

Tucholsky Wagner Zola Scott
Turgenev Wallace Fonatne Sydon Freud Schlegel
Twain Walther von der Vogelweide Fouqué Friedrich II. von Preußen
Weber Freiligrath Frey
Fechner Fichte Weiße Rose von Fallersleben Kant Ernst Richthofen Frommel
Engels Fielding Hölderlin Eichendorff Tacitus Dumas
Fehrs Faber Flaubert Eliasberg Eliot Zweig Ebner Eschenbach
Feuerbach Maximilian I. von Habsburg Fock Ewald Vergil
Goethe Elisabeth von Österreich London
Mendelssohn Balzac Shakespeare Rathenau Dostojewski Ganghofer
Trackl Stevenson Lichtenberg Doyle Gjellerup
Mommsen Thoma Tolstoi Lenz Hambruch Droste-Hülshoff
Dach Thoma von Arnim Hägele Hanrieder Hauptmann Humboldt
Karrillon Reuter Verne Rousseau Hagen Hauff Baudelaire Gautier
Garschin Defoe Hebbel Hegel Kussmaul Herder
Damaschke Descartes Schopenhauer George
Wolfram von Eschenbach Darwin Melville Grimm Jerome Rilke Bebel Proust
Bronner Campe Horváth Aristoteles Voltaire Federer Herodot
Bismarck Vigny Gengenbach Barlach Heine Grillparzer Georgy
Storm Casanova Lessing Tersteegen Gilm Gryphius
Chamberlain Langbein Lafontaine Iffland Sokrates
Brentano Claudius Schiller Bellamy Schilling Kralik Raabe Gibbon Tschchow
Katharina II. von Rußland Gerstäcker Raabe Gleim Vulpius
Löns Hesse Hoffmann Gogol Morgenstern Goedicke
Luther Heym Hofmannsthal Klee Hölty Kleist
Roth Heyse Klopstock Puschkin Homer Mörike Musil
Luxemburg La Roche Horaz Kraus
Machiavelli Kierkegaard Kraft Kraus
Navarra Aurel Musset Lamprecht Kind Kirchhoff Hugo Moltke
Nestroy Marie de France
Nietzsche Nansen Laotse Ipsen Liebknecht
Marx Lassalle Gorki Klett Leibniz Ringelnatz
von Ossietzky May vom Stein Lawrence Irving
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**Bromide Printing and Enlarging A
Practical Guide to the Making of
Bromide Prints by Contact and
Bromide Enlarging by Daylight
and Artificial Light, With the
Toning of Bromide Prints and
Enlargements**

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Imprint

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Chapter I

VARIETIES OF BROMIDE PAPERS AND HOW TO CHOOSE AMONG THEM

Contents

What is bromide paper? It is simply paper coated with gelatino-bromide of silver emulsion, similar to that which, when coated on glass or other transparent support, forms the familiar dry-plate or film used in negative-making. The emulsion used in making bromide paper, however, is less rapid (less sensitive) than that used in the manufacture of plates or films of ordinary rapidity; hence bromide paper may be manipulated with more abundant light than would be safe with plates. It is used for making prints by contact with a negative in the ordinary printing frame, and as the simplest means for obtaining enlarged prints from small negatives. Sometimes bromide paper is spoken of as a development paper, because the picture-image does not print out during exposure, but requires to be developed, as in negative-making. The preparation of the paper is beyond the skill and equipment of the average photographer, but it may be readily obtained from dealers in photographic supplies.

What are the practical advantages of bromide paper? In the first place, it renders the photographer independent of daylight and weather as far as making prints is concerned. It has excellent "keeping" qualities, *i.e.*, it does not spoil or deteriorate as readily as other printing papers, even when stored without special care or precaution. Its manipulation is extremely simple, and closely resembles the development of a negative. It does not require a special sort of negative, but is adapted to give good prints from negatives widely different in quality. It is obtainable in any desired size, and with a great variety of surfaces, from extreme gloss to that of rough drawing paper. It offers great latitude in exposure and development, and yields, even in the hands of the novice, a greater percentage of good prints than any other printing paper in the market. It offers a range of tone from deepest black to the most delicate of platinotype grays, which may be modified to give a fair variety of color effects where this is desirable. It affords a simple means of making enlargements

without the necessity of an enlarged negative. It gives us a ready means of producing many prints in a very short time, or, if desired, we may make a proof or enlargement from the negative fresh from the washing tray. And, finally, if we do our work faithfully and well, it will give us permanent prints.

The bromide papers available in this country at present are confined to those of the Eastman Kodak Company, the Defender Photo Supply Company and J. L. Lewis, the last handling English papers only. Better papers could not be desired. Broadly speaking, all bromide papers are made in a few well-defined varieties; in considering the manipulation of the papers made by a single firm, therefore, we practically cover all the papers in the market. As a matter of convenience, then, we will glance over the different varieties of bromide paper available, as represented by the Eastman papers, with the understanding that what is said of any one variety is generally applicable to papers of the same sort put out by other manufacturers.

First we have the *Standard* or ordinary bromide paper made for general use. This comes in five different weights: *A*, a thin paper with smooth surface, useful where detail is desirable; *B*, a heavier paper with smooth surface, for large prints or for illustration purposes; and *C*, a still heavier paper with a rough surface for broad effects and prints of large size. *BB*, heavy smooth double weight; *CC*, heavy, rough, double weight. Each of these varieties may be had in two grades, according to the negative in hand or the effect desired in the print, viz.: *hard*, for use with soft negatives where we desire to get vigor or contrast in the print, and *soft*, for use with hard negatives where softness of effect is desired in the print. For general use the *soft* grade is preferable, although it is advisable to have a supply of the *hard* paper at hand as useful in certain classes of work. The tones obtainable on the *Standard* paper range to pure black, and are acceptable for ordinary purposes. For pictorial work or special effects other papers are preferable.

Platino-Bromide paper gives delicate platinotype tones, and where negative, paper and manipulation are in harmony, the prints obtained on this paper will be indistinguishable from good platinotypes in quality and attractiveness. This paper comes in two

weights, *Platino A*, a thin paper suitable for small prints, and having a smooth surface useful for detail-giving; and *Platino B*, a heavy paper with rough surface, peculiarly suited for large contact prints or enlargements. Both varieties are obtainable in *hard* or *soft* grades, characterized as above. *Matte Enamel*, medium weight; *Enameled*, medium weight; *Velvet*, medium weight.

Royal Bromide is a capital paper in its proper place, *i.e.*, for prints not smaller than 8 × 10 inches, and then only when breadth of effect is desired in the picture. It is a very heavy cream-colored paper, rough in texture, and giving black tones by development, but designed to give sepia or brown tones on a tinted ground by subsequent toning with a bath of hypo and alum. This paper, also, may be had in two grades for *hard* or *soft* effects; it is further adapted for being printed on through silk or bolting cloth, this modification adding to the effect of breadth ordinarily given by the paper itself. I have seen prints on this paper which were altogether pleasing, but subject and negative should be carefully considered in its use. Rough Buff papers are very similar in character. *Monox Bromide*, made by the Defender Photo Supply Company, is obtainable in six surfaces; No. 3, *Monox Rough*; No. 4, *Monox Gloss*; No. 5, *Monox Matte*; No. 6, *Monox Lustre*; No. 7, *Monox Buff*, heavy rough.

The Barnet bromide papers, comprising ten different varieties, differing in weight and surface texture but very similar to the kinds already described, are imported by J. L. Lewis, New York.

As a suggestion to the reader desiring to have at hand a stock of bromide papers, I would advise *Platino A*, or a similar *soft* paper for prints under 5 × 7 inches; *Matte-Enamel* for *soft* effects, or a similar paper, as an alternative; *Platino C* and *Royal Bromide* for *soft* effects, or similar papers, for prints 8 × 10 inches or larger, and for enlargements. To these might be added a package of *Standard B*, and another of one of the above varieties for *hard* effects, to complete a supply for general purposes. The beginner, however, will do well to avoid the indiscriminate use of several varieties of paper, although he is advised to get information of all the different varieties in the market. It is better to select that variety which is best suited to the general character of one's negatives and work, and to master that before changing to another. It is true that an expert can get more

good prints on bromide paper, from a given number of bad negatives, than another expert can get with the same negatives and any other printing paper; but it is also true that for the best results on bromide paper the variety of paper used should be suitable for the negative. It will be found, however, that this word "suitable" covers, in bromide printing, a much wider range than is offered by many printing papers. In fact there are only two sorts of negatives which will not yield desirable prints on bromide paper: first, an exceedingly weak, thin negative lacking in contrast and altogether flat; and second, a very dense negative in which the contrasts are hopelessly emphatic. Even in such cases, however, it may be possible to modify the negatives and so get presentable prints.

The ideal negative for contact printing on bromide paper is one without excessive contrasts on the one hand, and without excessive flatness on the other. A moderately strong negative, such as will require from three to five minutes in the sunlight with a print out paper, fairly describes it. In other words, the negative should be fully exposed and so developed that there is a fair amount of density in the shadows. I have never been able, with bromide paper, to get the detail in the shadows of under-exposed negatives, such as we see in a good print made on glossy printout paper. For this reason the use of bromide papers with under-exposed negatives is not advisable. But there are a great many negatives which, while unsuitable as they come from the drying rack, can be easily adapted to the process by slight modifications. A very dense negative, for instance, may be reduced either with the ferricyanide of potash or persulphate of ammonia reducer; and a thin negative with proper graduations can frequently be intensified to advantage in the print. While, as has been said, there is great latitude in the matter of the negative, this latitude should only be availed of when necessary. Local reduction or intensification of the negative is seldom necessary, as better results can usually be obtained with bromide paper by dodging in the printing.

Chapter II

THE QUESTION OF LIGHT AND ILLUMINATION

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Thus far we have gained a general understanding of the different papers and the characteristics desirable in negatives. Before we take up the actual manipulation of bromide paper there are a few elementary principles bearing on the important detail of illumination which we must master. These may necessitate a little thinking, but a practical grasp of them will make our after-work much easier, and ensure that fairly good prints from poor negatives will be the rule instead of the exception.

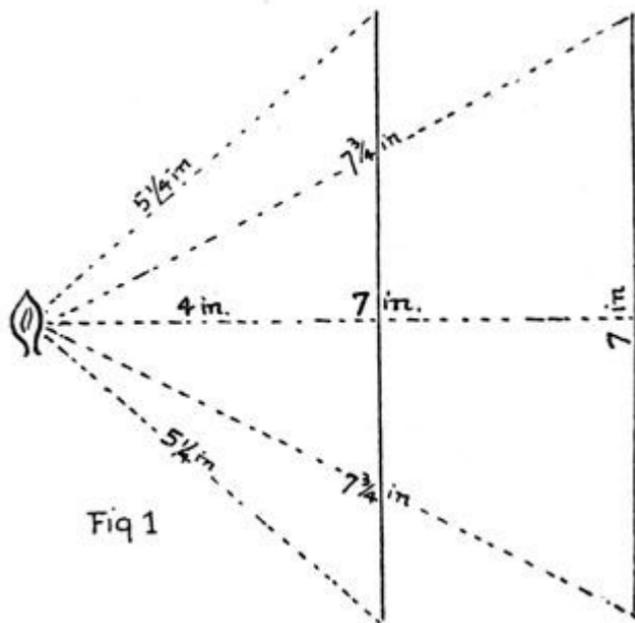
In the first place we have often read that a strong light overcomes contrasts, while a weak light increases them. Yet how many of us realize when we come to make prints by any process exactly what this means; in other words, how many of us apply the rule in everyday practice? It is very easy to see what is meant by the rule if we will take an ordinary negative, such as a landscape with clear sky, and hold it first six inches from a gas-flame and then six feet. It will be found in the first case that the sky portion is translucent while the clear glass will, of course, be clear; in the second the sky will be opaque and the clear glass still clear. The contrasts have been rendered greater by removing the negative further from the light-source. As this is true in the extreme case given, so it is true in a smaller degree where the distances are only slightly varied, as well as where we deal with the graded portions of the negative instead of with only clear glass and the densest portions. It is this fact that we utilize in bromide printing; and it is because we have such unlimited control over the strength of our light that it is possible with it to get equally good prints from a wide range of negatives. It is very much simpler and more practicable to regulate the strength of the light by increasing or diminishing its distance than by interposing sheets of paper, ground glass, or opal, as is occasionally done with other processes.

The necessity, however, for occasionally changing the strength of our light in this manner may seem to introduce an element of uncertainty into the problem of exposure; but there is another rule which brings it back again to simplicity itself, and enables us to quickly calculate equivalent exposures at varying distances from the light-source. This rule is: "The intensity of illumination varies inversely as the square of the distance from the source of light." For instance if a given negative requires five seconds exposure at one foot from the light, it will have an equivalent exposure if exposed for twenty seconds at two feet, the square of one being one, and of two being four.

It remains then only to apply these two rules to our actual work with bromide paper. The shadows in a certain negative will receive full exposure, say, in eight seconds at one foot from the light; but the high lights of the negative are so dense that no light will penetrate them at that distance from the light in that length of time. Hence a stronger light must be used, or the action of the same light continued for a longer time; but the latter will not do since the effect would be to over-expose the shadows. Hence, knowing that a strong light overcomes contrasts, we move the negative to the distance of six inches, where the rule tells us the equivalent exposure will be one-fourth that at twelve inches, in this case two seconds. Here the shadows get no more light, but it is possible that the high lights of the negative will be penetrated by reason of the additional force of the light.

On the other hand we have a thin, flat negative requiring for the shadows two seconds exposure at one foot from the light. Knowing that a weak light increases contrasts we move the negative three feet from the light, and instead of two, give eighteen seconds exposure, the rule telling us that this is equivalent. Thus we are enabled to regulate the strength of our light to suit the character of our negative. But a standard distance of one foot will not suit with all kinds of lights or with all sizes of negatives. If, for instance, our light is a Welsbach burner, giving an intense and comparatively white light, we will find that a normal negative will print too flat if exposed at one foot. In such a case two or even three feet would be a better standard. Experience with our light will, however, furnish the best standard, always taking a standard negative for the tests.

The size of the negative also has its influence on the unit of exposure. For instance, we may have a half-inch oil-burner, in which case we would probably have to expose a standard negative at four inches in order to get the proper contrasts. But this is out of the question with a negative of 5×7 or over, as a reference to the diagram, Fig. 1, will clearly show.



Here we find that while the centre of a negative is four inches from the light the extreme edges will be over five inches from it, the rule as to intensities telling us that the light at the edges will be only $16/25$ of that at the centre. This would result in a marked falling off of light at the corners, and would necessitate a constant motion of the printing frame throughout exposure, which is not wholly satisfactory. The remedy would be to use a stronger light at a greater distance. But another reference to Fig. 1 will show that if a 5×7 negative be held at seven inches from the light the difference will be only as 49 is to 56, which can in practice be disregarded, though it would be better to have it even less. Hence we see that it is never safe to have our unit less than the base-line of our plate, and it is better to have it

even greater, as we will frequently be obliged to halve the distance to overcome contrasts. It follows from this that the larger our negatives the stronger must be our light.

Now all of these considerations may make very dry reading, but the reader who has followed them closely will see how vital they are to successful work. It should not be thought, however, that every exposure on bromide paper must involve an arithmetical calculation. On the contrary, once the proper distance from the light for the normal negative has been ascertained, it will be found that nine negatives out of ten will require no change in the distance from the source of light. This, of course, presuming that we classify our negatives and enlarge from those of the same quality at the same time.

One great objection to the use of bromide paper is that it must be handled in a dark-room. But this objection is not as serious as it may seem. An ordinary living room at night furnishes a delightful place in which to make prints, if we handle our solutions with reasonable care. The ruby glass can be removed from the dark-room lamp, and the orange glass used alone. But in this case, as indeed with the ruby light, care must be taken to guard against too much light. Development should be conducted at a distance of several feet from the light, and when almost completed, the tray can be brought close under the light to enable the worker to stop it at exactly the right moment. Ordinary bromide paper is about as sensitive as the process or slow dry plate or the average lantern-slide plate, and requires as much care as either, but not nearly so much as the most rapid dry plates. If fogging is noticed, of course additional precautions should be taken at once.

Chapter III

CONTACT PRINTING ON BROMIDE PAPER

Contents

Nothing more than will be found in an ordinary dark-room will be found necessary in bromide printing by contact, unless it be some arrangement for determining readily the distance of the negative from the source of light. For this purpose and with an oil-lamp, use a board a foot wide and about three feet long placed on the developing bench against the base of the dark-room lamp. It should be marked with black lines six inches apart. See Fig. 2.

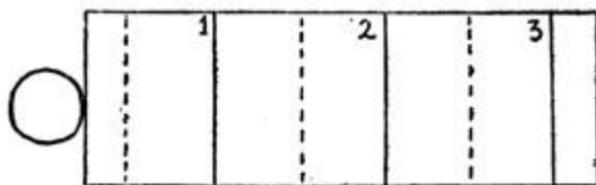


Fig 2.

Greater uniformity in lighting will be gained if a piece of white cardboard be placed immediately behind the flame. Some lamps have reflectors, in which case the card is unnecessary, provided that they reflect the light uniformly; otherwise such reflectors are worse than useless.

Having arranged the needful apparatus to our satisfaction, the last preparatory step before manipulation is the making up of a developer. Almost any of the modern developers (pyro excepted) will give good results with bromide paper. In every package of paper will be found the developers advised by the manufacturer of the paper used. Invariably there is among these a formula for ferrous oxalate developer. This is probably the best of all developers for pure black tones, but I cannot advise the novice to take it up in the early stages of his work with bromide paper.

When this developer is used an acid clearing bath is necessary, and this invites complications which may be disastrous to the prints. When experience has been gained, and a large number of prints are to be made at one time, it will be found advantageous as

working longer with greater efficiency and more uniformity than some of the other developers. It is troublesome to prepare and does not keep well, apart from which there is the disadvantage that it does not permit of control in development in as large a measure as other developers.

A reliable metol and hydroquinone formula is as follows: Thoroughly dissolve metol, $\frac{1}{4}$ ounce; hydroquinone, $\frac{1}{4}$ ounce; in water, 80 ounces; add sulphite of soda (cryst.), 4 ounces; and carbonate of soda (cryst.), $2\frac{1}{2}$ ounces. Bottled in 4-ounce vials and well corked, this developer retains its working power indefinitely. For normal exposures I take 2 ounces of the above and add to it 2 ounces of water. This will suffice for the development of three 8×10 sheets of paper, or their equivalent in smaller sheets. It is not wise to attempt to make it do more, as greenish tones will result. For the same reason, contrary to common opinion, I do not advise the addition of potassium bromide to the developer. It does not improve the developer, and may do harm.

An excellent developer which must be used freshly mixed, and may be made up in a moment, is as follows: Take $1\frac{1}{2}$ ounces of a 25 per cent solution of sodium sulphite; dry amidol, 30 grains; 5 to 10 drops of a 10 per cent solution of potassium bromide, and dilute with $4\frac{1}{2}$ ounces of water. A supply of new developer should be added as this is seen to become exhausted.

Other developing formulae could be given, but these two will be found to fill all requirements if properly compounded and intelligently used.

The greatest difficulty in developing bromide paper is to get rich black tones when desired, but this can be completely overcome by using entirely fresh developer from time to time, and never overworking the developer, whatever it may be. As compared with the paper, developer is cheap, and it is poor economy to save on the latter.

Except in rare instances the developer is better without any modifications whatever. In case of over-exposure, either general or partial, the developer after having been diluted as stated should be again diluted with its bulk of water. This gives blacker tones and more depth and life to the shadows. When through inadvertence we

under-expose a print it may frequently be saved after partial development in the weak solution by flooding with a strong undiluted developer.

The temperature of the developer is of the greatest importance. In summer the aim should be to keep it approximately at 65 degrees Fahr., in winter, 70 degrees, but it should never be allowed to go over the latter. This can readily be accomplished by placing the graduate in a receptacle containing ice-water in summer or hot water in winter.

The paper is first opened at a safe distance from the dark-room light, and it is well at first to cut up one sheet into several slips to use as test-strips. If any difficulty is found in determining which is the sensitive side, it will be well to throw a piece of the paper on a plane surface when it will be seen that it has a slight tendency to curl. The concave is the sensitive side. Taking a standard negative we first take one of the test-slips and place it upon the negative so that it covers a portion containing both high lights and shadows. With an oil-lamp having a 1-inch burner, expose the test-strip behind the negative in the printing frame at one foot for ten seconds. Close the lamp and flood the exposed strip with the developer. The image should appear in a few seconds, and if properly exposed development will be completed in from one to two minutes, usually one. Rinse for a moment, and place the strip in a fixing bath made up by dissolving 3 ounces of hypo in 16 ounces of water. After a few moments examine the strip in full light, and see whether the contrasts are right. If so, expose a full sheet of paper, this time rinsing the exposed sheet before development to avoid the formation of air-bubbles. If the contrasts are too great try a strip at six inches from the light and two and a half seconds exposure. If still too great, use a stronger light or try a longer exposure and use a very dilute developer. If still too great the negative is hopeless and should be reduced unless dodging will help it, as set out further on.

It will be noticed that this method calls for a one-minute development. This is desirable for several reasons: first, because it gives a unit and assists us in determining the correct exposure of other negatives, and second, because it is a comparatively short development, and yet gives sufficient time after the image has acquired the

proper depth to pour off the developer and flush with water, thus stopping development. It also leaves sufficient margin in the event of over- or under-exposure. With one minute as the unit, over-exposure will result in a fully developed image in, say, thirty seconds. This print we could save; but if our unit were thirty seconds it would be extremely difficult to save a print which had completed development in fifteen seconds. The chances are that the development would go on to a ruinous extent before we could pour off the developer and flood the print, or that it would go on even after the water was poured on it. Moreover, in case of under-exposure, two minutes would not be so very tiresome, but four minutes would, besides which we would risk straining the print by such prolonged development. While I am not prepared to assert it as a rule, yet it has been my experience that the time of development varies almost inversely with the length of exposure; so that if the test-strip concludes development in half a minute with ten seconds exposure, I give the next five seconds exposure in the expectation that it will take a minute to develop. This assists greatly in lessening the number of test-strips required to ascertain the correct exposure of a given negative.

Should we wish to see a proof before the negative is dry, it is taken from the fixing bath and well rinsed, though not necessarily thoroughly washed. It is then placed face up in a tray of water, on which we place face down a sheet of bromide paper. The two are removed together and squeezed lightly into contact to remove air bubbles. The back of the negative is then wiped to remove superfluous water, and an exposure of several times the normal given, preferably the normal exposure at half the standard distance from the light. The paper is then removed and developed as usual. In this way it is possible to show a print in fifteen or twenty minutes after the exposure of the plate was made.

The purpose of the rinsing before development is to avoid the possibility of air-bells. The paper should be rinsed in cold water, as warmish water will cause air-bells instead of preventing them. This rinsing can be dispensed with if thought desirable. The rinsing after development is for the purpose of stopping development immediately, and also in order that the prints may not go into the fixing bath full of developer, as staining would be likely to result in such

case. With the iron oxalate developer an acid rinsing bath is necessary, but it is not necessary with any of the other developers.

The fixing is important, as upon this depends in a large measure the permanence of the prints. The bath should be freshly made up, 3 ounces of hyposulphite of soda to 16 ounces of water. Prints are placed in this bath face down, and one under, instead of on top of another. The tray should be occasionally rocked. With a fresh bath prints will fix in ten minutes, but where many prints are made at one time it will be well to use a second fixing bath. The emulsion of an unfixing print will appear a yellowish tinge in the unfixing portions when examined by transmitted light; but this is not an easy or certain test. It is better to make absolutely certain of thorough fixing by continued immersion, occasional rocking and, where many prints are made, a second bath. The fixing bath should not be allowed to get too warm in hot weather. Blistering, staining and frilling will result in such a case, and I have known a print which was left in a warm fixing bath for an hour or more to be reduced beyond redemption. With freshly made hypo baths at a suitable temperature there is absolutely no danger of the paper frilling or blistering.

The final washing must be thorough, as the hypo is difficult to eliminate from both the emulsion and the paper. Care must be taken to see that the prints are well separated while washing. This ensures uniform washing.

It frequently happens that a negative may require more or less dodging in printing. With bromide paper this is particularly easy. We will take the simple case of a negative with dense sky which will not print out in the ordinary way. All that we need in this case is a piece of paper cut roughly to the sky line and kept moving during part of the exposure over the part which is to be held back. If necessary, cut down the light in order to prolong the exposure, or expose at a greater distance from the light. One or more test-strips will be required for this purpose in order to ascertain the relative times of exposure. A modification of this method is when a small portion of the negative only needs extra printing—a face or hand for instance. Here we take a piece of paper a little larger than the negative and cut a small hole in it, moving it in front of the light so as to throw the latter only upon the portions needing the extra printing. Still

another modification is where a portion only needs holding back. Here we use a small piece of paper or cardboard stuck on a knitting needle, moving the latter so that it will not intercept the light too long at one place.

In all these and similar instances which will occur to the reader, the dodging should be done during the first part of the exposure. The subsequent exposure seems to obliterate traces of such dodging better than when it is done at the end of the exposure, just as in cloud-printing better results are achieved by printing the sky first and the foreground afterward.

It is quite possible to make bromide negatives in the camera. They have their advantages in classes of work not requiring the finest definition, are much lighter, cheaper, more easily stored and less liable to breakage or other mishaps. They are best made on a thin, smooth paper, a *soft* paper being better than the *hard*. They are placed in the plate-holder by means of the ordinary cut film holder. The exposure required is ascertained by a trial or two, but roughly speaking is about one-twentieth that of a rapid plate. After development in the usual way – it being carried only a little further than usual – and after fixing, washing and drying, the paper negative can be spotted or retouched, after which it is waxed.