two it will be well to notice whether the body is equal to both cases, as one may go farther but not cover so well.
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Body.—The word "body," as applied to pigments, is almost synonymous with opaqueness. It is the most important property of a pigment, and it is because white lead possesses the quality in an eminent degree that it is so much valued.

Body is sometimes called "covering power," but this term is a little misleading, as some may suppose it to relate to the spreading capacity of the pigment.

If two different white leads ground in oil to an equal consistency be applied to different panels of a door, primed in the same manner, the one of the two leads that possesses the better body will be shown by it hiding the grain of the wood better. Some white leads, especially those that are manufactured by the new processes, lack this important quality of body, and three coats will only cover the work as well as about two of old process white lead.

There are numbers of methods of practically testing the "body" of pigments, among the simplest being the following.

Prime and paint a board with alternate black and white squares, like a chess- or draught-board. Take a sample of a pigment, similar to that to be tested, of which the body is known to be good, and paint a wide strip across the chess-board; then paint a smaller strip of the pigment to be tested. When both strips are dry, by comparing them one can tell almost at a glance which has the better body, the superior pigment covering or hiding the black squares better than the other. A second coat may afterward be applied to each over a portion of the strip, if desired.

It may be again mentioned that in all cases of practically testing paints the results are obtained by comparisons being made, and hence it is necessary in every case to have a standard with which to compare the sample to be tested as has already been explained.

The test of painting over squares of black and white may be varied by using stripes instead. The test
answers equally well for white lead, zinc, lithopone or any pigment of which the quality of body is of importance. In some colours it is of little moment.

**Tinting or Staining Strength.**—We have already explained at length how greatly the tinting strength of different colours or stains varies. Any painter can test the tinting strength of any colour himself in a very simple manner. All that is necessary is to have a pair of apothecaries' scales, some blotting paper, a palette knife, some pieces of glass or a flat piece of marble and some pieces of waxed paper. First weigh out say eighty grains of dry white lead or dry zinc. Any other white will answer equally well. Place these eighty grains on one side of the glass and the second eighty grains on the other. Now take the dry colour and weigh one grain and add that to one of the little piles of white, then weigh a grain of the standard colour and add that to the other pile. Next add to each pile a few drops of oil, taking care that the number of drops is the same in each case. With the palette knife thoroughly mix until no streaks can be seen and the mixture is perfectly uniform. Then by comparing the two the difference in tinting strength will at once be apparent. The same result would have been produced had ordinary white lead ground in oil been used instead of dry lead or zinc. If the colour is ground in oil a little difference in the method must be observed, the reason being that one colour might be ground much thinner than the other, in other words might contain much more oil than the other, and hence if equal weights of each were compared the result would be misleading. Take then each colour in oil—that is the standard and the colour with which it is to be compared—place on a small quantity of blotting paper and allow it to remain a few minutes so that the oil may be extracted. If it is thought necessary the sample can be washed with benzine, but for painters' purposes the extraction of the oil by means of blotting
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paper is sufficient for the purpose. The two samples having remained on the blotting paper for a short time one grain of each is weighed out separately on little pieces of wax paper, this being used so that the colour shall not stick to the scale. Then each grain is mixed separately with the white and the result compared as before. It is not too much to say that every painter should be prepared to make this test, because it informs him not only as to the tinting strength of the colour, but also gives valuable information as to the tone, etc. Of course the quantities may be varied if necessary, and a larger amount used instead of the single grains. It need hardly be pointed out that scrupulous cleanliness is necessary for successfully carrying out this test. The palette knife must be wiped between each operation and every care taken to do justice to both samples.

If the reader will turn to Plate I. in this work he will see a number of colours given in their full strength, and also when reduced with certain parts of white, as marked upon the sheets. The colours used in the preparation of this sheet were of excellent quality, and it will prove interesting no doubt to the student to mix the colour he has been in the habit of using in the same proportion with white, and to note whether the results come out above or below those shown by our samples.

THE PERMANENCE OF COLOURS.—It must be admitted that it is very disappointing to a painter to find, after taking pains to produce the exact colour required, that it "flies" or fades after a little exposure to the weather. The tests for the permanence of a colour when exposed to light are simple enough, and are to mix a little of the colours to be tested in oil and to spread them on different slips of paper, cut the paper in half, number each half with corresponding figures or letters, expose one half to a strong light for as long as may be deemed desirable and put the other half away
into a safe place where the light does not penetrate. Wax paper is the best, as it will not absorb the thinners or, better still, glass may be used, this being cut across with a diamond after the paint has been applied. It need hardly be said that the permanence of water colours is entirely different from that of oil colours. Some very useful experiments were made several years ago by Captain Abney on the permanence of water colours, and these were published in the form of a blue book. In the lists of colours which are given in the preceding chapters, the quality of permanence or non-permanence under various conditions is given in each case.

COLOURS FAST TO LIGHT.

Some colours fly or fade very quickly, while others are perfectly permanent. In the lists of mixtures under the head of "Reds," "Blues," etc., in this book, will be found a list of all the colours on the market and a note is made in each case whether the colour is permanent when exposed to light or not.

The method of ascertaining whether a pigment is fast to light is recommended by George H. Hurst in his admirable book, "Painters’ Colours, Oil and Varnishes," and is as follows.

Probably the simplest method (which is a very good one) of testing the durability of colours, is to provide a sheet of unglazed cardboard; that known as Bristol board will do very well. It must have so slight an absorbent property that if any coat of paint is placed on the surface it will remain there, and not soak into the substance of the cardboard. This sheet of board is ruled into squares or rectangles measuring about 3 in. by 3 in., or 2 in. by 2 in.

A little of the colour to be tested is ground up with a little gum water into a smooth paste, and a portion of one of the ruled spaces on the cardboard painted with it. It is advisable to rule and prepare two
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sheets at the same time. The name of the colour can be written either underneath the patch of colour in the square, or in a corresponding position on the back of the card. It is also advisable to grind a little of the pigment with oil, so that the relative durability as a water colour and as an oil colour can be tested.

One of the prepared cards is hung in a place where it is exposed to as much sunlight and air as possible, while the other card is placed in a drawer away from any such influence. After a week or two of exposure the cards can be compared to see if any changes have occurred; they can then be replaced in their respective positions, and from time to time compared together. Any change which may have been brought about by the action of sunlight and air on the exposed card will be observable; some colours will be changed in a few weeks' exposure, other colours require months of exposure to produce any effect.

By placing a card painted in the manner described, with different pigments in a closed cupboard, in which is placed a vessel containing some ferrous sulphide and diluted sulphuric acid, the action of sulphuretted hydrogen on the colours can be tested; if any are affected by this test it is certain that they will be similarly affected when exposed to the action of impure air.

We may now take each colour separately, following the order taken by the late Mr. W. C. Wilson, who arranged the above quoted table in conjunction with the author.

Chrome Green.—This colour is often made by the addition of a base such as barytes, but the presence of this material is not necessary. A number of different shades of chrome green are sold, usually designated pale, mid (middle or medium) and deep. The tinting strength should be tested by mixing one part of green to, say, a hundred parts of white lead or zinc, as explained elsewhere, or twenty-five parts of
lead may be used to one part of green. If it is desired to find out the relative strength for tinting purposes of the green, it can be done very simply in the following manner, but the painter must have a pair of apothecaries’ scales, in order to weigh the different quantities. Take first the same quantity of the green which is being tested as that of the standard. If the colour is not so deep add more green each time, and more and more until the two samples are exactly the same tint. By comparing the weights the experimenter will have accurately the relative value of the two greens for colouring purposes. The test for body of the green is performed in almost exactly the same way as that already described for white lead. Prime a board thoroughly so that there may be no absorption, paint across the centre of it a stripe of white and by its side a stripe of black. When this is thoroughly dry take the two greens; that is, the standard and the one being tested. Then mix both with exactly the same amount of oil and turpentine. Take a clean brush for each and paint over the black and white stripes. The one which has the greatest body will, of course, hide the stripes better than the other one. The experiment is simple, and is very useful as a body tint.

**Bronze Green.**—This colour is usually mixed by the painter and not bought ready made, although all manufacturers make bronze greens. Quaker green is practically the same thing. The mixture usually employed is ochre, lamp black and a little yellow. The chrome should be either yellow or orange, but not lemon. Bronze greens may be made in a large variety by varying the quantities of the colours mixed and by introducing sienna, umber or Indian red in small quantities as may be required. The colour is very rich, and many cheap bronze greens consist of a considerable quantity of adulteration.

**Emerald Green.**—This is a very brilliant green almost identical with spectrum green. It is
sometimes used where brightness is required. When ground in oil the test for purity is to dissolve it with benzine and when the dry powder is obtained to treat it with strong ammonia. It will thus entirely dissolve if pure, giving a deep blue colour.

**Venetian, Indian and Tuscan Reds, Etc.—**

These colours may be classed as the iron colours, consisting largely of oxide of iron. It should be remembered that ochres and umbers also receive their colouring from iron. Analysis gives but little information concerning the value of this group of colours. They form economical paints, especially as they spread well. The proportion of oxide of iron contained is often considered to be an indication of quality, but this refers particularly to cases where paint is to be used on iron. The tests of value to the painter are body and fineness of grinding, which may be tested in the usual way. Oxide paints are usually sold as such in three shades. A Venetian red is lighter than an Indian red, which, in comparison, should have a purplish tint. It must be remembered in this class of colours that a comparison of the same shades must be made if any useful result is to be obtained.

**Tuscan Red** is a mixture of Indian red with some sort of lake colour in order to secure brilliancy. This brilliancy forms an important feature of the test. Body should also be ascertained, and fineness of grinding is also important. A Tuscan red, which is coarse, may lose its richness when ground fine.

**Indian Red.**—This is shown by analysis to consist almost wholly of oxide of iron. The paler Indian red is, the greater is its tinting strength, and the rosier is the tint obtained from it by mixing it with white. Indian red should be always tested for fineness and tint.

**Vermilion and Vermilionettes.**—Many of the imitation vermilions consist of orange red, that is, a superior red lead coloured with eosine, which is the
name of one of the coal tar colours. Speaking generally, the scarlet colours are more permanent than those having a crimson tinge. It is important to know that the tinting strength for many vermilionettes is no indication of their quality, or rather, perhaps it should be said that within reasonable limits the better stainers they are, the worse colours they will prove to be. This is because barytes or some other mineral may be substituted for the orange red and then the eosine will go farther in staining.

**Red Lead.**—Every painter knows that the great objection to the use of red lead is that it will harden quickly. We recommend that on large jobs arrangements should be made with a manufacturer to supply a sufficient quantity for two or three days. It should be well ground to a thin paste in the proportion of, say, about one pound of oil to five pounds of red lead. The usual manner of painting iron, etc., in red lead is to first give a priming coat of pure lead and then a second coat of any colour desired. An excellent second coat is formed of equal parts by weight of red lead and good iron oxide. Any finishing coat may be applied.

**Chromes.**

There are many shades of chrome yellows sold, the most usual being lemon, medium and orange chromes, sometimes called 1, 2, and 3. The other shades are sold under various names, depending upon the manufacturer. It is advisable that the painter should always have on hand the lighter shades, as although it might appear at first sight that on mixing the deeper shades with white he would get the same result, as a matter of fact there is a considerable difference. As noted elsewhere, chromes must not be mixed with ultramarine. The pale chromes change colour quicker than the darker shades. Pale chrome should never be used on fresh plaster, although orange chromes may. In the deeper shades of chrome orange
red is sometimes used as an admixture or adulterant, but this is not a good stainer. The test for a chrome is tinting strength, taking care to make a comparison with the same grade of colours, that is, light, medium or orange chrome. Fineness is another important test. Placing a small quantity on glass and passing a palette knife over it and pressing firmly will detect grit if present. In the lighter chromes it is well to look for the greyness of tone which is objectionable. Chromes mix well with white lead and are strong in body.

OCHRES.—Analysis is of no value in determining the value of an ochre. Sometimes chrome yellow is used to tone it up. The colour is an important feature, as is also the fineness.

BLACKS

There are a number of blacks on the market, drop black, ivory black, blue black, vegetable black, carbon black, etc. The subject of their tests is a somewhat intricate one, but its tinting strength can be readily ascertained by mixing with white lead or zinc in the manner already described. They are frequently adulterated with barytes.

BLUES.

Prussian blue must be very finely ground or it is likely to settle out. A pure Prussian blue has a rich bronze appearance when looked at from certain points of view. The tint made by mixing with white should be clear and free from any leaden or gray appearance. Some Prussian blues have a certain red or purplish cast which cannot be removed. These should be avoided, as if a purple is required it is a simple matter to add a little red to the blue to produce the desired colours. One part in a hundred of good Prussian blue gives a distinct sky blue.

ULTRAMARINE.—As explained elsewhere, this colour cannot be mixed with white lead. Where it
is necessary to make a tint, zinc white should be employed in preference.

Umbers and Siennas.

The colour should be a rich brown rather than a red cast. In siennas prepared for grainers’ use, it is important that they be transparent rather than opaque. Richness and quality of tint should be considered rather than the body.

Those who are interested in testing colours are advised to purchase "Simple Methods for Testing Painters’ Materials," by A. C. Wright, M.A., B.Sc. The price is 5s., and the publishers are Messrs. Scott, Greenwood and Son, 19, Ludgate Hill, London, E.C. It is a thoroughly reliable work which gives simple tests for all the principal materials used by the painter.
CHAPTER XXIII.

NOTES ON COLOUR HARMONY.

Perhaps the most difficult subject with which the decorator has to deal is that of colour harmony. In other words, how to use different colours in decoration in such a manner as to produce a perfectly harmonious and pleasing result. The subject is a difficult and comprehensive one, and it would be impossible within the limits of this book to do justice to it. A few general hints, however, will no doubt be of service.

It should be first recognised that there are distinct rules and laws regulating harmony in colour. Just as some people have an ear quick to recognise the slightest discord, so some are fortunate enough to possess an inherent talent for recognising colour harmony. It is to be feared that while the musical ear, so to speak, is fairly common, the ability to harmonise colours is much rarer. Speaking generally, ladies have more natural talent in matters concerning colour than men have. Possibly the reason is that they are called upon more frequently to choose and determine upon matters relating to colour in connection with their dress. It is true that if one is inclined to be satirical one might suggest that some ladies, judging by the extraordinary combination of colours they wear, must be colour blind.

It has been proved by statistics that one person in ten is colour blind, but this does not mean wholly devoid of the ability to distinguish one colour from
another, but simply that there are certain colours which the person who is colour blind cannot distinguish from others.

In almost everyday work the painter is called upon to mix colours that shall harmonise, as, for instance, to paint the woodwork of a room in colours that will harmonise with the wall-paper.

Matching the Wall-paper. — The simplest plan, and therefore the one which is usually followed, is to take the prevailing colour of the wall and to use it, usually much lightened, or, the woodwork. Other colours which occur in the paper may be introduced as may be thought to be judicious. For example, if the room is a bed-chamber and the paper has a cream ground with a floral pattern printed in green with a pink flower, the stiles and rails of the doors might be painted a light green, the panels cream, and the mouldings, or a portion of them, pink. The same plan may be followed successfully with many papers, but on the other hand much more pleasing and artistic results may often be obtained by using a distinct, but harmonising contrast. A single example will suffice. The writer has before him a striped wallpaper, printed in brilliant sealing-wax red, which might cause wonderment in the eyes of a novice as to how it could possibly be used successfully in an ordinary room. The excessive brilliancy might at first sight appear to be certain to produce an effect too glaring to make a comfortable living-room. Yet such a paper used in a room very soberly furnished say, with old dark oak, ebony or black walnut, would look very handsome, or in a more modern room the doors, skirting, in fact the whole of the woodwork, might be finished in white enamel, and the effect would also be very good.

Contrasting Harmonies. — From this single example it can readily be seen that contrasting colours often give the very best results. A wall painted green
may look very monotonous, but if a frieze, having some bright red used liberally in it, is used in conjunction, there will be a vast difference in the appearance of the apartment.

The following suggestions for different colour schemes are by Mr. William Fourniss.

**SUGGESTIONS FOR COLOUR SCHEMES.**

**For a Red Wall.**—Red may graduate from Indian red to what would practically be a warm gray. Any colour going with a selected tone or tint needs to be modified so as to harmonise with it. If a wall has a paper coloured in light red and gold, and it is desirable that the woodwork should be red too, it must differ from the colour of the wall in tone and in intensity.

A Crimson Wall may have amber woodwork with cream coloured mouldings, or they may be heliotrope for contrast, or the woodwork may be white.

A Scarlet Wall may have light snuff brown, or a sage green, for the woodwork, with yellow green mouldings, or they may be white.

A Yellow Red Wall, in which scarlet has been tempered with an excess of chrome, will bear a raw umber tone of brown for the woodwork, with ivory or white mouldings.

A Pink Toned Wall.—With this the woodwork may be a yellowish green, with or without straw coloured mouldings, or two shades of citrine, with pearl grey for contrast in the mouldings.

For a Dark Red, inclining to purple, the woodwork may be a sage or myrtle green, with amber mouldings.

A Poppy Red.—Grey green, lavender and black may be used for this.

All warm tones and shades of green or gray may be used with red, provided they get their hues by contrast with the red. Any blue associated with red must be slatey or purple in tone. If the colour of a
wall-paper is heliotrope, inclined to red, the woodwork may be cream. If the heliotrope inclines to yellow, straw colour should be adopted.

**Blue.**

A Blue Wall of a Purple Tone.—With this yellowish orange, amber, salmon pink or terra cotta will harmonise according to the "value" of the wall colour.

A Peacock Tone of Blue Wall.—This calls for orange red, deep amber, warm brown, cool brown, or both.

A Sapphire Blue Wall.—Chocolate woodwork in two tones, with amber mouldings. Pearl grey and cream will go with this colour.

A Wall of an Ultramarine Tone.—Light warm grey and cool yellow brown go happily with this.

A Neutral Blue Wall will unite with citrine and chocolate, or a warm grey green, or a blue green grey, and salmon.

A Slate Coloured Wall of a Blue Tone.—For this there is plum colour and lavender, puce and orange to choose from.

**Yellow.**

This colour ranges from a rich sienna to a lemon tone; from citrine to a cream.

A Yellow Wall.—Plum colour, slate, brown, or citrine may be used with this.

A Gold Coloured Wall.—The woodwork may be in two tones of lavender, with citrine mouldings.

An Orange Coloured Wall.—The colour for the wood may be a purple tone of red, with maroon mouldings, or if light mouldings be required, citrine would serve.

A Canary Coloured Wall.—Vellum colour, with deep ivory mouldings, may be adopted for the woodwork.

A Deep Terra Cotta Wall.—A selection from buff, sage green, Indian red, vermilion, white and black
either or any, may be selected, the strong colours in the small parts.

A Primrose Tone of Wall.—Tones of snuff brown, medium yellow green, and lavender may be selected.

A Neutral or Drab Wall.—Shades of olive green, Venetian red, and lilac go well together.

Brown.

This colour is perhaps the best wearing colour for woodwork. There are infinite tints and shades, from sober to rich, from cool to warm. Blue agrees especially with brown.

Deep brown, light blue, and gold go well together.

Light Purple Tone of Brown Wall.—The woodwork may be yellow red, with cream mouldings.

A Brown Ingrain Wall.—The woodwork may be in two tones, made from indigo blue, with amber mouldings.

A Gold Coloured Brown Wall would unite with woodwork of a red tone of purple, with plum coloured mouldings, or a warm grey may be used.

Burnt Sienna Brown Tone of Wall.—With this, salmon and myrtle harmonise.

Green.

This colour, so extensive in Nature, will agree with all colours, provided they are toned to suit each other, warm or cold, neutral or bright, etc.

An Olive Green Wall will agree with maroon woodwork with a crimson lake, straw or pink tone for the mouldings.

A Medium Green Coloured Wall.—If two tones of red, a crimson tone and a yellow tone be adopted, the mouldings, if desired, may be a salmon buff.

A Grey Green Wall may have a primrose tone of woodwork, with a scarlet tone for mouldings.
A Moss Green Tone of Wall will associate well with citrine woodwork, and salmon coloured panels or mouldings.

A Pea or Leaf Green Wall goes well with a chocolate and a lavender.

Grey.

This neutral colour agrees with and helps every other colour.

A Warm Gray Wall.—With this the woodwork may well be a tawny leather colour, with either buff or cream in the mouldings. A quiet red would also suit.

A Silver Grey Wall sympathises with a salmon colour, as well as with a deep blue. Should there be blue and red in the pattern on the paper, the styles of the woodwork could then be a delicate raw umber tone of brown. The mouldings the same brown, with burnt sienna added to it. The panel may be a cameo pink. A snuff coloured brown would also come well.

A Drab Tone of Wall, having an ornament upon it, low in tone, a citrine for instance, would need some force in the woodwork. A rich burnt sienna brown suggests itself for this, with a reddish brown for the mouldings.

Of course, these schemes of colour can be reversed. Should the general tone of the wall-paper be that tone suggested here for the woodwork, it takes then the colour of the paper.

Colour Combinations for Doors.

Excellent results may be obtained in painting front and other doors in rich contrasting colours or in self-colours, i.e., a dark colour for the frame of the door and a tint of the same colour for the panels.

The following combinations are recommended as producing very good effects. They were carried out
NOTES ON COLOUR HARMONY.

in doors prepared by Messrs. Lewis Berger and Co., Ltd., for some of the conventions of Master House Painters and Decorators.

<table>
<thead>
<tr>
<th>FRAME</th>
<th>MOULDING</th>
<th>PANEL</th>
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<tbody>
<tr>
<td>Vienna Lake and Pompeian Red</td>
<td>Maroon Brown and Black.</td>
<td>Coronation Red.</td>
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<tr>
<td>Verona Blue.</td>
<td>Coronation Brown.</td>
<td>Pompeian Red and White</td>
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<tr>
<td>Purple</td>
<td>Maroon Brown.</td>
<td>Emerald Tint W.</td>
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<tr>
<td>Verona Blue.</td>
<td>Verona Blue (reduced).</td>
<td>Verona Blue (further reduced).</td>
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CHAPTER XXIV.

THE PROPORTIONS OF MATERIALS, NOTES, ETC.

A little consideration will make it quite clear that it is impossible to give exact proportions of materials necessary to produce a paint that will suit every job. These proportions are determined by the condition of the work. A new door of good sound pine will be treated differently to one made of an inferior wood, which is knotty and somewhat sappy. Again, a door that has been exposed to the weather for some years, and from which the paint has, perhaps, almost wholly departed, will require a different mixture to a front door from which the accumulation of old paint, extending perhaps, to over one hundred years, has been burnt off. Precisely in the same way as patent medicines cannot be safely used for any and every complaint, so it is impossible to have paints that will suit any and every purpose. In one case the doctor is consulted and he takes into consideration every symptom and every condition and acts upon his diagnosis or scrutiny of symptoms. In like manner the decorator takes note of every condition of his work, and prepares his paint accordingly. Again, iron would not be painted with the same mixture as wood. Still, if we cannot give exact proportions, we can, at least, give some information on the subject, which will form a guide and give some data for the reader to work upon. These we will give under separate heads.
PRIMING FOR IRON.—The usual plan is to use red lead mixed with linseed oil, the proportion required being about fourteen pounds of linseed oil to every hundredweight of lead. The second coat should be equal proportions of red and white lead mixed to a proper consistency with linseed oil. Sometimes oxide of iron paint is used instead of red lead.

PAINTING ON STUCCO.—The priming must contain a considerable quantity of oil because of the absorbent nature of the stucco, and it should have a big proportion also of turpentine. Four gallons of boiled oil to a hundredweight of red lead and three quarts of turpentine will usually answer. The second coat should be an equal mixture of red and white lead with a smaller proportion of turpentine and oil.

PRIMING FOR DEAL OR PINE (INSIDE).—With white lead use three-quarter ounces of driers and the same quantity of red lead to every pound of lead. Thin with three-quarter gallon of raw linseed oil to 14 lb. of lead.

SECOND COAT (INSIDE).—Use about half an ounce of driers and one ounce of red lead to every pound of white lead; 14 lb. of lead will require half gallon raw linseed oil and quarter gallon turpentine.

SECOND COAT (OUTSIDE).—Use about one ounce of patent driers to every pound of white lead, with the addition of about the same quantity of red lead.

THIRD COAT.—Use to 14 lb. of lead, quarter gallon each of raw linseed oil and turpentine and quarter pound driers.

TABLE OF MATERIALS REQUIRED.

The following table is extracted from a more elaborate one to be found in the "Painters' Pocket Book," by Peter Matthews, published at 3s. nett by John Heywood, Ltd., Deansgate, Manchester.

On absorbent surface, such as new plaster and stone. Based on the assumption that 10 lb. of white
lead mixed with driers and thinners will cover 40 square yards.

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Table: When 10 lb. of white lead with driers and thinners will cover 60 square yards (as on old painted work, or after second coat on new work).

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Eggshell Gloss.—To every pound of white lead add quarter of an ounce of copal varnish and to same quantity of gold size with half the quantity of boiled oil. These will serve the purpose of binding the materials together and causing them to dry. The thinners should consist of turpentine used in the proportion of about three-quarters of a pint to every 7 lb. of white lead.

Oxide of Zinc.—In mixing oxide of zinc it is necessary, as already mentioned, to use a special drier free from lead. Special zinc driers may be purchased ready made. They consist for the most part of borate of manganese.

Outside Woodwork.—To every hundredweight (112 lb.) of zinc oxide ground in oil as usually supplied use 19 lb. of refined boiled linseed oil, 5½ lb. of turpentine, and 5 lb. of zinc driers. A smaller quantity of driers will frequently suffice.
PROPORTIONS OF MATERIALS.

INSIDE WOODWORK.—Use rather more refined boiled oil and a little more driers. These mixtures may be employed in varying proportions of oil and driers on stone, plaster and iron, and the quantity of turpentine will rarely require to be changed.

PIGMENTS.

SOME USEFUL TABLES.

PIGMENTS LIABLE TO CHANGE UNDER THE INFLUENCE OF SULPHURETTED HYDROGEN, AIR, AND MOISTURE:

Yellow.—Chrome yellow, mineral yellow, Naples yellow.
White.—Chremnitz white, flake white, pearl white.
Red.—Red lead, purple red, iodine scarlet.
Green.—Verdigris, Scheele’s green, emerald green mountain green.
Blue.—Prussian blue, Antwerp blue.
Orange.—Orange chrome.

PIGMENTS LITTLE LIABLE TO CHANGE UNDER THE INFLUENCE OF SULPHURETTED HYDROGEN, AIR AND MOISTURE:

White.—Zinc white, constant white, tin white.
Red.—Vermilion, red ochre, Indian red, madder lakes.
Yellow.—Yellow ochre, barium chromate, zinc chromate, aureolin, raw sienna.
Green.—Chrome green, cobalt green.
Blue.—Ultramarine, smalt, Thenard’s blue.
Brown.—Vandyke brown, raw umber, burnt umber, manganese brown, sepia.
Black.—Ivory black, lamp black, Indian ink, graphite.
Orange.—Orange vermilion, burnt sienna.
PAINT AND COLOUR MIXING.

Pigments Liable to Deterioration when in Contact with White Lead, Chrome or other Lead Pigment:

Yellow.—Yellow orpiment, king's yellow, Indian yellow, gamboge.
Red.—Iodine scarlet, cochineal, carmine.
Orange.—Golden antimony sulphide, orange orpiment.
Green.—Sap green.
Blue.—Ultramarine.

Pigments which are Little Affected by Heat, and which may be Employed when the Material has to Stand Fire:

White.—Tin white, barium white, zinc white.
Red.—Red ochre, Venetian red, Indian red.
Yellow.—Naples yellow, antimony yellow.
Blue.—Smalt and royal blue, ultramarine.
Green.—Chrome green, cobalt green.
Orange.—Burnt sienna, burnt ochre.
Brown.—Burnt umber, manganese brown.
Black.—Graphite, mineral black.

Colours that may be Used with Lime:
White.—Permanent white, i.e., baryta white, gypsum, zinc white.
Red.—The vermilions, light red, Venetian red, Indian red, madder lakes.
Orange.—Cadmium, orange chrome, Mars orange, burnt sienna, burnt Roman ochre, light red.
Yellow.—Aureolin, cadmium yellow, lemon yellow, Naples yellow, Mars' yellow, raw sienna, yellow ochre, Roman ochre, transparent gold ochre, brown ochre, Indian yellow, Oxford ochre.
Green.—Oxide of chromium, transparent oxide of chromium, viridian, emerald green, malachite green, verdigris, terra verte, cobalt green, chrome green.
PROPORTIONS OF MATERIALS. 223

Blue.—Genuine ultramarine, artificial ultramarine, new blue, permanent blue, cobalt blue, cerulean blue, smalt.

Purple.—Purple madder, Mars' violet.

Brown.—Bone brown, bistre, Prussian brown, burnt umber, Vienna brown, Vandyke brown, Cologne earth, asphaltum, Cassel earth, manganese brown.

Citrine.—Raw umber, Mars' brown.

Blacks.—Ivory black, lamp black, blue black, charcoal black, cork black, Indian ink, black lead, drop black, plumbago.

Brushes.—We include here some information concerning brushes, but may first give a brief description of the way in which they are made, taking the firm of G. B. Kent and Sons, Ltd., as an example, as the author had the pleasure of going over their factory some time since. The following is his account written for the Decorator's Magazine.

A superficial observer may be inclined to think there is no particular advantage to the painter and decorator in possessing a knowledge as to how the tools he uses are made. Yet such a knowledge may help him considerably in judging as to the quality of those tools, and it will be at once acknowledged that an ability to discriminate in this respect is of considerable value. For brushes vary greatly in quality, far more so, perhaps, than our readers may imagine possible. Everyone knows that there are good brushes that cost more than a trifle, and rubbishy goods, chiefly of foreign make, that can be bought for, perhaps, half the amount. Probably there is not a reader who does not fully understand that it is far better in the end to buy the best quality brushes, that is, that it is cheaper to pay a higher price, because the work with such brushes can be done quicker and better than it can by the inferior ones, and also because the superior quality lasts much longer. Those things are well understood.
among most painters, and even if some of them will use cheap stainers and lose money in consequence, they have, at least, learned a lesson of the necessity of using only best quality tools.

But it is not a comparison between high grade and low grade brushes that we now want to make, it is rather to direct attention to the difference that exists in the actual quality of so-called first class tools of different makes. It is this difference that can best be understood after inspecting the process of brush-making, and it must be acknowledged that adulteration can be carried on in the manufacture of brushes to a considerable extent. Take a common ground brush as an example. The actual brush part should consist wholly of hog’s bristles, for there is nothing yet discovered that gives better results. Yet there are on the market many brushes marked “pure bristle,” which really contain more or less a large proportion of horsehair or other material which makes a poor substitute, but which cannot be easily detected, in fact, it is the difficulty of detection which has probably given rise to the objectionable adulteration referred to.

The objection to horsehair in a painter’s brush is that it is flabby and without spring, but its presence in adulterating brushes can be understood when it is said that approximately the price of horsehair is 1s. 9d. to 2s. 2d., and bristles 8s. to 9s. per pound. It certainly requires an expert to state positively whether horsehair is included or not, but there are certain signs that with care, will determine the matter, at least to a certain extent. The real bristle has its end split—called a “flag” end—the root end is considerably larger and cannot be mistaken. The spring or elasticity is another indication of the bristle. The horsehair, on the other hand, is the same both ends, and has no flag end; if the suspected bristles be viewed under a strong reading glass the difference can be told without a great deal of difficulty.
At the works of Messrs. G. B. Kent and Sons, Ltd., the author was shown how suspected brushes sent out had been dissected and the various parts divided up, and it was surprising to see how much horsehair could be included in a brush without giving it any out-of-the-way appearance. There were little piles of horsehair of different lengths, while the bristles were all sorted into other piles, each of different lengths. Photographs of the brushes that have been dissected in this way proved of use in showing painters that adulteration in brushes is carried on to almost as great an extent as it is in paint materials. No adulteration whatever in painting brushes is permitted in the standard quality of G. B. Kent and Sons, Ltd.

Certainly the brush department in any brush manufactory which is of the most importance is the bristle room, and it was to this that the author was first taken. There were bristles of many different kinds, most of them tied up into neat bundles ready to be afterwards dealt with. For instance, Siberian Okatka, and perhaps most important to my readers because they make the best paint brushes, having an excellent spring and being stiff. They are very costly, and are rarely used by themselves, nor is it necessary because other varieties of bristles may be mixed in, and it is this mixing or blending that constitutes so important a part in the brush manufacturer's art. Indeed, the purchase and blending take years of careful study to learn. One class of bristle is introduced into the mixing to give strength, another straightness, another solidity, another colour, and it is the judicious blending, the knowledge of which is acquired only by much experience, which makes a first class brush for first class work, and having the requisite spring and durability and the band of which will not burst.

The process of dividing the bristles into uniform lengths is termed "dragging," a very interesting process.
which requires considerable expertness on the part of the operator. A handful of bristles, after being mixed, is placed against a gauge, and the operator, grasping firmly those bristles which project beyond a mark which indicates the required length, withdraws them with his thumb and finger and places them aside. The whole bundle having been gone over in this way, a second dragging to the next mark is made, and so on until the bristles are arranged in little piles of uniform lengths.

The operation of "mixing" is also interesting. This is done in order to obtain a uniform colour and quality in the bristles. First, all the bristles of different colours are piled on the top of one another, varying considerably in colour in the different layers, from top to bottom. Perhaps there will be one layer nearly white and another nearly black. If these were all mixed up indiscriminately to make a brush, the result would be a very patchy appearance that would not be liked. The object, therefore, is to have an equal admixture of black and white throughout. A workman takes in his hand a portion of the bristles from top to bottom, cutting through all at once. These he holds in his two hands and "jab"—for the want of a better word—through a steel comb which is fixed upright before him. This mixes the different coloured bristles and at the same time pulls out inferior or woolly parts that may have been left in. As each handful of bristles is dressed in this way it is laid aside, and when the whole is completed, the second dressing is gone through in the same way as the first, the result being that the admixture is perfect, and the appearance of any one part of the pile is exactly the same as that of the other. It is essential also that all the bristles should lie the same way, and, as in the rough an uncertain small proportion of the bristles arrive with their heads the wrong way, to extract them, another small comb, termed an "engine," with
teeth very close together, is used; the "flag" end of
the handful is combed over this, and the roots of the
"turned" hairs catch in the comb.

It will be unnecessary to describe in detail how
every brush is made, but an ordinary ground brush
will serve as an example. The actual manufacture is
not difficult. First, the bristles are carefully weighed
out so that every brush of the same grade has exactly
the same quantity of bristle in it as a corresponding
brush; great care being taken not to disturb the way
in which the bristles lie. They must all point one
way, and naturally they have a certain bend. The
outside of the brush is usually made of white bristles,
while the inside is grey and yellow. This is almost a
universal rule, for although the inside bristles are of
equal spring to those outside, still trade demands
white bristles outside and has them. The reader
will understand that the bristles that are to form the
ground brush about to be made are lying on the scale,
these having been weighed they are taken off, the white
bristles being underneath, so as to form the outside of
the brush. The workman takes all the bristles care-
fully, but firmly, in both hands, and turns the bristle
round his thumb in such a way that the bend of the
bristles all turn inward towards the centre, and the
white bristles or "cappings" lie in an even rim round
the rest, and the "knot" is then tied round with
string. The knots are then dipped in hot cement
and kept warm, standing upon a hot plate.

The next process is "driving," which consists in
forcing the handle through the bristles, which has been
previously inserted in its binding, and this tightens
the brush by compression.

Varnish brushes, as a rule, are shaped in a manner
somewhat similar to the method of making artists'
pencils, that is to say, the wedge shape is produced by
placing the bristles into a small circular box, the
bottom of which is concave. Hence, it will be seen
that the bristles, if even they are all of the same length have the necessary chisel edge for a varnish brush. After the brush is made, the bristles are thoroughly scoured on a stone with soap and water. After the brush is finished, the bleaching chambers are reached where, by means of sulphurous fumes, the bristles are bleached to the required degree of whiteness.

The Care of Brushes.—However good a brush may be it will soon be ruined unless it is properly treated when out of use. The following hints will suffice as a guide in this respect:

Writing Pencils, etc.—Wash in turpentine until quite clean, and if they are not to be used for some time, dip in olive oil and smooth from heel to point.

Stipplers.—Wash thoroughly in pure soap and hot water, rinsing with cold water. Place point downward to dry.

Varnish Brushes.—The best method of keeping varnish brushes, in the opinion of the author, is to suspend them in the same description of varnish as that they are used for. As this is not always possible, boiled oil may be used instead.

Paint Brushes.—Mr. Ernest N. Kent gives the following instructions in "Specifications":

Brushes made for Use in Colour should first be soaked well in water to swell the bristle in the binding. This applies also to whitewash brushes which are bound either by wire or leather.

A Brush after use should be thoroughly cleansed out in turps or soap and water. If left in water any length of time they are liable to twist, and the bristles lose their elasticity.

A Brush made for Paint should not be used in varnish, the spirit of which dissolves the cement with which it is set, and loosens the bristles. When a ground brush has been well worn down in colour, it may, however, be used in varnish.
**PROPORTIONS OF MATERIALS.**

Varnish Brushes when not in use should be suspended in either varnish or oil, the brush not resting on the bristles. No brushes should on any account be kept in turpentine.

Stippling Brushes should be well cleansed and dried after use, the bristle being carefully kept from crushing; a box in which they can be slid, allowing the bristle to hang downwards is recommended.

Should a Brush become quite hard with Paint it should be soaked for twenty-four hours in raw linseed oil, after which time in hot turpentine.

The Tintometer.—Many attempts have been made to devise an instrument by which records of colours can be registered with accuracy. The nearest approach to success in this direction is the tintometer, which is described as an instrument for the analysis of accurate measuring and recording of all colours. It is an invention of Mr. J. W. Lovibond, of Salisbury, and is largely used not only by colour and dye manufacturers, but in many other industries. By its use a colour manufacturer can dispense with keeping a sample of every colour he makes. Provided that the customer possesses a Tintometer, and the colour manufacturer one also, it is the simplest matter for an order to be sent simply by numbers which will ensure complete accuracy of shades. The instrument consists of a double tube, ending in an eye-piece at one end, and in equal apertures for viewing the colour to be measured, and the glasses which are used as measures at the other end. These glasses are coloured in various degrees of intensity, and in even gradations ranging from almost white to strong colours in red, yellow and blue respectively. In the whole 465 coloured glasses are supplied with the instrument, but it is so very rare indeed that so large a number is required, and, as a rule forty or fifty glasses or even many less will answer all purposes. It will be understood that the colour which is to be measured or
recorded is placed on one side of the double tube, on the other side is put one, two or three glasses which are changed until a perfect match is obtained. A note of the numbers of the glasses thus records the matched colour. The instrument is a great success, and permits of the colour analysis of pigments.

Fig. 38 shows the arrangement for measuring colour in opaque objects. The optical instrument B fits into the shoe at A, the bottom of which is commanded by both tubes of one instrument. Under one side at F is placed the opaque substance to be measured, and under the other the standard white, for reflecting the beam of white light, which is then dissected at J by the suitable standard glasses, as already described for transparent colours.

Coloured Oil Varnishes.—Spirit varnishes made in various colours are familiar enough to decorators, but they are not very durable. A series of coloured oil varnishes are manufactured by Messrs. Lefranc and Cie., of Paris (London office, 27, Fetter Lane, E.C.), which are very useful for various purposes. For example, they may be used on such woods as bird's eye maple, chestnut, etc., with excellent effect, as the beautiful lights in the wood show up to advantage through the varnish. They are also used for glazing.
especially the red colour, which on a ground of bright coloured oxide, shows up well and does away with the necessity for using fugitive crimson lake.

**Oxides.**—The oxide of iron paints which are so useful and economical for the use of house painters depend to some extent for their durability upon the proportion of ferric oxide which they contain. Even more important is the fineness of the pigment and the colour or tone. The writer has examined some Indian reds and a special Turkey red made by the Derby-Oxide and Colour Co., Ltd., Rugeley, Staffs, which may be taken as typical oxides of a high quality.
DESCRIPTION OF COLOURED PLATES.

PLATE I.

The only really sound objection to the use of high grade ‘‘prepared’’ paints by the decorator has been the undoubted fact that no prepared paint can possibly be equally suitable—as it comes from the can—for all surfaces, all conditions and all coats.

Paint should be amenable to the manipulation of the craftsman to suit the needs of his job. The attractive range of colours on Plate I shows ‘‘M.P.P.’’ (Master Painters’ Paint), a material that embodies all the good points of the highest grade of prepared decorators’ paint, with none of its drawbacks.

‘‘M.P.P.’’ is a semi-paste paint in 7lb. and 14lb. tins, and is guaranteed ‘‘Genuine Lead, Pure Zinc Oxide, Refined Linseed Oil, Genuine American Turpentine, necessary colouring matter and Drier.’’ It is ready for the painter to thin down as the job requires. Nothing need be added but turpentine for first coat, and linseed oil for finishing coats. It is, therefore, adaptable to all surfaces and conditions—undercoat or finishing work.

It is made in a range of standardised colours, which are easily reducible with white to match any desired shade. Plate I. shows graphically what colours the painter will get by mixing the ‘‘M.P.P.’’ stock colours with varying proportions of white. It is obvious that with such a material the painter can effect considerable reduction in the stock carried—without in the least reducing his ability to give clients exactly what they want.

The colours shewn on Plate I are painted out on paper from the actual paint—both stock colours and reductions.
DESCRIPTION OF COLOURED PLATES. 233

PLATE II.

This Plate illustrates a selection of colours, of "Combinol" flat oil paint, manufactured by Messrs. Goodlass, Wall & Co., Ltd., of 42, Seel Street, Liverpool. The colours shewn are very pleasing, and many others are made. The manufacturers claim that this material will cover upon a reasonably good surface 95 square yards per gallon. It dries with a smooth, matt finish; is admirably suited to plaster, woodwork, paper or even iron surfaces, and for the treatment of walls and woodwork in hospitals, hotels and residences, etc. The makers guarantee absolute immunity from flaking or shelling. The material is non-poisonous and absolutely washable. It is easy in application, which means that ample time is available for joining up edges, when used on a large surface, without showing brush marks. Combinol is not made for use over wet plaster, while it is very valuable for an undercoating under enamel, and the firm are supplying large quantities for that purpose.

PLATE III.

This Plate represents ten out of the sixty shades of "Wallpax" Patent Oil Flat Wax Paint manufactured by Messrs. Samuel Wills & Co., Ltd., Bristol. The value of the patent being the introduction of certain waxes, which, while not giving a greasy surface, produces a very washable and exquisite matt finish. It is not a distemper, and is quite free from glue, size and water. It is also a fine bath-room paint, on account of its effective resistance to steam and moisture. This quality, and being non-poisonous, makes it a most valuable paint for the interior of greenhouses. It is also made in a flatting or undercoating quality, which enables even exterior work to be done in two coats.

This paint has met with a considerable amount of appreciation during the few years it has been on the market. It has splendid body and spreading power, one gallon covering about 80-90 square yards, and in some cases over 100 square yards.
This Plate shows six examples of "Vernasca," made by Mander Brothers, Wolverhampton. Vernasca is a flat, washable, wall paint of enamel-like nature, which is superior to any water paint, and is produced in 70 different shades. It is claimed that in most cases a single coat of this material is sufficient, thus making it very economical in use.

This plate shows the various shades of Fastains, a speciality introduced by Messrs. Naylor Brothers (London), Ltd., of Slough. This stain is a Fast Varnish Stain for use on floors and wood work, which can be very easily applied and dries in 2 to 3 hours with a rich gloss. It enables large surfaces to be covered without the blemishes inseparable from the use of Spirit Varnish Stains, and, being of a transparent nature, does not veil the natural beauty of the grain, but brings it into prominence. It is especially adapted for Church Work, Floors, Staircases, Panels, Wainscoats, Rafters and similar work.

This plate shows the Washable Distempers manufactured by Messrs. Naylor Brothers (London), Ltd., of Slough. The addition of water is the only thing necessary to make the distemper ready for use, whilst the covering power is very considerable, varying according to the surface to be covered. It is particularly suitable for brick, cement, plaster or stone surfaces, and also for use on wood. The addition of petrifying liquid in the proportion of 3 gallons to the cwt. renders the Distemper more durable for outside use, and sizing or varnishing with a coat of Hard Oil Varnish will give a porcelain surface which makes it extremely durable and suitable for bath rooms, halls, public rooms, etc.
DESCRIPTION OF COLOURED PLATES. 235

PLATE VII.

This Plate shows the standard shades of Paripan Flat Enamel, with the exception of white, which is, of course, supplied. These pale tints have been arrived at by a most careful selection and elimination, and will be found to meet all the requirements of nine out of ten users. Medium and dark colours can be supplied to customers’ patterns in lots of one gallon and upwards.

An equally useful range of Paripan glossy colours may be had on application to the makers. Paripan Flat should not be confused in any way with any form of water or oil bound material—it is absolutely an enamel and just as suitable for doors and woodwork as for walls and ceilings. So many people now object to highly glossy surfaces, but seeing no alternative for woodwork, they still ask for enamel finish.

PLATE VIII.

The tints shown are specimens of Messrs. Naylor’s Superfine Ready Mixed Gloss Paints, which are made in 24 standard colours. They are, as their name implies, mixed ready for use and have been introduced to meet the demand for a paint which will help to save the heavy labour cost of mixing paint in the old way. The finishes are guaranteed to comply with the high standard which is expected of this old established firm, whose name is so closely connected with the word ‘Superfine.’ The paints have a high gloss, and the colours are both artistic and durable. Packed in smaller sizes, these paints meet with a ready sale to the amateur house painter, and at the same time their value as a labour saver and as a perfect finish is realised by the Decorator and Painter.

PLATE IX.

This plate illustrates the various colours of Solignum Wood Preserving Stain, made by Major & Company, Ltd., Hull, and is of peculiar interest at the present
time in view of the fact that Solignum has been specified for so many of the Housing Schemes. We understand that a good deal of misunderstanding exists as to the nature of Solignum, and that many painters are under the impression that wood once treated with Solignum can never be painted afterwards. This impression, we are assured, is quite wrong. Any paint that is as dark in colour as the Solignum can be applied straight over it without any difficulty, so long as the Solignum is quite dry, and there is more than one simple and inexpensive method (quite reliable) of preparing Solignum to receive white or pale tinted paint or enamel if required.

The colours of Solignum are pleasing and artistic, and the low cost of the material compared with the usual methods of painting, not unnaturally appeal strongly to the Architect or Surveyor, who must employ everything that will tend to reduce the cost of the houses which the country requires so badly. And when this reduction in cost is secured without any loss of efficiency, the popularity of Solignum is understandable.

Solignum can be left with its natural dull or matt finish, or wax polished, or coated with knotting or the makers own Stopping Solution, and then varnished, if a bright finish is required.

PLATE X.

On this Plate are shown twenty-four of the sixty standard colours of Minerva paint issued by Messrs. Pinchin, Johnson & Co., Ltd., of General Buildings, Aldwych, London, W.C.2, as a result of a competition which is described on another page. The reader should remember that while these colours do not necessarily accord in certain cases with their own ideas of what any particular name may be, that they have been selected as a result of the concensus of opinion of some three thousand different decorators and colour experts. It should also be borne in mind that inasmuch as one name is as good as another for a colour, provided that the name
is fixed rigidly, that a convenient plan is to adopt Messrs. Pinchin, Johnson's standard colour and to work upon it as a base. It should also be added that this firm have made a practical application of the standard colour-card, by making it the base of a new paint they produced some years ago under the name of "Minerva Paint," which is ready prepared for use. They have selected from their standard colour-card twenty-four different colours, as shown upon Plate, and make "Minerva Paint" with these twenty-four standard colours. Now, inasmuch as a painter can very readily produce tints by adding white to any of these colours, and can so obtain a large series of different tints, the firm have issued an exceedingly useful colour-card, which gives samples of the twenty-four colours above mentioned, and underneath four rows of tints made from the same colours having been reduced with three parts, seven parts, fifteen parts and thirty-one parts of white respectively. At the top of Plate is given one example of the reductions with white, viz., Standard Carnation Red. This colour sheet will be gladly sent to any reader of this book who writes to Messrs. Pinchin, Johnson & Co., Ltd., General Buildings, Aldwych, London, W.C. 2.

PLATE XI.

Sixteen beautiful colours of "Hygeia" Flat Wall Finish, manufactured by Messrs. Pinchin, Johnson, and Co., Ltd., of General Buildings, Aldwych, London, W.C. 2, are shown in this plate.

The attractive features about a "Hygeia" Finish are its lovely texture and pure colour toning, allied to marble hard durability.

Any Room, Hall, Corridor or Staircase, finished in "Hygeia" appeals instantly to the eye as being beautifully decorated, whilst a closer investigation reveals the practical merits of the "Hygeia" surface.

For, despite its velvety appearance, "Hygeia" sets like marble. It can be cleaned by flooding, washing
238 PAINT AND COLOUR MIXING.

or scrubbing, whenever necessary, and will not lose its charm or protective merit until physically perished by the effluxion of time. In short, a "Hygeia" surface is as truly hygienic and economical as it is obviously beautiful.

"Hygeia" fits in particularly for good class Domestic Decoration, Hotel Rooms and Corridors, Public Halls, and Buildings, Theatres, Cinemas, Hospitals, Churches, Schools, etc.

Everything connected with "Hygeia" is Grade I. Its conception is sound; the ingredients employed are beyond suspicion; manufacture is thorough; testing is Spartan in its severity, and consequently results with ordinary care are consistently satisfactory.

Booklet, containing full range of "Hygeia" Shades, will gladly be sent to any reader of this book by Messrs. Pinchin, Johnson and Co., Ltd., upon application to their Head Office.

PLATES XII. AND XIII.

These Plates each show six examples of "Matsine," a material which is now so well-known as scarcely to need any description. Matsine is used either as a stain on bare wood, or as a "scumble" on painted surfaces. In the former case, panelling and similar work on ordinary timber can be very economically finished in the shades of more expensive woods. Matsine is made in a number of different shades, and practically any kind of wood can be imitated by selecting a suitable ground colour, followed by a "scumble" of Matsine.

PLATE XIV.

This Plate shows thirty-six specimens of typical water colours manufactured by Messrs Winsor & Newton, Ltd., of Rathbone Place, W., the selection embracing not only the more brilliant colours but also those which are most commonly employed in water colour painting.
The plate will be very useful for reference in connection with the chapter on artists' water colours, with the specimens of oil paints which are contained in this book. They will then get an accurate idea of the difference of appearances between a pigment ground in water and one ground in oil. It should further be observed that artists' colours are, as a rule, of a much higher grade than house painters' oil colours, and are correspondingly more expensive. The specimens are washed by hand on Whatman paper, and mounted on the plan originally devised by Messrs. Winsor & Newton, Ltd. It will be noted that, owing to the manner in which the washes are graduated, the difference of appearance between thick and thin washes of the various colours can be easily observed.
"WALLPAX."

(regd.)


"WALLPAX" is a flat Sanitary Wax Paint prepared for use, and packed in useful air-tight tins.

"WALLPAX" is excellent for Hospital Wards, Operating Rooms, Public Buildings, &c. It is absolutely free from animal matter, glue, water, or any ingredient liable to the attack or lodgment of bacteria.

"WALLPAX" is superb for General House Decoration, Bath Rooms and Kitchens as a steam-resisting paint; also as an undercoating for White Enamel and Bath Enamel.

"WALLPAX" may be used upon old or new walls, over distempered or painted surfaces, paper, stone, iron, or in fact any surface, provided ground work is dry and not loose or powdery. It can also be thoroughly washed and cleaned as often as necessary.

"WALLPAX" is most reasonable in cost. It also has great covering properties equal to the highest class enamel, which makes it possible to be used in place of ordinary distemper, as well as for the most expensive decorative work. It possesses great obliteratorive power, one coat well covering up a black ground work.

"WALLPAX" FLATTING is a form of "Wallpax" specially made for all kinds of undercoating work to be enamelled or varnished; such as Perambulators, Motor Cars, Railway Carriages, Lorries, etc. This "Wallpax Flatting" can also be made for use in Spraying Machines for mass production work.

"WALLPAX" is stocked in 32 colours, and made in 60. The manufacturers can supply special shades, at a slightly increased cost, if time is allowed.

Manufactured by—

SAMUEL WILLS & Co., Ltd.,
BRISTOL and LONDON,
CASTLE GREEN. 6, ELDON ST., E.C.2.
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