

Hammer Dry Plate

Company

ST. LOUIS, U.S.A.



A SHORT TALK ON
NEGATIVE MAKING



HAMMER'S LITTLE BOOK

A SHORT TALK ON
NEGATIVE MAKING.
FORMULAS,
SIZES AND LIST PRICES.

—————
NINTH EDITION
—————

HAMMER DRY PLATE CO.
SAINT LOUIS, MO., U. S. A.

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Introduction



IN this, the Ninth Edition of "Hammer's Little Book," we have carefully revised the formulas and retained many of the old suggestions for the proper handling of dry plates. For the benefit of those just beginning the study of photography, we describe the process of manipulation in its successive steps, from the exposure of the plate to the finished negative.

Hammer Photographic Dry Plates are manufactured in fourteen distinct classes, each of which is intended to fulfill a special purpose. They are named Extra Fast, Fast, Slow, Special Extra Fast, Aurora Non-Halation (Double Coated), Commercial Orthochromatic, Orthochromatic Extra Fast, Orthochromatic Slow, Orthochromatic Double Coated, Lantern Slide, X-Ray, Photo Postal Plates, Opal and Ground Glass Transparency. All have the same characteristics, but are different in speed and special adaptability for the various kinds of work for which they are intended.

We aim to attain in the manufacture of these various classes of our plates the best that skill and modern machinery can produce, by honest and careful work, by the use in their make of only the highest grade chemicals, gelatine and glass procurable. Because of personal supervision of all of the various stages of their manufacture, these plates, in all of their classes, are as near perfect as it is possible to make them, and they have been characterized as the most uniform and the best workable plates upon the market.

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HAMMER EXTRA FAST PLATES

These plates are manufactured to meet the general requirements for studio, field and instantaneous work, and constitute our standard plate. They are made of the highest grade chemicals and material procurable, with the finest quality of glass the market affords. Fine grained, high speed, clear, clean, uniformly coated, no fog or frilling, they are easily developed, fix quickly, dry with uniform density, and have printing quality unsurpassed, printing equally as well upon developing paper as upon printing out paper. They are carefully examined, absolutely reliable and securely packed. Easily reduced when development has been carried too far, they are likewise easily intensified when the development has not been carried far enough. They permit readily of local reduction or intensification, and are made especially to take readily and require the least amount of retouching. For studio work they are always reliable, producing soft effects, detail in the deepest shadows, catchy highlights in the white. They are best for babies and children, when snapshots under the skylight are required, and also for group work. For field, instantaneous, interiors, home portraiture, animal studies, architecture, etc., they are unsurpassed, possessing the speed, uniformity and brilliancy so essential in this class of work.

Hammer Fast Plates

These plates are half as rapid but possess all of the other qualities of the Extra Fast Plates. They permit great latitude in exposure, are clean and clear and brilliant, and any degree of softness or great contrast can easily be produced upon them. For use whenever a subject will permit of a little longer exposure.

Hammer Slow Plates

These plates are manufactured upon the same lines as are the Extra Fast and Fast, and when developed with a normal developer will produce strong, fine-grained, vigorous negatives. Speed, to meet the requirements of commercial photography, copying, process, and all pho-

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tographic work that does not require a short exposure. Give five times the exposure of the Extra Fast.

Hammer Special Extra Fast Plates

The most rapid plates made, embodying the highest science in the manufacture of modern dry plates. Made of especially selected and analyzed chemicals and material, they are coated upon extra selected glass, examined by experts and packed with the utmost care. Great care must be taken with this plate in the dark-room, as its extreme sensitiveness will not permit the same volume of red light as the Extra Fast. It is especially adapted for studios making large portrait negatives and for large group work where time and small stops are necessary. Suitable for flashlight work, laughing babies and difficult groups of children. They are soft and mellow in the whites, retaining detail down in the deepest shadows. The chemical effect of this plate with its high speed is its characteristic feature, due to the high grade of chemicals and material used and the extra care in its manufacture. Instantaneous under the skylight, it is the ideal plate for dark and dreary days. For field work, instantaneous landscape photography, rapidly moving objects, such as horse races, moving trains, field sports, flying birds, where focal plane shutters are necessary, this plate will be fully timed with most perfect detail and chemical effect. Years of careful study of the wants and requirements of photography have given to this plate a leading place in this field of photographic work.

Hammer Aurora Non-Halation (Double-Coated Plates)

The clean glass is first coated with our Slow emulsion, and dried as usual. Then each plate is examined for any possible defects. Then the plates are returned to the coating-room and there receive a second coating, but this time it is of our regular Extra Fast emulsion. They are then returned to the drying-room.

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dried, and the next day again examined. One can readily see the immense advantage this plate has over a single-coated plate for general work, as where great contrasts are to be photographed. Expose for the shadows, time the exposure for the outer film; the under or slow film will take care of the highlights. To get the best results these Non-Halation Plates should be developed with a rather dilute developer—to give the under film a chance to show its quality. Fix and wash a little longer than usual. For use when the subject has strong contrast, such as difficult interiors, silverware, cut glass, and in all cases where there is a possibility of halation, views, cloud effects and marine photography.

Hammer Orthochromatic Extra Fast Plates

Are the product of years of chemical research, which have produced a plate that is sensitive to orange, yellow, green and the ordinary reds.

These plates have been much improved within the last year. Their color sensitiveness has been greatly increased.

The value of this special sensitiveness is very apparent. In view work, where there are clouds and colored foliage, or work embracing great distance, the finer details are retained. Draperies are reproduced in their true color values. Auburn hair will not be reproduced as though it were black. Freckles are less noticeable. Blue eyes will not be reproduced as almost white.

The ever-increasing orders for the Hammer Orthochromatic Plates indicate how well pleased are the users of these goods, with the superior quality found therein. Microscopic workers find it to their advantage to use Hammer's Orthochromatic Plates.

Hammer Commercial Orthochromatic Plates

These plates are one-fourth the rapidity of the Extra Fast Orthochromatic, and possess exceptional color value for both the yellow and green without the use of a ray filter. When

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a ray filter is used, the yellow is brought up nearly to the blue. Especially made for commercial work and also suitable for views and interiors. We recommend this plate for painted china, with delicate color, and for furniture work where the grain of the wood is essential.

Hammer Orthochromatic Slow Plates

Same quality as Orthochromatic Extra Fast and Commercial; for use where plenty of time can be given.

Hammer Orthochromatic Double Coated Plates

A Non-Halation, Double Coated Orthochromatic Plate possessing good color value, can be used with or without a ray filter. The under coating is of our Slow Orthochromatic emulsion, and the top coating is of our Extra Fast Orthochromatic emulsion. Excelling for portrait work, views, cloud effects, in the reproduction of oil paintings, or any object having a great range of color. Develop with a rather diluted developer. Fix, and wash a little longer than an Extra Fast Plate.

Hammer Lantern Slide and Transparency Plates

This plates is about one-sixteenth the rapidity of our Extra Fast Plate. It is grainless, rich in any tone desired, engravers black, brown, purple, olive green and red tones can be reproduced. Absolute clear glass effect in the highlights. The glass used is especially made for this plate and is of the thinnest kind and absolutely uniform.

Surface of film made especially for coloring. Used for landscapes, portraits and illustrated songs. Slides that are to be shown with a very strong light, electric or of calcium, should be made more dense than those to be shown with oil light.

Hammer X-Ray Plates

These plates are made especially for scientific purposes. They are packed in envel-

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opes—unless otherwise ordered. The back or glass side of the plate is the side where the paper joins to form the envelope. In placing a plate under the subject, be sure to have the face of the plate towards the subject.

When the X-Ray machine is in operation, all plates that are not being exposed on the subject must be protected by metal; an iron box, a lead-lined box, an iron or lead plate fastened against the wall in the next room (with a table or shelf in front of the wall on which to lay the plate), will protect the plates if care is taken that they are not allowed to extend beyond the edge of the metal shield.

The ordinary wall is no protection; plates can be fogged by X-Rays that have come through several walls.

The time of exposure should be made as short as practical, but be governed by the following figures, as X-Ray exposures are nearly always undertimed.

If the tube is 10 to 12 inches above the subject, with the usual outfit will require about the following exposure:

The Wrist	15 to 30 seconds
Elbow	1 minute
Knee and Shoulder	3 minutes
Chest	5 minutes
Pelvis	5 to 10 minutes

Doubling these will not over-expose your plate, but doubling again will over-expose same.

Hammer Photo Postal Plates

These plates are so manufactured that they develop and fix quickly, with firm film, used for postal photo work and where quick development and fixing are necessary. Will develop in 1½ minutes and fix in plain hypo bath (80 degrees Hydrometer test) in 35 seconds; Metol-Hydrochinone developer.

Exposure for Studio Work

The correct exposure of a dry plate cannot be definitely stated, as conditions vary to such an extent that no definite rule can be laid down as a working basis. Speed of lens, size of diaphragm used, speed of plate,

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time of day, season of year, subject to be photographed, are all conditions that must be taken into consideration. However, as a guide we offer the following as a basis for the users of Hammer Plates. Taking our Extra Fast with a first class lens, and say 12 M, May 2nd, F. 16, U. S. 16 clear sky, under the skylight:

Extra Fast	1 second
Fast	2 seconds
Slow	5 seconds
Special Extra Fast	½ second
Commercial Orthochromatic	2 seconds
Orthochromatic Extra Fast	1 second
Orthochromatic Slow	5 seconds
Orthochromatic Double Coated	1 second
Aurora Non-Halation D. C.	1 second
Photo Postal	1 second

Taking into consideration conditions of skylight, curtains, volume of light, kind of photo to be taken, color of walls in studio, etc.; time can best be determined by a few exposures.

Exposure for Field Work

For regular view work where considerable shadow exists in some parts of the subject the following is approximate. For views with extreme highlights, exposure table on page 23 should govern:

F. 16, U. S. 16, May 2nd, sky clear:

Extra Fast	¼ second
Fast	½ second
Slow	1 second
Special Extra Fast	¼ second
Orthochromatic Extra Fast	¼ second
Orthochromatic Double Coated	¼ second
Aurora Non-Halation D. C.	¼ second

Always taking into consideration your lens, size of stop used, varying your exposure according to the time of day, light condition, distance and season of the year.

Development

Pure chemicals, clean trays, a safe red light in the dark-room are essential factors in producing the best chemical results. If the plate has had sufficient exposure, the density of the negative increases as the time of the development is prolonged. The length of development depends upon the time of exposure,

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temperature of the developer, temperature of the dark-room, purity of chemicals, kind of photographic paper in use, viz: stronger development for printing out paper, platinum, and somewhat weaker development for developing papers and carbon. By using the various developers recommended for use with Hammer Plates, the best chemical results are produced if compounded as given and used at the temperature stated. However, any good developer will give good results. Extra Fast Plates as a basis for development, exposed for studio work as indicated on page 9, will develop in about five minutes, when developed one at a time. This also applies to field work. Should a number of plates be developed at a time, it is advisable to add a little additional water to each batch of developer. More water in summer and less in winter; colder water in summer and warmer in winter.

Fixed, washed, dried, as hereinafter described. All weights given in these formulas are Avoirdupois, 437.5 grains to the ounce.

Pyro and Soda (3 Solutions)

By having the stock in three solutions, the developer can easily be modified to meet the climatic and water condition in any locality.

With Crystals.	Solution No. 1.	With Pure Dry Chemicals
16 ounces	Pure Water	16 ounces
5 ounces	Sulphite of Soda (Anhydrous)	2½ ounces
	(By hydrometer test 80°)	

	Solution No. 2.	
16 ounces	Pure Water	16 ounces
2½ ounces	Carbonate of Soda (C. P.)	1¼ ounces
	(By hydrometer test 40°)	

	Solution No. 3.	
Pure Water	24 ounces	
Oxalic Acid	15 grains	
Pyrogallic Acid	1 ounce	

To develop, take ½ ounce each of No. 1, No. 2 and No. 3, in 6 oz. of water in winter, 8 oz. of water in summer.

Temperature of developer, 60 degrees Fahrenheit or less in summer; 65 to 70 degrees Fahrenheit in winter.

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*Use Hammer Anhydrous Sulphite and C. P. Carbonate.

More water may be used in warm weather, and less water in cool weather.

Hydrometer

When hydrometer test is used, care should be taken so that the hydrometer tests correctly. In many cases the paper scale in the tubes by constant use is apt to slip, giving an incorrect reading.

Test same by placing in water from time to time, and if it tests 0 per cent it is correct.

Metol-Hydrochinone

(2 Solutions)

	No. 1	Metric Weights and Measure
80 ounces of Pure Hot Water	or 2400 c. c.
½ ounce of Metol	or 15 grammes
¼ ounce of Hydrochinone	or 7.5 grammes
3 ounces of Sulphite Soda (Anhydrous)	or 90 grammes

	No. 2	
80 ounces of Pure Water	or 2400 c. c.
2½ ounces Carbonate Soda (C. P. Dry)	or 75 grammes

TO DEVELOP, TAKE:

2 ounces of Pure Water	.....	or 60 c. c.
1 ounce of Solution No. 1	.....	or 30 c. c.
1 ounce of Solution No. 2	.....	or 30 c. c.

Temperature of developer, 60 degrees Fahrenheit or less in summer; 65 to 70 degrees Fahrenheit in winter.

Metol-Hydrochinone Tank Developer

Water	.....	64 ounces
Sulphite Soda (Anhydrous)	.....	145 grains
Carbonate Soda (C. P. Dry)	.....	112 grains
Metol	.....	18 grains
Hydroquinone	.....	11 grains
Bromide Potassium	.....	8 grains

Pyro Tank Developer

(Stock Solution)

	No. 1	
Water	16 ounces
Sulphite Soda (Anhydrous)	3 ounces

	No. 2	
Water	16 ounces
Carbonate Soda (C. P. Dry)	1 ounce

	No. 3	
Water	24 ounces
Oxalic Acid	15 grains
Pyro	1 ounce

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TO DEVELOPE TAKE:

- 2 ounces of No. 1.
- 2 ounces of No. 2.
- 2 ounces of No. 3.
- 61 ounces of water.

At 60 degrees Fahrenheit, will develop in 30 minutes.
At 70 degrees Fahrenheit, will develop in 20 minutes.

If the plates are not absolutely clear, use from 10 to 20 drops of a 10 per cent solution of Bromide Potassium.

In case more intensity in a negative is wanted, add from $\frac{1}{2}$ to 1 oz. of additional stock solution of No. 1, No. 2 and No. 3. In case more rapidity in development is wanted, raise the temperature from 60 to 70 degrees, for slower development lower the temperature.

If a stock solution is not desirable, mix dry chemicals for daily use:

- 156 grains of Sulphite Soda (Anhydrous).
- 54 grains of Carbonate Soda (C. P.).
- 36 grains of Pyro.
- 64 ounces of water.

At 60 degrees Fahrenheit, will develop in 30 minutes.
At 70 degrees Fahrenheit, will develop in 20 minutes.

If the plates are not absolutely clear, use from 10 to 20 drops of a 10 per cent solution of bromide of potassium.

Photo Postal Plate Developer

No. 1

Water	128 ounces
Metol	165 grains
Hydroquinone	1½ ounces
Sulphite of Soda (Anhydrous).....	6 ounces

No. 2

Water	128 ounces
Carbonate Soda (C. P.).....	10 ounces

TO DEVELOP:

No. 1.....	16 ounces
No. 2.....	16 ounces

For postal cards, use same as above but add 1 minimum of a saturated solution of Bromide of Potassium. Use until exhausted.

X-Ray Plate Developer

(Use Hammer X-Ray Developer.)

Hammer X-Ray Developer is put up in paper tubes. Dissolve the entire contents of a tube in 8 ounces of water; do not try to use before it is all dissolved.

Hammer X-Ray Developer, single tubes.....15c
Hammer X-ray Developer, per box (3 tubes).45c

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Hammer X-Ray Plates are put up in envelopes—unless ordered otherwise. The back or glass-side of the plate is the side where the paper is joined to form the envelope. In placing a plate under your subject, be sure to have the face of the plate towards the subject.

LANTERN SLIDE AND TRANSPARENCY PLATE DEVELOPERS

Hydrochinone Developer

(For black tones)

	Metric Weights and Measure
20 ounces Distilled Water	or 600 c. c.
60 grains Hydrochinone	or 2 grammes
2 ounces Sulphite of Soda (crystal).....	or 60 grammes
6 ounces Carbonate of Soda (crystal).....	or 180 grammes
40 grains Bromide of Potash.....	or 1.3 grammes

(Use without diluting.)

Dissolve the Hydrochinone in the water and add the other chemicals in the order given.

If the plate is properly timed, development will be complete in about two minutes. This developer can be used for several plates by adding a little fresh developer to that used after each development.

Some lantern slide experts prefer to slightly over-develop, and then after fixing and washing to reduce the slide to the proper density; this method produces very crisp, clear slides. Those wishing to try this method should use our Howard Farmer reducer (page 16). This reduction can be done by daylight. Wash well after reducing and rinse in absolutely clean water before setting up to dry.

Eikonogen-Hydrochinone Developer

WARMER TONES.

No. 1

Pure water	15 ounces
Sulphite of soda.....	6 drams
Citric acid	15 grains
Eikonogen	90 grains
Hydrochinone	45 grains

No. 2

Pure water	10 ounces
Caustic soda (in sticks).....	60 grains
Bromide of potash	60 grains

FOR USE, TAKE:

Solution No. 1.....	2 ounces
Solution No. 2.....	1 ounce

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The fixing bath must be fresh and clean. Use about six (6) ounces hypo to the pint of water, or use our Acid Chrome-alum Fixing Bath.

The plate must be thoroughly fixed and thoroughly washed. When the last trace of silver bromide disappears, consider the plate only half fixed.

It is advisable (after washing well) to use a clearing solution, even if there is no stain apparent.

The plate must be well washed before putting it into the clearing solution.

The tone of a lantern slide made on these plates may be decided either by the length of exposure and the development or by an after-process.

The rule of development toning is that prolonged exposure and a heavily restrained developer gives warm tones. The restrainer generally used is a 10 per cent potassium bromide solution.

Fixing Bath

All plates are fixed by the following solution:

Acid Chrome-Alum Bath.

To avoid stains, due to numerous causes (and to harden the film during warm season), we recommend the following fixing bath in preference to all others, for the entire year. This kind of a bath has been in use for years:

(Mix only in order given)

Water (about)	100 ounces
Sulphuric acid	3 drams
Sulphite of sodium	4 ounces

When dissolved, add:

Hyposulphite of sodium..... 2 pounds

Dissolve, and then add:

Chrome-alum, from 1 to 2 ounces, previously dissolved in 20 ounces of water. Then add water to make 160 ounces.

The quantity of Chrome-alum may be increased in warm weather.

During hot weather negatives should remain in Acid Chrome-alum bath fully 15 minutes after they are fixed. This thorough fixing will

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save time in washing the plates. They will then require but 15 minutes washing.

Plain Fixing Bath

The Fixing Bath may be a plain solution of hyposulphite of soda, of a strength of about five (5) or six (6) ounces to the pint of water. A fully saturated solution diluted with an equal quantity of water is of about this strength.

Washing

Plates should be thoroughly washed in running water for at least one-half hour, or in several changes of water for the same period of time, thereby eliminating all chemicals from the gelatine film.

Drying the Negatives

Too much care cannot be taken in the drying of a negative, and often a well-developed plate is spoiled by careless drying, making them thick and chalky.

Plates are best dried in a moderately warm room, the temperature of which should not vary much, with good ventilation. They should not be placed too close together. A plate must never be laid in the sunlight to dry, as this may melt the film, cause transparent holes, and will increase the intensity. In cold weather do not allow the negative to get too cold while drying; this not only retards the drying, but in case the moisture therein should freeze, it will cause mottled spots. If the negative is partly dry and then removed to another room which is much warmer or colder, it will cause a difference in the intensity of the part to dry last. If a negative be wanted in a hurry, it may be quickly dried by laying it for ten minutes (after thoroughly washing) in a bath of alcohol, then it will dry rapidly. If dried in this way the negative must first be very thoroughly washed, for if any hypo be left in the film, an insoluble white deposit may form, which cannot afterwards be removed.

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An electric fan placed within a few feet of the negatives will readily dry them, but care must be taken to avoid water marks.

Intensifying Solution

No. 1	
Bichloride of mercury.....	200 grains
Bromide of potassium.....	100 grains
Water	10 ounces

No. 2	
Sulphite of sodium.....	½ ounce
Water	4 ounces

Place the negative in Solution No. 1 until bleached, then wash well and place in Solution No. 2 until entirely cleared; after which the plate must be well washed. This operation may be repeated if there is not sufficient intensity gained by first treatment.

Wash thoroughly after intensifying.

Local Intensification

Splendid results can be obtained upon a negative by applying with a small tuft of cotton upon a short stick or a camel hair brush, on parts of a negative that are desired more intense, especially the high lights, by applying No. 1 to such parts. When sufficiently bleached, wash, and place in Solution No. 2; then wash again. Clouds in landscape negatives are often improved by this treatment.

Reducing Solution

No. 1	
Ferricyanide of potassium.....	1 ounce
Water	16 ounces

No. 2	
Hyposulphite of sodium.....	1 ounce
Water	16 ounces

Wrap Solution No. 1 in opaque paper, as it is affected by the light. Take a sufficient quantity of No. 2 to cover the plate in a tray, and add to it a small quantity of No. 1; immerse the plate and watch it carefully. If the solution contains enough of No. 1 the reduction will proceed rapidly.

Wash thoroughly after reducing.

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Local Reduction

When parts of a negative are too dense they can easily be reduced by applying the reducing solution to those parts with a tuft of cotton, gently rubbing those parts until the desired reduction is attained. Wash under running tap, frequently, and repeat. White drapery, when sometimes too dense, reduces remarkably well with this treatment and often greatly improves a negative. Local reduction can also be accomplished by rubbing alcohol gently with a tuft of cotton or cotton wound around a sharp stick, over too intense parts of a negative, or when high lights are too strong, and in the hands of a careful operator greatly improves a negative.

Clearing Solution

Water	20 ounces
Pulverized Alum	½ ounce
Sulphuric Acid	1 dram

If the plate is yellow after final washing, immerse it in the clearing solution and rinse with water.

When developing paper is used or when an exceptionally clear negative is wanted, plates should be passed through this solution before the final washing, making them snappier.

Negatives produced by prolonged development with Pyro, especially if not much sulphite be used, are sometimes extremely yellow and unpromising, though some are often excellent printers. For the purpose of getting rid of this yellow, or so-called Pyro stain, various acid fixing baths and clearing baths, compounded of alum, acid, etc., are recommended. When sufficiently cleared, it is washed and dried. This bath must not be used until all the hypo has been well washed out, as acids decompose hypo and produce undesirable compounds in the film.

Hammer Dry Powder Developer

(For the Amateur)

Is compounded with accuracy from the best of chemicals, insuring good results to the user.

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The only caution that is necessary is for the user to be sure that both powders are entirely dissolved; then if the plate has the correct exposure (or near it) a good negative will result.

We do not advocate this developer in preference to those that may be prepared from our published formulas, if good chemicals are used; but for those who do not wish to make up stock solutions, or when going on a trip, they wish to carry the developer in a form that will not cause damage to other goods in case of breakage, this is just the developer that will fill the bill for this purpose, as a trial will convince you. There are none better and we have found none as good (in this class).

This developer is enclosed in paper tubes, six tubes in a box. Each tube will make 12 oz. of developer. (The more water used the softer the effect).

Price, 25c per box.

We can supply you with this developer by mail if your dealer does not handle it.

Hammer Retouching Varnish

Is now used in nearly all of the leading studios in the country, and carried in stock by all dealers in photographic supplies.

This preparation has so many advantages over other varnishes that it is meeting with an increasing demand.

It is always ready for use.

Requires no heat in applying.

It dries instantly.

Gives an ideal tooth for the pencil.

Will hold all the lead you may wish to put on.

It will not permit paper to stick to the negative.

It does not change the color of the negative.

It is flowed over the negative; not rubbed on.

It may be flowed over the negative after retouching, without injuring the retouching.

The glass side of the negative may also be coated with the varnish and lead applied,

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where an extra amount of retouching is desired.

Keep bottle well corked.

Keeping Qualities and Precautions

The excellent keeping qualities of all Hammer Plates are well known. The importance of these qualities, both to the dealer and his consumers, is apparent. Plates should be kept in a cool place, and in as pure and dry air as possible. They should not be stored in the vicinity of new paint, as the vapors of turpentine, oil, etc., have an injurious effect on the sensitive film. Excessive heat is more injurious to plates than dampness. Plates should be stored, if possible, in a room where gas is not burned. If circumstances necessitate their being kept in an impure atmosphere, each package (unopened) should be wrapped in a double coating of tin or lead foil.

Plates should not be left longer than necessary in dark slides or sheaths; they are liable to deteriorate when so left for any length of time, partly from accidental ingress of light and partly from emanations from the wood, metal, leather, etc.

If it is necessary to repack plates after exposure, they should be placed in pairs, face to face, and each pair wrapped in waxed paper. No printed paper of any kind should be used.

Suggestions for the Beginner

On developing, pour the developer over the plate by running the graduate along one side of the dish so as to propel a wave of the solution across the plate and avoid patches and streaks caused by quick acting developers when they are not properly applied.

If the dish is not rocked occasionally during development, there will be a mottling all over the film. Pyro is more likely to give this effect than others. There is no remedy; prevention is easy.

Patches of fog may come from fingers or thumb that are contaminated with hypo. Keep

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every trace of hypo out of the developer and off the plates until after development is complete and the plate washed.

Do not use alum except as heretofore directed. When alum is used, either before or after fixing, the plate must first be thoroughly washed to free it from all traces of developer or hypo, otherwise there are liable to be scum-like leathery patches that cannot be removed. A proper washing, however, removes all danger of this defect.

If a portion of the negative is partly dry and the plate then removed to a warmer place, where drying goes on more rapidly, the part last to dry will have the greater intensity. If a plate, after being in the hypo, is only rinsed and allowed to stand exposed to the air for some time, it will lose intensity to a considerable degree. After thoroughly fixing, then thoroughly wash the negative.

The Dark-Room

The dark-room in which the plates are handled and developed must be perfectly dark, except for the light from a small ruby window (ruby glass and orange-colored paper), by which the development may be watched. An abundance of pure water is a necessity, and good ventilation should be had, if possible.

The light for the developing room must be as non-actinic as possible. There is no such thing as perfectly safe light. A combination of ruby glass and orange-colored paper, illuminated, from the outside, by a gas jet or lamp is, however, practically safe. The light should not, in any event, be allowed to shine directly on the plate any more than is absolutely necessary—only in the start to avoid bubbles, and at the finish to judge density. Too much of even this ruby light will fog the plate.

A good wood sink lined with lead, or a cement sink, is best for the dark-room. A good thermometer is necessary in the dark-room. Regulate the temperature of both the dark-room and the developer accordingly.

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Under Exposure

An under-exposed plate has usually a lack of detail in the shadows and weakly lighted parts, with too much tendency to density in the strongly lighted portions. To counteract this as much as possible, it is best to remove the plate from the normal developer as soon as its condition is known, and without washing, to place it in a tray of water where no light of any kind can reach it. If this treatment in thirty (30) or sixty (60) minutes brings out the detail of the shadows where there has been but little action of light, it may then be developed in normal developer in a dark place. No plate much under-exposed ever gives a satisfactory result. It is no use to employ a large excess of alkali with the idea of "forcing" out the detail, for such proceedings will only result in fog and stain.

When a plate has been carefully exposed and fails to show an image after careful and persistent development, the cause may be attributed to one of five things:

The slide of the holder was not withdrawn.

The shutter failed to open.

The plate was not in the holder.

The developing solution lacked an essential constituent.

The exposure was too short to give even the ghost of an image.

When developing Aurora Non-Halation Plates it is best to use a dilute developer, so the delicate impression can gain sufficient density. Finish with a normal strength developer, using a trace of bromide solution, if necessary.

Over-Exposure

An over-exposed plate is flat; wanting in contrast, full of detail, but lacking in intensity in the high lights, or foggy. If a plate is known to be considerably over-exposed, commence with a developer containing a full dose of Pyro and some bromide, but very little of the alkali, and then small quantities

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of the alkali may be added from time to time as the development progresses.

Slightly over-timed plates, which would be flat and worthless if developed in normal developer alone, may be greatly improved by adding a few drops of bromide solution (10 ounces of water to one ounce of potassium bromide) to the developer as soon as the over-timed condition is apparent.

Approximate Exposure Table

(Using Diaphragm F. 8.)

Exposure Table for Hammer Extra Fast Plates, in	Intense Sun	Bright	Hazy	Dull	Very Dull
Subject—	Part of a Second				
Clouds	1-800	1-500	1-400	1-250	1-200
Snow, sea and sky—distant view	1-400	1-250	1-200	1-125	1-100
Semi-distant views and light objects	1-200	1-125	1-100	1-64	1-50
Average scenes, near views and buildings	1-100	1-64	1-50	1-32	1-25
Groups, dark objects, portrait—out of doors	1-50	1-32	1-25	1-16	1-12
Views—heavy foliage in foreground	1-25	1-16	1-12	1-8	1-4
Wood and badly-lighted river banks..	1-10	1-8	1-6	1-4	1-2

There are a number of exposure meters and exposure systems in use. The following are the readings for those most generally in use, for Hammer Extra Fast Plates. viz:

Wynne F-111	Watkins 250	H. & D. 375	Steadman F-22 US-32
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Other speeds and grades of plates in proportion.

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Dr. Scott's Table of Comparative Exposure

Hour of Day	a. m.	p. m.	June	May July	April August	March Sept.	Feb. Oct.	Jan. Nov.	Dec.
	12		1	1	1½	1½	2	3½	4
11	1	1	1	1	1¼	1¼	2	3	5
10	2	1	1	1	1¼	1¼	2½	4	6
9	3	1	1	1¼	1½	2	4	*12	*16
8	4	1½	1½	1½	2	3	*10		
7	5	2	2½	2½	3	*6			
6	6	2½	*3	*3	*6				
5	7	*5	*6						
4	8	*12							

*The accuracy of these figures would be affected by yellow sunset.

Example—If it is necessary to give one-half second exposure in June, 12 m., under like conditions in December, 12 m., it will require two seconds exposure.

For instantaneous work on moving objects, the exposure should be as long as the movement of the object will allow. For all other subjects, the exposure should be sufficiently long to secure detail in the shadows of the picture without forcing development.

Tank Development

This is the newest way of development in photography. Photographic writers everywhere are high in their praise of this method of development. We cannot give a better explanation of Tank Development than that in the "Photo Miniature," credited to Mr. A. Child Bayley:

No. 1. It gives us perfectly uniform negatives when exposure has been correct, whether we develop daily or only have a few to deal with every now and then.

No. 2. It brings everything out that can be gotten out of an under-exposed plate, and removes the temptation to over-develop in the hope that more details may be obtained.

No. 3. It gives us as good results as can be gotten with over-exposed plates, and prevents any risk of insufficient development which may be caused by the difficulty of judging how far the development has gone when the plate is very opaque.

No. 4. It reduces light fog to a minimum.

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No. 5. It overcomes entirely the difficulty of determining when development is complete.

No. 6. It can accommodate itself to the nature of the subject or to the printing process to be used, or may be settled, once for all, to give a good "all-around negative."

Improving the Character of Negatives

A negative, although free from fog, spots, stains, etc., may not print satisfactorily, owing to errors in exposure or development, or to the naturally hard, flat or badly-lighted character of the subject. Thin negatives may be grouped into the over-exposed, the under-exposed, and those which have been correctly exposed but insufficiently developed. A negative too thin from over-exposure (a common fault) is full of detail, but without contrast, and will give a poor, flat print. If it be intensified without previous preparation, it will only print more slowly. We must, therefore, first reduce, or even remove, some of the detail in the deepest shadows, by means of Farmer's Reducer. It is a good plan to lay the plate in this solution in a white dish, and when the white of the dish can be seen through the deepest shadows to remove the plate, thoroughly wash it and then intensify it with mercury. This procedure may not make a first-class negative, but it will generally result in considerable improvement. Negatives too thin from under-exposure are usually so deficient in detail that little can be done with them. Slight intensification may improve them to some extent. Negatives correctly exposed, but not developed long enough, require intensification without previous treatment.

General Hints on Development

Do not wet the plate before development, and do not first pour the developer into the dish and then drop the plate into it. Both of these proceedings tend to cause the formation of air bubbles on the surface of the film; these adhere to the film, and, when once

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formed, are very difficult to get rid of, even when a brush is used. Where the film is protected by an air bell, the developer cannot act, and thus an undeveloped spot is left which fixes out in the hypo bath, leaving a clear, round spot or hole. Lay the dry plate (film side uppermost) in a dry dish, and then pour the developer over it in one sweep so as to cover the plate all over with it at once. If a portion of the plate be left uncovered, even for only a few seconds, there will probably be a mark on the finished negative. In order to avoid this danger, use plenty of developer. Rock the dish during development, constantly and in both directions. The object of this is two-fold. In the first place, it has a great influence on the vigor and brilliancy of the negative, because the action of the developer releases bromine from the silver bromide of the plate, which bromine immediately combines with the alkali, forming a bromide. Now, this additional bromide, if not distributed by rocking, remains in the developer at the place where formed, so that the development at that part of the plate is additionally restrained. It will be easily seen that the most bromide will be formed and the greatest restraining action will result just at those places where action ought to be most vigorous. Less bromide will be formed in the less exposed parts. The latter will therefore develop more and the former less than they should, producing less contrast—flatness—in the resulting negative. Another result of rocking is to prevent a mottled appearance, which often shows itself when developer is not kept in motion. Do not fix the plate directly when you see enough detail, but give enough time to acquire density also. It is perhaps the most difficult thing in development to judge when the image is dense enough, and such knowledge can only be acquired by experience with the particular brand of plates employed. No two developing agents are alike in their results. Pyrogallie acid, Eikonogen, Metol and Hydrochinone, or combinations of two or more of these, are generally used. The conditions under which individuals

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must work are so varied that no one particular formula can be applicable to all. When strong, vigorous printing negatives are desired, pyrogallic acid, in combination with either carbonate of soda or carbonate of potash is generally preferred; although by dilution and modification as much softness and detail can be produced with this as with any other developing agent. Quick development with strong solutions means a lack of gradation, a forcing up of the high lights before the developer has time to act on the less exposed parts. Good results can be obtained only by slowly coaxing out the detail, so that all parts of the image come up fairly together. A developer containing too much alkali (carbonate of soda or potash) will cause flat, foggy negatives. All developers should be carefully filtered before use. If several plates are developed together in a large tray, the edges are liable to strike together, detaching small chips of glass, which adhere to the soft, gelatine surface, and thus cause pin-holes. Keep the plates separated by little strips of wood, tightly fitted to the bottom of your tray.

A good way to determine completion in development, is to place your finger on the back of the plate after same has been developed for about four to five minutes (where the high lights are darkest); if they show as opaque as does your finger, the plate is sufficiently developed.

Chemicals

The chemicals used in development and fixing should be the best obtainable. They should be kept in labeled and well-stoppered bottles. The water used to make up developing solutions should be the purest obtainable. Distilled water is best, filtered ice water next. If well or hydrant water is used, boil first (but not in any iron vessel), then cool, filter, and bottle for future use.

Pyro

Pyrogallic Acid does not keep if dissolved in water only. It soon becomes oxidized and

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discolored, but if a small quantity of almost any acid be first added to the water, this action is prevented and the solution remains but slightly colored and in good condition for a long time.

Sulphite

Sulphite of Soda is a usual addition to the Pyro solution, which it helps to preserve, but it also serves two other purposes; one of which is to keep the mixed developer clean during development, and the other is to regulate the color of the negative. A negative developed with Pyro without sulphite has a yellowish tone, which some people like, as being non-actinic, it gives additional vigor in printing. The addition of a large proportion of sulphite—say eight (8) or ten (10) times the weight of the Pyro—gives almost pure black, while smaller quantities give intermediate tones in the negative. Too much sulphite tends to flatness. Ordinary sulphite of soda varies a good deal in quality. It should be in clear crystals and kept in well-corked bottles; if left exposed to the air, it is gradually converted into sulphate, which forms a white crust. This is not only useless in the developer, but acts to some extent as a retarder. If the dry plate workers would use less sulphite of soda in their developers and make slightly less dense negatives they would produce better photographs.

Reduce the proportion of sulphite until the negative shows just a trace of yellow; they then require less density and the finer shadows or half-tones in the high lights will be saved with printing value. (Sulphite of soda, even in solution, does not keep well for any great length of time.)

The quantity of sulphite required in the developer depends upon the condition of the water used in the developing solution.

Soda

The common washing soda usually sold by grocers is not pure or uniform in quality, and should therefore never be substituted for car-

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bonate of soda when making a developing solution. If possible, buy all your chemicals of a responsible dealer in photographic supplies, and use the best. In hot weather use less of the carbonate of soda or carbonate of potash in the developer than in cool weather. Six parts of carbonate of soda crystals are equivalent to three parts carbonate of potash, or two and a half parts of carbonate of soda dried.

Potassium Bromide

A solution of potassium bromide (one ounce bromide to ten ounces of water) should be in every dark-room. When plates are a little over-exposed, a few drops of this solution added to the developer will restrain its action, and may thus produce a good negative from what would otherwise be a worthless plate.

(Greater or less quantity of)

The tendency of a greater or less quantity of any factor in the developer is as follows:

Reducer	More—Clogs up whites; too much contrast.
	Less—Slow development; lack of brilliancy.
Alkali	More—Quick development; dense, flat negatives; fog, etc.
	Less—Slow development; contrast.
Sulphite	More—Colder tone.
	Less—Warmer tone; stain.
Water	More—Thin in high lights; detail.
	Less—Contrast.
Temperature	Higher—Quick development; flat or fog.
	Lower—Slow development; blank shadows; almost equivalent to under-exposure.

Each ounce of our (Pyro-Soda) developer (when diluted with 7 ounces of water) contains the following amount of each chemical:

Water	1 ounce
Oxalic acid	.04+ grains
Pyro	1½ grains
Sodium Sulphite (cryst)	8+ grains
Sodium Carbonate (cryst)	4+ grains

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Hard Negatives

Caused by prolonged development of an exposure that has been correct. Very hard negatives are caused by the plate being under-exposed and over-developed. Excessive density is caused by over-exposure and over-development. In either case our formula for reduction will remedy the matter to some extent and produce a good negative.

Weak Negatives

Usually caused by lack of development, old developer, exhausted developer, poor quality of chemicals and low temperature. When the plate has insufficient strength it can be somewhat improved by our Intensification Solution.

Frilling

Frilling usually happens in hot weather. Care should be taken so that the dark-room is not too warm and the developer should be 60 degrees Fahr., or less, and the hypo solution 60 degrees or less. Use plenty of fresh hypo, and add more chrome-alum to the fixing bath. In an extreme case, soak the plate in a bath of 20 ounces water and 1 ounce chrome-alum immediately after the plate is developed and washed, just before it is placed in the regular fixing bath. Leave the plate in the Acid Chrome-alum Fixing Bath 15 minutes after it is entirely fixed; then wash for 15 minutes only.

Never add fresh hypo to an old fixing bath. Throw the old bath away, mix a fresh one, never add hypo to an Acid Chrome-alum Bath; chrome-alum may be added if mixed with acid sulphite as per Acid Chrome-alum formula, if a harder film is wanted.

Halation

Halation is the spreading of the strong lights of a negative and consequent encroach-

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ment upon the shadows. In a view negative including a bright sky it is generally found, on development, that the extreme edge of the plate above the sky, which was protected by the rebate of the dark slide, does not remain clear, although the other three edges may do so, the strong light of the sky having spread beyond its proper boundary. When a picture is taken of the dark interior of a building including a window, the light of the latter often seems to spread and form a wide blur all around. (Can be remedied by local reduction.)

In the ordinary negative the effect of halation is scarcely apparent; but, nevertheless, it is there more or less generally, and is detrimental to the fine details. Halation is due chiefly to light which has passed through the film and been reflected from the back surface of the glass plate. It is also, to a minor extent, caused by a lateral spreading of light from particle to particle of the silver bromide in the film. Some plates are more liable to halation than others; this depending on the opacity and other characteristics of the film. The **Hammer Plates**, even when not backed, are notably free from it; but the **Hammer Aurora Double Coated (Non-Halation) Plate** is prepared especially to prevent halation. As the merits of this plate have become better known, there is a corresponding increase in the demand. **Hammer's Aurora** is, even under ordinary conditions, superior to any single coated plate made for general work. We recommend their use, especially for interiors, landscapes and marine views, as well as for groups and white draperies. Expose for the darkest shadows and use a rather dilute developer.

Stains

Deep yellow, orange or brown stains appearing gradually, either in patches or all over the plate, some time after the plate has been finished, are due to imperfect fixing or incomplete washing after fixing, or they may be

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caused by hypo decomposed in the film by improper use of alum or acids.

In a great many cases these stains may be removed by placing the negative in our **Clearing Solution** until they disappear; then wash. Sulphuric acid often removes stains; solution made up of 20 ozs. water and 1 oz. acid. Apply with cotton. Surface stains, caused by prolonged development or scum on the developing solution, are easily removed by our **Reducing Solution**.

Spots

Small, clear holes, usually, but not always, circular, with sharply defined edges, are due to air bells which have remained on the film at the time of development. If the air bell happens to be removed during development, a similar spot will remain, but it will not be quite clear. If the air bell still remains on the film during fixing as well as development, a spot will probably be formed which is circular, with a sharply defined edge, and quite clear, but with an opaque center—the center consisting of undissolved silver bromide. In this case the hypo has been able to work its way partially under the bubble, but not sufficiently to reach the center. Clear spots of quite a different character, usually very small and numerous, clearly defined, but of very irregular shapes, are caused by dust on the surface of the plate during exposure. These particles, being opaque, prevent the light from reaching the film, and consequently print themselves as places which do not develop. If plates have been for any length of time in dark slides, sheaths or grooved boxes, and especially if these are carried about more or less, dust is sure to settle on the film. The remedy is, of course, to keep the dark slides, etc., clean, and whenever possible, to dust the surface of the plate before putting it in the slide. Another kind of transparent spot, triangular in form and irregular in size, larger, usually, than dust spots, is caused by a scum which forms on the surface of the developing solution, if it is prepared and left in an open vessel, such as a graduate or tray, some time

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before using. When disturbed, this scum breaks up into small triangular particles and adheres to the surface of the plate, preventing the action of the developer. Scales and sediment which accumulate in the developing tray and in graduates in which the developer is prepared and used, will at times become detached and adhere to the film, causing transparent spots. This trouble is especially liable to be met with when one changes developing formulas without first cleaning the trays and graduates. Clean with acid and then wash. Small, transparent spots, resembling little particles of lint and dust, are usually caused by brushing the surface of the plate hurriedly before placing it in the holder; the gelatin film becomes electrified by the friction and attracts to itself the dust and lint floating in the surrounding atmosphere. **Remedy:** Use a tuft of clean cotton and wipe slowly in one direction only.

Purple or dark, opaque spots, comet or irregular in shape, and irregular in size, are generally caused by adding dry pyrogallic acid to the developing solution immediately before using; little particles of the undissolved pyro adhering to the surface of the plate causes the spots. Sediment in the fixing solution often causes opaque spots. To remove such spots, soak the plate a few minutes in water to which has been added a few drops of nitric acid. Use no more acid than is necessary to remove the spots in a reasonable time.

Spots and Pinholes

Spots and pinholes in negatives are produced in so many ways and under so many different conditions that it would be impossible to enumerate and describe them. Cleanliness in every operation is the only sure preventative. If the dark-room, and also the graduates and trays which contain the developing solutions are kept clean, the cameras and plate-holders kept free from dust, the fixing solution free from sediment, developing solutions filtered, and each plate carefully dusted before being placed in the holder, very few spots of any kind will be seen.

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Dark purple spots, comet shaped, are due to iron in the hypo. Filter the bath two or three times, until the trouble disappears.

Fog

A blackening of the plate all over, under the action of the developer, may be really due to over-exposure. This kind of fog may be easily distinguished from all others, by the fact that the edges of the plate, where protected by the rebate of the dark slide, usually remain clear. Fog all over the plate may be due to an unsuitable developer containing too much alkali or too high temperature; or it may be due to the plate having been exposed to light elsewhere than in the camera. The camera itself may admit light through a crack or hole, or fog may be due to light reflected from the sides of the camera; or it may be due to glare from the lens, having had the sun in front when the exposure was made. The dark-room light may be at fault. General fog does not admit of remedy; the only thing that can be done, if it is worth while, is to reduce the negative sufficiently to clear off the fog and then intensify. Lines of fog emanating from the corners of a plate are generally due to faulty dark slides, a band of fog across a plate is sometimes caused by emanations from the hinges or a dark slide. Traces of hypo in the developer, or the exposure of a plate to white light before the bromide of silver is thoroughly dissolved in the fixing solution, will cause fog.

Removing Film

(Removing film quickly from glass.)

A	
Sodium Fluoride	60 grains
Water	8 ounces
B	
Sulphuric Acid.....	1 dram
Water	8 ounces

Both solutions can be used until exhausted. Place the negatives in solution A for a couple of minutes, and then place directly in solution

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B. After another couple of minutes raise the film with the finger from one corner; it will soon leave the glass. Very good in the case of broken negatives, for transferring the film onto another glass. In this case place the negative (before stripping) in a Chrome-alum Bath, made up 1 ounce chrome-alum and 20 ounces water, for one-half hour. Then wash and proceed to strip.

Lantern Plates

The exposure of a Lantern Slide which is to be made by contact, is a very simple matter. Place the printing-frame which contains the negative and Hammer Lantern Plate at a distance of 5 feet from the ordinary gas flame. The frame must be held so that the actinic light passes through the negative to the Lantern Plate. An average quality of negative will require 6 seconds exposure. If the exposure is made too close to the light, there will be too much light getting through the high lights. An intense negative may be exposed nearer the light. When the correct exposure is found (say 6 seconds at 5 feet) with your light, always expose 6 seconds and vary the distance from the light according to the density of the negative you are using. The results of over and under-exposure are of the same character with our Lantern Plates as are obtained with ordinary negative plates in general work. Insufficient exposure will give lack of detail and density, while with too long an exposure a flat and often indistinct looking image will result. With a little practice, an approximately correct exposure can be guessed at sight.

Three Good Rules

Which will greatly help to insure clean work:

No. 1. Always keep hypo by itself; mix it only in its own dishes, and always wash your hands before touching anything else.

No. 2. Always rinse the tray, no matter what was used in it, as soon as you are through with it; also rinse before use.

No. 3. Keep litter out of your workroom.

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Any good developer will work well with Hammer Plates, but the following have been tested and tried and have been found to work exceedingly well:

Metol-Pyro Developer

No. 1

Pure Hot Water.....	28 ounces
Metol, thoroughly dissolved.....	120 grains
Sulphite Soda (Anhydrous)....	5 ounces
Pyro	1 ounce

Dissolve the above; then add 15 grains Oxalic Acid, dissolve in $\frac{1}{4}$ ounce water.

No. 2

Pure Water	28 ounces
Carbonate Soda (C. P.).....	3 ounces

Tray Development

TO DEVELOP, TAKE:

1 ounce of No. 1.
1 ounce of No. 2.
Water, 10 ounces.

Temperature, 65 degrees. Add 3 or 4 drops of a saturated solution of Bromide of Potassium. Develop in a very weak light. Development should be completed in 5 to 8 minutes.

Tank Development

TO DEVELOP, TAKE:

2 ounces of No. 1.
2 ounces of No. 2.
61 ounces of water.

Temperature, 65 degrees, and add 10 drops of a saturated solution of Bromide of Potassium. Reverse tank every 5 minutes. Develop in 30 to 35 minutes.

Pyro Developer

A

Water	16 ounces
Sulphite Soda (crystals).....	4 ounces
Oxalic Acid	20 grains
Pyro	1 ounce

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Water	B	16 ounces
Carbonate Soda (crystals)		3 ounces

TO DEVELOP, TAKE:

4 drams of "A."
4 drams of "B."
8 to 10 ounces water.

Metol-Pyro Developer

Water	No. 1	27 ounces
Pyro		1 ounce
Metol		60 grains

Carbonate Soda No. 2testing 40

Sulphite Soda No. 3testing 70 to 80

FOR USE, TAKE:

1 ounce of No. 1.
1 ounce of No. 2.
1 ounce of No. 3.
8 to 12 ounces of water.

Metol-Pyro Developer

Sulphite of Soda Hydrometer, testing 80°
No. 1

Carbonate of Soda Hydrometer, testing 40°
No. 2

Water No. 312 ounces
Pyro $\frac{3}{4}$ ounce
Metol $\frac{1}{4}$ ounce
Sulphite of Soda60 grains
Citric Acid40 grains

TO DEVELOP, TAKE:

No. 1, one-half ounce.
No. 2, one-half ounce.
No. 3, two drachms.
Water 6 to 8 ounces.

Pyro Developer with Carbonate of Potash

32 ounces of Pure Water	No. 1	or 960 c. c.	Metric Weights and Measures
4 ounces of Sodium Sulphite (Anhydrous)		or 120 grammes	
1 ounce Carbonate of Potash (C. P.)		or 30 grammes	

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24 ounces Pure Water	No. 2	or 720 c. c.	Metric Weights and Measures
15 grains Oxalic Acid (dissolved first)		or 1 gramme	
1 ounce Pyro		or 30 grammes	

TO DEVELOP, TAKE:

1 ounce of Solution
No. 1or 30 c. c.
 $\frac{1}{2}$ ounce of Solution
No. 2or 15 c. c.
6 to 8 ounces of Pure
Wateror 180 to 240. c. c.

When the plate is fully developed and you find the high lights too thin, use less water in the developer; if too dense, use more water.

Pyro-Acetone Developer

Clear, clean and quick; for hot climates. The film does not soften during development. Washed negatives dry quickly.

Water No. 123 $\frac{1}{4}$ ounces
Sulphite Soda (Anhydrous) No. 23 ounces
(Hydrometer test 75°)

Water No. 224 ounces
Oxalic Acid15 grains
Pyro1 ounce

FOR USE, TAKE:

Water5 ounces
No. 11 ounce
No. 2 $\frac{1}{2}$ ounce
Acetone (Liquid)2 drams

Do not keep the plate out of the developer long, while developing, or streaks will result.

Eikonogen-Hydrochinone Developer

64 ounces of Pure Hot Water	No. 1	or 1920 c. c.	Metric Weights and Measures
1 ounce of Eikonogen		or 30 grammes	
$\frac{1}{8}$ ounce of Hydrochinone		or 4 grammes	
2 $\frac{1}{2}$ ounces of Sulphite of Soda (crystal)		or 75 grammes	

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No. 2	Metric Weights and Measures
64 ounces of Pure Water.....or 1920 c. c.	
2½ ounces of Carbonate of Potash (dry)or 75 grammes	

TO DEVELOP, TAKE:

2 ounces of Solution No. 1.....or 60 c. c.
1 ounce of Solution No. 2.....or 30 c. c.

Add old developer (solution previously used) in sufficient quantity to produce best results.

Ortol Developer

No. 1
Ortol .....160 grains
Water .....to make 16 ounces

No. 2
Carbonate Soda (C. P.).....240 grains
Sulphite Soda (Anhydrous).....120 grains
Water .....to make 16 ounces

FOR USE, TAKE:

1 ounce of No. 1.
1 ounce of No. 2.
6 ounces of water.

If less water is used, it will give denser negatives; more water will give softer negatives.

Edinol Developer

Water .....20 ounces
Sulphite Soda (crystals)..... 5 ounces
Edinol .....96 grains
Carbonate Soda (crystals)..... 2 ounces

To develop, take 1 ounce of this stock solution to 1 ounce of water. More water in warm weather.

Rodinal Developer

For Tray Development, use 1 ounce in 20 to 30 ounces water; for Tank Development, use 1 ounce in 80 to 100 ounces water.

Glycin Developer

No. 1
Glycin .....123 grains
Sulphite Soda.....370 grains
Water (hot, 200 degrees)..... 7 ounces
Let cool, then add:
Carbonate Potassium 46 grains

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No. 2
Carbonate Potassium616 grains
Water 14 ounces

TO DEVELOP, TAKE:

1 ounce of No. 1.
1 ounce of No. 2.
3 ounces of water.

Contrast Developer

For use when great contrast is wanted:

Hot Water.....80 ounces
Sulphite Soda (Anhydrous)..... 6 ounces
Carbonate Soda (C. P.)..... 4 ounces
Hydrochinone 1 ounce
Bromide Potassium (crystals).....¼ ounce

Use full strength at about 70 degrees Fahr., or the same formula, substituting ½ ounce Glycin and ¼ ounce Hydrochinone.

Opal Plate Developer

Water 8 ounces
Metol .....14 grains
Hydro 5 grains
Sulphite Soda (Anhydrous).....40 grains
Carbonate (C. P.).....15 grains
Bromide Potassium (sat solution) 4 drops

Postal Plate Developer

(One Solution)

Water 20 ozs.
Metol 11 grains
Sulphite Soda .....180 grains
Hydrochinone 10 grains
Carbonate Soda .....240 grains

Use without dilution.
Develops in about 45 seconds.

HAMMER'S LITTLE BOOK:

SIZES AND LIST PRICES

Hammer Dry Plates

Special, Extra Fast, Fast and Slow.

Doz. in case	Sizes	Per doz.
30	2 x 2	\$ 0.20
30	2½ x 2½	.30
30	2½ x 4	.35
30	3 x 3	.35
30	3 x 3½	.35
30	3¼ x 3¼	.40
30	3¼ x 3½	.40
30	3½ x 3½	.40
30	3¼ x 4¼	.45
30	3¼ x 5½	.65
30	4¼ x 4¼	.60
30	3½ x 6½	.75
30	4 x 5	.65
30	4¼ x 5½	.75
30	4¼ x 6½	.90
26	4¾ x 6½	.90
20	4 x 7	1.00
20	5 x 7	1.10
20	5 x 8	1.25
12	6½ x 8½	1.65
12	7 x 10	2.10
12	8 x 10	2.40
4	10 x 12	4.20
4	11 x 14	6.00
3	14 x 17	9.00
2	16 x 20	13.25
2	17 x 20	14.00
1½	18 x 22	16.50
1	20 x 24	20.00

Hammer Dry Plates

Special, Extra Fast, Slow and Orthochromatic.

SPECIAL SIZE.

Sizes	Per doz.
15x24	\$17.00
12x30	22.00
20x28	46.00
20x30	52.00
22x27	48.00

A Short Talk on Negative Making.

Sizes	Per doz.
22x28	49.00
22x30	54.00
24x30	58.00
25x30	60.00

Made only on special orders and subject to ten days' delay.

Hammer Orthochromatic Plates

Extra Fast Orthochromatic, Slow Orthochromatic and Plain Glass Transparency Plates.

Doz. in case	Sizes	Per doz.
18	1 x 1½	\$ 0.20
18	2 x 2	.20
18	2½ x 2½	.30
18	2½ x 4	.35
18	3 x 3	.35
18	3 x 3½	.35
18	3¼ x 3¼	.40
18	3¼ x 3½	.40
18	3½ x 3½	.40
18	3¼ x 4¼	.45
18	3¼ x 5½	.65
18	4¼ x 4¼	.60
12	4 x 5	.65
12	3½ x 6½	.75
12	4¼ x 5½	.75
12	4¼ x 6½	.90
12	4¾ x 6½	1.00
12	4 x 7	1.00
12	5 x 7	1.10
12	5 x 8	1.25
8	6½ x 8½	1.65
6	7 x 10	2.10
6	8 x 10	2.40
2	10 x 12	4.20
2	11 x 14	6.00
1½	14 x 17	9.00
1½	16 x 20	13.25
1½	17 x 20	14.00
1½	18 x 22	16.50
1	20 x 24	20.00

HAMMER'S LITTLE BOOK:

Hammer Aurora Non-Halation and Double Coated Orthochromatic Plates

Doz. in case	Sizes	Per doz.
18	3¼ x 4¼	\$ 0.55
12	4 x 5	.80
12	3½ x 6½	.95
12	4¼ x 5½	.95
12	4¼ x 6½	1.10
12	4¾ x 6½	1.20
12	5 x 7	1.40
12	5 x 8	1.55
8	6½ x 8½	2.10
6	7 x 10	2.65
6	8 x 10	3.00
2	10 x 12	5.15
2	11 x 14	7.25
1½	14 x 17	11.25
1	16 x 20	16.40
1	17 x 20	17.25
1	18 x 22	20.40
1	20 x 24	24.65

Lantern Slide Plates

YELLOW LABEL

Thin Glass

Doz. in case	Sizes	Per doz.
30	3¼ x 4	\$ 0.45
30	3¼ x 3¼	.40
12	6½ x 8	2.00

Lantern Slide Plates

WHITE LABEL

Glass 20 to Inch

Doz. in case	Sizes	Per doz.
30	3¼ x 4	.45
30	Cover Glass 3¼ x 4	.25
30	Cover Glass 3¼ x 3¼	.20

A Short Talk on Negative Making.

Photo Postal Plates

Doz. in case	Sizes	Per doz.
100	2½ x 2½	\$ 0.25
30	3½ x 3½	.40
36	3¼ x 4¼	.45
30	3¼ x 5½	.65
30	4 x 5	.65

Hammer Opal Plates

Doz. in case	Sizes	Per doz.
12	4 x 5	\$ 0.85
12	4¼ x 6½	1.45
12	5 x 7	1.80
8	6½ x 8½	2.90
6	8 x 10	4.30
2	10 x 12	6.90
2	11 x 14	9.40

Ground Glass Transparency Plates

Doz. in case	Sizes	Per doz.
18	4 x 5	\$ 0.80
12	4¼ x 6½	1.10
12	5 x 7	1.40
12	5 x 8	1.55
8	6½ x 8½	2.10
6	8 x 10	3.00
2	10 x 12	5.15
2	11 x 14	7.25

HAMMER X-RAY PLATES

X-Ray Plates

Doz. in case	Sizes	Per doz.
6	5 x 7	\$ 1.40
6	5 x 8	1.55
6	6½ x 8½	2.10
6	8 x 10	3.00
2	10 x 12	5.15
2	11 x 14	7.25
1½	14 x 17	11.25

HAMMER'S LITTLE BOOK:

X-Ray Plates—Double Coated

Doz. in case	Sizes	Per doz.
6	5 x 7	\$ 1.70
6	5 x 8	1.85
6	6½ x 8½	2.55
6	8 x 10	3.60
2	10 x 12	6.10
2	11 x 14	8.50
1½	14 x 17	13.50

Larger sizes made to order on short notice. 8x10 or smaller are packed ½ dozen in each box, 10x12 and larger are packed ¼ dozen in each box.

The plates are packed in envelopes made of chemically pure paper.

(Envelopes and plates sent separate, if so desired.)

Hammer Extra Fast, Special, Fast, Slow and Orthochromatic Plates

In Centimeter Sizes.

Doz. in case	Sizes Centimeters	Per doz.
30	6½ x 9	\$ 0.30
30	6 x 9	.30
30	8 x 9	.40
30	9 x 12	.60
20	8½ x 17	1.00
20	12 x 16	1.00
20	12 x 18	1.10
20	13 x 18	1.10
12	18 x 24	2.20
12	18 x 26	2.40
4	21 x 27	3.00
4	24 x 30	4.20
3	30 x 49	9.00
1	50 x 60	20.00

Sodas

Bottles in case		Per bot.
12 bots.	1 lb. Sulphite Soda	\$0.35
12 bots.	1 lb. Carbonate Soda	.25
6 bots.	5 lbs. Sulphite Soda	1.50
6 bots.	5 lbs. Carbonate Soda	1.00

A Short Talk on Negative Making.

Hammer Retouching Varnish

Doz. in case	Ounces in each bottle	Price per bottle
1	16	\$ 0.50
2	8	.25

Hammer Metol-Hydrochinone Developer

Tubes in each box	Price per box
6	\$ 0.25

X-Ray Developer

Tubes in each box	Price per box
3	\$ 0.45

ALL LIST PRICES SUBJECT TO DISCOUNTS AL-
LOWED BY DEALERS.

BRANDS
:::OF::: **Plates**

MANUFACTURED BY

**HAMMER
DRY PLATE CO.**

ST. LOUIS, MO., U. S. A.

Extra Fast
Special Extra Fast
Fast
Slow
Aurora Non-Halation
Commercial Ortho.
Ortho. Extra Fast
Ortho. Slow
Double Coated Ortho.
Lantern Slides
X-Ray
Photo Postal
Opal Plates
Ground Glass Trans-
parency