THE

OIL AND BROMOIL

PROCESSES.

SECOND AND REVISED EDITION

BY

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AND

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PREFATORY

The oil-pigment process, as practised to-day by a very considerable number of workers in pictorial photography, differs only in its method of application and general use from the process invented by Poitevin in 1855.* Poitevin's specification dealt with the production of an image in greasy ink on chromated gelatine, but his description of the method was too vague to be regarded as instructional. A later patent by Asser (No. 543 of the year 1860) contains a specification that distinctly sets forth a description of the production of proofs in printing ink, for use as primary or direct prints. In *The Amateur Photographer* for December 20, 1904, Thomas Bolas, F.C.S., F.I.C, deals at length with Asser's process, and describes his own production of prints by this method before the Society of Arts in 1878.

The oil process is essentially collotype on paper, but it has been due to Mr. G. E. H. Rawlins that a practical revival of oil printing has been

* Poitevin's English Patent, No. 2815 of 1855.

made. Its application in the production of photographic pictures is now firmly established, and the need for a complete handbook on the process and its offshoot -- the Bromoil process, will be met by this volume. Mr. Rawlins described the results of his first experiments in *The Amateur Photographer* for October 18, 1904, and his procedure at that time was to apply the pigment for the formation of the picture by means of a composition roller. Later experiments demonstrated that greater control was to be obtained in the application of the ink if special brushes, similar in design to stencil brushes, were used, and the pigment applied with a dabbing action. By this means the production of the image becomes entirely subservient to the desires of the operator.

Oil printing, therefore, in its present practice, gives to the photographer the power of absolute control over his result, as any part of the picture may be strengthened, subdued, or even eliminated altogether, at will. The materials are both simple and inexpensive, and the results are absolutely permanent. No other printing process at present known to the pictorial photographer places such enormous control in the hands of the skilful and artistic worker.

The Bromoil Process utilises the power of

bromide paper for, enlarging purposes, and by employing chemical action the silver image of the bromide paper can be converted into an image that is analogous to the chromated image in the oil process. Bromoil gives the oil worker still greater possibilities, as it places no restriction upon the size of the final print, which can be produced entirely by artificial light, either by contact, or in the enlarging apparatus. To Mr. Welborne Piper is due the original method of producing oil prints from bromides. His description of it appeared in *The Photographic News* for August 16, 1907, and the method of procedure is equally as simple as the direct oil-pigment process. The latest and most practical instructions for working both processes will be found in the following pages.

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THE OIL AND BROMOIL PROCESSES

I

THE OIL-PIGMENT PROCESS

The Process in Brief

THE reader who has not tried the oil process for the production of his photographic prints, and who takes up this book for the first time, may ask, " What is the Oil Process ? " In the prefatory note a brief historical reference is made to the inventors and original experimenters, but without dipping further into this side of the subject (i.e. the birth and early history of the process) we feel that a short explanation as to the basis of our subject is necessary. The following brief outline

will therefore serve to describe the process generally:--

Paper thinly and evenly coated with gelatine, such as the double-transfer paper used in the carbon process, or the special oil-pigment paper prepared for the purpose, is sensitised with an aqueous solution of bichromate of potassium or ammonium, and allowed to dry in the dark. The paper is insensitive when wet, but becomes about three to four times as sensitive to light as ordinary P.O.P. as soon as it is dry. When quite dry the paper, which is now stained yellow by the bichromate is ready for printing from a negative.

Printing is conducted in daylight just as with P.O.P. or platinotype, but it is here the beginner may go wrong, and it will repay him to devote some little attention to the question of correct exposure, because much of the success of the after manipulations depends upon it.

A faint brown image is formed on the surface of the paper, and this affords a guide to the correctness of the exposure. The image should be clearly visible in all parts, and printing is complete when detail is just perceptible in the highest lights. After exposure, the printed paper is washed in plain cold water until the whole of the yellow

bichromate stain has been removed. During this period of washing, which should occupy about half an hour, the picture will appear in relief on the gelatine surface. The parts which have been protected from light by the dense portions of the negative *(i.e.* the highlights), absorb more water than those which have been printed deeply *(i.e.* the shadows), and the image swells up in proportion to the different gradations of the negative.

The best negative for the process is one that has a good scale of gradations from high lights to shadows, and is fairly " plucky."

When the swollen gelatine image has been obtained, the print is in condition for “inking up” or pigmenting.

This is accomplished by placing the print upon a pad of wet blotting-paper. This is necessary because if the surface becomes dry during pigmenting the pigment will adhere equally all over the surface. By keeping it damp and the image in a swollen state, the portion which has absorbed the greatest amount of water (i.e. the high lights) will repel the pigment more than the parts which have been fully exposed *(i.e.* the shadows). The latter attract the ink in proportion to the amount of exposure.

The pigment is applied by means of specially

prepared brushes. These brushes are made of fine hog-hair or fitch, and are so constructed that they present an even, flat butt-end, which allows the pigment to be spread evenly on the surface of the print with a light “dabbing” action. The pigment, which is of fairly stiff consistency, is spread on a piece of glass or china palette, the brush is dabbed on the pigment and then lightly dabbed on the surface of the print, which should not be actually wet, but in a tacky, moist condition. Lithographic inks are suitable for the process, but the special pigments now prepared, and easily obtainable, are recommended.

The image will now grow under the action of the brush, and the more pigment that is applied to the shadows the darker these portions will become. At the same time, the high lights repel the application of the pigment, and by continuing the dabbing action the whole picture is gradually built up, and can be modified to any extent to suit the worker.

The application of very stiff pigment tends to produce a hard result, while thinning the pigment with a medium such as boiled oil or Roberson's Medium makes it possible to obtain a much flatter result. A soft smudging action of the brush will distribute the pigment evenly over the surface, and assist in toning down high lights, while a

vigorous “hopping” action of the brush will take away pigment and accentuate high lights.

Materials Required

1. A good strong negative is the best for initial experiments -- say one that will give a good P.O.P. print.
2. A good paper, fairly tough, and of smooth surface, coated with gelatine -- such as the double transfer papers used in the carbon process. (Suitable papers for the oil process are fully described on pages 14 to 20.)
3. Sensitising solution of bichromate, as described later.
4. Blotting-paper.
5. Piece of old glass, or thick sheet zinc, larger than the sizes of prints likely to be worked, also a few old ½ or 1/1 plate negatives as ink palettes.
6. A palette knife or old household knife to spread ink on palette.
7. Specially prepared oil pigment or lithographic ink of fine quality. (The pigments are described on pages 47 to 52.)
8. Brushes for pigmenting the picture. *(See* pages 40 to 45.)

The following materials may also be used with advantage :--

1. Blanchard brush as described -- later (p. 33).
2. Soft rubber for clearing high lights, etc.
3. Blind pen or lance points for picking up spots of ink, hairs, etc., on print during or after pigmenting.
4. Spring handle for brushes when “hopping.”
5. Tracing-paper to fold over prints whilst drying, to prevent dust from settling upon the surface.

Suitable Papers for the Oil Process

The question of papers for oil-pigment prints is one of importance, and should receive full consideration by all oil workers ; for this reason a few may be described which we have found from recent practical trials to be worthy of consideration. It must not, however, be assumed that they are the only ones that are good, or that better may not be found or made, but the papers mentioned are, at present undoubtedly the best for the purpose.

There are many workers who are only using one make of paper, and are quite in the dark as to the possibilities of others that may be used.

It may be said at the outset that all the papers mentioned below are quite ready for sensitising, and that each and every one of them should be treated alike in this respect.

Rawlins' Oil-Pigment Paper and "Pigmoil"

First (in justice to Mr. Rawlins, who has done so much for the revival of the process) should be mentioned the paper known as "Rawlins" Oil-pigment Paper", placed on the market by Messrs. Griffin, of Kingsway, London. It is a very excellent paper, and eminently suitable for the process for which it is intended. A later variety of the Rawlins paper is made by the same firm under the name of "Pigmoil" paper. This is an improvement on the original Rawlins paper, and is probably the best for the beginner to use, and indeed for advanced workers also. The pigment is taken up readily in the shadows and repelled in the high lights. The operation of pigmenting can be conducted very rapidly with "Pigmoil" paper, and the tendency is to get strong vigorous results. It is made in two grades, "smooth" and "rough," and is sold in cut sizes from quarter-plate to 18 by 16 inches, also in rolls 35 inches wide. Whole-plate size, to name a medium one, costs 2s. per packet of' 12 pieces.

The " smooth " surface papers have no special indication as to which is the coated side, and this is where the beginner may go wrong. Careful inspection will, however, show that the two sides are slightly different in texture, the very smooth side being the coated one. If any difficulty is experienced in finding this, the tip of the tongue applied to the corner of the paper will readily disclose which side is coated with gelatine.

This paper is admirable in every respect for the process. In many early workers' hands, progress towards success with the oil process was slow, owing to difficulties that occasionally arose in pigmenting. “Pigmoil” paper has been specially made for the purpose of obviating these difficulties. With it the oil pigment “takes” with great readiness, and the process is much simplified, so that with very little practice straightforward prints can be obtained by the novice.

When using it, however, one feels that one is using an expensive article in comparison with other gelatine-coated papers obtainable, and which may be successfully used for the process. This is the only complaint that can be levelled against this admirable production, and if the price is not considered it may be regarded as the ideal paper for the process.

The Autotype Company's Papers

The Autotype Company have also recently introduced a special double-coated paper for the oil-pigment process. This is made in two varieties. Special No. 1 is a thickly coated white paper of fine grain. It pigments easily and stands a considerable amount of hard brush-work. No. 2 has also a fine grain, but is a toned paper, and is highly suitable for certain effects where a toned paper may be used.

The Autotype Company's final support for double transfer carbon work is frequently used by the leading workers in oil. "No. 76" is one that has given great satisfaction. It is pure white and has a beautiful matt surface.

The coating is even and thick, so that good relief is obtained when the printed paper is soaked in water and blotted off. The same paper with a toned or cream-colour surface is known as "No. 77." These both take the ink well and stand rough usage. The Autotype Special No. 1 and No. 2 are the same as Nos. 76 and 77, but are double-coated and therefore somewhat easier to work. "No. 90," known

as “smooth-toned” Reynolds, is also a good paper that works well in our hands. If very rich “juicy” prints, with a decided gloss, are required, the Autotype Litho-Transfer paper is recommended. This is very thickly coated and gives great relief.

Illingworth's Papers

Messrs. Illingworth's Double-Transfer Papers are very popular for the process, and are recommended by several well-known oil workers, particularly Monsieur Demachy.

No. 125 “Thick Smooth” is a very useful paper for almost all purposes. It is very strong, and its colour may be termed “opal tint.” It takes the ink easily. The image swells up well when wet, and the pigment does not “sink in” even when a thin ink is used.

No. 117 is a thick, strong, rough-surface paper, not too rough by any means, but a most useful surface for large work or broad masses of light and shade. It is toned paper, but not so deep in colour as No. 77 Autotype.

In No. 119 Illingworth's we have a thick white Whatman paper of a distinct character, and it may be used in a similar manner to the last named (117). It must be noted that these

thick papers should be soaked longer than the thin papers, in order to obtain relief before pigmenting.

No. 151, " Gravure White " or Toned, is also a good paper made by Illingworth and recommended by Monsieur Demachy.

If a toned smooth-surface paper is desired, Illingworth No. 118 is to be recommended. It is almost like a vellum paper. It is stout and fairly heavy, is well coated, and takes and holds pigment readily. If printed with wide margins and the print plate marked, etching-like productions may easily be secured.

Other Makers

Messrs Elliott & Sons of Barnet, and Wellington & Ward, of Elstree, who are also makers of carbon tissues and supports, have several excellent final supports that can be employed successfully for the oil process.

The Rotary Company have two papers. No. 1, " Thin White Smooth," is similar to P.O.P., but with much less gloss for small work. It is admirable, and for fine portrait work it will be found useful, but its scope is not so wide as the others we have mentioned. No. 2, " Matt Medium," is a useful paper, especially if stiff or

hard inks are being used. It is of the " egg-shell " surface kind, but not quite so heavy as No. 76 Autotype. It is well coated, and one has no difficulty in finding the right side. For work up to whole-plate size it can be recommended.

It is hard, takes the ink well, dries without the ink sinking in too much, and will stand more than ordinary usage.

Sizes of Paper

All the double transfer papers mentioned above are obtainable in rolls 12 ft. by 30 inches, in addition to packets of the usual cut sizes from $^{1}/_{4}$ plate to 15 x 12.

It is advisable when printing the sensitised paper for oil prints to place the negative on a glass support in a frame larger than the negative and use a piece of paper also larger than the negative.

Most of the makers of the papers described issue them slightly larger on account of this requirement in carbon work: thus, for a whole-plate it is sold 9 x 7. If the larger piece of paper be used it leaves a margin all round, and this will keep the brush from picking up dampness from the wet blotting-paper when working near the edge of the print. After printing is finished,

any colour may be removed from the white margin, and this margin may be made use of for mounting-up purposes if trimming is not required.

To Coat Paper with Gelatine

There is no reason why the oil worker should coat his own paper : when there is such a splendid range of eminently suitable papers at his disposal, we think he is fastidious indeed if one or the other does not suit his purpose. There may, however, be times when he wishes to coat a very special kind of paper to secure certain effects and results, and should therefore know how best to do it. We cannot do better than quote Dr. A. R. F. Evershed, who has done a considerable amount of successful experimental work in connection with the process.

" To coat the paper with gelatine, take 6 grains of thymol, rub it in a mortar with 30 to 60 minims of alcohol (spirits of wine), and add this to 20 oz. of water in a wide-mouthed vessel; then 1 oz. of Heinrich's or Nelson's gelatine is cut into shreds and put into the alcohol and water, the whole is allowed to stand for an hour or more, and then dissolved by the aid of a

water-bath, the temperature of which should not exceed 120°F., as otherwise the gelatine will be killed. When completely dissolved, the mixture should be filtered through a couple of thicknesses of Indian muslin, and the paper can then be coated; and this is the most troublesome process. It should be conducted as follows: Have ready a piece of plate-glass, levelled by means of four screws screwed into the table, or by wedges, and test with spirit level; another piece of glass (an old cleaned negative will answer) ; both these must be larger than the piece of paper it is desired to coat; a dish larger than the glass, a 2-oz. measure, glass rod, and plenty of very hot water.

The papers recommended by Dr. Eversheď were Smith's Royal Cartridge, at 1*d*. a sheet, or Steinbach's Water-colour paper or Turkey Mill H.P. (the latter two can be obtained at Reeve's depots at 2*d*. or 3*d*. a sheet); or Rives' Photographic, to be obtained at Fallowfield's at 4*s*. a quire.

Having cut the paper to size required, mark a " B " on the back of each corner, immerse it face downward in hot water in the dish, and remove all airbells, but under it first place the thin piece of glass, fill the measure with hot water, and in it put the glass rod; now proceed

to warm through the plate glass, and then replace on the four screws; empty the water out of the measure, and in it pour some of the melted gelatine (a sheet 12 in. by 10 in. requires about 6 drachms for a thick coating), and stand by the fire; then take the thin glass and lift it out of the water with the paper on it, and put it on the warmed plate-glass, both being allowed to drain for a minute, being sure there is no air imprisoned between the paper and glass; now take the measure and pour the gelatine in a pool in the centre of the paper, and by means of the glass rod guide it to the edges, at the same time removing any air-bells or bits of dust.

Let the gelatine set, and in about 15 minutes the coated paper can be removed from the thin glass and put on a level surface to dry; now if any gelatine has overflowed on the glass, insinuate a palette-knife or similar article under the paper all round to free it, and this may require attention again ; in about three or four hours the paper can be hung up to dry, but the Rives' paper must be left lying flat on blotting-paper, which is known by the paper curling inwards, and it can then be cut up if required and stored; it will keep indefinitely, the thymol acting as a preservative.

Sensitisers and Sensitising

The best results are certainly not obtained by jumping about from one condition of things to another, and for this reason we suggest that Sensitisers and Sensitising be as simple as possible, and that the work be conducted upon a definite basis, especially for initial experiments. The sensitising of paper for the " Oil Process " with various strengths of bichromate of potassium or ammonium is not advocated ; it is better to begin with one standard strength. The paper coated with gelatine may be sensitised, as in the carbon process, according to the quality of the negative ; but by far the best plan, and one to be recommended, is, -- Choose a reliable standard sensitiser and use it always. bearing in mind that very thin, weak negatives are bad for the production of good oil prints, no matter what sensitiser is used. Further remarks on the best type of negative to use appear on page 35.

A Standard Sensitiser

The following sensitiser can be regarded as the best for all-round work, and should be adopted as a standard for the oil-pigment process:

Take 1 oz. bichromate of ammonium, powder it well, and add to it 10 oz. of water. This makes a saturated solution. Always keep a few crystals of the salt at the bottom of the bottle, and add water as the bulk is reduced.

For use take 1 part of stock bichromate solution, and mix with 2 parts of methylated spirit, or, preferably, pure alcohol.

The method of application is described later, but care should be taken, when spirit is mixed with the sensitiser, that the two are well blended.

It is well to point out here that *potassium* bichromate is precipitated by alcohol, so cannot be used in a spirit sensitiser. In the case of the ammonium salt, the alcohol mixture does not keep well, therefore only just as much as is likely to be used should be mixed and applied as soon as possible.

Other Reliable Sensitisers

The following sensitisers are given as examples of the variations that are permissible in this part of the process, but the beginner is advised to adopt the standard formula above.

Mr. G. E. H. Rawlins recommends for the original Rawlins paper :

Potassium bichromate . .	1oz.
Water	20 "

For the " Pigmoil " paper, each piece is immersed in the following :

Potassium bichromate . .	80 gr.
Potassium citrate . . .	1 oz.
Citric acid	40 gr.
Water	10 oz.

The potassium citrate and the citric acid are dissolved together in part of the water, and added to the potassium bichromate which has been previously dissolved in the remainder of the water. The mixed solution keeps, provided the " used " solution is not returned to the bottle. The paper should be completely immersed in the solution for not less than two minutes, then hung up to dry in the dark.

M. Puyo insists upon a comparatively weak solution of bichromate of potassium or ammonium, not more than 2 or 3 per cent., for the floating method of sensitising, and a 6 per cent. Solution

of ammonium bichromate with spirit for the brush method.

M. Demachy gives the following formula in the little booklet on the subject published by James A. Sinclair & Co., Haymarket:

" To cover six whole-plate sheets of double transfer paper, take 5 cubic centimetres (1½ drams) of ammonium bichromate 6 per cent. solution, and add 10 cubic centimetres (3 drams) of alcohol (90°). Pin a sheet of paper on your drawing-board by its four corners, dip the extremity of your flat hog's-hair brush in the alcoholic mixture, draw it once horizontally along the upper part of the sheet, and with rapid downward strokes gather the solution from the top streak and cover the whole sheet."

Dr. Eversheed advocates a 5 per cent. solution of potassium bichromate for average negatives, and also the following:

A 10 per cent. solution of potassium bichromate is taken, and to each part one part of acetone is added; this is brushed over the paper quickly with a well-charged, wide camel-hair brush. No part should be gone over twice, as the solution dries very quickly. It may then be smoothed by stippling with a badger softener.

James A. Sinclair, F.R.P.S., finds the Bennett

sensitiser for carbon tissue answer well. The formula is:

Potassium bichromate . .	4 dr.
Citric acid	1 dr.
Water	25 oz.
Ammonia ·880 . . .	about 3 dr.

The potassium bichromate and citric acid are dissolved separately in hot water, the solutions mixed, and sufficient ammonia ·880 added to change the colour from red to lemon-yellow. It is imperative that the ammonia be added immediately after mixing the two solutions. The solution, if mixed as described, will keep indefinitely.

John H. Gear, F.R.P.S., advocates floating the paper for sensitising or brushing the mixture on. His sensitising solution consists of :

Bichromate of ammonium .	100 gr.
Carbonate of soda . . .	10 ”
Water	4 oz.

One part of this solution is mixed with two parts 90 per cent. alcohol. Care should be taken in sensitising not to allow the solution to get underneath or at the back of the paper. He advises a good margin, at least

one inch each way outside the border-line of the negative.

Messrs. Burroughs, Wellcome & Co. issue amongst their excellent series of " Tabloid " chemicals, one for sensitising carbon tissue: viz.—

" Tabloid " potassium ammonium chromate, gr. 24.

This is a preparation of the double chromate of potassium ammonium which simplifies the operation by obviating the necessity of using ammonia solution. It is a great convenience for those who only require it for occasional use. The makers issue the following instructions : —

" Tabloid " Potassium ammonium chromate, gr. 24 . . . . . .one
Water . . . . 1 oz.

If printing from soft negatives, dissolve one " Tabloid " product in 2 oz. of water; or if from very hard negatives, 1 in 6 dr. of water.

Sensitising the Paper

There are two methods of sensitising:

(1) By immersion.

(2) By coating or brushing on.

The latter method is certainly preferable. It is quicker, cleaner, and more certain, but paper sensitised by this method will not keep more than twenty-four to forty-eight hours, and it is advisable to use it as soon as possible. Paper that has been immersed keeps for three or four days, but in either case the best results are obtained with freshly sensitised paper—i.e. paper that is used as soon as it is dry after sensitising.

Sensitising may be conducted in weak daylight, but the wet sensitised paper should be immediately removed to a perfectly dark place to dry. Light and gas fumes should be avoided during the drying processes, and to avoid possibility of fogging the paper the beginner should conduct his sensitising operations in artificial light at first.

Sensitising by Immersion

A dish slightly larger than the print is filled to the depth of about an inch with the sensitising solution.

The paper is immersed face upwards, and kept under the solution, and free from air-bells, for two or three minutes; this will soften the gelatine and allow it to take up the sensitiser.

Drain the paper over the edge of the dish, or a glass rod, and pin up to dry. The drying takes several hours in an ordinary dark-room unless a spirit sensitiser is used.

Paper that has been sensitised by immersion may be assisted to more rapid drying by squeegeeing it on a plate of glass or zinc, to remove all surface moisture before hanging up to dry. It should be squeegeed film downwards. It is wise to make a pencil-mark on the *back* of the paper before sensitising by immersion, so as to easily distinguish one side from the other.

Sensitising by Coating

This method of sensitising is strongly advocated because the process is quicker; it is more satisfactory and economical, and also, after printing, the bichromate is easily and thoroughly washed out: this is an important point.

Sensitising by coating is performed by brushing the sensitiser over the surface of the paper, and for this purpose the formula containing alcohol is much the best, because of its rapid drying properties.

M. Puyo recommends a brush for this purpose, and the use afterwards of a goat's-hair

brush for softening; this equalises the coating. The following process, however, is strongly recommended:

Make up the standard spirit formula given above, or buy a 1*s*. bottle of the Autotype Company's " New Spirit Sensitiser." It is perfectly satisfactory for the purpose, and can be strongly recommended, as it keeps well. The beginner

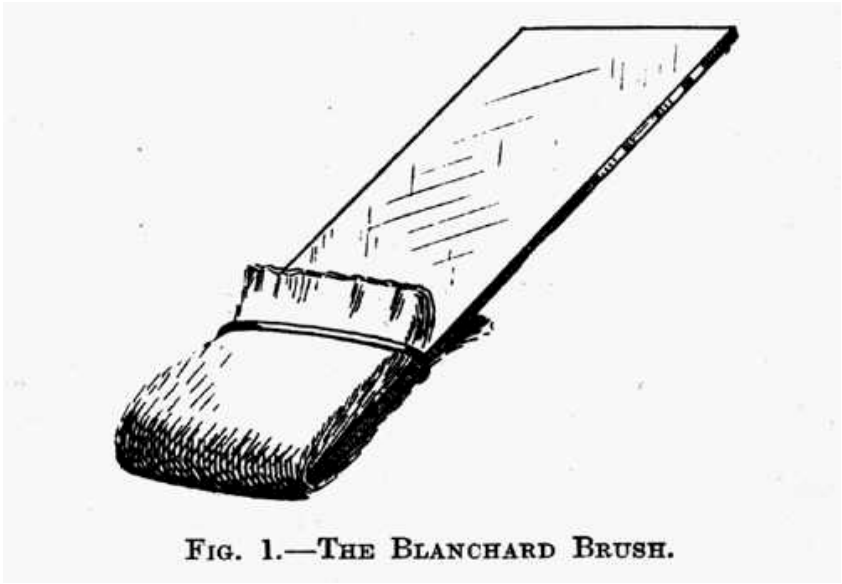

FIG. 1.—THE BLANCHARD BRUSH.

needs the hands and mind to be as free as possible, and for this purpose alone it is worthy of consideration; even the experienced worker will find this ready-made solution invaluable to have at hand, especially if he is a " carbon " worker also, for he may then with the same solution prepare an odd sheet or two of tissue, if he so desires.

With each bottle of " Spirit Sensitiser " the Autotype Company send out a coating brush, which, although a good old-fashioned tool, may be new to many present-day pictorial workers. It is what is known as a " Blanchard Brush ". It consists of a piece of glass, about 6½ in. x 2¼ in. (an old half-plate negative cut down the centre would provide two), a piece of swandown calico or fluffless flannelette is wrapped over one end of it, and held in position by a rubber band. It is one of the best brushes that can be used for the purpose.

To coat paper for " oil " work, go into the dark-room, or a room illuminated by subdued daylight or artificial light, and take a clean quarter-plate dish which is quite dry. Pour into it a small quantity of the " Spirit Sensitiser, " according to the quantity of paper you require to coat — say about 1 oz. for four 12 x 10 pieces.

Now take a piece of blotting-paper and put this on a drawing-board, or other such support, and with the aid of two " dark-room pins " fasten the piece of paper to be sensitised at the top. Now tilt up the dish of sensitiser so that the liquid is all at one end, dip the Blanchard brush into the solution, and taking up as much as the brush will carry, go rapidly over the paper

from top to bottom. The brush will coat it quite smoothly and evenly, and drying will commence almost before you can take the sensitised paper off the board. The illustration will indicate the method.

It is convenient to have a large cardboard box lined with blotting-paper, top to bottom. When the first piece is done, put it into the box

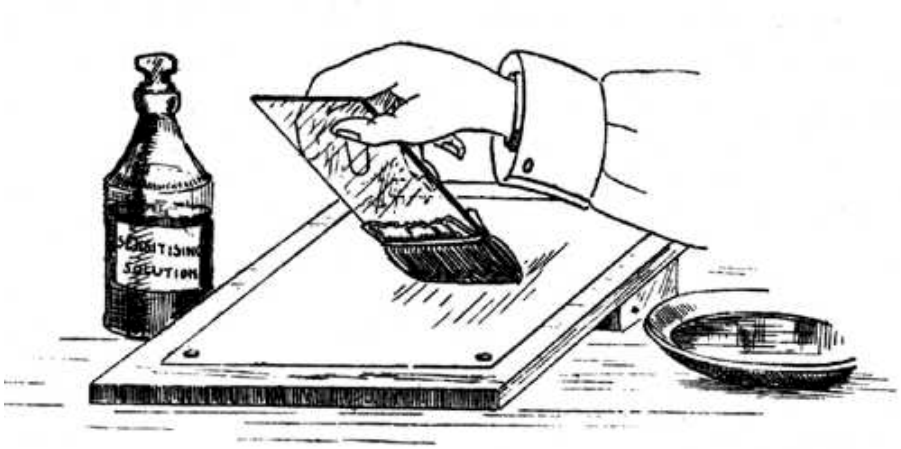

FiG. 2—SENSITISING PAPER 11 WITH THE BLANCHARD BRUSH

and go on with the second, and so on until all are ready ; then pin some of them on the inside of the lid and others on the bottom of the box, and close it up. Or, the pieces of paper can be pinned up to dry in the dark-room or a dark cupboard.

The paper will dry in about ten minutes or less. In order to ensure it being " bone dry, " place the pieces in a cardboard box for a little while

in a warm place — for instance, if convenient, on the oven-top of the cooking range — they are then in fine condition for work. At some periods of the year the dried paper will have a limp feel unless the room is warm, and if limp it does not work so satisfactorily.

By the drying method given above, paper has been sensitised, dried, printed, and the print placed in the washing water within an hour, even during the damp months of winter.

Printing

Printing from the negative on the bichromated paper is very similar to any other daylight process. A fairly strong negative should be chosen for initial experiments — such a negative as would give a good, bright P.O.P. print.

Almost any negative may be used if one fully understands the process, and various degrees of inks may be used to obtain hard or soft results at will; but this cannot be taught — it is the outcome of experience and practice with the brush.

The negative is placed in the frame, and paper ready sensitised and *bone-dry is* then placed in contact with it, as in ordinary printing. The

frame should be filled in artificial lights or very weak daylight. We must at once realise that the operation of printing is a fairly quick one. A bright diffused light is the best for the purpose, and in most months of the year an average negative may be printed in 5 to 10 minutes. An actinometer may, of course, be used, but is not absolutely necessary. The image is a " print-out " one, just as in Platinotype : a slight brown image appears on the yellow paper, and this image strengthens as the printing proceeds. How far to carry the printing is a matter that a few trial exposures will quickly teach, but the image should be printed well out, and details should be visible in the high lights before taking the paper out of the frame. Care should be taken not to expose the paper too much to day-light while inspecting the print, as it must be remembered that the paper is about four times as sensitive as ordinary P.O.P. and if slightly fogged, renders clean pigmenting difficult later.

It is recommended that a printing-frame larger than the negative be employed, so that printing-paper an inch larger each way may be used; this excess of paper all round the print will be of great value when inking-up the print. When working on a piece of paper printed close

up to the edge, there is danger of the brush picking up moisture from the wet pad on which it is placed during the process of inking. This can be avoided by using paper larger than the negative.

If quite identical exposures are required, a print meter may be used, and the number of tints it colours be carefully registered. There is a slight continuing action of light, but it may not possibly alter the results of such an easily-controlled method as the oil process very much.

The prints should, however, be washed as soon after exposure as possible, and the continuing action is thus stopped. The endeavour should be made to secure the correct exposure if possible, and deal with the print as quickly as possible.

Washing the Print

Printing being finished, the print is removed from the frame and placed in water — preferably running water — the object being to remove all bichromate. The bulk of the yellow bichromate will be quickly washed out, and it is then necessary to leave the print in several changes of water for 30 minutes to 2 hours. It will be found that

brush-sensitised paper does not require so much time to wash, as the bichromate is chiefly in the gelatine, and but very little in the paper fibres.

Care must be taken that the paper is kept well under the water, and no air-bells form; the bichromate must dissolve out evenly, and the gelatine image of the print must receive a generous soaking to give the desired relief.

The object of this soaking is to swell the gelatine image. The use of warm water for this purpose, although it does it very effectively, is not recommended, because the gelatine is affected and some of the delicate half-tones may be lost. Tepid water — about 75° — may, however, be used to hasten elimination of the bichromate, and the first washing should be conducted as quickly as possible. M. Demachy suggests the rapid bleaching of the image by the addition of a small quantity of bisulphide of soda to the third washing bath and rinsing thoroughly afterwards.

In hot weather a 3 per cent. or 5 per cent. bath of alum for 5 minutes will be of advantage. This should be soon after all traces of bichromate have been washed out, and the print should have, say, 20 minutes' soaking afterwards.

After removing the print from the washing-water, lay it face upwards on a pad of three or four thicknesses of saturated blotting-paper, or a pad of thick, well-washed butter-cloth, which holds the water well, and with a piece of clean, dry, fluffless blotting-paper or butter-muslin that has been boiled and well dried, remove the surface moisture from the print very quickly; or better still, take a pad of cotton-wool, enclosed in a clean, soft piece of linen or silk hand-kerchief, and form it into a ball, and with this take off the excess of water from the surface of the print. It will be seen that the image now stands out in clear relief, and this gives the print its foundation for the purpose of pigmenting.

Much of the image may appear to have been washed away, only the deepest shadows retaining their brown colour.

After washing, the prints may be dried and stored away, to be pigmented at some future time if desired. In this case the prints must be well and evenly soaked before proceeding with the pigmenting. This soaking should be for at least an hour in cold water. In very cold weather two hours will not be too much to bring the print into good condition for inking-up, and raising the temperature to 75° is recommended. The

application of warm water to the gelatine image is, however, always attended with risk in view of its softening effect, and the vigorous brush action that follows when pigmenting.

The temperature of the water in which the print is washed, and the temperature of the atmosphere of the room in which the damp print is pigmented, are matters which undoubtedly need attention. It has been found that prints made in extremely cold weather, or washed in very cold water, or pigmented in a room of low temperature, give results that are much flatter and lacking in contrast, when compared with prints from the same negatives made under warmer conditions of temperature. This point should be remembered, and the operations of washing and pigmenting should be conducted with an average temperature of 65° if possible. The effect of temperature may also be made some use of as another factor in the control of the print from certain negatives.

Brushes

The type of pigmenting brush best suited to the oil and bromoil processes is that which is usually

described as the “ stag-foot ” brush. It has acquired this name, we assume, from its apparent similarity to the pedal extremity of the quadruped mentioned. This brush is illustrated in Fig. 3 (Nos. 1 and 2). They are mostly made in France, and are of fitch-hair (“ the polecat ” or “ fitchet ”). They were originally recommended by Messieurs Demachy and Puyo, and have now been universally adopted by all workers in oil.

M. Bullier, 5, Rue Charlot, Paris, supplies these brushes; but they are now obtainable in England from Messrs. Griffin of Kingsway, London, James A. Sinclair & Co., Haymarket, and Robersons, Long Acre, W.C.

Messrs. Griffin also supply “ Rawlins ” brushes, which are very well made and of first-class quality. They are made on the straight or flat-top principle, as in the illustration, No. 3.

Another form of this brush is the “ Gradator.” This is fitted with a sliding collar of metal, which adjusts the hardness or softness of the brush at will by permitting more or less of the hairs to be free for pigmenting. It is obtainable with either flat or askew top.

The “Prima” brush — a useful brush of soft hog-hair — is made by Griffins, and for starting pigmenting is very useful.

A very large brush, made of long and fine "Lyons" hair, shaped like the Fitch brushes, is supplied by both Sinclair and Robersons. It is specially designed for dealing with broad masses of colour and for inking up large prints expedi-

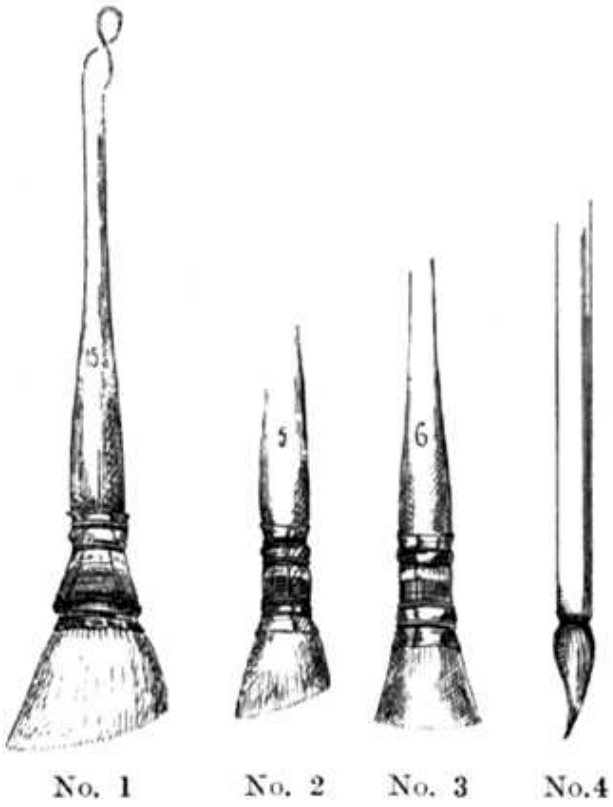

FIG. 3.—BRUSHES.

tiously. At the same time it is capable of giving the finest texture. It has been named the " Mortimer " brush by Mr. Sinclair, and listed by him under that title.

Messrs. John B. Smith, of Hampstead Road, London, supply several useful brushes specially

designed for the oil-pigment processes ; and Messrs. Miller & Co. of St. Thomas' Road, London, N., have also placed on the market a set of excellent brushes for the work. These are known as the " Salon " set, and include every useful shape.

The quality of the brushes employed for pigmenting is an important factor in the success of the results obtained. There is no doubt that the use of brushes of the best quality assists in the production of the finest prints. Good " Fitch " brushes of the type described are quite the best for all purposes. The hair is beautifully arranged in the manufacture, so that a firm dome-shaped surface is presented to the print when the pigment is dabbed on. It is also possible to do small and fine work with quite a large brush, provided that the brush is of good quality.

For a beginner, therefore, one or two of these Fitch brushes of fairly large size will amply equip him for most work. It is to the earnest worker's advantage, however, that he should possess a number of brushes, as it is easier and better to use a fresh clean brush as needed during the progress of pigmenting than to stop and clean the brush that has become fully charged with ink.

The “ stag-foot ” form of brush, being made with an oblique top, is much more suitable for working on an inclined surface as in the illustration on page 57 ; the hairs of the brush are then in the best position for work upon the paper, and the hand can take up a very natural and easy position; it therefore facilitates the inking, and is much more satisfactory — in fact, most prominent workers would not think of attempting to make an oil print without it.

The following brushes are recommended, and should be obtained, if possible, if the worker is making prints at frequent intervals every week:

Two	Stag-foot	Fitch	Brushes	. No. 14
Two	”	”	”	. No. 10
Two	”	”	”	. No. 7
One	”	”	”	. No. 5

In addition to these one or two straight-top brushes, Nos. 10 and 5; a “ Gradator ” brush, and one or two small sizes in Fitch for detail work. For preliminary pigmenting and big work a “ Prima ” brush and a No. 3 “ Mortimer ” brush will be useful.

This set of brushes should equip the worker thoroughly for all types of prints, and will enable

him to lay down a brush if it has become too heavily charged for the effect he desires, and take up a clean one.

If, however, only one or two brushes can be afforded at the start, the best to get are the Fitch No. 14 and No. 10, with a smaller one for detail work.

A very fine and useful brush for " working " in fine high lights is what is known in the " process " world as a " Chinaman's pen." (See Fig.3, No.4) Messrs. Penrose & Co. sell them under the title of the " Chinco " brush at *3d.* and *4d.* each; they are drawn out to a fine point and are firm, yet the tip is most soft; and they are the cheapest and best brush we know for stopping out defects, taking off small spaces of pigment, etc. They are set in bamboo, and have a protector of the same material. Sinclair and Griffins also supply this brush.

To Clean Brushes

Too much care cannot be taken with the brushes, not only because they are expensive, but because it very materially affects the quality of the work to be done with them.

After pigmenting they should not be left to become dry, but be immediately cleaned of all

ink and dirt. The best method of cleaning to be adopted is to pour a little petrol on a clean rag and rub the hairs of the brush on the rag. This will clean them admirably. If, however, the brushes have been allowed to get clogged, they need a thorough cleaning before use again. The petrol should be applied first and then the brushes washed in soap and water.

Take the brush in the hand and soap it well under the tap with a little water running upon it; work it between the fingers, and then let the water wash away the dirty mass which is the result of soap and ink; then re-soap again and leave a few moments whilst you clean up another brush, and so on until all have been roughly cleaned; then go over each one and wash until all trace of ink is gone, and the washing water remains clear, surface-dry them on a clean towel, and hang up hair downwards in a warm room to dry.

Do not roughly handle the brushes whilst washing or put them out of shape ; when perfectly dry make a cone of white writing-paper and slip it over the brush, over this place a small elastic band — it will help the brush to go back to its original shape.

Mr. G. E. H. Rawlins, writing in *The Amateur Photographer* on the subject, says: —

" So much depends upon the condition of the brushes that it pays well to take care of them. Although they last a long time, they naturally deteriorate with use, and the washing " takes it out of them," even more than hopping and dabing. It is therefore advisable to avoid washing them if possible. My plan is to wash my hands instead of my brushes! I keep two or three old brushes for the heavy pigmenting and rough preliminary work, and these I wash as usual after use. To distinguish them from the rest I have stained their handles black. Their condition is not very vital, as they are never wanted for fine work, so washing does not affect them much. But for the gentle ' hopping ' work I keep all my best brushes ; and, as they never become heavily loaded with pigment, I find careful rubbing on an old print, and then on the palm of my hand, generally cleans them quite enough to make washing only an occasional necessity."

Inks and Pigments

The choice of inks or pigments is a most important one. Upon this subject there is a great difference of opinion. This to some extent is based upon the fact that the personal equation

in the process is so considerable that a general rule cannot be laid down. Some workers can produce a brilliant print with a soft ink, yet an equally good worker will produce a flat and lifeless result, and in spite of all endeavours cannot give the brilliance of the other worker from the same negative. This is brought about by the personal touch, as there are probably no two oil workers who pigment a print in the same manner.

The chief points about the selection of ink are that it should he of extra good quality, finely ground, and one that will dry in a reasonable time.

There is not much doubt that the practical pictorial worker in the oil process studies his inks very keenly; he makes no hard-and-fast rule as to their thickness, but uses his judgment as to what he requires in his final result.

It may be taken as a general rule that hard or thick inks give contrasts, and soft inks flatness. Warm-coloured inks give less contrasts than blacks.

The special inks made by Mr. Rawlins, and now sold commercially by Griffins of Kingsway, may be taken as excellent examples of the best consistency for general all-round work. These

THE CHALET

Straight print. (See next page.)

THE SNOWSTORM

Oil print from same negative as print on preceding page; showing effect obtainable with slightly wet brush.

pigments are supplied in fine colours in tubes. The “ engraving black ” will be found to give print of fine tone and quality, and the ink is in the right condition for immediate use. Black is the best “ colour ” for most work, and generally suits every subject.

Robersons of Long Acre have recently put a series of special pigments on the market in handy form for the oil process, and their range of colours and undoubted high quality recommend them at once.

James A. Sinclair & Co. have also introduced “ Sinclair's Permanent Inks ” for the oil and Bromoil processes. These are made in a variety of colours, dry quickly, and are very brilliant in results. Both Sinclair's and Roberson's inks are supplied in a very stiff consistency, and have to be thinned for use by the addition of a very little “ Roberson's Medium.”

M. Demachy says on the subject of inks :

“ My first experiments were made with Mr. Rawlins' Special Ink — a thick tacky sepia, that works very well ; but subsequent trials have convinced me that complete liberty of interpretation can only be reached by having at one's disposal several samples of ink of different thicknesses

and composition. I have often found it necessary to use locally, on the same print, two or three different inks of the same colour, but of various degrees of tackiness, according to the degree of stickiness of the different portions of the gelatine relief. One must have actually seen the contradictory effects of two samples of different ink on the same print in the proportions between oil and pigment. The general rule is as follows : Thick, tacky ink causes contrast: fluid ink, such as ordinary oils, flatness. It follows that an over-exposed print will give a good image with thick ink, and no image at all with fluid ink, for it will ink all over — and *vice versa*, of course.

" This is why I insist on the necessity of having samples of ink handy for use on the same print, for it may happen — and it does often happen — that a false value, for which the negative is responsible, has to be toned down; in other words, that some portion of the picture has been, from an artist's point of view, under-exposed. It must be treated accordingly, and dabbed with fluid or extra fluid ink, just as thick and tacky ink will have to be applied locally to portions that take too much pigment, and lose their modelling. Patient working with the same sort of ink chosen for the rest of the picture will not

produce equivalent results, as experience has proved. For extreme cases I can recommend a tube of ordinary oil colour to be used sparingly.

" I have come to the conclusion that all sorts of inks, except the non-dying lithographic transfer ink, can be of use — but that only two samples will meet the everyday requirements of the oil printer. These, for France, are represented by the " Encre Machine " and the " Encre Taille Douce " * of Valette's, both of which are quite free from turpentine. I use several other kinds of home and commercial manufacture, but only for special and rare occurrences. With an ink of the thickness of " Encre Machine " for fully exposed, and of " Taille Douce " for under-exposed portions of a picture, one can work for months without feeling the want of any other ink. The day that want makes itself apparent, a simple addition of cooked or pure linseed oil will be sufficient to convince the oil painter that he had better print another picture with the right exposure ".

Other inks that can be employed for the process are " Photo Litho Black ", made by Messrs.

* Both the " Encre Machine " and " Encre Taille Douce " can be obtained from J. A. Sinclair & Co., Haymarket, London S. W.

Penrose; and Litho Black and Sepia, Shades 1, 2 and 3, by Flemings. These are all good and ready for use.

The best collotype inks made by Messrs. Penrose can also be recommended, and if a very soft and smooth working pigment is wanted, Windsor & Newton's " Stiff " oil colours in tubes are useful. They are excellent for negatives giving very hard prints and if a picture in a low key, lacking in contrast, is wanted.

The beginner is advised to stick to one ink, such as Rawlins' or Sinclair's , and do all work with it until he has acquired a knowledge of the process and a " touch " that enables him to get the results he wants.

Pigmenting or Inking up the Print

We now arrive at the most important stage of the oil process, that of inking-up the print already prepared for the purpose. It is a stage that may be written down as purely individual and which really requires a practical lesson to demonstrate thoroughly.

We have all our own particular methods of controlling a negative in the developing dish — working on the film or glass side, as well as con-

trolling the print by various means to produce what is in our judgment a harmonious pictorial result. Now this indicates a wish to produce something that contains our own pictorial ideas apart from what mechanical means will give us, but we use photography as the main basis of the production.

The personal element is given greater opportunity in " oil " than in any other controllable process, and in pigmenting the print we have absolutely free control of our subject, bearing in mind the power of the consistency of the inks we are using.

To be practical and as brief as possible : After the print has been soaking for at least an hour it is taken and placed upon a pad of wet smooth blotting-paper. The best method of preparing this pigmenting pad is to take a sheet of plate-glass and use this as an easel upon the working desk. Upon the sheet of glass place three or four thicknesses of 80-lb demy white blotting-paper or " Robosal " well soaked with water. Upon this spread a pad of two thicknesses of butter-muslin (that has been well boiled previously). This makes a good firm working surface.* Upon the muslin place the print,

* Messrs. Griffin of Kingsway now supply a pigmenting pad specially made in an enclosed metal case ready for use.

face upwards ; now take a piece of the blotting-paper and take off the excess of wet from the surface of the print. Do not make the surface too dry; only take off the superfluous wet.

The print is now in a condition for receiving the ink. It will be noticed that the image stands out well in relief upon the surface of the wet gelatine, and many workers judge the character of their success from the appearance of the print at this stage. The greater the relief the more readily the ink will “ take ” in the preliminary pigmenting.

Now take a piece of clean glass or Bristol board (an old negative answers well), and at one side place some of the ink to be used; a small quantity, about the size of a pea, will suffice for several 1/1 plate prints. Spread this out on the surface to about 1 to 2 inches square. The ink should be in a condition that can be worked about with the knife on the palette without much pressure.

For mixing up the ink, a stiff palette knife or old household knife should be used. Having spread the ink on the glass, a brush is taken and dabbed once or twice on it, so as to pick up some of the ink ; but before applying it to the print it is dabbed twice or three times on a clean

part of the palette to distribute the ink evenly over the brush.

The brush should be lightly held, and not gripped, between the thumb and the second finger, the first finger supporting the second and helping to guide the brush ; the third finger should be separated, and the fourth in the air,

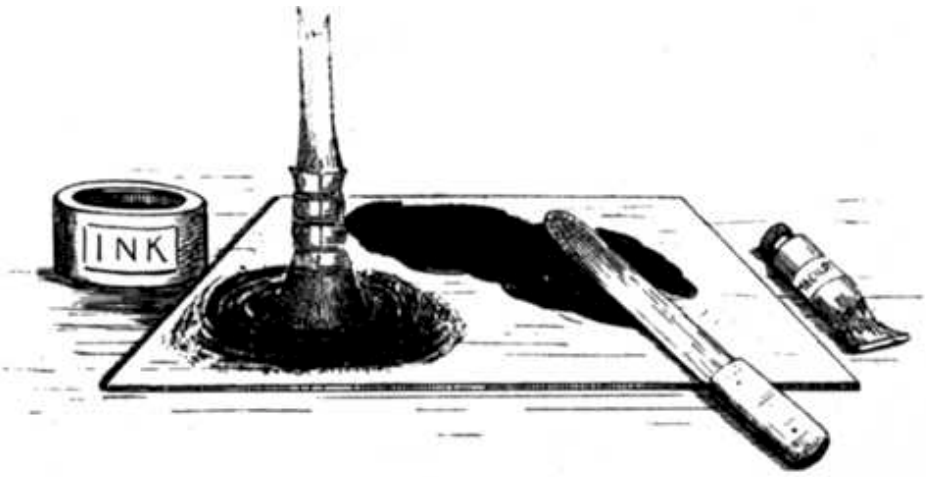

FIG. 4.—INK AND PALETTE.

in the painter's method. The wrist should be bent, but quite free. The brush should not be held too near the hairs — a very general mistake with those who are not used to handling brushes. Any ink will seem harsh and unmanageable, if the print has not the sufficient exposure for that ink; while if it has been properly exposed, however hard the ink, it will seem soft in use. The worker can thus feel at his finger ends, from the

very first, whether the composition of the ink is suitable.

It is always wise to start inking up with “ hard ink,” bearing in mind that we can always introduce any lower consistency of ink into our work as occasion requires, but it will be found very difficult to introduce a “ hard ” ink on a “ soft ” one, the tendency being to pick up the ink already deposited.

In our practice it is usual for us to have two consistencies of ink on the glass or ink palette, one of thick or normal consistency and the other thinned down somewhat with Roberson's Medium, linseed, oil, or Meglip.

We have found that the colour of the blacks is much finer with linseed oil than with any other reducer we have tried, and the “ oiliness ” of the print is retained much better; but Roberson's medium, supplied in tubes, is cleaner to use, and dries very rapidly.

The brush action of most workers varies considerably. Many take a slow kind of tickling or dragging action on the paper, whilst others just dab the brush lightly all over the print and build up the image in their own particular manner. A small amount of ink only in required at the commencement. When once the ink begins to “ take ”

and the image forms, go boldly to work and ink-up as quickly as possible, taking up more ink on the brush from the palette as the print requires. The best results are obtained by working boldly and finishing off the results quickly.

The beginner will now realise that the action of

FIG. 5.

the ink is to adhere to those parts of the picture which have been acted upon by the light, while other parts of the picture — the high lights — repel the ink on account of the gelatine being filled with moisture, to which the ink will not adhere.

The print must be kept moist from underneath all the time pigmenting is proceeding.

If it becomes surface-dry, the pigment will adhere all over. (This at times may be taken advantage of when certain effects are desired.)

The beginner should start pigmenting with a light tapping action evenly all over the print, depositing the ink carefully and surely, and taking up more from the palette as required. It will be readily seen when more ink is wanted on the brush, as the empty brush will start lifting pigment instead of depositing it. Always restart upon the print in the shadow part and gradually work towards the high lights.

If pigment is required to be removed or reduced, it will be found that quick light tapping or " hopping " with the brush will do what is required. A slower action, by which the brush is softly pressed on to the surface of the print, will deposit pigment, even in the high lights. If this action is continued with a soft ink it is possible to completely ink over the entire surface of the print to a uniform tint. A quick bouncing or hopping action of the brush will then " clean " up the high lights and shadows and bring out the picture again. One is to use gentleness rather than violence when pigmenting a print. Under the influence of a gentle perseverance the print will take up the ink ; if one is violent it refuses

to do so. Most of the beginner's difficulties are brought about by too much vigour and roughness in handling the brush, or by impatience at not getting a finished and perfect result immediately.

A sweeping or dragging action of the brush upon the almost finished print gives a touch of brightness very often to the lights, and at the same time the shadows are helped. This sweeping action can be effectively employed to intensify a somewhat flat or weak print — one that has been made from a flat negative or has been over-exposed. The best method of " sweeping " is to hold the brush by the end of the handle almost vertically over the print and gently " swish " or " sweep " lightly across the surface. It must be the merest touch — just a flick and no more. The high lights will be cleaned up in a remarkable way by this method and the shadows gain in strength by contrast.

The brush needs cleaning immediately after, as it will frequently evince a tendency to deposit the colour it has swept up in ugly patches on undesirable places.

The outline and general form of the picture having been built up by carefully going all over the print with gentle dabbing and hard ink, the broader shadows are inked in with a well-charged

brush — still using the hard ink. This ink can be used until the picture is fairly well developed and most of the shadows as strong as desired. If to the ink on the palette a very little Roberson's Medium or linseed oil is added, and the mixture well kneaded and spread about with the palette knife, it will be found that when the brush applies the softer variety the print will take the ink more evenly all over its surface. Care must now be taken not to entirely close up the finer details, which may well occur if the ink is too soft.

Vigorous " hopping " will then have to be resorted to, to clear the print again.

The hopping action with the brush is one that comes instinctively to many workers. It consists in gently dropping the brush square on to the pigmented portion that requires clearing, and catching the brush as it " bounces " up again. The brush is never dropped or " thrown " from a greater distance than about 2 in. from the paper, and after a little practice it is possible to repeat the action with great rapidity and certainty. It is a method of treatment, however, that should be avoided, as the desired effect should be obtained, if possible, by building up, and the hopping action only used as a corrective.

Experience shows that a print with reserved whites looks infinitely better than one the whites of which have been produced by removal. But in the darker portions of the print the use of the hopping action often becomes a necessity. There are half tones and shadow details that

FIG. 6.—POSITION OF BRUSH FOR "HOPPING."

it may not be possible to reserve. They will have to be inked over and picked out by "hopping."

The less a print is worked on, the better it will be.

As the picture is but slightly visible at first, it will be found of service to have at hand an

ordinary " straight " bromide or P.O.P. print — the latter need be only lightly printed — fixed and rinsed. Such a straight print not only is a great help in showing one all the drawing of one picture, but also it is a useful aid as a restrainer, preventing one dabbing about indiscriminately.

We have found that the average worker in oil generally succeeds in obtaining prints at first that do not do the process justice. The results are dirty, and the picture has a spottiness that appears difficult to obviate in some workers' hands. The smooth, velvety texture that should be the standard of a good oil print is generally missing, although the pigmenting has been otherwise conducted perfectly. We have heard the expression " creamy " applied to the appearance of a really good oil print that has been produced with due regard to the possibilities of the pigment, and with less regard for the " grainy " texture that appears to be inevitable when some workers use a brush.

The fine texture can only be secured by practice, and the beginner need not despair because he fails to get a perfect print at the first attempt.

One of the chief causes for uneven or degraded texture that occurs with the beginner is the

drying of the print during pigmenting. The paper must be kept in the right condition of moisture for pigmenting, or the results will be unsatisfactory.

A corner of the print should be lifted occasionally during pigmenting, and the under side should appear quite wet. If this is not so, the print should be lifted entirely from the pad, placed on a sheet of clean blotting-paper, and the pad should be well wetted again by pouring a little water all over it. Sometimes the print is allowed to get so dry that it curls up from the pad. In this case the best plan is to float it for a minute or two on the surface of a developing-dish full of water. The paper will quickly absorb sufficient moisture to put it in working condition again, when it can be replaced on the pad — which should also be re-wetted, and pigmenting can be continued.

Brush action can be assisted somewhat by the use of a spring handle for holding the brush. Messrs. Griffin supply an arrangement of stiff wire that holds the brush in a vertical position at one end and allows the other end — the wire is about 10 in. long — to be held in the fingers, and the " play " of the stiff wire handle gives a " tapping " action to the brush. Similar holders can easily be constructed by ingenious

workers, and are principally designed to save fatigue to the muscles of the forearm.*

The control that the oil-pigment process places in the hands of the pictorial worker enables a pleasing result to be frequently obtained from the most unpromising negative, and in a manner that probably no other process could attempt.

With the " pilot print " before him, the worker should make his mind up as to the parts that require accentuating, and the high lights that need suppressing. The first general inking up then gives a working outline, and progress should then be quite straightforward.

It is useful, sometimes, to make a matt surface pilot print — say on bromide or gaslight paper — and with a soft pencil or charcoal and stump go over the composition, subduing portions here and there, strengthening shadows where needed, and generally pulling the masses together.

If it is a portrait, the background may be treated, or the high lights of the collar or hands may be reduced, but in any case it becomes much easier to make a satisfactory oil print with

* Since writing the above, James A. Sinclair & Co. have introduced an improved form of brush-holder to facilitate pigmenting.

AWAY ALOFT.

The straight print. (See next page, for controlled oil print from same negative.)

AWAY ALOFT

Bromoil print from same negative (see preceding page) Note alterations in tones and accentuations of masses

greater decision with the pilot print treated in this fashion before one, than when working at the print without a guide of any sort beyond a sustained idea of the result as you think it ought to be.

It has been said that the clouds of many oil prints are either conspicuous by their absence, or bear strong evidence of being hand-made, and we must say there is much truth in the statement. Yet there is no reason for this: clouds may be " printed in " just as in any other process, and can be inked-up just as delicately or as vigorously as may be desired; and they are certainly more truthful and artistic than any " home-made " clouds we have seen.

Over-Exposure,Correct Exposure, Under-Exposure

These three conditions are likely to be encountered, and they can be easily recognised and treated accordingly.

In the first, under the influence of a light tapping the ink takes everywhere; with every touch of the brush the shadows take on more ink and darken very rapidly, losing all gradation. At the same time the high lights darken to a

half-tone. Dabbing in the way described has no effect instead of removing ink, it seems to make it adhere more strongly. These signs indicate that the print is over-exposed. Hard ink must be used for the pigmenting, and hopping resorted to, to keep the lights clear. The " sweeping " action already described must also be attempted, and as much of the pigment on the high lights brushed off as possible.

In the second case, we may find that under the tapping strokes the part selected for the test progressively inks-up and the normal contrast make their appearance. This shows that the print is correctly exposed for the hard ink, and all one has to do is to go on inking-up with that. This is certainly the best result to get, as it gives the greatest freedom to the photographer for modifying his treatment in different parts. One should always try for the exposure that will give this result.

In the third case (under-exposure), the print only " takes " the ink with difficulty. In spite of repeated tapping and dabbing, the shadows will not darken, and the highest lights and lighter half-tones make no appearance. If the tapping is a little harder, the shadows lighten and the

half-tones become granular. The appearance of a coarse grain under the brush, which cannot be made finer, is always an indication that the print is insufficiently exposed for the particular ink in use. Dabbing immediately weakens the tone.

These signs show that the print has not had enough exposure for the hard ink, and this must therefore be thinned with a little Roberson's Medium or oil. The addition should be done little by little, so as not to exceed the exact degree of softness that suits the exposure. In fact, it is better to use an ink a little too hard rather than one too soft as the latter has the effect of over-exposure and tends to flatten the result. Besides, the softening action is very marked. A mere spot of medium or oil, such as can be taken up on the end of a match, quite transforms the hard ink. If the first addition is insufficient for the purpose, add some more. After one or two such additions we shall feel that the resistance of the ink ceases. The shadows under a light tapping stroke gradually darken in tone, and the half-tones gradually take on a delicate modelling. This shows that the ink is suitable, and work with it is continued.

One general principle has already been enun-

ciated-viz., that the tones should be gradually built up by successive additions , rather than that we should have to remove an excess of ink. Another is that it is advisable, after bringing out any particular part, to build up its gradations almost as far as necessary before passing on to a fresh part.

The whole picture may be divided into the centre of interest and the subordinate parts. It is in the first-named always that the strongest accents and the clearest details are to be found; in the second, the different elements are sub-ordinated or sacrificed. Hence the importance of the rule. In the progress of inking, the centre of interest should always he a stage in advance of the rest.

Removing the Pigment

A soft sponge and cold or slightly tepid water will remove the whole of the pigment from the print if a mistake has been made that cannot be easily corrected without starting afresh. This, of course, only applies if the pigment has not had time to dry. If the pigment has been applied thickly, petrol will be necessary to remove it. The surface of the print can then be finally

cleaned with plain water and a soft sponge, taking great care not to abrade the surface. The print should of course be well soaked again before starting to re-pigment, and it is safer to let it dry totally before soaking it anew — to avoid unequal swelling of the gelatine.

The points to remember when pigmenting are:

Much ink will be deposited if (1) the image is nearly dry; (2) the dabbing is heavy and slow ; (3) the pigment is fine and the brush well charged ; (4) the temperature of the air is high; (5) the print has been over-exposed.

Little ink will be deposited if (1) the image is very moist; (2) the dabbing is light and quick; (3) the pigment is stiff and the brush comparatively clean; (4) the temperature of the air is low ; (5) the print has been under-exposed.

After Treatment

When the pigmenting has been satisfactorily accomplished the print must be hung up to dry in a place free from dust, or it may be laid on a sheet of clean blotting-paper in the bottom of a box or drawer, or pinned by the four corners on

a board and placed near a stove, when it will dry very rapidly. In the ordinary way the paper and gelatine will dry in 1 to 3 hours according to the hygroscopic condition of the surrounding atmosphere, and the ink in about 24 hours, or less in warm weather. Heavily pigmented prints, of course, take longer to dry than those in which the pigment is very slight.

When dry, the first thing to do is to clean up the surface of the print. It will be found that in spite of every precaution a certain amount of fluff, small hairs and other foreign matter, has found its way on to the surface of the print while pigmenting or drying. No attempt should be made to remove this until the surface is dry.

When quite dry, it will frequently be found that lightly " dusting " the surface with a clean brush — a pigmenting brush answers admirably — will entirely remove the specks and bits of fluff, etc., that were adhering. A soft cloth may even be applied, and gentle rubbing resorted to. In the case of hairs embedded in the pigment, a small lancet, or fine-pointed knife will generally serve to lift these out. Care must be taken, and a steady hand is needed so that no mark remains.

A needle mounted in a wooden penholder

makes a handy tool for picking off these atoms of foreign matter. Another method that has been suggested is to place the dry print face downwards in water at a temperature not exceeding 70° in a deep dish. In about half an hour, after occasionally rocking the dish, the fluff and dirt will wash off and drop to the bottom of the dish. The print can then be pinned up to dry again. When the fluff and specks have been removed, and the print is perfectly dry, it can be straightened out flat by passing a flat-edged ruler over the back. This should be done on a sheet of clean glass, and the ruler should be drawn over the back of the print — not the print pulled under the ruler —or the surface may get damaged.

High lights can now be touched up with a pointed piece of rubber, or very fine points of light can be accentuated with a sharp scalpel or penknife. The sharpened nibs sold for print trimming make excellent retouching knives. *(See* Fig. 7.) A piece of soft rubber will work wonders in capable hands at this stage of the print's life, and many of the tone values can be greatly assisted if it is found necessary. The retouching should not be overdone, as the tendency to introduce many points of light will probably disturb the concentration

Fig. 7.

of the subject which has been achieved in the pigmenting.

Spots may be touched out carefully with a little of the original pigment; but large spaces should be touched in this manner very carefully indeed, or the newly applied pigment will dry with a different texture and betray itself at once.

The appearance of oil prints — especially those in which heavy shadows appear — may be enhanced by varnishing. " Vernis Retoucher," supplied by Robersons or Sinclair, is the best for the purpose. This is an exceedingly fluid petroleum varnish. It is applied rapidly to the print with a broad camel-hair varnish brush, and dries almost immediately.

Mounting the oil print is easily conducted, but it is always wise to keep a sheet of tissue paper in front of it to avoid abrasion.

The best method of mounting is to trim the dry print and affix it by the corners only or the top edge to the required position on the mount. It may, however, be pasted all over the back, but is difficult to rub down satisfactorily, as there is always the risk of injury unless the pigment is some weeks old and absolutely hard.

Dry mounting can be recommended also if the

pigment is quite hard, but do not attempt this form of mounting with a print pigmented within 24 hours. The heat of the mounting process will probably remove the greater portion of the pigment.

FAILURES IN THE OIL PROCESS

For the benefit of beginners a useful Table of Points in connection with the Oil-pigment Process in appended. The various points have been tabulated by Dr. A. R. F. Evershed. Many of the points also apply to the Bromoil process

FAULTS.	CAUSES.	REMEDIES.
1. Pigment refuses to adhere . . .	(a) Underprinted image . . .	(a) Print deeper.
	(b) Too stiff a pigment . . .	(b) Thin pigment with megilp.
	(c) Too rapid a brush action . .	(c) Obvious.
2. The pigment, after first adhering, comes away in small irregular spots.	(a) Too rapid and uneven a brush action.	(a) Obvious.
	(b) The gelatine has blistered . . .	(b) Burn the print.
	(c) Some foreign body on brush . .	(c) Clean the brush.
	(d) Some defect in the gelatine coating.	(d) Generally met with in papers not specially prepared for the process. Use different.
3. The pigment adheres all over. both high lights and shadows.	(a) Printing on the non-gelatine surface	(a) Obvious.
	(b) Unsuitable negative, viz. too thin	(b) Intensify the negative.
	(c) Washing water too hard . . .	(c) Boil the water and allow to cool.
	(d) Oveprinted image	(d) Do not print so deeply.
	(e) Insufficient soaking	(c) Soak two or three times as long, up to six hours.
	(f) Too thin a pigment	(f) Spread a thin film out, and allow the excipient to evaporate.

3. The pigment adheres all over, both high lights and shadows.	(g) Brush too heavily charged with pigment. (h) Brush action too slow (k) Deterioration of gelatine, due to (i) too long a soaking, (ii) the use of hot water, or (iii) formation of bacteria. (l) Drying of print whilst pigmenting	(g) Obvious. (h) Obvious. (k) (i) Throw print away; (ii) ditto; (iii) ditto (l) Re-soak or re-damp blotting paper pad.
4. Circular spots, refusing to take pigment.	(a) Formation of air-bells in sensitising bath. (b) The brush has picked up some moisture.	(a) Brush paper whilst in bath. (b) Press brush on clean dry blotting-paper, and press another piece on the spots.
5. Circular spots, taking pigment more freely than other parts of image.	(a) Formation of air-bells between surface of gelatine and water whilst soaking. (b) Puncturing of gelatine	(a) Turn prints two or three times over and remove air-bells when first put into water. (b) Destroy print.
6. Pigment adheres in streaks	Unskilled sensitising with brush	Sensitise in future by immersion.
7. Pigment is deposited as if "peppered" on to the image.	Brush has become clogged	Clean brush by rubbing on a piece of clean old P.O.P. or bromide paper.
8. Pigment deposited in irregular areas after soaking during pigmenting.	Print has not been put into the water face downward and all the imprisoned air between the surface of the print and water displaced.	Obvious.
9. Image pigments up as a negative instead of a positive.	Unknown	Continue pigmenting, and the reversal will disappear.

II

THE BROMOIL PROCESS

As briefly mentioned in the introduction to this book, the Bromoil process is analogous to the oil-pigment process inasmuch as it depends upon the distinctive action of swollen gelatine towards greasy ink; but in this case, instead of being brought about by the action of light on a bichromate salt in the gelatine, the selective image that repels or attracts the ink has been produced by chemical action on a silver image already formed in bromide paper. The selective action is in direct ratio to the original image; and in the final Bromoil print — provided the pigmenting has been straightforward — the result is a picture in oil pigment that has replaced the silver image of the bromide print. The enormous advantages that the Bromoil process places in the hands of the worker who desires to make large prints but who has not the time or inclination to make the enlarged negatives which are necessary for the direct oil process, are obvious.

What can be more simple than the production of a bromide enlargement, drying it and treating it with a bleaching bath, etc., when it becomes practically the basis for an oil print ready for pigmenting ? It is the ideal winter or evening process, as the entire procedure can be carried out by artificial light, and quite as much control is placed in our hands as with “ oil ” printing.

The Bromide Print

The quality of the bromide print which is to be converted into the Bromoil print is deserving of careful attention. The best print for the purpose is the one that is specially prepared for Bromoil work, but as this means as good a bromide print as the negative will give, there is no reason why good prints or enlargements should not always be made.

The print should receive correct exposure, and should be fully developed in a dilute amidol or metol-hydroquinone developer. The dilution of the normal developer with an equal amount of water slows the action, and allows an apparent evenness and richness of deposit to build up that does not appear to obtain when a quick-acting concentrated developer is employed. The character of the print appears different, even when

made from the same negative and given the same exposure. There is no doubt, however, that a bromide print made in this way and fully developed to obtain a full, rich, and plucky image, is ideal for making a Bromoil print.

The tone of the print for Bromoil work should be blacker than would be quite correct for a good bromide print, but the shadows should not be flattened by over-exposure. The fixing bath should be a neutral one. The acid fixing bath appears to harden the film to such an extent that uneven bleaching or inability to properly pigment results.

It is also possible to entirely omit the fixing bath at this stage, and considerable time is saved. The developer must be well washed out, however, before bleaching. This method is not so certain as when the developed print is fixed, washed, and dried in the usual manner.

Smooth matt papers are the best for pigmenting. Rough-surface papers are never altogether successful. Any of the best-known brands of bromide paper will yield good Bromoil prints, but bromide paper with a specially prepared emulsion calculated to withstand the rough treatment of vigorous pigmenting and also to give bright prints is now made by several manufacturers specially for the process.

The prints should be freshly made. Prints that have been made for some time, and allowed to get hard, are difficult to deal with. The best method of treating such a print, provided another cannot be made to replace it, is to soak it in water not lower in temperature than 65° for 4 or 5 hours. It is then taken out and hung up to dry. When dry it may be treated in the same manner as a freshly made print, and may give the same result.

Bleaching the Print

The original bleaching solution for Bromoils suggested in *The Photographic News* by Mr. C. Welborne Piper was as follows:

"Ozobrome" stock solution	4 parts
10 per cent. potash alum solution . .	4 ,,
10 per cent. citric acid solution. . .	1 part
Water to make	20 parts

The print was placed in this until the image bleached out or turned a faint brown colour. The action of this bath is somewhat rapid, and the solution becomes exhausted fairly soon. The best results are obtained when the dry print is placed straight into the bleaching bath and

allowed to soak until evenly bleached and quite limp. Messrs. Griffin have placed upon the market a special “ Bromoil ” solution that needs only the addition of water for immediate use. The formula is:

Bromoil solution (No.1 and No.2)	1 part of each
Water	2 parts

This diluted solution should be kept in a well-corked amber bottle or in the dark, and replenished from time to time with a little fresh stock Bromoil solution mixed in the above proportion. It may then be used repeatedly until exhausted.

In this solution the image takes about three minutes to completely bleach out. The effect of this becomes apparent when pigmenting. The constituents of the solution enable a very strong and vigorous image to be built up with great rapidity. This Bromoil bleacher is also supplied by Messrs. Griffin in powder form, and only needs dissolving in water to make fresh solution ready for use.

In a little booklet on the oil and bromoil processes previously referred to, and published by James A. Sinclair & Co., C. H. Hewitt, F.R.P.S.,

gives the following formula for a bleacher for Bromoil prints: —

Potass. Bichromate	2 dr.
Potass. Bromide	1 ,,
Potass. Ferricyanide	1 ,,
Alum	4 ,,
Citric acid	1 ,,
Water, distilled, up to	10 oz.

This solution should be mixed fairly freshly.

Mr. Hewitt suggests that with this formula the bromide print should be soaked in cold water until limp, the water being carefully drained off again and the solution applied so that the action commences evenly. Bleaching is complete in a minute or two.

The Acid Bath

A brief rinse in running water or a couple of changes in clean water should follow the bleaching, and the print, now practically free from yellow stain, is immersed in an acid bath composed as follows:

Water.	1 pint
Pure sulphuric acid	1 oz.

When making up this solution add the acid to the water, and not vice versa, or sufficient heat will be generated to break the bottle or measure. In any case do not use the acid bath until it is of normal temperature — i.e. 65°. It may be readily cooled by allowing cold water to run on to the bottle containing the solution. The print should be allowed to stay in the acid bath for about five minutes—longer in cold weather, or for less time in warm weather. By passing the finger-tips over the surface of the print while in this bath, a distinct relief will be felt. This will be particularly the case at the margins of the print if there is a clear mark of the printing-frame rabbet.

At the expiration of five minutes the print should be removed, and the image should be visible in faint relief if the subject is one containing contrasts. Obviously, if the subject is one containing very little contrast of light and shadow there will be scarcely any relief in the bleached image.

The Fixing Bath

The print is again washed for two or three minutes, and then fixed for one minute in —

Hyposulphite of soda	2 oz.
Sodium sulphite	½ ,,
Water.	20 ,,

This bath practically removes all trace of the silver image and leaves the paper almost blank. The proportions of hypo given above should not be exceeded, or blistering may occur. Blistering may also occur if the fixing bath is too freshly made, and is in consequence very cold. All solutions for the Bromoil process should be of about an equal temperature — say 65°— if the best results are wanted. If this bath is not used the pigmenting may still be done, but there is a danger of the silver image remaining in the film blackening on exposure to light, and the tones of the final print would be affected. If necessary, however, the unfixed image can be redeveloped with amidol or sodium sulphite and the pigment applied on top of the redeveloped image.

The whole of the bleaching and fixing operation may be conducted in broad daylight.

The Bleached Image

After fixing, the print is washed for five minutes, and is then ready for pigmenting, or it can be dried and put away for future use. In this case

it will need to be soaked for about an hour before the image will be in the best condition for pigmenting.

In cold weather care must be taken to ensure that the washing waters and also the fixing bath are not below about 65° temperature, or there will he difficulty in pigmenting and “ flat ” prints will be obtained.

An inspection of the print when it is ready for pigmenting will enable one to tell very accurately whether it is in proper condition or not.

If correct, the image will be slightly coloured and also glossy, while the rest of the print will be white and matt. The effect varies slightly with the kind of paper used and the vigour of the original black and white image.

Generally the image will be seen to be in sunk relief, or intaglio, but the degree of relief is not of any consequence. It appears to depend largely on the thickness of the gelatine emulsion and the character of the subject as mentioned above. With a thin rough paper little or no relief is produced, but the image will pigment just as readily as one in strong intaglio.

In hot weather, or if a sample of bromide paper is used of which the gelatine is too soft to stand much brush-work, a method of hardening

the film, suggested by Mr. T. H. Greenall, in *The Amateur Photographer,* should prove useful. The bromide paper is bathed in a hardening solution *before* exposure.

The bath, which will keep and may be used repeatedly, consists of 50 minims of 40 per cent. formalin dissolved in 5 ounces of ordinary mineralised (methylated) spirit. The time of immersion is half a minute, and the paper is then pinned up to dry. Of course several sheets may be hardened at one operation, and the work must, of course, be done in the dark-room. It appears necessary to use the formalin *before* making the silver print, and not at later stages.

Alternative Methods of preparing the Print for Pigmenting

An alternative bleaching bath which dispenses with the acid bath can be made as follows :—

10 per cent. bromide of potash solution . .	4drs.
10 per cent. sulphate of copper solution . .	6 ,,
10 per cent. bichromate of potash solution .	2 ,,
Water	8 oz.

When first mixed this bleacher (which should

be pale green in colour) will be cloudy in appearance. This will not interfere with its working qualities, but as a brown precipitate will be thrown down, it is best to clear it by the addition of one or two drops of pure hydrochloric acid. It can be used over and over again.

This bleacher works best at a temperature of 65°- 70° F. When the print is bleached wash well in water at a similar temperature, and then fix in above fixing bath. Rinse, and dry. This bleacher is suitable for thin and flat prints.

Yet another method, advocated by C. H. Hewitt, is briefly as follows: —

(1) Bleach the bromide print in the ordinary way in the bichromate ferricyanide bleacher.

(2) Wash in, say, a dozen changes.

(3) Swell and fix in ammonium sulphocyanide 1 oz. to water up to 20 oz.

(4) Wash in, say, a dozen changes.

The print is then ready for pigmenting in the usual way.

In this method the acid and fixing baths are replaced by the sulphocyanide bath. The tendency, however, is to render the gelatine very soft.

A modification in the preparation of the bromide print for pigmenting suggested by J. M. Sellors *in The Amateur Photographer* for July 27,

1909, will be found useful by those workers who desire to make an enlargement and convert it into a bromoil straight away. The production of the bleached print is very rapid.

The bromide paper is exposed in the usual way, soaked for a few seconds in plain water, and developed with amidol. After vigorous washing with a spray for one minute to clear out the developer, it is placed in the bromoil bleaching bath, which is heated to a temperature of between 80° and 90° F. The bleaching usually takes from two to three minutes. After bleaching, the paper is again washed under the spray for one minute and transferred to the 5 per cent sulphuric acid bath, in which it remains for from three to ten minutes. After another minute's wash under the spray, it is put into an ordinary acid fixing bath, made up of the hypo, sodium sulphite, and sulphuric acid, and allowing five minutes for fixing. The paper is then well washed for ten minutes, and at the end of that time is ready and fit for pigmenting.

Pigmenting

The print, after leaving the washing water, is placed on a wet pad of blotting-paper in the same manner as a direct oil print (see page 52).

The surface of the print is mopped with fluffless blotting-paper or butter-muslin, and the pigment is applied with the same action as in the oil-process. (For description of brushes and pigments, see pages 40 and 47.)

The method of inking is, however, a little different in the case of Bromoil prints. Here the best procedure is to apply the ink at first in a fairly stiff condition in all cases. This will pigment up the general outline and form of the picture in solid colour. The ink can be applied boldly, but not roughly, with a large brush, and the surface covered as expeditiously as possible. When the image is thus well pigmented, the second part of the treatment commences with a more fluid ink.

The first ink can be softened with Roberson's Medium, or an ink of a different shade can be applied; but this latter must be done carefully, or results not altogether satisfactory will appear. A thin sepia coating may be, for instance, applied over a black or blue-black colour, or burnt sienna over sepia or burnt umber. The second application is made with a quiet " smudging " action of the brush, and the colour applied very sparingly. Only just sufficient is necessary to soften down the hardness of the first application and to produce a velvet-like texture.

If a delicate image is required the picture may be built up gradually with a very little pigment on the brush at the beginning.

Half-tones can be readily lightened by dabbing with a nearly dry brush, but shadows can only be softened slightly, and turpentine or benzole is necessary for their removal. Detailed high lights, if over-pigmented, should be cleaned right off the wet cotton wool or a wet brush, and can then be re-pigmented. A dry brush will lighten them, but at the expense of their brilliancy.

The texture of the paper should be chosen to suit the subject, and glossy papers avoided always, but very rough bromide papers do not appear to take the pigment well. The papers known as " Carbon " or " Velvet " surface will be found very suitable for obtaining rich bold results.

The after treatment of Bromoil prints is practically the same as that described for oil prints (see page 69).

For spotting purposes it is a good plan, when pigmenting in a " made " colour, to dab a fairly thick patch of it on to the margin of the print. This is cut off when the print is trimmed and cleaned up, and if any portion needs retouching a little medium applied to the patch of colour

will soften it sufficiently to give a small supply and afford an exact match for the print.

Some Experiments in Bromoil

A process of utilising the redeveloped image of the bromide print in which the rationale of the Bromoil process is followed in order to varnish the shadows of the picture was described in *The Amateur Photographer* for December 10, 1907.

The print is bleached by the method previously described, well washed, and then either treated with sulphide solution, as in ordinary sulphide toning, or redeveloped, in which case the final image will be black. The sulphiding solution consists of —

10 per cent. sodium sulphide . .	25 mm
Hydrochloric acid (1 in 5) . . .	5 ,,
Water	2 oz.

Note. — The hydrochloric acid must be added at the last moment before using, and fresh solution mixed each time.

The alternative redeveloping solution must be fresh, and consist of —

Amidol	2 gr.
Sodium sulphite	20 ,,
Water	1 oz.

After either sulphiding or redeveloping, the print is just rinsed and then placed in sulphuric acid, diluted,1 oz. in 20 oz. of water, as in the Bromoil process. In this bath the print is allowed to soak for twenty minutes or longer, and is then washed for ten or twenty minutes and dried; or it may be taken at once for varnishing.

To Apply the Varnish.— Have ready a moist pad, consisting of several layers of wet paper placed on a sheet of glass, and on this place the print previously soaked in water. The varnish consists of a few drops of Japan gold size and a touch (about one-fifth the quantity) of raw linseed oil, and should be mixed with an old table-knife on a piece of glass. Now take a china painter's dabber, which is a soft camel-hair brush, closer and more velvety than a mop, and press it on the layer of varnish, afterwards dabbing it once or twice on a clean part of the glass, and proceed to apply the varnish to the print.

It will be found that the highest lights resist the varnish and remain perfectly matt, whilst the shadows take on extra richness in proportion to their depth. In a large print a part only may be worked on at once. The operation must be complete before the varnish dries, but should this occur before the high lights are clear, it is

only necessary to gently wash the print with soap and water, or with a soft rag moistened with paraffin, followed by soap and water.

Further notes by Mr. Greenall in a subsequent issue of *The Amateur Photographer* described a method of adding pigment to the gold size and so obtaining an oil print on top of the redeveloped bromide print.

The bromide print is bleached in the usual manner, and is then just rinsed and put straight into the sulphuric acid bath, where it remains twenty minutes or longer, and then into a fixing bath composed of hypo 4 oz., sulphite of soda 1 oz., water 20 oz. A few minutes' fixing is sufficient, and after half an hour's washing the print is ready, or it may be dried and used at any future time after soaking in water. No washing is required between the bleaching and sulphuric acid, because in this case any reduction due to chromic acid is of no importance, but if the print were a toned bromide intended for glazing, it must be washed an hour before putting in the sulphuric acid, which must also be fresh, or there will be loss of half-tone.

The process of pigmenting is similar to the direct oil process.

Any powder colour may be used for preparing the pigment, but it must be fine. Paint-shop

colours are too gritty except for large work. The smoke from a small lamp burning turpentine, if caught on the palette, or better on a 12 by 10 enamelled iron developing tray, will give a very pleasing black. The powder is made into a stiff paste with the least possible quantity of Japan gold size, and is then placed in a small covered tin. For use a little about half the size of a pea (for a 10 by 8 print) is spread out on the palette, with one drop of a mixture of one part raw linseed oil and two parts common benzoline. The benzoline quickly evaporates when the paste is spread out, and is only used to dilute the oil. If the paste was originally stiff, it may mean another drop of the medium before it will touch even the shadows, but it is best to keep on the hard side and soften very cautiously. At a certain moment you will get a pigment which will give all the tones and leave the whites clear, which is what you require. Should extra brilliancy or more vigour be necessary, add one drop of the gold size and less of the oil; but the brush should remain clean, and if you make a mistake, simply wipe off the picture with a rag moistened with benzoline, wash the print with soap and water, and start afresh. This may be done even after the print is dry.

Winsor & Newton's powder colours can be

used with success. A mixture of about equal parts of vandyke brown and black with a little Indian red works satisfactorily, as also does black and burnt sienna. Black alone takes the least size, and is the easiest to work. With the browns it may be necessary to " sweep " the print once or twice with a badger softener to get contrast before finally putting in the half-tone.

The Ozobrome-Oil Process

This process, which should prove of considerable advantage to workers in the oil-pigment and Bromoil processes, enables the operator to obtain any number of oil prints from a single bromide (or gaslight) print. It was first described by J. Parrack, in *The Amateur Photographer* for May 12, 1908.

In practice it is a combination of the ozobrome process and oil painting. The bromide print is prepared in the same way as for ozobrome.

Place the bromide print in clean, cold water. Next take a piece of oil-pigment paper (or any other paper suitable for oil printing) and wet it in cold water. Then place it in dilute ozobrome solution, made by adding four parts of water to one part of concentrated solution. Allow the paper to remain in the solution two

minutes. Lift it out and drain off the superfluous solution. Now draw the paper through clean water and bring it into contact with the bromide print. Take the two papers out and squeegee them into close contact. Leave for about twenty minutes. When this time has elapsed place the prints in cold water and separate.

So far the working has been the same as in the ozobrome process, except that instead of pigment plaster oil-pigment paper has been used. The rest of the operation is the same as in oil printing.

Wash the paper to get rid of the ozobrome solution. Place the paper on the wet blotting-pad, surface-dry, and pigment as in oil printing.

The bromide print should be washed, and then may be developed up with any suitable developer. It is then dried and kept for further use.

The oil print will, of course, be reversed, but, as this process would be used principally in the case of enlargements, this is no drawback. If the operator, in making the bromide enlargement intended for this process, reverses his negative, he will obtain from it any number of oil prints the right way round. There appears to be no limit to the number of prints obtainable.

Bromoil Prints in Colours

In *The Amateur Photographer and Photographic News* for September 29, 1908, Mr. E. Warner published a short note on his method of producing multi-coloured Bromoil prints. Mr. Warner was the first to make oil prints in colours, and his procedure is as follows:

"The bromide print must be fully exposed, and FULLY DEVELOPED (this last important), use amidol developer, rather more than usual quantity bromide potassium advisable — put by to dry; soak, then bleach in ozobrome sol. 4 parts, alum (1 in 20) 8 parts, citric acid (1 in 20) 1 part, water 2 parts ; rinse, transfer to sulphuric acid, dilute, 1 in 20, leave in bath 25 min.; rinse, fix in hypo 4 oz., soda sul. 1 oz., water 20 oz. ; wash carefully, as gelantine is now very tender, in running water half an hour; dry, bone hard; resoak for 20 min. for pigmenting; charge brushes FULL of colour for pigmenting, and work rapidly. Finish print in one sitting.

"The colours are made by grinding artists' quality colours, and mixing with thin lithographic varnish and a spot or two of pure olive oil. Quantities are best ascertained by experiment, as proportions must be adjusted to weather conditions. (Rowney's will grind any colour —

very fine — in spirit at a nominal charge. Some colours are very troublesome — all blues, some browns, and some reds.) Experiments with litho. colours, has proved them to be messy and unsatisfactory in many ways.

" Put out all colours to be used (use old negatives), start always with blacks, browns, or reds, never with blues or yellows (supposing that a full range of colour is to be used). If colours are used in the order named as little trouble as is possible will result. If a large surface is to be covered with a tint colour — pink, light yellow, or light blue, etc. — and detail is not required, thin down colour with lard, which gives some stiffness (more than oils), and does not degrade the colour.

" After working over a portion of the surface (both in oil and Bromoil) do not leave it too long before finishing, or freshness of print will be spoilt."

Recapitulation

(1) The bromide print from which the Bromoil is made should be full of contrast, not altogether lacking in detail, but above all must be fully developed, and the shadows a rich black, not grey, nor with a tinge of brown or green, but black.

For the beginner, therefore, a good " plucky " negative is useful if he desires to make such a bromide print.

(2) Always develop, if possible, with Amidol, and avoid using an acid fixing bath.

Other developers may be used, and the acid fixing bath also, but they introduce elements of uncertainty that their avoidance removes.

(3) Pour the bleaching solution on to the dry print. Wetting the print before bleaching may prove to be a source of uneven markings, and many troubles that arise when pigmenting.

(4) The bleaching should not be too rapid. Too rapid bleaching primarily indicates that an unsuitable bromide print is being used, and pigmenting becomes correspondingly difficult.

(5) The bleached print may be placed straight into the acid bath without washing. The acid bath should be freshly made, but cool — about 65°. The print should remain in this for at least five minutes. Longer in cold weather.

(6) After the acid bath the print should be washed in clean water for about five minutes or in half a dozen changes, and then placed in the fixing bath for two or three minutes.

(7) The final washing may be from five minutes to a quarter of an hour. The print may then be hung up to dry, or placed upon the wet pig-

menting pad, blotted, and pigmented at once. If the print is allowed to dry it should be resoaked for at least one hour in water at 65° before pigmenting. If *not* soaked enough the picture may ink up as a negative instead of positive and only vigorous brush-work will save it.

(8) The entire picture, if unsatisfactory, can be cleaned off with a little petrol on a rag, and after the surface has been gently wiped with a wet cloth a fresh start can be made.

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