How to make Good Pictures

A Book for the Amateur Photographer

Published by
Canadian Kodak Co., Limited
TORONTO, CANADA

HOW TO MAKE
GOOD PICTURES

A BOOK for the Amateur Photographer published by Canadian Kodak Co., Limited, Toronto, Canada.

TR146
H68
1910z
c.2

INDEX.

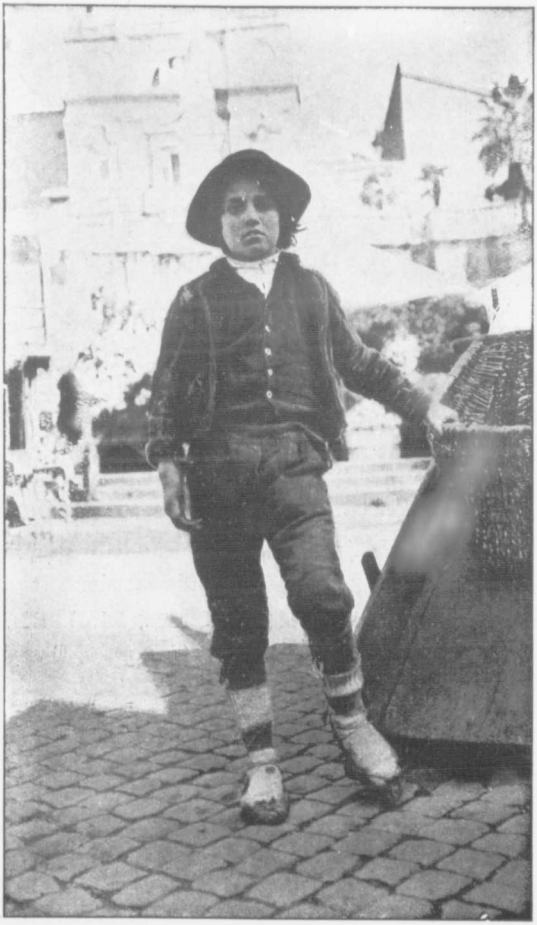
PREFACE.

"How to Make Good Pictures," the title of this book, explains its mission.

We can only add that in it all photographic processes have been reduced to the simplest form consistent with good results—that no complex theories are exploited or unworked out experiments introduced.

We have given prominence to the Kodak system of picture making because time has demonstrated its supremacy for the producing of good results in the simplest way.

CANADIAN KODAK CO., LIMITED,
TORONTO, CANADA.



A Market Boy.

THE CHOICE OF A CAMERA.

Ten to twenty years ago it was customary to open a book on photography for the amateur with a discussion of the relative merits of film and plate cameras. Such discussion is no longer necessary for film quality has for many years equalled plate quality. As to the superior convenience of film there has never been any argument.

In addition to extreme lightness and compactness, combined with great durability, the film camera possesses the advantage of loading and unloading in full daylight; in fact, with the cartridge film camera, every process from loading the camera to the finishing of the print may be accomplished in ordinary light.

The sensitive film upon which the image is impressed by the action of light, put up in its convenient and compact daylight loading, cartridge form, weighs but one twentieth as much as its equivalent in glass plates with the necessary holders, is non-breakable, and may be developed without the aid of the dark-room.

In speed and quality, the Eastman N. C. Film is equal to the finest portrait plates; it is proper in orthochromatic balance, and has become the most dependable of photographic products.

With the perfection of the modern finder, the necessity for viewing the image on the ground glass screen, is far more imaginary than real, and with the extremely accurate scales supplied on all focusing Kodaks, the correct estimating of distance for sharp focus is a very simple matter.

And with all of the folding Kodaks (3¼x4¼ and larger) the use of glass plates, and the ground glass screen is made possible by means of a simple combination back or adapter taking the place of the regular back. It is safe to say, however, that the glass plate and screen focusing feature will be but rarely employed, and then only when one wishes to make an exposure or two around the house.

In the selection of any particular Kodak, the safe rule is to buy the best the purse will allow, bearing in mind, nevertheless, that satisfactory pictures are made with even the least expensive of the Kodak or Brownie cameras.

Practically all of the amateur work to-day is made with the small film camera. In many of the amateur photographic exhibitions and salons, you will see large pictures, but in most cases the foundation for these pictures was a small film negative.

LENSES.

It follows naturally, with the variations in size and cost of the camera, that the optical equipment will vary in the same proportion, and the user of any lens should familiarize himself with its limitations as well as its capabilities, always bearing in mind, however, that the lens equipment of any Kodak or Brownie camera will afford perfect results within its limitations.

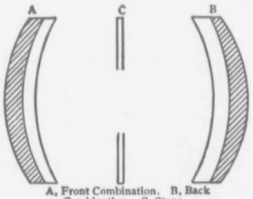
Lenses commonly used in hand cameras may be divided into three classes: "Single", composed of one piece of glass, "Single Combination" (sometimes also called simply "Single"), composed of crown and flint glass, and "Double Combination" (often called simply "Double") consisting of two single combinations. Lenses of the highest correction and with superior covering and illuminating power are broadly classed as "anastigmats" and will be compared with the ordinary type later on.

PLANO-CONVEX.

Single Lenses: Single Lenses are made in two forms, meniscus and plano-convex. The meniscus form, giving the best definition, is always employed except in the cheapest class of cameras. These lenses are always mounted behind the diaphragm which controls the amount of light to be admitted through the lens.

MENISCUS

Double Combination Lenses: Double combination lenses are usually of the form shown in the cut and consist of two meniscus lenses mounted with the diaphragm between.



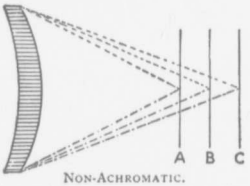
A, Front Combination. B, Back Combination. C, Stops.

DOUBLE LENS.

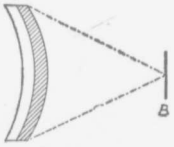
Corrected Lenses: All glass, when ground into lenses, has the quality of dispersing the different colored rays of light so that they will not focus on the same point.

The rays which act on the sensitive surface of the film, and produce the image, are those from the violet end of the spectrum and are called the actinic or chemical rays. The visual rays are from the red end of the spectrum, hence if these rays are separated by the lens the image we would see on the ground glass is not the one which would make the picture. Fortunately flint and crown glass have different dispersive powers, and, therefore, one can be made to correct the action of the

other. Hence if we assume that with a non-achromatic lens such as shown in the cut, the visual focus would be at C, the chemical focus would be at A. Flint glass bends the chemical rays more than does crown glass, and so by combining a negative lens of flint glass with a positive lens of crown glass, the chemical and visual rays are brought into coincidence, i. e., are brought to focus in the same plane as at B. The lens is then called "achromatic". In a non-corrected lens even the chemical rays do not all focus at one point, but in small lenses the dispersion may be so slight as to be impossible of detection in the picture by the naked eye.



NON-ACHROMATIC.



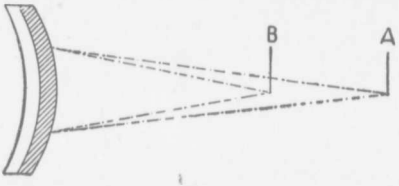
ACHROMATIC.

It may be said that the difficulties of lens making increase in geometrical ratio to the size of the film or plate to be covered, and many forms of lenses other than those illustrated herewith have been devised to overcome these difficulties.

In very small cameras an exceedingly simple lens can be employed, for instance the lens used in the original Pocket Kodak, which took a picture 1½ by 2 inches, was a single meniscus non-achromatic, and probably no lens ever had higher encomiums showered upon it. The reason being that it was carefully made, rightly tested and inspected, and not over taxed. As a matter of fact, no double achromatic lens could be made that would surpass it in brilliancy or covering power. For larger sizes lenses must be corrected, but there is little in a double lens, except that of speed, unless 3¼ by 4¼ or larger pictures are desired. Single lenses tend to slightly curve the marginal lines of the picture, but this is unnoticeable in small pictures and is unobjectionable in view work of any size unless the picture contains architectural subjects.

Double lenses can be worked with a larger stop opening than single lenses and are, therefore, quicker, especially in the larger sizes. Such lenses are almost essential for 4¼ x 6½ and 4 x 5 snap shot work and are preferable for 3¼ x 4¼, but below that the advantage, except that of speed, disappears. Everything depends on the quality of the work put into a lens. Differences of curve or polish not to be detected except by an expert often constitutes the difference between a good and poor lens and only those which have been through the most rigid inspection and trial should be put in a camera by the manufacturer.

Fixed Focus: "Fixed Focus Lenses" are so often mentioned in catalogues and advertisements that the impression has gained ground that this is some distinct kind of lens, with an extraordinary power of focusing all objects near and far in one plane. There is no inherent quality in any lens that makes it "fixed focus"; it is such when it is immovable and that is all. Any lens can, therefore, be made "fixed focus", but the extent to which it will focus all objects in one plane depends upon its length of focus and size of stop or diaphragm used, and upon that only. The reason for this is that the rays of light from near and far



objects do not focus at the same point. For instance in the exaggerated diagram shown herewith, we will assume that B is the point at which objects 100 feet distant will focus and that A is where objects 10 feet distant will focus. Now the distance between A and B will vary in ratio to the focal length of the lens. In a lens of three inch focus it is ascertained mathematically to be 3-16 of an inch and in one of twelve inch focus, 1¼ inches. Hence, if using a 3 inch focus lens the sensitive surface is placed between A and B, the object at 100 feet and beyond (all objects beyond 100 feet come practically within one focus) and objects 10 feet distant will none of them be more than 3-32 out of focus, which, with the size of stop ordinarily used for snap work, creates so slight a blurring of the image that it cannot be detected. Experience has shown that the limit of focus for a lens which is to be employed for snap shot work with the focus fixed is under 5 inches; in other words, that a 3¼ x 4¼ plate is about the largest that can be used to advantage under such circumstances. It is possibly true that for cameras of this size and under, little can be gained by having the focus adjustable, and that, on the other hand, better average results will be obtained with a fixed focus, owing to the fact that there is no adjustment that will allow the lens to be put out of focus by a mistake in estimating distances.

Anastigmat Lenses: As heretofore stated, aside from the simpler forms of lenses there are those, much more highly corrected, and calculated upon formulae that permit their working at a much larger aperture than the rapid rectilinear lens. Such lens are termed anastigmats.

To secure a sharp, satisfactory negative with the ordinary R. R. Lens, its opening cannot be larger in diameter than one-eighth the focal length of the lens. Such opening admits suf-

ficient light on clear, bright days to obtain well timed exposures even as fast as 1-100 of a second; but in very dull lights snap shots are impossible.

But with an anastigmat the construction and optical corrections are such that sharp satisfactory pictures may be made at an opening more than one-seventh the focal length of the lens—hence, admitting over 60 per cent. more light in a given time than the R. R. lens. In combination with a Focal Plane shutter exposures as short as 1-1000 second may be made. And on dull days and even indoors, where with an R. R. lens little or no impression could be obtained, the anastigmat admits so much light that "slow snap shots" may be made.

GET ACQUAINTED WITH YOUR LENS.

The user of any lens should familiarize himself with its limitations as well as with its capabilities. This is particularly true in the case of the Anastigmats, and we therefore ask that those who are not entirely familiar with photographic optics read the following brief explanation, that they may get the full benefit of the power of their lens and that, on the other hand, they do not ask of it the impossible. It should be borne in mind, however, that what we have to say here *is applicable only to lenses of from 5 to 8 1-4 inch focus,* such as are supplied on hand cameras. These directions make no pretension to covering the entire field of photographic optics.

In comparing the work of one lens with another, you must, first of all, remember that such comparisons must be made with a stop opening of the same relative size (*f* value).* In comparing the Anastigmat with the ordinary Rapid Rectilinear lens, do not expect as great depth of focus with your Anastigmat set at an opening of *f*.6.3 as your R. R. lens gives at its largest opening, *f*.8. The Anastigmat at *f*.8 will give as great depth of focus as will an R. R. of the same focal length with the same opening, while on the other hand, the R. R. will not work at all at *f*.6.3.

NOTE. It should be borne in mind that the shorter the length of focus, the greater the depth of focus. This explains why very small cameras can have a "fixed focus" (immovable), while larger cameras are all made so that they can be focused.

See Chapter on diaphragms page 17.

What Depth of Focus Means: Suppose, now, that you are using your Anastigmat at the full opening *f*.6.3 and have set the focus at say 15 feet. An object 15 feet distant will be absolutely sharp, but objects 10 and 20 feet distant will not be. Stop your Anastigmat down to *f*.8 or *f*.11.3 and those objects each side of the exact point of focus will materially increase in sharpness. Go further and use stop *f*.22.6, or a still smaller stop, and everything from 10 feet on to infinity will be sharp. It will thus be seen that the smaller the stop, the greater the depth of focus, i. e., the greater the power of the lens to sharply define, at the same time, objects nearer the camera and further from the camera than the principal object

in the picture, which, of course, is the object focused upon. But it is obvious that with the small stops the exposure must be correspondingly lengthened.

Anastigmat Speed: Using a stop of *f*.8 or smaller the advantage of the Anastigmat over the really excellent Rapid Rectilinear lenses furnished with our cameras is not marked, but there is an improvement in definition and in the correctness of lines. But let us suppose that we desire to photograph a rapidly moving object, or to take a picture on a cloudy day. What do we find? The *f* value of a lens denotes the relation of the opening in the lens to its focal length. Suppose, then, that we have a single achromatic lens of 5 inch focus, speed *f*.14, a Rapid Rectilinear lens of 5 inch focus, speed *f*.8, and an Anastigmat lens, speed *f*.6.3, of the same length of focus, 5 inches. How do they compare in speed? To reduce this to its simplest terms we will divide the focal length (5 inches) in each case by the *f* value.

$$5 \div 14 = .357$$
$$5 \div 8 = .625$$
$$5 \div 6.3 = .793$$

It will thus be seen that in using the single lens the largest opening is $\frac{357}{1000}$ of an inch in diameter, with the R. R. lens $\frac{625}{1000}$ of an inch and with the Anastigmat $\frac{793}{1000}$ of an inch. The amount of light admitted by a lens in a given time depends, of course, upon the area of the opening at that time being used in that lens. The amount of light admitted in a given time with these different lenses would, therefore, be in direct proportion to the square of their diameters. Here, then, omitting the fractions, is the result:

Single lens	$.357 \times .357 = .127$
R. R. lens	$.625 \times .625 = .390$
Anastigmat lens	$.793 \times .793 = .628$

We thus find that the speed of the R. R. lens is over three times that of the single lens, and the speed of the Anastigmat is 61% greater than the speed of the R. R. lens. Therein lies the greatest Anastigmat advantage. But simply because it has this speed you don't always need to use it. The speed must be used with discretion, just as greater care is required in operating an automobile than in operating a bicycle.

Under conditions that would give you good results with an R. R. lens at *f*.11.3 use stop *f*.11.3 with your Anastigmat—don't use the largest opening for every occasion; use it only for emergency. *Your greatest Anastigmat advantage lies in the fact that when the light is so poor that you cannot get a properly timed negative with your R. R. lens at its greatest opening f.8 without resorting to a time exposure, you can open up your Anastigmat to its full opening and get a successful snapshot.*

For the same reason, i. e., because the Anastigmat admits more light in a given time than does the R. R. lens, it is used in connection with high speed shutters for photographing rapidly moving ob-

jects. Even in bright sunlight the R. R. lens will not give sufficient illumination to make its use practical with the extremely high speed shutters when worked at their shortest exposures—but the Anastigmat, by reason of the large opening that can be used, enables you to take advantage of the high speed shutter.

Shutter Speed and Lens Speed: Strange as it may seem, there are some amateurs who do not understand the difference between a fast lens and a fast shutter, thinking, apparently, that because they have a fast lens they should catch all moving objects sharply, or because they have a fast shutter that their pictures should be fully timed. The reverse of this proposition is the truth. The fast shutter, by reason of shortening the exposure, cuts down the light and tends toward undertiming.* Remember that these speeds are always relative. Your Anastigmat opened to *f*.6.3 will not give as fully timed a negative in $\frac{1}{200}$ of a second as your R. R. lens will at *f*.8 in $\frac{1}{100}$ of a second. Your *f*.6.3 Anastigmat is 61% faster, not 100% faster than the R. R. lens.

*This refers in particular to between-the-lens shutters. With a focal plane shutter, such as used in the Speed Kodaks and Graflex Cameras, other factors enter. Such shutters give more illumination of the plate in a given time than between-the-lens shutters—but, on the other hand, work many times faster when at full speed.

Unfair Comparisons: We have had some complaints that the Anastigmats were not giving as fully timed negatives as they should in comparison with the R. R. lens which our customer had previously used. *In every case* we have found that the fault was not in the Anastigmat but in the old shutter with which the R. R. lens was used—such shutter having become dirty or through the springs weakening or other cause, failing to work at its supposed speed. The result under such circumstances being that the old lens was getting the benefit of a much longer exposure than was intended, while the Compound shutter fitted to the Anastigmat was chopping off the light with greater accuracy.

Two "Stop" Systems: The user of an Anastigmat should bear in mind that there are two systems under which shutters are marked for stop openings and this must be reckoned with in making comparisons. Most shutters for R. R. lenses are marked on the Uniform System (abbreviated to U. S.), while the shutters for Anastigmats are marked by the *f* system. The *f* value of a stop is the proportion that its opening bears to the focal length of the lens. For instance *f*.8 means that the diameter of the stop opening is 1-8 of the focal length of the lens, etc. The Uniform System is based on the *areas* of the openings, each next higher number having half the area of the preceding number and therefore requiring twice the exposure. For instance: If 1-100 of a second be correct for stop U. S. 4, then with the same light conditions and stop U. S. 8, 1-50 of a second would be required. However, the two systems are easily compared.

TABLE.

U. S. 4	*f.* 8
U. S. 8	*f.*11.3
U. S. 16	*f.*16
U. S. 32	*f.*22.6
U. S. 64	*f.*32
U. S. 128	*f.*45.2

There is no exact U. S. designation for *f.*6.3, but it is approximately U. S. 3.

A Law of Optics: The larger the stop opening the less depth of focus. This is not a rule covering any particular lens that we or anyone else exploits. It's as fixed as the course of the planets. With a large opening, depth of focus must be sacrificed. In this matter of opening, then, the difference between the R. R. and the Anastigmat is this: The Anastigmat will cut perfectly sharp on objects *at the focused distance,* over the entire picture with a large opening, admitting a large amount of light, thus requiring a relatively short exposure; but when this large opening is used, there is no great depth of focus. The R. R. lens will not cut the entire picture sharp with this large opening, even if correctly focused. With the smaller openings, as *f.*8, etc., the Anastigmat has the same depth of focus as the R. R. lens and gives sharper definition over the entire picture.

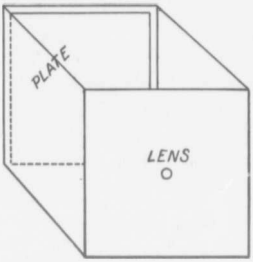
Deductions: It is perfectly evident then that it is best to use only a moderately large stop opening (say *f.*8 or *f.*11.3) even with an Anasitgmat, and time accordingly when conditions will permit. However, when the light is dull and a snap shot is desired, the full opening may be used, or if it is desired to photograph rapidly moving objects in good light, the full opening may be used with a high speed of the shutter. It must not be expected, however, that with such full opening objects in the foreground, in the middle distance and at long distance can *all* be sharp. Set the scale for the correct focus on the principal object and that object will be sharp. *As a rule, your picture will be rather better for having the unimportant parts less sharply defined than the principal subject.*

The Anastigmat will do everything better than the R. R. It will do some things that the R. R. lens cannot do at all—but no lens has yet been invented or is likely to be that can combine extreme speed with depth of focus, except in the very small sizes, or, in other words, except in lenses of very short focus. Even in these, the error, though not noticeable, is there—but that's another story.

And in making these comparisons we would be doing the subject scant justice did we omit to mention the anastigmat lens especially designed to meet Kodak requirements.

The Zeiss-Kodak anastigmat lens encompasses all the quality and dependability which the word Kodak implies.

KNOW YOUR CAMERA.



Before attempting the making of pictures it is of the utmost importance that you fully understand your camera and its equipment. A camera in its simplest form would be a simple box, made light tight, with a lens at one end and a means for supporting a plate or film inside the box at the other end, as illustrated in the accompanying diagram.

The bellows, shutter and other attachments are simply convenient modifications of this form; the bellows permitting the folding of the light chamber, and the shutter a means for allowing the light to pass through the lens for definite periods.

Before attempting to load the camera, examine it carefully and familiarize yourself with the shutter and its workings. Note carefully the diaphragm or stop openings in the shutter, and how with the larger opening a greater quantity of light passes through the lens in a given time, and you will then understand why we use the largest opening for snap shots, and the smaller ones for time exposures. The use of the diaphragms or stops is fully explained on page 17.

Having mastered the operation of the shutter, and the focusing device, if your camera be provided with one, and having a slight idea of the conditions necessary for picture taking, the camera may be loaded.

We will presume that you have taken the advice given in the previous pages and are in possession of a cartridge film camera.

LOADING THE CAMERA.

With Film: With a Kodak this operation is performed in daylight and is very simple. The film is put up in light-tight rolls and extending the full length of the strip of film and several inches beyond each end is a strip of duplex paper, red on one side, and black on the other, which in connection with the flanges on the spool, forms a light-proof cartridge.

FILM CARTRIDGE

After inserting the spool and threading up the paper the camera is closed and the key turned until the paper has been reeled off and the sensitive film brought into place in the focal plane. The duplex paper runs with and behind the film, and at proper intervals is marked with the number of the section of film, 1, 2, 3, etc. In the back of the camera is a small red window through which the figures appear as the key is turned. Turn the key slowly to the left and watch the little red celluloid window at the back of the camera. When 15 to 18 turns

have been given a hand pointing toward the first number will appear, then turn slowly until the figure 1 is in front of the red window. Fig. I.

The warning hand appears only before No. 1. These figures show just how far to turn the key and how many exposures have been made. After all the exposures have been made, a few extra turns of the key entirely covers the film with duplex paper and the camera may be unloaded in daylight.

FIG. I.

It is all as simple as threading a needle (simpler for a man) and with each camera is a manual telling plainly about each step. The amateur must bear constantly in mind, however, that the paper must be kept tightly rolled about the film all of the time until it is in place in the camera and the camera closed, for should the film be exposed to daylight for even a hundredth part of a second its ruin would be accomplished.

In the 3½ x 3½, 3¼ x 4¼ and 4 x 5 sizes Film Cartridges may now be obtained for "Double-Two", six or twelve exposures. 3¼ x 5½ may be had in "Double-Two", six and ten, and 4¼ x 6½, and 5 x 7 in "Double-Two", and six exposure cartridges. The "Double-Two" cartridges contain four exposures, so arranged, however, that two of them may be removed after exposure or, if desired, the entire four exposures may be made before taking out cartridges.

With Plates: For loading with glass plates a dark-room is essential, that is, a room from which all white light has been excluded as described on page 90. Provide also a dark-room lamp, and a shelf or table on which to work. Remove the dark slides from the plate holders and, having closed every avenue for the entrance of white light and lighted the dark-room lamp, open the box of plates.

Take one of the plates from the box and put it in the holder face up, handling the plate by the edges. (The face is the dull side.) Insert the dark slide with the word "exposed" next the plate. Now turn the holder over, if it is a double holder, and load the other side in a similar manner. When all the plate holders have been filled close up the remaining plates in a box, wrap them up securely or put away in a dark drawer.

The Film Pack: By use of the Premo Film Pack the ordinary plate camera is transformed into a daylight loading film camera with the advantage of focusing on the ground glass the same as when using plates. This pack consists of twelve flat cut films packed together in a light proof paper case. Attached to each film is a paper tab, the end of which is numbered, thus showing the operator just which film is in position for exposure. The method of using this pack is extremely simple, as the only movement necessary in placing the film in position for the next exposure is to simply pull out a tab.

MAKING THE EXPOSURES.

Before attempting the actual making of exposures it is highly essential that the beginner have some practical knowledge of the sensitive film, its composition and the action of light upon it.

The only difference between a dry plate and a film is in the support, that of the plate being a sheet of glass, and of the film a flexible transparent material, that is light, non-breakable and rollable, the sensitive coating or emulsion in each instance being the same. In addition to the advantages of a light, flexible and non-breakable support, film possesses several other distinct and important advantages:

Eastman N. C. Film is protected by being backed with a strip of specially prepared duplex paper, red on one side and black on the other, the red side coming in contact with the sensitive surface of the film. This backing in connection with the thinness of the film support renders the film almost entirely free from halation, a defect found very largely in all glass plates unless specially prepared. Halation and its causes is explained on page 158. This freedom from halation gives the film a far greater latitude in exposure than can be given with plates, and especially adapts it to the conditions of harsh lightings under which the amateur ordinarily works.

In addition to these most advantageous features, Eastman N. C. Film is superior in *Orthochromatic Quality.*

As this is a most important qualification we afford a rather full explanation:

In the earlier days of photography the plates used gave very untruthful renderings of *color values.*

Yellow and red, for instance, photographed as black, while violet, indigo and blue, photographed as white.

The chart on page 16 shows the range of spectrum from violet to red.

The ordinary plate is highly sensitive to violet, a trifle less sensitive to indigo, and so on, as we approach the other end of the spectrum, the yellow and orange rays affect the plate but little and the red rays hardly at all.

An orthchromatic plate or film is one in which these errors have been so far corrected as to give truer color value, i. e., the emulsion is sensitive to a wide range of colors in an equal or nearly equal degree.

Why Orthochromatism Helps: With a non-orthochromatic plate you might be making a picture, with say a bed of flowers in the foreground—some light yellow and others dark blue. The negative, owing to its deficiencies, would yield a print in which the yellow flowers would appear darker than the blue ones, though, to the eye, the yellow flowers would appear lighter.

In other words, it would not give, in the resulting pictures, the true color values. The fully orthochromatic plate or film corrects these mistakes and renders the color *values* (the depths of color) in their proper relation to each other.

In the same way the orthochromatic film helps preserve cloud effects, differentiating between the clouds and the surrounding blue sky.

In a properly equipped factory such as ours, there is no difficulty whatsoever in making any desirable degree of orthochromatism. Naturally, however, intelligent use must be made of this ability. For instance we manufacture a plate (the Seed Panchromatic) for photo engraving purposes that is so sensitive to red, that not even the most perfect ruby lamp can be used with it, and it has to be handled in absolute darkness. It is therefore self evident that such a film or plate would not be practical for ordinary use.

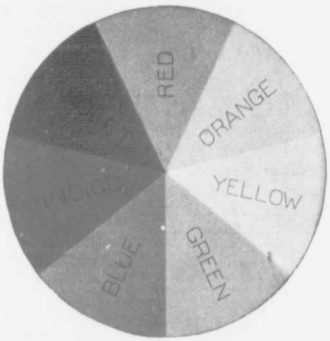


Chart showing range of spectrum.

Kodak film was first made as an orthochromatic film in 1903. Up to that time we had sold hundreds of thousands of orange dark-room lamps in our developing outfits. Immediately it became necessary to substitute a deep red for orange because this orthochromatic film was so sensitive to yellow.

Kodak N. C. Film has back of it, not only perfect manufacturing facilities, but every advantage that experience and scientific research can afford, and possesses orthochromatic quality in absolutely the right degree to afford the best possible average results in the hands of the amateur.

Kodak N. C. Film is the most perfectly balanced film in the rendering of color values.

Everything else being equal film will, therefore, give better results for the amateur than can be secured on glass plates.

A negative is produced by the action of the rays of light passing through the lens, and coming to a focus on the sensitive surface of the film which is composed of an emulsion of silver salts. Light colored objects reflect strong rays of light and they affect the sensitive surface the most. With a clear bright sky, the rays from it will render the sky in the negative opaque, or nearly so; the rays reflected from a white object will be almost as strong as those from the sky; the rays from a red brick chimney will affect the sensitive surface much less, while so little light comes from heavily shaded places as to hardly produce an impression. Therefore, we have in the negative, a record of the lights and shadows as we see them, but all reversed. When these are again reversed in making a print from the negative, we have them again in their proper relation. A certain amount of light is necessary in order to produce a negative of proper density. We can make a snap

shot out of doors on a bright day in 1-50 of a second, or even less. If we wish to take a picture indoors on the same day, we must expose from two seconds to several minutes, according to the amount of light entering through the windows, and the coloring of the wall and floor coverings. You cannot make a snap shot indoors, neither can you give a long time exposure outdoors on a bright day, with successful results,—your exposure must be approximately correct. Fortunately Eastman N. C. Film has a most remarkable latitude and one can vary quite a percentage either way from the absolutely normal exposure and still produce good results.

In the section of this book devoted to home portraiture, a number of comparative experiments are given. See page 43.

STOPS—OR DIAPHRAGM OPENINGS.

An understanding of the use of the lens diaphragms or stops is absolutely essential to good work. The best part of a lens is its center, i. e., those rays of light which pass through a lens at or near its center will be correctly imparted and will therefore give an image sharp and clear on the ground glass, while the rays which pass through the outer edges of the lens will not make such a clear and distinct image. It can thus be seen that the smaller the stop opening the sharper the picture, because the outside rays of light will be cut off. It naturally follows that with the smaller opening we employ the less light we are admitting in a given time.

As an instructive experiment, if the beginner has a camera with a focusing screen, let him focus some object on this screen, using the largest stop opening, and noting the lines comprising the image to see if they are sharp. Then let him use the smaller opening and note the increase in sharpness, and the decrease in light. The better the lens, the larger the stop opening we can use successfully, and consequently the "faster" the lens. Suppose we have one lens of eight inch focus, and we find that in a given light we can make a clear, sharp picture in five seconds with a stop one inch in diameter, while with another lens of the same focal length we must use a stop of but one-half inch in diameter in order to get a sharp picture. Unless you stop to think your answer will be 10 seconds for the lens with the half inch opening. As a matter of fact we must give four times the exposure, or 20 seconds, because the *area* of the one inch stop is four times that of the half inch stop. Now, if we know the correct exposure with any one stop we can figure the correct exposure with any other stop by the following rule:

The time variation between two stops is inversely as the square of their diameters. With our single lens cameras there are stop openings of three sizes; the largest, for ordinary snap shots, the second, (which has almost 2-3 the diameter of the largest) for snap shots on the water and in tropical climates, or for time exposures indoors, and the smallest, ordinarily used for time exposures—never for snap shots.

With the Rapid Rectilinear lenses there is a greater number of stop openings and they are arranged by what is known as the Uniform System, commonly abbreviated to "U. S." See page 11.

The convenience of the U. S. system lies in that each higher number stands for an opening having half the *area* of the preceding opening. Between each number, therefore, we simply double the time. For instance, the table given on page 25 is for use with stop No. 8 with the No. 4 Folding Pocket Kodak. If we use stop No. 16 we must give twice, or if No. 32 four times the time of the table.

Ordinarily the appended table is a good one to follow in the use of the stops with a Rapid Rectilinear lens, but there are some exceptions:

No. 4—For instantaneous exposures in *slightly* cloudy weather and for portraits. Do not attempt instantaneous exposures on dark, cloudy days.

No. 8.—For *all ordinary instantaneous exposures* when the sun shines.

No. 16.—For instantaneous exposures when the sunlight is unusually strong and there are no heavy shadows; such as views on the seashore or on the water, or in tropical or semi-tropical climates; also for interior time exposures.

Nos. 32 and 64.—For interiors.

No. 128.—For time exposures outdoors in cloudy weather. *Never for instantaneous exposures.* The time required for time exposures on cloudy days with smallest stop will range from ½ second to 5 seconds, according to the light. The smaller the stop the sharper the picture.

To get "depth of focus", i. e., have all objects, both near and far, needle sharp, use the smallest stop.

The No. 4 stop is not to be used when absolute sharpness is desired, as the opening is so large that few lenses will have a good "depth of focus" with it—i. e., only the objects at the exact distance focused will be sharp, those nearer by or farther away being more or less "out of focus".

Sharpness is extremely desirable in a picture, but what we call "roundness" and "atmosphere" is perhaps fully as important. What is meant by these rather vague terms is sometimes puzzling to the beginner and they are, perhaps, best explained as referring to that quality in a picture which gives the proper idea of both distance and perspective—that quality which is the opposite of the silhouette; which makes every object appear in proper relation to every other object and gives life and character to the picture. "Atmosphere" and "roundness" we find by practical experience are somewhat lost by using too small a stop. We should, therefore, use the largest opening which will give us a sharp picture.

SHUTTERS.

The box form cameras of our manufacture are equipped with the Eastman Rotary Shutter. This shutter does not include an iris diaphragm, the stop openings being on a sliding plate and brought into position by means of a lever. The shutters on the folding film cameras, with the exception of the 1A and 4A Speed cameras, are equipped with iris diaphragms, the size of the stop opening being regulated by the opening and closing of the device.

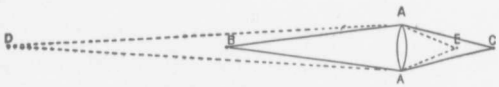
The 1A Speed and 4A Speed Kodaks are equipped with what is termed a focal plane shutter. This type of shutter being radically different from both the rotary and the iris diaphragm shutters in that it is placed at the back of the camera, immediately in front of the sensitive film, instead of just in front or between the lenses. With cameras so equipped the stop openings are naturally in the lens barrel and entirely independent of the shutter.

The manuals accompanying the different instruments cover these points fully.

FOCUSING.

If your Kodak makes pictures 3¼ x 4¼ inches or larger, you must look to your focusing as well as to the matter of light and stops. The manual accompanying the instrument explains how to do this, but something of the reasons for the necessity of it may be of value to you. It is our intention to make this book intensely practical, yet a bit of theory often helps one in the accomplishment of practical ends.

Suppose we wish to make a picture of an object six feet away; the focusing point would be (with most lenses used in a 4 x 5 camera) seven inches from the lens. Now again, should we wish to make a picture of an object 100 feet or more distant, we find that the focusing point will be six inches from the lens. So you can readily see that, with a camera of that size, it would be impossible to have a lens always set at the same point or distance from the sensitive surface, for if the nearby objects were in focus (sharp) the distant ones would be out of focus (not sharp), and *vice versa*, and for that reason we have what is called an "adjustable focus"; that is, the front of the camera or that part which carries the lens, is made so that it can be moved and the distance of the lens from the sensitive film or plate be increased or decreased.



A A Lens. C Focus of the rays of light from object B.
E Focus of the rays from object D.

The variation of focus is shown, greatly exaggerated, in the above diagram.

When we say that a camera is "in focus" it is equivalent to saying that the sensitive surface of the film or plate, when in the camera, will come in contact with the rays of light reflected from the subject at this point or the point of focus.

To Focus: On the Adjustable Focus Kodaks will be found a little scale marked with figures usually from six to one hundred, and indicating feet. (They are also marked for meters.) You will also find a little pointer that, as you move the lens back and forth, will pass over the scale. Now, should you wish to take a picture of an object, say fifteen feet distant, you will move the pointer until it rests over the figure 15. This indicates that the lens has been brought to the proper distance from the focal plane (i. e., the surface of film or plate) for the focusing of objects at a distance of fifteen feet. Objects nearer by, or farther away, will not be absolutely sharp, this, however, depending largely upon the size of the stop you are using. See page 17.

While the adjustable scale for all cameras up to and including 4¼ x 6½ inches will, when carefully used, give one just as sharp pictures as can be obtained by focusing on the ground glass, there is some satisfaction to the student of photography in focusing his camera on the glass before he sets out on his photographic career. It shows him what his lens is doing and why it impresses an image on the sensitive film.

When used with glass plates, the No. 3, 3A and 4 Folding Pocket Kodaks and the 4A Folding Kodak may be focused on the ground glass, there being a special Combination Back and Focusing Glass for this purpose. However, for the purposes of the study of this question of focus this back is not necessary, as the back of the camera may simply be removed and a piece of ground glass laid against the rollers over which the film passes and the picture may be focused on this. Be careful, however, to have the glass of such size that it may be placed in actual contact with the rollers; otherwise, it will not be in the proper focal plane and the lesson will be lost.

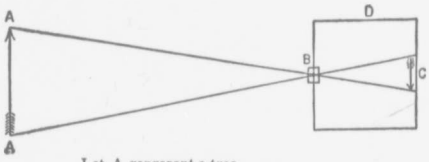
NOTE—The experiment of looking at the image on the ground glass may be similarly tried with the fixed focus Kodaks and will prove extremely interesting and instructive to the beginner.

To accomplish this, place the camera on a tripod, on the window sill or on a table. It will be better to focus on something outside of the house at first as the light will be stronger. Point the camera at some object, a tree, for instance; put the ground glass in position, use the largest stop and open the shutter. With your head about one foot away and your eyes on a level with the camera, take a piece of black or dark cloth and place over your head and back part of the camera, thus cutting off all light except that entering through the lens. Do not try to look through the ground glass, but at it. In a few seconds, or when your eyes get accustomed to the darkness, you will see a picture on its surface. The picture or image you see will be just what you would get on the sensitive surface of your film or plate. You will, however,

notice that the picture is inverted, or upside down. This may excite your curiosity but will explain itself by the aid of the following diagram:

The rays of light from "A" passing in a straight line through "B" until they are interrupted by "C", on which they strike, form an inverted image of the object "A".

Now move the lens back and forth until the tree is sharply defined on the ground glass. When the lens is at just the proper



Let A represent a tree.
B the lens.
C the ground glass or focusing screen.
D the camera.

distance from the ground glass, the object will be as "sharp as a needle" even if the largest stop be used. Now focus on objects at other distances. First, on an object one hundred feet or more away and then on an object only eight feet away. You will notice that the farther away the object, the nearer to the focal plane (ground glass) the lens must be in order to give a sharp picture, and *vice versa*.. And you will notice further, if you take the trouble to carefully measure the distances, that your ground glass tells the same tale as your focusing scale,—in other words, if you focus on an object 25 feet distant and get it sharp, that the pointer on the focusing scale will point at, or nearly at, 25. You will also notice that all objects from 15 to 35 feet will be in good focus.

Our factory methods of adjusting the focusing scale correspond closely to the foregoing paragraph. To insure accuracy, the focusing scales are placed on Kodaks by actual focusing. The camera is placed beneath a hood, which serves as a focusing cloth and cuts off all light except that entering through the lens. Incandescent lights are arranged at different distances, which correspond with the figures on the focusing scale. For instance, the camera is first focused on a light 15 feet away, regardless of the scale, which is then so placed on the camera that the 15 foot mark will come directly underneath the pointer. The scale is then fastened in position and tested at other distances, the image on the ground glass being examined with a magnifying glass. Before the camera is finally passed from his department, the inspector makes certain that the focusing scale corresponds exactly with the ground glass at each distance.

While the shutter is open and the ground glass is in position it will prove interesting and instructive to note also the effect of the stops. After focusing on some object with the largest diaphragm, put a smaller stop in position and note the decrease

in light and the increase in sharpness over the entire picture. There may be no marked increase in sharpness of the particular object on which you have focused, but nearer and further objects will be sharpened in a remarkable degree. Remember this point later. The above experiment with stops may also be tried with the fixed focus cameras.

Having now something of the theory of photography, you are prepared to make your first negatives. Read carefully the instructions on the making of snap shots and time exposures given in the following pages having also read carefully the instructions for operating your camera, which are given in the manual accompanying it, you are ready to sally forth and undertake the work of exposure. We advise snap-shot work to begin with, but you should be sure to pick out for your first work a day when the light is strong and brilliant, that your first batch of negatives may be fully timed.

SNAP SHOTS.

Instantaneous exposures, or "snap shots", as they are more frequently called, are usually made while the camera is held in the hand and are about the first thing that the amateur attempts. Some learned writers deprecate this, but as snap shots are the simplest exposures to make and ordinarily the simplest to develop, because most likely to be correctly timed, we believe the amateur should begin his photographic career with this class of work.

Before making an exposure, either time or instantaneous, be sure of four things:

FIRST—That the shutter is set properly. (For time or instantaneous exposures as desired.)

SECOND—That the proper stop is in position.

THIRD—That an unexposed section of the film is turned into position, or that an unexposed plate is in position and that the dark slide has been removed.

FOURTH—Unless the camera has a fixed focus see that it is properly focused on the *principal object* to be photographed.

To take instantaneous pictures the object must be in the broad, open sunlight, but the camera should not be. The sun should be behind the back or over the shoulder of the operator.

NOTE—Effective pictures may frequently be made by working toward the sun, shading the lens to keep out direct sunlight when so doing, but the amateur should not attempt such work at the start.

Set the Focus: Set the focus by placing the pointer over the figures on the index plate nearest the estimated distance of the *principal object* to be photographed *in feet.*

It is not necessary to estimate the distance with any more than approximate accuracy. For instance, if the focus is set at 25 feet (the usual distance for ordinary street work), the sharpest part of the picture will be the objects at that distance from

the camera, but everything from 15 to 35 feet will be in good focus. For general street work the focus may be kept at 50 feet, but where the *principal object* is nearer or farther away the focus should be moved accordingly.

Use the Proper Stop: It is imperative that a large stop be used in making snap shots. With most cameras the *largest* stop must be used under ordinary conditions with bright sunlight. This is the case with all of the single lens Kodaks. With the double lens Kodaks use No. 8 stop. See page 18.

This size stop *must* be used for snap shots except where the sunlight is *unusually* strong and there are no heavy shadows, such as views on the water, or in tropical or semi-tropical climates, when the next smaller stop may be used.

The smallest stop must never be used for snap shots or absolute failure will result.

Locate the Image: Holding the camera steadily, locate the image in the finder. The finder gives the exact scope of view and shows on a reduced scale just what will be in the picture—no more, no less.

Hold It Level: The camera must be held level.

If the operator attempts to photograph a tall building, while standing near it, by pointing upward (thinking thereby to center it) the result will be similar to Fig. 1.

This was pointed too high. This building should have been taken from the middle story window of the building opposite.

The operator should hold the camera *level,* after withdrawing to a proper distance, as indicated by the image shown in the finder. Some cameras are equipped with a rising and sliding front to assist in taking the tops of tall buildings, etc. See page 28.

FIG. I.

All being in readiness

Hold the Camera Steady,
(The least jarring will cause a blurred negative.)
Hold it Level and
Make the Exposure.

The Sky Line Road.

TIME EXPOSURES INDOORS.

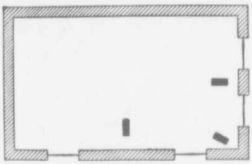


DIAGRAM SHOWING POSITION OF CAMERA.

First put the camera in position. The diagram shows the proper position for the camera. It should not be pointed directly at a window as the glare of light will blur the picture. If all the windows cannot be avoided, pull down the shades of such as come within the range of the camera.

To make a time exposure, place the camera on some firm support, like a table or tripod, focus carefully (this, of course, does not apply to fixed focus cameras) on the principal object and locate the image in the finder.

Focusing on the Ground Glass: When using plates, or cameras using a Premo Film Pack Adapter, the focusing may be done on the ground glass if desired. The plate holder or adapter being removed and the shutter opened, the image may be seen (reversed) upon the ground glass. Cover the head with a focusing cloth of some opaque material and look on the ground glass, *not through* it. Focus by moving the lens back and forward until the picture is sharp. Then close the shutter, insert plate or roll holder and proceed as before described.

If the light is so poor that the image is seen with difficulty the focusing may be done with the largest stop and a smaller one placed in position afterward.

Set the shutter, and all being in readiness press bulb or lever, as the case may be, to open shutter. Give the proper time (using a watch if more than two seconds) then close the shutter.

Time Needed For Interior Exposures: The following table is an excellent guide for making interior exposures and is based upon the time needed for exposures with the stop ordinarily used for snap shots in single lens cameras, and with the No. 8 stop in all Rapid Rectilinear lenses. When a smaller stop is used the time must be increased proportionately. Where there are figures greater softness will be obtained in the faces by somewhat increasing this time.

White walls and more than one window:

bright sun outside, 2 seconds; cloudy bright, 10 seconds;
hazy sun, 5 seconds; cloudy dull, 20 seconds.

White walls and only one window:

bright sun outside, 3 seconds; cloudy bright, 15 seconds;
hazy sun, 8 seconds; cloudy dull, 30 seconds.

Medium colored walls and hangings and more than one window:

bright sun outside, 4 seconds; cloudy bright, 20 seconds;
hazy sun, 10 seconds; cloudy dull, 40 seconds.

Medium colored walls and hangings and only one window:

bright sun outside, 6 seconds; cloudy bright, 30 seconds;
hazy sun, 15 seconds; cloudy dull, 60 seconds.

Dark colored walls and hangings and more than one window:

bright sun outside, 10 seconds; cloudy bright, 40 seconds;
hazy sun, 20 seconds; cloudy dull, 1 minute, 20 seconds.

Dark colored walls and hangings and only one window:

bright sun outside, 20 seconds; cloudy bright, 80 seconds;
hazy sun, 40 seconds; cloudy dull, 2 minutes, 40 seconds.

The foregoing is calculated for rooms whose windows get the direct light from the sky and for hours from 3 hours after sunrise until 3 hours before sunset.

If earlier or later the time required will be longer.

As a general rule use a medium sized stop for time exposure indoors.

TIME EXPOSURES IN THE OPEN AIR.

When the smallest stop is in the lens the light admitted is so much reduced that time exposures out of doors may be made the same as interiors but the exposure must be much shorter.

WITH SUNSHINE—The shutter can hardly be opened and closed quickly enough to avoid over-exposure.

WITH LIGHT CLOUDS—From ½ to 1 second will be sufficient.

WITH HEAVY CLOUDS—From 2 to 5 seconds will be required.

The above is calculated for the same hours as mentioned above and for objects in the open air. For other hours or for objects in the shadow under porches or under trees, no accurate directions can be given; experience only can teach the proper exposure to give.

Time exposures cannot be made while the camera is held in the hand. Always place it upon some firm support, such as a tripod, chair or table.

Practical Hints: In the foregoing pages we have given a bare outline of how to make snap-shots and time-exposures, and further on we shall give the details of development. Before, however, taking up the chemical part of picture making, we propose to treat of some of the important details of exposure.

The beginner should expose a roll of film or a few plates, taking both snap-shots and time exposures and developing them as per instructions on pages 79 to 98, before taking up the study of various methods of portraiture, etc.

THE KODAK AUTOTIME EXPOSURE SCALE.

We would not feel justified in leaving the subject of exposure, without adequate mention of the Kodak Autotime Exposure Scale.

The great majority of photographic failures is due to incorrect exposure —the uncertainty of just how shutter speed and diaphragms should be set for various subjects under various conditions of light.

In almost all collections of negatives there will be found some very thin and lacking in detail, indicating under-exposure, or very flat, indicating over-exposure.

The Kodak Autotime Exposure Scale obviates exposure difficulties with all outdoor conditions; it is permanently attached to the shutter, and knowing the subject you wish to photograph, and the conditions of light, a glance at the scale will show you the proper point to set the shutter speed and diaphragm indicators. The accompanying illustration shows clearly the principle on which it works.

NOTE—The Kodak Autotime Scale is a part of the Kodak Automatic Shutter, and can be furnished as an extra on the following shutters:

STYLE A. For use with Kodak Ball Bearing shutter, 2½ x 4¼ and 3¼ x 4¼.

STYLE AA. For use with Kodak Ball Bearing shutter, 3¼ x 5½ and 4 x 5.

STYLE B. For use with F. P. K. Automatic, 2½ x 4¼ and 3¼ x 4¼, No. 1 S. V. (Blair or Premo) Automatic, or No. 1 B. & L. S. V. Automatic shutters.

STYLE BB. For use with F. P. K. Automatic, 3¼ x 5½, and 4 x 5, No. 2 S. V. (Blair or Premo) Automatic, or No. 2 B. & L. S. V. Automatic shutters.

STYLE C.. For use with Kodak Automatic shutter, 3¼ x 4¼.

STYLE CC. For use with Kodak Automatic shutter, 3¼ x 5½ and 4 x 5.

STYLE D. For use with B. & L. Automatic and Century Automatic shutters, 3¼ x 4¼.

STYLE DD. For use with B. & L. Automatic and Century Automatic shutters, 3¼ x 5½ and 4 x 5.

STYLE DDD. For use with B. & L. Automatic shutter, 4¼ x 6½.

THE RISING AND SLIDING FRONT.

Occasionally in the taking of photographs of buildings or in landscape photography it is found that the subject cannot all be readily included except by tilting the camera, which would produce the undesirable results shown on page 23. To assist in correcting this fault some cameras are provided with a rising front, which may be utilized in cutting out an undesirable foreground or to assist in taking in the top of a high building, etc. To illustrate this we take the No. 3A Folding Pocket Kodak, which is manipulated as follows:

Fig. I. shows how to raise or lower the front when making vertical exposures. Pull out the small milled head on the right hand side of the front, and raise or lower the front by turning the milled head. When the front is at the desired height let the milled head spring back into its original position. This will lock the front in place. When through using pull out the milled head and center lens by moving the front up or down, as the case may be, until the opening in the little metal clasp is directly over the line on the standard.

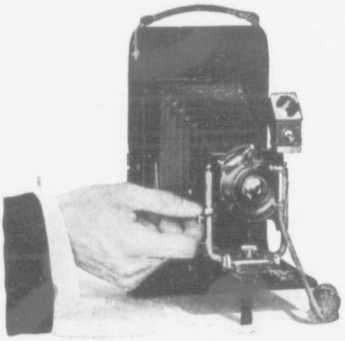


FIG. I.

FIG. II.

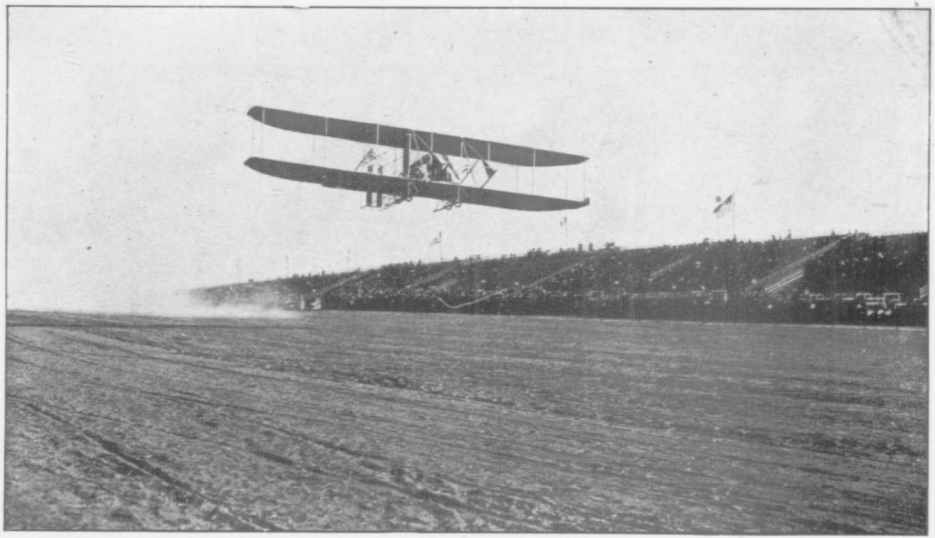
The front can be moved to the right or left (up and down when Kodak is placed on its side for horizontal exposure) by loosening thumb screw directly under the shutter as shown in Fig II., and sliding front in either direction to the desired position. Lock in position by tightening thumb screw. When through using, reverse the operation shown in Fig. II., and slide back to the center and lock in position.

In order to make a sharp picture when using the rising front it will be better to use a small stop (No. 32 or 64) and as this in turn necessitates a

time exposure, a tripod or other firm support must be provided. Experience alone can teach the many ways in which the rising and sliding front may be used for composing artistic pictures.

N. B.—Do not fail to center front before closing camera, as otherwise there is danger of ruining bellows when folding.

Summer Time.



A Good Flight.

PICTURE TAKING.

Having familiarized yourself with the operation of your camera and its various parts, and studied carefully the sections devoted to the use of stops and exposure the supreme test comes in the taking of the actual picture.

There are, of course, subjects everywhere for your camera, but we would suggest beginning on simple, well illuminated landscapes, keeping a careful record as to the time of day, stop opening and duration of exposure. By so doing you will not only be able to correct the errors in your early efforts but will have a practical knowledge of exposure that will be of material value in the solving of the more complex problems of indoor work. It will be well to bear in mind that for all work including objects in motion, sunlight is necessary. The nearer the object to be photographed is to the camera the more rapid must be the working of the shutter.

PHOTOGRAPHING MOVING OBJECTS.

In most instances where the beginner attempts the photographing of moving objects, the result will be disappointing, this is due solely to his lack of appreciation of the circumstances and the actual conditions confronting him. For example, he takes his camera to the race track to photograph a friendly brush between local trotters.

Securing a position just under the wire he waits for the finish, and as the horses rush by at a 2:10 clip he snaps them broadside from a distance of ten feet, and fails to understand why the negative should show nothing but a blur, for he will have nothing else. The reason for his failure is this; if he has a double lens instrument with an F. P. Kodak Automatic shutter it has worked in approximately $\frac{1}{10}$ of a second, an apparently very short space of time, but we find on figuring it out that a horse covering a mile in 2:10 covers 40 feet and 8 inches in one second of time or over nine inches in $\frac{1}{10}$ of a second, the time the shutter is open—a sufficient distance to make a most decided blur. The distance the image will move on the plate during exposure is to the distance the object moves, as the focal length of the lens is to the distance from lens to object. In this case we will suppose the focus of the lens to be six inches, and we know the distance from lens to object to be ten feet (120 inches) and the distance the object moves approximately nine inches. We will let X stand for distance image moves on plate and it gives us the following equation: $X : 9 : : 6 : 120 = \frac{6}{10}$. It is obvious that if the object moves $\frac{6}{10}$ of an inch on the plate the picture will be ruined. We find then that in order to take pictures of moving objects at right angles there are two factors of prime importance—the speed of the shutter and distance from the object. In the ordinary amateur outfit the shutter speed cannot be materially increased and we must therefore take the picture from further away. Experiment

has proven that in order to sucessfully take pictures of rapidly moving horses, etc., from a position near by and at right angles the shutter must work in from $\frac{1}{500}$ to $\frac{1}{1000}$ of a second (Muybridge claimed to have used a shutter working in $\frac{1}{2000}$ of a second) and this extreme speed necessitates a special camera and lens as well as a special shutter.

While splendidly adapted for all classes of work, the 1A Speed and 4A Speed Kodaks are of the special construction necessary for this extreme speed work, as the focal plane shutters with which they are equipped work up to $\frac{1}{1000}$ of a second. As previously stated the focal plane shutter differs from the between the lens shutter of the ordinary Kodak in that it is placed at the back of the camera, just in front of the sensitive film, close to the focal plane of the image, (which gives this type of shutter its name). The focal plane shutter consists of a cloth curtain with a series of apertures, any one of which can be made to pass across the face of the film. The speed of the exposure is regulated by the width of this aperture in the curtain and a tension spring in one of the rollers upon which the curtain is wound. Continuing the explanation of the photographing of rapidly moving objects, it is obvious that when a moving object is within the field of a lens, its image is also moving across the focal plane of the film. To obtain a sharp negative of this moving object with the focal plane shutter it is necessary that the aperture in the curtain of the shutter travel across the face or focal plane of the film, and pass a space equal to the width of the aperture in the curtain at a higher rate of speed than the image of the object is moving.

Empire State Express.

But there are tricks in all trades and satisfactory pictures of rapidly moving objects can be readily made by photographing them from partly in front as well as from a reasonable distance. The accompanying picture of the Empire State Express, moving at full speed, shows plainly what can be done in this direction. It was made with a Pocket Kodak and is a good illustration of what can be accomplished by taking the picture from a point at a considerable distance from the object and also somewhat ahead of it. By acting on this hint the amateur can soon learn to take pictures of rapidly moving objects, and in such a manner as to largely avoid the disagreeable blurring.

In the ordinary snap shot work, with comparatively slow exposures, the length of exposure is considered as the most important factor, and while this is important in photographing

rapidly moving objects, the most important factor is the speed of the moving object, because the negative of this object must be sharp to be of any value. Further, it is not the actual speed of the moving object, but the speed with which its image moves across the face of the film, and this speed is increased or diminished according to the angle of movement in relation to the lens. To make this point clear, let us take a man running, at a distance of twenty-five feet. If the line of movement be across the field at right angles to the lens, the movement across the film will be very rapid, but if *towards* the lens the motion of the image is very slight. Unless for some special purpose better negatives and better pictorial effects are produced by photographing from an angle of from 45 to 60 degrees. The user of the focal plane shutter must bear in mind that the shutter curtain aperture has nothing whatever to do with the depth of focus. The shutter is concerned with the speed of the exposure only, and whatever the aperture in the curtain, it will have no influence as to the depth of focus. It is the lens aperture that concerns the depth of field. This aperture is regulated by means of iris diaphragm or stops, as stated on page 17. The size of the aperture of the stop determines the depth of the focus of the lens, that is, the sharpness of definition of objects at varying distances from the camera, and it also necessarily determines the volume of light that passes through the lens in a given period of time. The smaller the aperture of the lens, the greater the depth of focus, but the weaker the volume of light. Therefore in making very rapid exposures with the focal plane shutter, it is necessary to use a small *curtain aperture* to obtain sufficient speed to arrest motion, and at the same time the *largest permissible lens diaphragm* to admit the greatest possible volume of light in order that the image be recorded in sufficient strength on the sensitive film to produce a good negative. In making slow instantaneous exposures, a *larger curtain aperture* may be employed, and if the light is strong, a *smaller lens diaphragm,* to increase the depth of focus and secure greater definition.

Speed Factors: It is not so much the actual speed of the object as the apparent movement with which the image of the object passes across the surface of the film. This movement is determined by the actual speed of the object, the angle of movement to the lens, the distance of the object from the lens, and the focal length of the lens.

When these factors are known it is a simple problem to determine the movement of the image over the surface of the film and how fast the shutter must travel to arrest motion.

The same conditions that determine the apparent speed also decide the size of the image, so that a modification of one factor of necessity influences the others.

Size of Image: It has been demonstrated that in high speed work, the best results are secured when the image of a man is about one and one-half inches in height, while the image of a rapidly moving horse should not exceed one inch from shoulder to hoof.

In attempting to arrest rapid motion with an image greater than above, you have to sacrifice both time of exposure and depth of field in the attempt to arrest motion.

Distance of Object: The distance of the object when the photographer can control it, is naturally largely determined by the size of image wanted and the focal length of the lens used.

When the distance is beyond the operator's control, his only remedy is to use a lens of suitable focal length.

Depth of Lens Field: In ordinary photography, the photographer soon learns that the smaller the lens diaphragm, the greater the depth of field. In high speed work it is necessary to secure the greatest possible illumination, entailing the use of a large lens opening which limits the depth of field.

In high speed work, it is not possible to secure perfect definition of all objects in the field and the photographer must be content with securing perfect definition in the portion containing the greatest interest.

An important fact is this—that no matter what the focal length of the lens used, if the photographer will be content with an image 1½ inches in height he will get sufficient depth with the largest aperture of his lens.

It is only when dealing with unusual subjects, such as large or extended groups, that it may be necessary to determine the largest stop that can safely be used and still retain good definition.

SUBJECTS.

Children at Play: Action in the ordinary amusements of children is comparatively slow, and extremely short exposures are unnecessary, and in but rare instances will a shutter speed higher than $\frac{1}{100}$ of a second be required. As children average about one-half the height of an adult, to obtain an image one and one-half inches high it will necessitate working somewhat closer to the subject. This naturally lessens the depth of the field, making it necessary to use a smaller stop, about *f*.8 for small groups.

Children's Portraits: Taken in an ordinary room, within six feet of a window open to the clear sky, portraits of children in light colored dresses may be taken with the largest stop of the lens, with an exposure of from one to three seconds. Out of doors, employ a shaded spot, with an exposure of from $\frac{1}{10}$ to $\frac{1}{100}$ of a second.

Foot Races: It must be taken into consideration that when a man runs 100 yards in ten seconds, this is true of his body only, and that his feet are traveling twice as fast. So in calculating the shutter speed it must be decided whether or not the entire image of the runner is to be perfectly sharp.

With a lens of 8½ inch focus, the runners should be photographed at a distance of 35 feet, and if they are moving at right angles to the lens, a shutter speed of $\frac{1}{700}$ of a second will render the body perfectly sharp, but the feet will not be perfectly defined. The entire image perfectly sharp would demand an exposure of $\frac{1}{1400}$ of a second.

For best results, both pictorial and mechanical, photograph your subjects at an angle of about 45 degrees to the lens, the exposures will then be $\frac{1}{500}$ and $\frac{1}{1000}$ respectively.

For long races, a slightly slower shutter speed is permissible, but the largest stop of the lens must always be used.

Base Ball and Tennis: If the ball is the objective, use the fastest speed and the distance between it and the player must be 50% greater than when the player is the object. When possible select a point in which the ball travels directly toward or away from the lens.

A base runner should be considered as moving as swiftly as a hundred yard sprinter. At bases the movement is comparatively slow, and about $\frac{1}{330}$ of a second exposure will be sufficient.

Owing to the similarity of action, what has been said of base ball applies equally well to tennis, except that in tennis the action is not quite so rapid.

Horse Racing: Such subjects should be handled in the same manner as a man running, because a horse's hoof, when off the ground, moves twice as fast as his body.

Photograph when possible at an angle of 45 degrees to the lens.

Fast Trains and Automobiles: Trains should be handled at a distance of not less than 100 feet, so as to include the whole train. Best results are obtained at an angle of 45 degrees or less toward the camera. At 45 degrees $\frac{1}{500}$ of a second will arrest the movement on the film of a train moving at 35 miles an hour, while $\frac{1}{330}$ will be enough for one traveling at the rate of 60 miles. Double these speeds if sharp definition of the wheels is required.

An automobile may be considered as a locomotive, and shutter speeds figured accordingly. At an angle of 45 degrees, the slower machines may be taken at a distance of fifty feet, with an exposure of $\frac{1}{1000}$ of a second.

For higher speeds, it is better to increase the distance in proportion to the speed of the machine, rather than to depend on a faster shutter speed.

Simply because your lens has a large opening do not feel that you must use it. On the other hand, for the sake of increased depth of focus—i. e. sharpness in both near and far objects, use the smallest opening that will give a fully timed negative. Don't use buck-shot for shooting quail—you will be more likely to get quail with bird-shot. The small opening covers a multitude of errors in focusing.

Valley Green.

LANDSCAPE PHOTOGRAPHY.

In taking up the actual making of the picture we purposely began with the photographing of moving objects as such subjects are so frequently encountered in landscape work.

By familiarizing you with this subject you are forewarned and forearmed as to both the limitations and possibilities of whatever equipment you are using.

In landscape photography we advise against the introduction of human figures as in nearly all cases they fail either in costume or in pose, to harmonize with your subject.

The domestic animals, such as horses, cows and sheep, can however frequently be introduced with success.

When human figures are introduced, avoid having them look directly at the camera and see that they harmonize with your pictures in pose, or in action.

The physical side of picture making, exposure and development, is much more easily mastered than the artistic.

While it is true that there are some few individuals possessed of an inherent sense of the artistic, most of us have to give, in advance, a good bit of study and thought before we can produce results even bordering on the artistic.

To fully cover the subject of artistic composition would require more pages than are devoted to this entire book, but we can in a general way afford suggestions that will aid greatly in avoiding or overcoming most of the errors apparent in unstudied work.

The great secret of artistic work is simplicity, the avoidance of overcrowding, and the employment of the fewest lines and masses in the composition of your picture. Next in rank to simplicity is harmony and balance, and without these, artistic composition is impossible, and in this connection, it may not be necessary to state that the fewer elements that enter into your picture, the easier it will be to bring them into harmony and balance.

One of the faults oftenest in evidence in the work of the beginner in photography is the desire to include too much within the confines of his picture.

You frequently see material for two, or even more complete pictures crowded into one with the result that the eye wanders confusedly from one point to another, and affording only a sense of irritation rather than that of pleasure.

First, have a reason for making your picture—either to preserve a record of some interesting place or occasion, to picture the beauty of some bit of land and sky, or to produce a picture appealing to the observer by its beauty of line or tone.

A successful picture may combine all of these qualities, but one is always dominant and there should never be any question as to its reason for being.

It is to be regretted that composition is not an exact science that can be depended upon mechanically to produce results. We can, nevertheless, apply sufficient of its general principles that together with the study of good pictures, will aid us materially in avoiding the inartistic.

Bringing things together in an orderly and symmetrical arrangement is perhaps as good a definition of composition as any.

Selection must however precede composition, and the first lesson must be to learn to leave out what is not required.

Examine any one of your earlier attempts at landscape making and you will find that your negative includes a whole lot of unnecessary things that you failed to observe.

In this matter of selection, a good rule is to seek first a good foreground, one that will lead you unobtrusively, yet pleasantly up to the principal object in your picture.

Choose your view point carefully, remembering that while the painter can eliminate what he desires, you have an almost equal advantage in that you can move your camera to the right or left, up or down, or focus on a different plane, and with different stop openings, to secure the effect you desire.

In perfecting your composition the following underlying principles must be observed.

Your picture must have a dominant figure or object to which all other parts of the picture must be subordinate. There should be some object of secondary interest connected with your principal object. For instance, if your principal object is a clump of trees, a second clump, a little further away; or again, a woman playing with a child, or watching an incoming boat—this constitutes the motif of your picture.

Remember always that the background must be subordinate and unobtrusive.

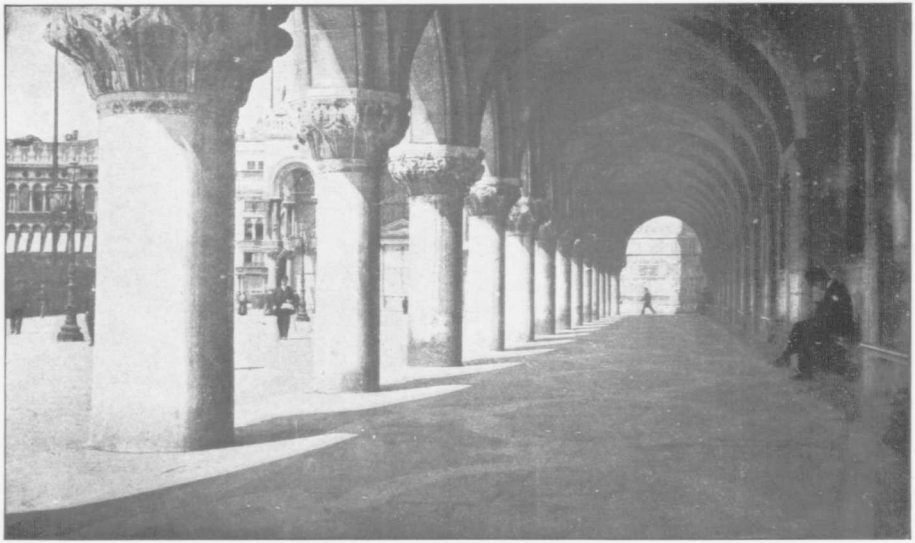
Also that there should not be two highlights or deep shadows of equal importance, and that when possible the deepest shadow should meet the highest light.

And finally that the most important position in a picture is always more or less towards the center, either to the right or left, the exact center should be avoided as this divides the picture into equal parts.

The horizon line, which in most landscapes is the more conspicuous, should never divide the picture into two equal parts, but should be approximately either one-third from the top or from the bottom.

When there are subjects in the near foreground, the line should be about one-third from the top, while for broad expansive views it should be at the same distance from the bottom.

With the latter, one should have, if possible, a clouded sky. Clouds are a decided advantage inasmuch as they break up the monotony of a white sky and add greatly to the beauty and attractiveness of the picture.



A Portico.

Made with aid of Kodak Autotime Scale.

Lighting: Of equal importance with the arrangement of the objects in your picture is the question of lighting, as the lighting determines the strength and position of your lights and shades. Beginners, as a rule, when making exposures in the sunlight, should have the sun behind the back or over the shoulder, but the advancement of the amateur warrants further information.

Effective pictures may frequently be made by having the sun to one side, and at various times the value of the picture is increased by its being a trifle to the front. (In such case it will be necessary to shade the lens to keep out the direct sunlight during the exposure.)

As an illustration let us take a tree in the bright sunshine, walk around it and closely observe the different effects of light and shade. You will notice that when you face the tree and the sun is directly back of you that the tree has the appearance of being flat; as you move gradually to the right or left you will see that part of it is in shadow, and as you arrive at an angle of 90 degrees with your first position you will find that one side is in the sunlight while the opposite side is in shadow, and that it stands out with the pleasing contrast of light and shade, thus affording depth and roundness.

The shadows should also have careful study. These should be transparent to a degree, always containing detail.

Heavy black shadows, devoid of detail, are always a detriment to your composition. When the sun is very bright and the lights are strong while the shadows are black, the result with a snap shot would be too great contrast. This can be overcome by a very, very short time exposure, resulting in a softening of the highlights and an added amount of detail to the shadows. When photographing boats, the point of view to be obtained (if possible) should be such that the shadow effects on the water are made to help the composition.

STREET PHOTOGRAPHY.

The successful picturing of street scenes requires both thought and dexterity on the part of the amateur.

He must bear in mind that he will have to work quickly and quietly, attracting as little attention as possible, and he must be able to take in a pleasing and interesting situation at a glance.

This class of work demands perfect understanding of all the workings of the camera, the ability to level and focus quickly, and expose the instant the conditions are right.

The ability to level the camera quickly and accurately is particularly important, as in most instances the architecture of the surrounding buildings will show, and if the camera is not level, the building lines will be anything but pleasing.

A good many pictures of street scenes show that a number of persons were looking at the camera when the exposure was made. For instance, take a group of youngsters interested in some game, their action, intensity and unconsciousness is what makes the picture. Let them become aware of your purpose, the game stops and all stare at the camera, thus spoiling the opportunity for a successful bit of work.

The holding of the camera during exposure is also important. Many pictures show that the point of view from which they were taken was too low.

The distance upward from the ground or object upon which we stand to the level of the eyes, or the point of view from which we see our subject will range, in most cases, from four and one-half to five and one-half feet.

Now if we hold the camera ten inches or so above our knees it can readily be seen that the point of view is radically changed, and that the effect produced upon the eye might be entirely lost if taken from that position. The proper place is against the chest, or as high as we can manage it and still see what is in the finder.

ARCHITECTURAL AND INTERIOR PHOTOGRAHPY.

The amateur and particularly the tourist frequently encounters architectural subjects possessing most interesting features from the structural or historic point of view.

In straight architectural work full detail is essential and in most cases entails the use of small stop openings, and a time exposure.

This branch of the work makes imperative the absolute leveling of the camera, in order to avoid distortion, and the worker should likewise carefully read the instructions regarding the rising and sliding front as this attachment is most valuable in this work when used intelligently.

A diagonal rather than a full front view of a building will usually be found the more pleasing,, particularly so if a portion of the building is in shadow.

In detail work, the position of the camera, is important: Doorways and windows should be taken full front, if taken from one side the correct effect of the top is often lost.

Exposure should be ample especially for interior work, as an under-timed negative will not only fail to bring out the detail but the contrasts will be too great.

Eastman N. C. Film will be found especially valuable for this class of work, on account of its non-halation and orthochromatic qualities.

In photographing interiors such as the ordinary living room of a home, some thought must be given as to the arrangement of the portion of the room to be pictured. By all means avoid crowding; do not attempt to include every bit of furniture in the room within the confines of your picture, and be careful that the larger objects, such as heavy chairs or the like do not come in the immediate foreground as they will then photograph out of proportion.

If the pictures on the walls are glazed, avoid if possible reflections from the glass, such reflections can frequently be avoided by pulling down one of the window shades.

When possible photograph across the light coming from a window, rather than directly toward it, as by so doing you will obtain better gradation and avoid the halation as well.

One last word: Take plenty of time in selecting your view point, and in arrangement, and give plenty of time for the exposure.

HOME PORTRAITURE.

The Photographic Value of Light:

Before beginning the making of exposures in and around the home, it is most essential that the Kodaker understands the power of light in order that his exposures may come within the limits of the latitude of the film, and approach the normal or correct exposure as nearly as possible.

The beginner is very apt to be misled into estimating his exp ure according to the visual rather than the actinic power of the light; in other words, a light that appears exceedingly

White Dresses are Very Helpful in Shortening Exposures.

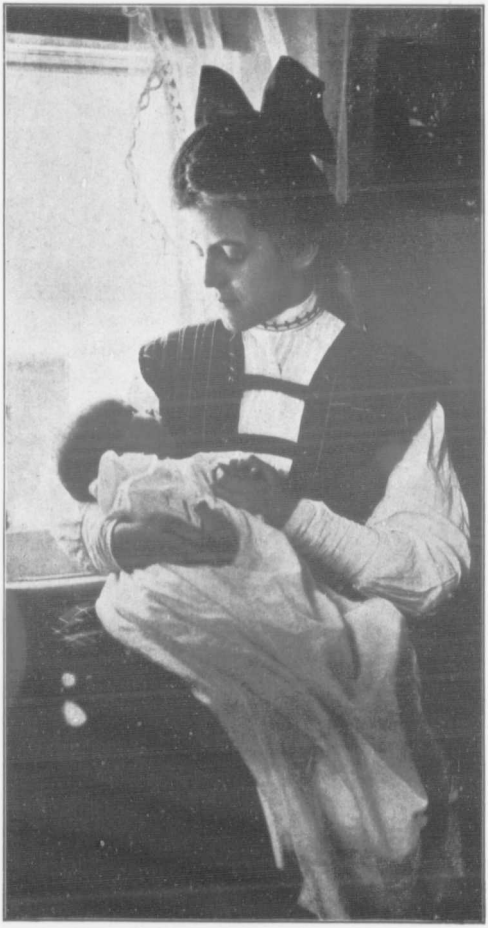
bright and powerful to the eye may have but weak recording power on the sensitive film. The actinic power of the light is diminished by refraction and absorption. As an example, examine the light on a bright sunny afternoon about two o'clock. Outdoors in this light a fully timed negative can be produced in 1-100 of a second at stop U. S. 8. Now enter a room on the sunny side of the house, one having good large plate glass windows, with white walls and white wood work; the light appears, if anything, brighter than outdoors. Now make an exposure, with the

same speed and stop opening, placing the subject close to the window, and we find upon development that this exposure is very much under timed. In this case the loss of actinic power of the light is due to the refraction and absorption of the light rays by the window glass, and to the fact that there is no direct exposure to the light of the whole sky. To obtain a negative equal in density to the first one it will be necessary to give an exposure of from one to two seconds, or one hundred to two hundred times as long as for the exposure just the other side of that deceptive piece of glass.

A Flash-light Portrait—Eastman Flash Sheet.

Next try an exposure in the nice light dining room, with its bright red rug, and bright red wall paper—two seconds exposure should be plenty. Well, what *is* the matter; used same speed and same stop, and the light was just as good as in that room, and yet a bad under exposure. Could the color of the rug and wall have had anything to do with it? That is the solution. Anything red in color has the power to absorb a great portion of the light rays that would have any effect on the film—your dark-room lamp is fitted with a ruby glass. With the white walls one is aided by the light *reflected back from* their surfaces in just about the same proportions as the other exposure was lengthened by the absorbing power of the red walls and floor covering.

Now try two further experiments. Take your subject outside again, on the shady side of the house, but where you can obtain



Placing Subjects Close Against the Window, Securing Good Illumination with a Very Short Exposure.

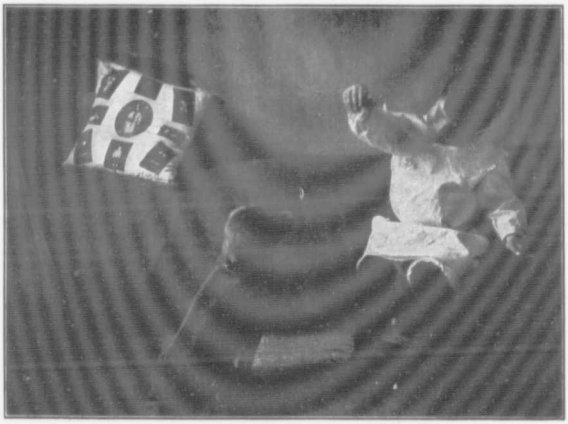
direct illumination from the sky. To your eyes, this location would seem to require a longer exposure than the one in the room with the white walls, but try an exposure of 1-10 second. This de-

A Snap Shot Made Possible by Light Reflection from Below.

velops up about normal. Now as a final experiment move the subject up on the veranda, just far enough back so that the direct light from the sky cannot be utilized. The illumination appears

to be just as good here as for the previous exposure, but to be on the safe side try two exposures, one of 1-10 second, the same as for your last outdoor exposure, and one of 1-2 second; once more a surprise, as the 1-10 second exposure is very much under exposed, and the one-half second could have been increased to one second without danger of much overtiming.

These few experiments will serve fairly well as a working basis for future exposures, but, of course, during the shorter days and in cloudy weather, the exposure will have to be proportionately increased.



A Picture Where Detail in the Background is Permissible.

In the somewhat contrasty light usually encountered, err on the side of over exposure, as this not only affords better shadow detail, but the consequent tendency to flatness overcomes much of the contrast.

Of course, in photographing small children, time exposures of any appreciable duration are out of the question, but even in such cases, risk movement rather than under exposure.

A portrait should be not only a correct likeness, but should present the subject in a pleasing pose, subduing defects and accentuating the strongest characteristics.

A portrait to be pleasing must avoid harsh contrasts and possess full gradation from highest light to deepest shadow, consequently it is necessary to so arrange the subject and light as to produce this effect.

In your previous experiments you acquired a fairly good knowledge of the intensity value of light, so experiment a little in regard to its quality.

Placing your subject close to the window, with the light full on the face, all parts are equally illuminated, and with consequently no gradation. Now move the subject back a few feet, the light immediately softens, and you obtain a roundness and modeling far more pleasing.

Turning the subject's head partly away from the light increases the steps in gradation, only the part of the face in deepest shadow appears too dark and without detail.

Illustrating Arrangement of Kodak and Subject for Full Length Portraiture—See page 49.

Illuminating this shadow is very simple. Take a large white towel, and hold it about four feet away from the shadow side, it lightens up a bit, but not quite enough so walk slowly toward the subject until this shadow is sufficiently illuminated to bridge that big gap in gradation.

All you have to do now is to pin the towel to the back of a tall chair or anything else handy and you have as satisfactory a reflector as one could wish.

Before attempting any actual exposures place the subject in various parts of the room and carefully study the effects you can produce.

One thing to remember is this, that the light intensity value increases and decreases by the square of the distance from the source of the light; that is to say, if the correct exposure two feet from the window is three seconds, four feet from the window will demand an exposure of twelve seconds to secure equal density in the negative.

Portrait Obtained by Arrangement Shown on page 48.

Always use the strongest light that you can consistently for the effect you desire to produce, as prolonged exposures not only detract from the spontaneity of expression and pose, but make your subject uncomfortable and liable to move.

The preceding experiments have had to do only with the technical side of portrait making, and therefore you have experimented only with the recording power of the light. In order that you may make your pictures artistic you must learn how to control and direct the light just where you want it to produce the desired effect.

Light Control: Controlling the light is a very simple matter, and entails no extra apparatus beyond a few sheets of paper or cloth, and a few pins or thumb tacks for holding them in position.

It is generally accepted that allowing the light to fall on the face at an angle of forty-five degrees produces the most natural effect, and you can easily secure this illumination by simply blocking up the lower half of the window.

Other methods of lighting can be used, and some most charming effects can be produced by allowing the light to come from other angles.

Now with the lower portion of the window curtained, and the reflector placed in the proper position, you have the light under good control for bust or half length portraits, but suppose you want to make a full length portrait with the subject attired in dark costume; in this case you have got either to move your subject further back from the window, use a semi-transparent curtain for

blocking the lower half of the window, or use a second reflector to reflect the light upon such portions of the subject as require it.

The simplest way is, of course, to move the subject back from the window until the light covers the figure fully, but in some

Illustrating Arrangement of Kodak and Subject for Full Length Portraiture—See page 51.

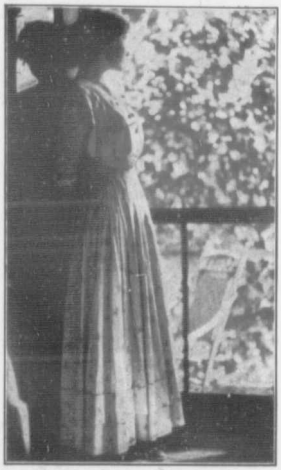
cases this will extend the duration of the exposure beyond the practical limit, when one of the other two alternatives must be employed.

Bleached cheese cloth may be used for blocking the window when it is necessary to admit some light through the lower portion of the window, and for reflecting light up from the floor a sheet placed on a chair, or sometimes just spread on the floor will do the trick.

In portraiture you must always bear in mind that the face is the most important element in your picture, and consequently you

must subordinate all other parts; this is a comparatively easy matter when the subject is attired in dark costume, but when the clothing is white or nearly so, some means must be devised for subduing it to its proper key without loss of its natural softness and brilliancy.

Some times an absolutely opaque curtain for the lower half of the window will suffice, but more often it will stop out too much light, and in such cases you can resort to the very simple expedient of using a piece of *yellow* cheese cloth for curtaining off the lower portion of the window, employing one or more thicknesses as the occasion demands.



Portrait Obtained by Arrangement Shown on page 50.

When the costume is dark the illumination and exposure must be sufficient to show detail in the figure and texture in the garment, and with white or light costumes the light must be soft enough so as not to render chalky whites without detail.

Correct development of the exposures will do much in accomplishing these results, and will be explained in its proper place.

A goodly number of pages could be devoted to talks on plain lightings, line lightings, the so-called "Rembrandt" effects and a whole lot of other lighting methods, that in the end would only serve to confuse you and put you further away from the making of good straight portraits than you were making before you commenced to read.

Posing: Nine hundred and ninety-nine children out of every thousand are naturally graceful and will pose themselves far better than you can—and remember, don't be in a hurry, and, don't be fussy.

The tactful Kodaker can coax his little subjects into the proper place for the exposure, and then wait till the proper moment arrives.

When you were a youngster didn't you "just hate" to have anyone fussing with or at you, pulling down your skirts or straightening your necktie or slicking back your hair or saying "Don't do that Jimmie", or "Take your finger out of your mouth Susie"? Just remember your own childish likes and dislikes when picturing the Kiddies.

If you have a pre-conceived idea for a picture, the only way you can carry it out successfully is to get the youngster or youngsters interested in it; in fact, to play some game with them

that will finally work them into the arrangement and pose you desire.

Most youngsters when told to do any particular thing have a preadamite desire to do just the opposite.

When attempting to photograph children who are not familiar with the Kodak or the process, place your Kodak in position and then go about doing something else for a little while until they become accustomed to its presence, even allowing them to handle the Kodak if they so desire.

Illustrating Position of Kodak and Subject for Ordinary Window Lighting—See page 53.

Simple costumes photograph best, and the children feel more at home in them.

White and lighter colors are specially well adapted for children's costumes, not only adding to the youth of the subjects, but aiding you in that you may employ a shorter exposure.

When it comes to the grown ups a certain amount of posing is necessary, though as you become accustomed to the work it may be minimized by so arranging the seat they are to occupy, or the other incidentals of your picture, that they will involuntarily assume the pose desired.

Posing Suggestions: A successful portrait depends upon more than correct lighting, exposure and development. Full length portraits seem to express more of the individuality of the subject; but the more of your subject you include in your picture the more difficulties you will

encounter. You will find in every instance that there is one side of the subject's face that will photograph better than the other, and when possible determine this point before placing the subject infront of the Kodak.

Whether the portrait shall be full face, three-quarter or profile will be determined of course by which view point shows the subject to the best advantage.

With persons having fairly regular features and good complexions it frequently happens that good portraits can be obtained from almost any angle, but in most cases it is necessary to subdue some feature or strongly accentuate some others to produce the best effect.

As an example take a young man with too prominent ears; it is obvious in this case that the full face would be displeasing, so

Portrait Obtained by Arrangement Shown on page 52.

Illustrating a Simple Method of Using Eastman Flash Sheets.

turn the face slowly away from the light until the ear nearest the light disappears from the line of sight.

The ear on the shadow side is of course subdued by the shadow, and if still too prominent you can, as one expedient, have your subject rest his head on his hand, placing the hand just forward of the ear, or the shadow can be deepened by removing the reflector to a greater distance from that side of the face.

Portrait Obtained by Arrangement on page 53.

Sometimes the chin is a little weak; tilting the head slightly upward will help, or the chin can be rested on the hand—a profile of course, is not to be considered.

Double chins can be treated in the same way.

Now take a subject with a massive lower jaw; place him squarely facing the Kodak and you will note that the head outline is nearly rectangular. Request him to turn his head slowly away from the light, and stop at the point where the head outline presents an oval form; it may also be necessary to tilt the head either up or down a trifle to produce the most satisfactory view. When the subject has a very thin face or high cheek bones the light should be so directed upon the face as to fall just below the point of the cheek bone; this may be accomplished by lowering the shade, blocking the window a little or moving the subject a trifle further from the light.

We quite often encounter a subject with deep set eyes, or wish to make a picture with the hat shadowing the face. In such cases, to afford sufficient illumination to the eyes, turn the subject more toward the light or use a supplementary reflector.

Bald heads are easy; have some one hold a sheet of cardboard over the head between the light and the bright spot, just out of range of the lens.

Particular attention should always be paid to the eyes, as the entire facial expression depends so much upon them. Avoid double catch lights, and have them in good focus.

When eyeglasses are worn be very particular to see that the glasses do not show a blur from reflected light.

If the glasses do show a blur move the head slightly, either way, until the blur vanishes.

When portraying the full figure, we naturally have a few more things to consider, and one exceedingly important point, and that is curves, not angles, make for beauty and harmony.

Now don't fuss much with your subjects. If the figure is to be seated request the subject to be seated, and usually a quick pat here and there will get rid of any obstreperous angles —and if you do not succeed thus quickly stop right there, and invent some excuse to have the subject stand up for a moment, and then again be seated—it doesn't take much to bore even the most willing subject and too much fussing will destroy all chances for success.

Watch the hands carefully and do not have them too far forward from the body or they will then photograph out of proportion with the face. The hand partially closed usually presents a better appearance than when clenched or with the fingers extended.

Remember always that the face is the most important part of your picture, and that all lines should lead up to it, and all other parts should be subordinated.

A $\frac{1}{25}$ Second Exposure.

A $\frac{1}{10}$ Second Exposure.

These few suggestions are given that you may learn to avoid the more common errors and to realize the necessity for studying your subject and knowing what you want to do before you make the exposure.

A Dignified, Yet Thoroughly Natural Pose.

Back-Grounds: An illy chosen background will ruin the finest bit of portrait work, so it is most important that some thought be given to this portion of your picture.

For bust portraits a perfectly plain ground is in good taste, utilizing the wall of the room when covered with plain paper, or suspending some plain fabric behind the subject when the wall covering is objectionable.

For full figures and groups some detail in the background is not objectionable, but in any case it must be subdued, and in no way attract the attention from the portrait part of your picture.

In a good many of the little home pictures detail in the background and accessories is permissible, provided it is not too prominent.

Take for instance a group around the piano; lack of detail in the piano would be foolish; or if you were making a picture of the kiddies playing in the nursery, detail in the wall and any furnishings in the room would be in harmony with your picture.

Detail is all right so long as it does not detract from the human interest in your picture.

The trouble with most of us is that we become so much absorbed in the portrait part of the picture that we are very prone to overlook or slight the other parts, and as the background really forms the setting for our picture we must give it equal attention.

Developing: Tank development, first, last and all the time, not only for portraiture but for every sort of exposure, as it is not only the simplest and easiest method, but affords the best possible results.

With the Kodak Film Tank use the twenty minute powders as this seems to afford just the right printing quality for portraiture. If, however, you employ the dark-room method do not carry your development quite as far as for landscapes, and especially so when your subjects are gowned in white, as too long development is apt to clog up the whites and prevent the correct rendering of detail in the print.

Out-Door Portraiture: Outdoor portraits should never be made where the full light of the sun falls. Select a spot away from the sun, but one where the direct light from the sky will fall upon your subject. The light is softest before ten in the morning and after four in the afternoon.

This refers to the warmer months as there wouldn't be much fun in outdoor portraits "when the winter time comes round".

Baby's Interest Held by Something Outside the Window.

A clump of shrubbery makes an excellent background, if the subject is placed several feet in front of it, and the lens used with a large opening.

Reflectors and that sort of thing are not of much account in this class of work nor can you do much in the way of fancy lightings, but you can produce a goodly amount of most satisfactory work with comparatively little effort.

Spacing and Trimming: It is a rule among painters that the picture must fill the canvas; in other words, anything that is not of interest or detrimental to the chief object in the picture must not be included. In some instances it is not possible to place the subject or the camera so as to include only what is wanted; the remedy then is to trim your prin. till only the true picture remains.

A few suggestions in spacing may not come amiss:

In full or three quarter length portraits, a very short person may be made to appear taller by spacing the picture so that the head comes close to the top of the print; a low chair or table will also serve to produce this effect. Persons of unusually large size are a bit careful as to the furniture upon which they trust their weight, so it may be unnecessary to suggest refraining from the use of small or frail furniture when posing such subjects. In spacing pictures of children allow a little more space at the top than for adults, as this affords a better impression of their size.

Made With Aid of Kodak Portrait Attachment.

Some very good artists claim that it is permissible to cut off part of the head or head gear in the picture but never the feet or hands. Usually you can include all these important parts without detriment to the picture.

Too much blank space around your subject is often almost as bad as too much detail, and some small object such as a picture or vase can be introduced, provided it is so placed as not to interfere with the rest of your composition. The picture on page 44 illustrates this point.

The more you study the art of filling your space the less trimming you will have to do, but when you *do* have to trim, trim mercilessly.

Mounting: Just as many good photographs have been spoiled by bad mounting as paintings have been spoiled by inappropriate framing. As the mount forms the setting for your picture, some thought must be given to its selection, both as to color, shape and size.

Fortunately most of the mount manufacturers have given a good deal of time and thought to the production of harmonious and appropriate mountings for all classes of work, so the danger of inappropriate selection is largely minimized.

One of the first things to consider is color. The color of the mount must harmonize with the tone of the print. Black and

Made with 3A F. P. Kodak with Kodak Portrait Attachment.

white prints should not be mounted on brown or any of the warmer shades; select rather one of the soft grays, black or white. Where the print contains very strong high lights a pure white mount may be used, but when the tones are subdued use gray, as the strong white degrades the higher lights of your soft print. Black mounts may be used with prints containing deep shadows for the same reasons. In some cases a black and white print may be mounted on green with harmonious effect, but more often this color produces a jarring sensation especially when the green is very strong. With warmer toned prints, such as sepias, browns and dark purples, the various shades of brown, green and even subdued reds may be used to advantage.

Allow good wide margins on your mounts, and use simple ones, so that the pictures show up stronger than the mount.

The Kodak Portrait Attachment: No small investment will afford more lasting satisfaction than the one of fifty cents expended for a Kodak Portrait Attachment.

The Kodak Portrait Attachment is simply an extra lens so mounted as to slip over the front of the regular Kodak lens.

With this little attachment in place one can work close to the subject, and obtain large head and shoulder bust portraits. But this is by no means the extent of its usefulness, as it can be used for photographing small animals, flowers and the like, obtaining much larger images than are possible without its use.

The illustrations on this pages 60 and 61 most clearly demonstrate its usefulness in portraiture.

Some of the Pictures Now let us call your attention to some of the illustrations that help to bring out the points in the text.

The four sets of pictures showing the Kodaker at work, and the results of his exposures. are of more than ordinary interest as they tell their story so very much better than it can be told with words. And, as you study these pictures

Made with Kodak Focused at 8 ft. Without Portrait Attachment.

you will see how simple they all are, and how they were made under conditions that can be duplicated in practically every home.

The pictures on pages 48, 49, 50, 51, illustrate a very simple and satisfactory method for making a full length portrait. You will notice the entire absence of screens or reflectors. At first glance the Kodak would seem to be pointed directly against the light, but the patches of sunlight on the floor show that the lens is working diagonally across the light. Your attention is called to the clever way in which the glass door has been used to reflect the light against the shadow side of the face, and how the clump of trees outside has been utilized to form the background. The set on pages 52 and 53 most satisfactorily demonstrates the possibilities of the ordinary window lighting, without the aid of accessories.

Made with Kodak Portrait Attachment
Focused 3½ ft. (Reduced)

A simple and very satisfactory method of utilizing the Eastman Flash Sheets for flashlight portraiture, is shown on pages 53 and 54. The position of subject, Kodak and flash is so clearly indicated that comment is unnecessary.

The pictures on pages 45 and 57 show a simple method for producing the full illumination demanded for very short exposures by working close to, and almost against the light.

When the picture on page 57 was made the attention of the baby was held by having one of the other youngsters go outside and throw snow balls against the side of the house. Usually some little stunt like this will save the day when the orthodox methods fail.

The pictures on pages 58-59 demonstrate the wonderful possibilities of the little Kodak Portrait Attachment, when used by the light of an ordinary window, by following the simple methods outlined.

The illustrations on page 55 are just little outdoor pictures—yes, just "snap-shots", but they possess a naturalness that makes Daddy, away from home, mighty glad to pull them out and look them over, pretty often.

None of the illustrations lay claim to being masterpieces, they were all made under ordinary light conditions, all made with a Kodak and on Eastman N. C. Film, except as stated, and any one of you can produce equally successful results by following the instructions in your Kodak manual, and the few additional pointers here offered.

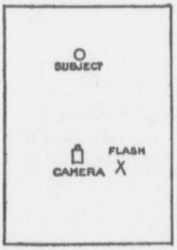
A Simple Window Lighting.

FLASH LIGHT PORTRAITURE.

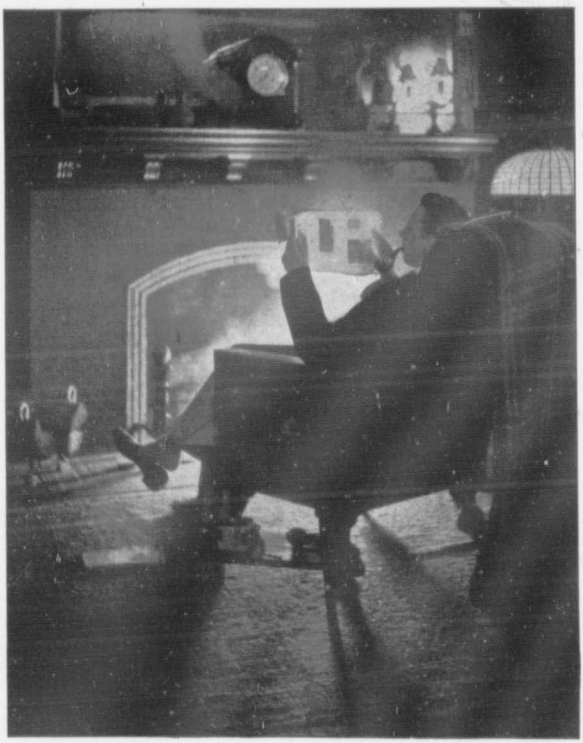
The flashlight has done much to broaden the sphere of the amateur photographer. It has made him absolutely independent of daylight for the making of portraits and other indoor pictures, and has even made possible the taking of certain classes of outdoor pictures at night.

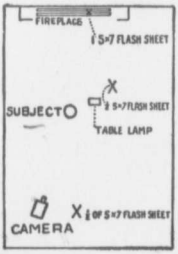
As the amateur has comprehended the artistic possibilities of flashlight for illumination, and how simply and safely all lightings may be obtained, he has in some instances practically abandoned daylight for portrait making.

In this chapter we shall deal only with the simplest means of flashlight illumination—Eastman Flash Sheets and ordinary flash powder. In using the latter, the directions on package must be followed implicitly to ensure good results.



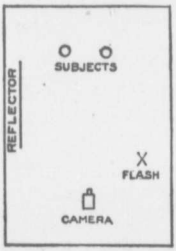
Small charge of flash powder.
7 feet from subject.
7 feet from floor.
Medium dark walls.
Subject 6 feet from camera.





Three flashes, total exposure three seconds.
One No. 3 Eastman Flash Sheet in fire place.
One-half No. 3 Eastman Flash Sheet just above and to right of reading lamp.
One-third No. 3 Eastman Flash Sheet directly back of subject two feet from floor.
Dark walls.
Subject 8 feet from camera.

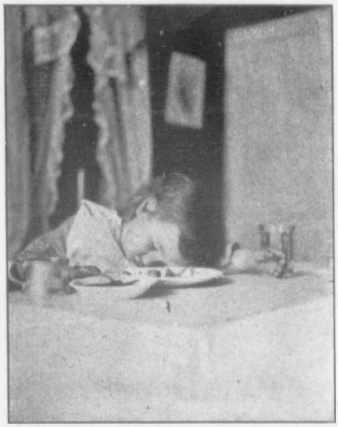
What a Flashlight Is: A flashlight is the illumination secured by the ignition and combustion of certain chemical compounds, or by the passing of pure magnesium through a flame. The illumination thus afforded is of powerful actinic quality, and of extremely brief duration, and unless handled understandingly is apt to produce too great contrasts in lighting to be satisfactory to artistic tastes. It is, however, a very simple matter to place and control your flashlight, so as to make it much more certain than daylight and to yield exactly the proper degrees of contrast or softness.

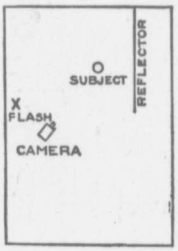


Small charge of flash powder.
7 feet from subjects, 3 feet from floor.
White cotton cloth reflector.
Medium dark walls.
Subjects 8 feet from camera.

Flashlight and Daylight: For work in the open, or well lighted interiors, daylight is of course highly satisfactory, as we are accustomed to its strength, and can in a sufficiently accurate manner determine the proper time of exposure. On the other hand, and particularly in the making of portraits, the amateur is usually confined to the use of

rooms improperly or insufficiently illuminated for his purpose. With daylight, even though he possesses unusual ability in arranging and controlling his light, he is often handicapped by being unable to direct his light to just the proper point or to obtain it in sufficient volume just when he needs it. With the proper flashlight, the amateur, after but a few experiments, is dealing with an absolutely known quantity. He knows to a certainty just how much illumination each flash sheet or each flash cartridge will provide, and that he may direct his light to fall absolutely in the desired place, as he may place his flash so that the rays of light will proceed in any direction.

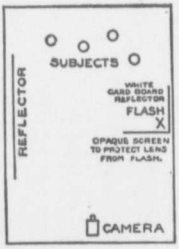




Small charge of flash powder.
6 feet from subject.
2 feet higher than subject's head.
White oilcloth reflector behind subject.
Cheesecloth screen between flash and subject.
Dark walls.
Subject 6 feet from camera.

In making a portrait with the aid of a flashlight, we must remember that we are attempting to counterpart the action of daylight, and consequently the same rules that apply to daylight portrait making will be necessary.

As heretofore stated a portrait must not only be a good likeness, but to be pleasing must in addition present the subject in the most favorable pose and lighting without undue contrasts, and with good gradation between the highest lights and deepest shadows. It may be accepted that the most pleasing illumination is secured by allowing the light to fall on the features at an angle of forty-five degrees, though exceptions to this rule may be made as hereinafter explained. In making a portrait by daylight you could not ex-

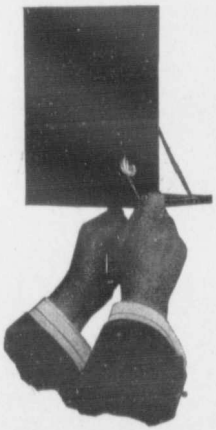


Eastman Flash Sheets.
8 feet from subjects, 7 feet from floor.
White cotton cloth reflector.
Flash placed in angle of two large sheets of cardboard to act as reflector and to shield lens from flash.
Medium dark walls.
Subjects 25 feet from camera.

pect to secure good results by placing your subject and camera in any position regardless of the light, but rather would have to spend some time in placing your subject and in arranging the control of your light so as to have it fall in the proper place. When using flashlight, the same precautions must be observed, only your task will be easier, as you may always be sure of the requisite amount of light and also of your ability to control it.

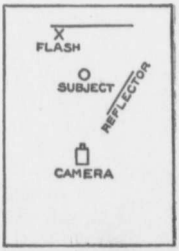
The essentials of flashlight picture making are few: The Kodak and film, a firm and easily adjusted support for the camera during exposure (preferably a tripod, with corks on the spikes on the legs to prevent slipping, or an R. O. C. Tripod Truck specially designed for this purpose), a package of Eastman Flash Sheets or a small supply of flash powder, according to the work in hand, a screen or filter for diffusing the light and a simple reflector for softening shadows. Where the flash is at a considerable distance from the subject, a reflector behind the light may be used advantageously to increase the volume of light, instead of a screen before it to diffuse the light.

For all ordinary work, in rooms of average size, we recommend the Eastman Flash Sheets and Eastman Flash Sheet Holder. The sheets are exceedingly simple to handle, and requiring about one second to consume, afford a broad soft light. In photographing children, or any subject apt to move during the exposure, we advise the careful use of a good flash powder in order to obtain an instantaneous exposure by its brilliant illumination. As some subjects are apt to become nervous during your preparations for the exposure, do not neglect to reassure them, and avoid all appearance of nervousness yourself, proceeding calmly and slowly with each operation. When using daylight for illumination, the subject must be placed with regard to the window opening, but with flashlight the subject may be placed anywhere in the room, as most convenient, and with the camera at the proper distance, the flash may be placed in any position necessary to produce the desired lighting.



A convenient method of using the Eastman Flash Sheets is to provide a strip of wood about eight feet long and about the thickness of an ordinary lath; this strip may be tied to the back of a chair, in an upright position, as it then can be easily moved to any point in the room. But the safest and simplest way of using flash sheets is by means of the Eastman Flash Sheet Holder, which takes care of every contingency.

It may be safely held in the hand, always between you and the flash sheet. Or the handle may be unscrewed and the holder



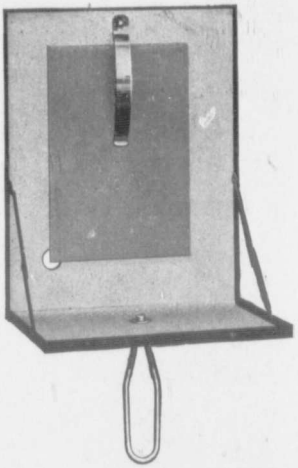
Eastman Flash Sheets.
5 feet from subject.
10 feet from floor.
White cotton cloth reflector.
Lens shielded by sheet of cardboard during exposure.
Medium colored walls.
Made with Kodak Portrait attachment.
Stop U. S. 8.
Subject 3½ feet from camera.

attached to any ordiinary tripod being provided with a socket for that purpose.

The flash sheet is held securely in place by the spring finger shown in illustration, in such manner that the bottom corner of the sheet lies across the opening in the back of pan.

Then to set off the flash, merely touch a match from behind, through this opening, to the corner of the sheet.

It is obvious that with this holder the flash can be held in any position or at any height in the room and it is a very great convenience. Furthermore, the white fireproof lining of the Eastman Flash Sheet Holder acts as a reflector and will increase the strength of the light.

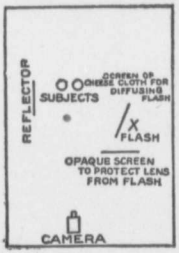


Never place more than one sheet in the Eastman Flash Sheet Holder at a time. If two or more were used, one would be liable to blow off and drop on the floor while still burning.

Wherever flash powder has been mentioned so far in this book, we have tried to impress on the reader the necessity for care and implicit following of directions. As already explained, flash powders are necessary to secure instantaneous exposure for making pictures of subjects in which there is any chance of movement, as in pictures of children, but the powders are highly inflammable and carelessness in their use is apt to lead to disastrous results.

The manufacturers of flash powders always give directions as to methods of handling their products, which should be carefully followed in every case. A good rule is to use flash powders only where it is impossible to use the safe Eastman Flash Sheets—*i.e.*, in cases where an instantaneous exposure is imperative.

Before lighting the powder, be sure that no lace curtains or other inflammable materials are apt to come within reach of the flame, as the light spreads out from the cartridge quite a distance. In addition to the light, another most important requisite for doing good flashlight work is a plate or film which is rapid, orthochromatic and non-halation. Do not attempt to make a flashlight portrait on any plate not possessing these qualities, and as they are all combined in Eastman N. C. Film, we have here the ideal medium for this work.



Eastman Flash Sheets.
5 feet from subjects, 6 feet from floor.
White cotton cloth reflector.
Cheesecloth screen between flash and subjects.
Medium dark walls.
Subjects 10 feet from camera.

Now as to the actual work. We will assume that it is evening, but suggest, if day time be selected, that you do not have too much daylight in the room. Pull down the window shades and turn on the lights, as if it were evening. When making the exposure do not turn down the lights, but leave them burning brightly. The light will do no harm, and will prevent the dilation of the pupils of the eyes of the subject, and avoid the stare so often in evidence in flashlight pictures. The color of the walls and ceiling and the size of the room will have much to do with the result. Select, if possible, a room of medium size, with light colored walls and ceiling; this will afford a general diffusion of the light and aid greatly in softening the effect. The first thing to be considered is the size of the flash sheet to be used and its position.

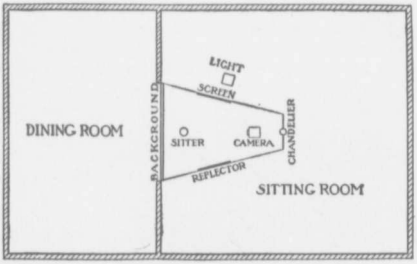
The Eastman Flash Sheets are made in three sizes, 3 x 4, 4 x 5, and 5 x 7 inches, and numbered one, two and three, according to size. The proper size of the sheet to use will be determined by the complexion of the subject, the color of the room, and the distance of the light from the subject. For example, if the subject is of fair complexion, with light hair and white dress, and if the room is of medium size and light walls and hangings, a No. 1 Flash Sheet would be sufficient, placed at a distance of about six feet. For medium complexions use a No. 2 sheet, and for very dark, a No. 3, or put the No. 2 sheet a little closer to the subject. The further the subject is from the light, the softer the effect. Strong, bold lightings are obtained by placing the light close to the subject.

As a basis to work from; six feet is about the proper distance for the best result in average cases. At a distance of eight feet, to secure full illumination use a No. 3 Flash Sheet, and for any distance less than six feet a No. 1 Flash Sheet will afford sufficient light under average conditions. The light may be placed anywhere except within immediate range of the lens, but its exact position will depend upon the style of lighting desired and the individual characteristics of the subject. An idea prevails among beginners that the light should never be placed anywhere except behind the camera, as it might cause a reflection of light into the lens, but the light may be placed anywhere except inside the limits of the picture without trouble from reflections. In some instances an opaque screen may have to be used, to cut off such rays of light as would reflect into the lens, but these cases are so obvious as not to demand further explanation. A common error among beginners is that they do not place the light high enough. If the light is placed six feet distant from the subject, it should also be placed about three feet higher than the head of the subject, in order to afford correct modeling of the features, and the desired softness. There are exceptions to this rule, as in the case of a subject with deep set eyes and heavy eyebrows, or a subject with a large hat, when it is desired that the hat should not cast a shadow on the face. In such cases the light should be lower. A reflector and screen are important aids in obtaining artistic results. It is obvious that unless some means are pro-

vided to equalize the lighting on the sides of the face, the contrast will be too strong, and the "chalk and soot effects" will be much in evidence. The reflector for softening contrasts is a simple proposition. For a bust portrait, with the subject seated, a white towel fastened over the back of a high backed chair will serve the purpose; do not place the reflector too low, as the reflected light coming up from below will be apt to flatten the shadow side of the face. The reflector should also be placed a little forward of the sitter, as this affords better half tones between the highest lights and shadows, and also serves to prevent any stray rays of light from reflecting into the lens. With standing figures, a small sheet or any light colored material (except yellow or red) may be hung over a string or tape fastened across any part of the room, with thumb tacks, so that it occupies the desired position. The light screen or filter can be similarly arranged on another tape. This screen should be of white cheesecloth, and at least a yard square. A convenient method is to tack the cloth to a light wooden frame, about a yard square. If a tripod socket be inserted in one side of the frame, an extra tripod may be utilized to hold the screen in any desired position.

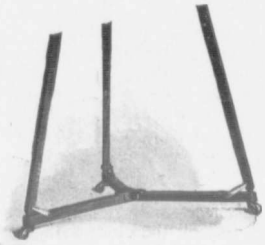
The diagram below illustrates one of the many ways in which the reflector and light screen or filter may be used.

Many houses have arches or folding doors between the rooms, with portieres which may be utilized for a background, attaching one end of the reflector and screen by strings or tapes to each end of the curtain pole, and tying the other ends to the chandelier, usually found above the center of the room. Every room has a number of door or window casings, to the side of which a pin or tack may be driven without damage, and these afford sufficient opportunity for varying the arrangement shown in the diagram, to obtain exactly the lighting desired.



Let us now arrange our subject for an exposure, taking for example a lighting and pose similar to the one on page 69. If you are using a flash sheet without the Eastman Flash Sheet holder, you should ignite the flash sheet by means of a match fastened in a split stick, at least two feet long, or, better still, with one of the long handled gas lighters provided with a wax taper. All being in readiness, open the shutter and quickly light the flash sheet; as soon as it is consumed, close the shutter. Do not hurry, as the illumination afforded by the gas flame will not make any impression on your film in the short time necessary to close the shutter after the exposure has been made.

Tank Development affords the ideal method for development of flashlight exposures, as it not only brings out everything the exposure is capable of yielding, but the negatives will have just the right quality for portraiture.



The R. O. C. Tripod Truck is a most convenient accessory for flashlight and other work, where a tripod is employed indoors.

Placed on this, the tripod legs are held firmly in position by quick acting spring catches, and of course there is no possibility of slipping or the tripod spikes marring floor or carpet..

The truck is fitted with castors, making it a very simple matter to move the camera about the room to any position.

Folds compactly when not in use and is perfectly solid when extended.

SUMMARY

The following summary of conditions necessary for successful results must be given careful consideration.

1. Correct Lighting:	a—Position of light. b—Proper diffusion of light by screen. c—Distance of light from subject. d—Proper placing of reflector.
2. Correct Exposure:	a—Size of flash. b—Size and color of room. c—Color of subject. d—Distance of light from subject.
3. Correct Development:	a—Suitable developing formula. b—Proper strength of developer. c—Duration of development.

The illustrations for this chapter were all made on Eastman N. C. Film, and with the Eastman Flash Sheets and small charges of flash powder.

The diagrams accompanying the illustrations fully explain just how each picture was made, and the amateur following the simple instructions should experience no difficulty in producing equally successful results.

INTERIORS BY FLASLIGHT.

The foregoing chapter thoroughly covers the ground of Flashlight Portraiture but we wish to follow it up with a few remarks upon flashlight work in a general way. Aside from the making of portraits there are many uses for the flash.

Frequently it is desired to take a photograph of an interior which, by reason of a lack of illumination, or because some window, which cannot be covered, comes within range of the camera, is impracticable by daylight. In such cases a flash light solves the problem. Again, it is desired to photograph a very large room which is lighted from only one side by daylight. To get a full time exposure in the darkest corner of the room would cause a decided over-exposure near the windows. A flash light, concealed from direct line with the lens by some article of furniture or by a screen, illuminates the dark corner and gives a properly lighted exposure of the entire room.

These are the ordinary uses of the flash light, and by following the simple rules laid down, the amateur can make pictures with as great an assurance of success as when making snap-shots out of doors. For the production of unusual effects, however, one must study all the conditions, weighing carefully cause and effect, and must not yield to disappointment if success be not obtained at first.

There are many ways in which the flash may be made to cooperate with other artificial light, or with daylight, to produce a unique or artistic effect, and to the serious worker it offers another means to the end most desired by all photographic workers, pictorial effect.

Flash Sheets: The Eastman Flash Sheets provide a simple and effective method of producing the flash. Being of great actinic power they impress the image upon the sensitive surface of film or plate quickly, although the flash is less blinding than that of ordinary powders.

The fact that flash sheets burn slowly as compared with flash powder makes them far safer to use—the danger from explosion by careless handling being reduced to a minimum.

For photographing dark corners when photographing interiors by daylight, for portraiture and small groups, the Eastman Flash Sheets afford an ideal means of illumination, but for large rooms, and for groups of ten or more persons, fairly good charges of powder should be employed as they afford a greater amount of light. Except for extra large rooms or groups the No. 2 Cartridge will provide sufficient light with stop 16.

In straight interior work, when no living subjects are included, and a number of flashes can be made, the Eastman Flash Sheets may be used according to the following table:

TABLE.

For	10	feet	distance	and	light	walls	and	hangings	use	1 Sheet.
"	10	"	"	"	dark	"	"	"	"	2 Sheets.
"	15	"	"	"	light	"	"	"	"	2 "
"	15	"	"	"	dark	"	"	"	"	3 "
"	25	"	"	"	light	"	"	"	"	3 "
"	25	"	"	"	dark	"	"	"	"	4 "

The above table is for No. 1 Sheets. Stop U. S. 8. A smaller number of the larger sheets may be used if preferred.

As stated on page 70 two or more flash sheets should never be superimposed one upon the other, or a number of sheets be pinned with corners over lapping, as the combustion is sufficiently rapid to afford the liability of a sheet blowing off and dropping on the floor while burning.

Groups: Arrange the chairs in the form of a semi-circle, facing the camera, so that each chair will be exactly the same distance from the camera. Half the persons composing the group should be seated and the rest should stand behind the chairs. In case any of the subjects are seated on the floor the limbs should be drawn up close to the body, not extended towards the camera. If this is not done the feet will appear abnormally large in the picture.

It is better to leave the room lighted in the regular way while making the flash. Arrange the persons composing the group so that no one's face will be shadowed by another's body or head. This can be done readily by looking at the group from where the flash is to be fired.

Have the flash light high enough so that shadow of heads against the background will not be thrown up higher than the head.

Taking Large Groups: In taking large groups it is necessary to have the camera a considerable distance away. In such a case, to light the group sufficiently with the flash behind the camera, a strong flash would be necessary.

This may be obviated in cases where the camera can be placed in an adjoining room, where there are double parlors, for instance. Then set off the flash in the room where the group is, it being shielded from the lens by the projecting partition. This gets the light close to the subject. In this way a much weaker flash would suffice.

Background: In making single portraits or groups, care should be taken to have a suitable background against which the figures will show in relief. A light background is better than a dark one, and often a single figure or two will show up well against a lace curtain. For larger groups a medium light wall will be suitable.

The *finder* on the camera will help the operator compose the group so as to get the best effect. In order to make the image visible in the finder, the room must be well lighted with ordinary lamplight, which may be left on while the picture is being made, provided none of the lights are so placed that they show in the finder.

In General: In portrait work it is always best to have the room well lighted when making the flash, if it can be done in such a way that none of the lights come within range of the lens. If the room is darkened the sudden flash of the light so strains the eyes of the sitters that it almost invariably gives them a staring look, whereas if the room is already well

illuminated by gas or lamp-light the strain is not great and the eyes will have a natural expression. Of course when the room is brightly lighted the shutter should not be opened until the instant before the flash is made, and should be closed quickly after the flash is over.

In making portraits by flash light, the camera should not be held in the hand, but should be supported as described on page 68. Before setting off the flash see that no articles of furniture in range of the lens are closer to the camera than the persons to be photographed. The nearer an object is to the lens, of course, the larger the picture. A chair placed too near the camera might appear in the picture bigger than everything else visible.

Flash light work is usually regarded as of minor importance compared with daytime photography, which may be explained by the fact that most people have not made themselves familiar with it. As a matter of fact it well repays considerable time and study, in view of the results that are possible. Some professional photographers now are using the flash light extensively in their regular portrait work.

When more than one flash light is to be taken, the windows should be opened and time allowed between each flash to free the room thoroughly from smoke, otherwise all of the pictures after the first one are liable to have a "foggy" effect. The Eastman Flash Sheets give a minimum of smoke, but the lens is even keener than the eye, and what will seem to be but little smoke in a room will often times have a decided effect upon the picture.

When, for any reason, it is necessary that the shutter remain closed until the instant the flash is discharged and be closed again instantly afterward, it is well to have the flash sheet hanging near so that the shutter can be operated with one hand and the flash with the other and their action thus made simultaneous.

In using the flash sheets it should be borne in mind that they are not instantaneous, and in portrait work the subjects, should, therefore, be warned to remain still as if for a time exposure.

The flash sheets do not produce a sudden flash when they are lighted, and a second or so is consumed in burning a single sheet. As compared with the ordinary flash powder they give a much broader source of light, which means that they do away with the harsh shadows that are so objectionable in most flashlight work. The flash from the sheets is far less blinding than that from the ordinary powder, a decided advantage in giving pictures without the staring effect to the eyes so often seen.

The Reflector: In the various articles upon Portraiture is explained the use of the reflector. In practice it is often inconvenient or undesirable to secure an assistant for the purpose of holding the cloth to be used as a reflector. Fig. I shows a reflector which may easily be constructed and which will be found very convenient in use. Provide two pieces of wood about one inch wide by one-half an inch thick, one piece being about two feet and the other two feet six inches long. In one end of the longer piece insert a screw eye having a head about one half an inch in diameter. Cut an opening in the center of the second strip so that the head of the screw eye will fit it snugly. A small flat hook fastened to the strip completes the joint. Procure a piece of white cotton cloth about two feet square and fasten it to the edge of the short strip with small tacks. A large elastic rubber band completes the apparatus.

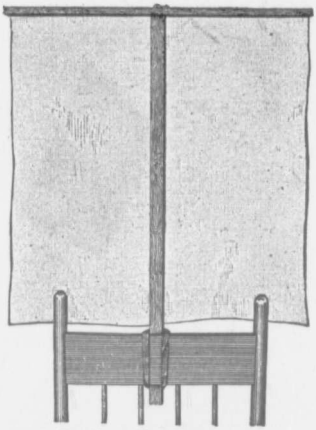


FIG. I. THE REFLECTOR.

For use fasten the two strips together by the joint and fasten the screen by the aid of the rubber band to the back of an ordinary chair. The cloth will then hang straight down and by moving the chair about and changing the height of the screen by sliding the upright piece up or down the reflector may readily be placed in any desired position.

DEVELOPMENT.

The amateur has the choice of two methods of development:

TANK DEVELOPMENT

DARK-ROOM DEVELOPMENT

The user of a roll film camera is particularly fortunate in that he may make use of the Kodak Film Tank, and thus perform the entire operation of development in full daylight.

The Eastman Plate Tank for plates, and the Premo Film Pack Tank for film pack films, require the use of the dark-room for loading, after which development can be carried on in full daylight.

The time and temperature method of development—developing for a definite time, with a given strength of developer, and at a given temperature—the foundation of the tank system of development, has long since passed the experimental stage. Tank development is no longer a mere theory—it is a success.

There is every reason for the adoption of this simple method for the development of film or plates. First and foremost, it affords better results than the old tentative dark-room method, even in the hands of the expert.

The tank prevents accidents, such as light fog and scratches; it protects the novice from his own inexperience——the experience is in the tank.

Tank development takes care of all differences of exposure within reasonable limits. Indeed, it has now been fully demonstrated that normal development, such as the tank gives, produces better printing negatives than does the old method of endeavoring to force under-exposures and restrain over-exposures. Snapshots and time exposures go into the tank at the same time and come out together, developed to their full values. No individual treatment is necessary.

Tank development offers better convenience and comfort. With cartridge film it is daylight all the way, and with plates and Premo Film Pack, the dark-room is necessary only while loading the tank, and for washing before fixing—operations requiring but a few moments.

Tank development is the most economical method of development—time saving, as you may develop a dozen plates, or a full roll of film, at one time; film and plate saving, as it insures the highest percentage of good printing negatives; space saving, as any one of the tanks for either film or plates will occupy but a corner of an ordinary suit case.

The fact that many of the most noted professional photographers in the country have adopted the Eastman Plate Tank for their developing, is one of the best evidences of the superiority of the tank system. To these men the convenience of tank development is a secondary consideration. What their business depends upon is results, and they find by actual experience that tank development produces a better quality of results than does the old method.

The dark-room method of film development is simple, but the amateur has naturally to depend upon his own judgment as to the obtaining of proper density and must take precautions as to a safe light to work by. As improvements calling for slight changes in the methods of manipulation are frequently made in Kodak apparatus, the operator of a Kodak Film Tank should read carefully the manual accompanying the particular tank he purchases.

WITH THE KODAK FILM TANK.

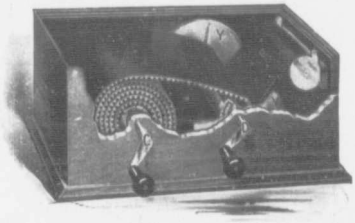


FIG. 1.

The Kodak Film Tank consists of a wooden box, a light-proof apron, a "Transferring Reel", a metal "solution cup", in which the film is developed, and a hooked rod for removing film from solution. There is also a dummy film cartridge with which one should experiment before using an exposed cartridge. The various parts of the outfit come packed in the box itself.

Setting up the Film Tank:

1. Take everything out of the box. Take the apron and Transferring Reel out of solution cup.
2. The axles marked C and D, in the cut are to be inserted in the holes in the front of the box. The front will be toward you when the spool carrier in end of box is at your right. These axles are interchangeable.

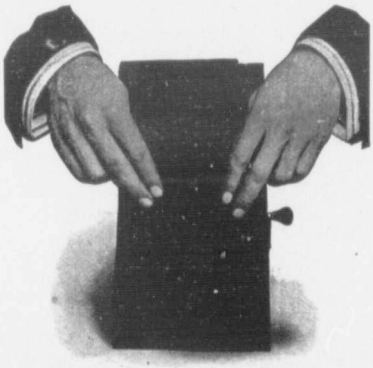


FIG. 2.

The axle "C" must be pushed through the hollow spindle which will be found loose in the box. This spindle has a lug at each end to which the hooks of the apron are to be attached.

3. The axle "D" must be pushed through the hollow rod of the Transferring Reel to hold reel in position as indicated in the illustration. The flanges at each end of the Transferring Reel are marked "Y" in the illustration. Both axles "C" and "D" must be pushed clear through into the holes on the opposite side of the box.

4. Attach one end of the apron to spindle, through which axle "C" passes, by means of the metal hooks which are to be engaged with the lugs on the spindle. (Fig. 2). The corrugated side of the rubber bands is to be beneath the apron when it is attached. Turn to the left on axle "C" and wind entire apron on to axle, maintaining a slight tension on apron, in so doing, by resting one hand on it.

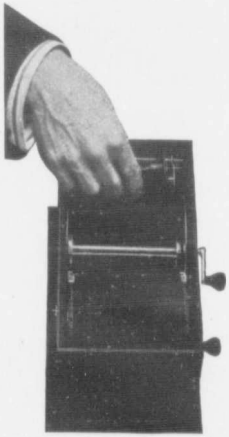


FIG. 8.

5. Insert film cartridge in spool carrier (Fig. 3), and close up the movable arm tight against end of spool. Have the duplex paper ("B" in Fig. 1) lead from the top.

Important: Film to be used in the Kodak Film Tank must be fastened to the duplex paper at both ends. All Kodak films are fastened at one end in the factory. For instructions on how to fasten the other end see page 89.

6. Break the sticker that holds down the end of duplex paper, thread the paper underneath wire guard on Transferring Reel—through which axle "D" passes (Fig. 4), and turn axle slowly to right until the word "stop" appears on duplex paper.

7. Now hook apron to lugs on Transferring Reel (Fig. 5), in precisely the same manner that you hooked the opposite end to lugs on the spindle, except that axle "D" turns to the right.

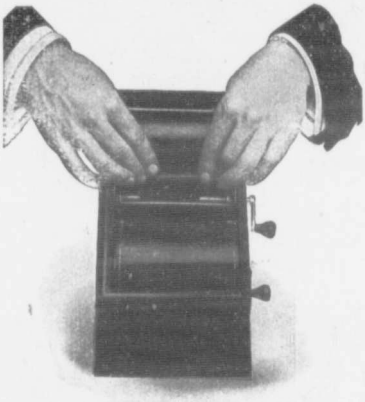


FIG. 4.

8. Turn handle half a revolution so that apron becomes firmly attached and put on cover of box. Turn axle "D" slowly and steadily until duplex paper, film and apron are rolled up together on Reel. As soon as this is completed the handle will turn very freely.

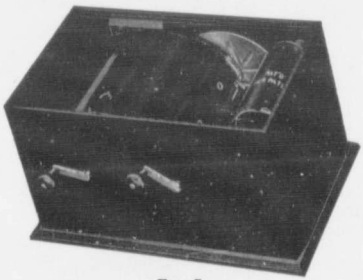


FIG. 5.

9. Prepare developer as described on page 84.

10. Now remove cover from box and draw out axle "D" (Fig. 6), holding apron and duplex paper with other hand to keep end of apron from loosening.

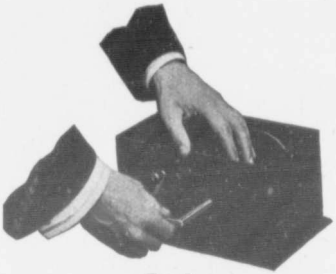


FIG. 6.

11. Remove entire Transferring Reel (now containing apron, duplex paper and film) which is freed by pulling out axle D, and insert immediately in the previously prepared developer.

In removing Reel do not squeeze the apron, but hold it loosely or slip a rubber band around it to keep from unrolling.

Using the Solution: 12. Having filled Solution Cup, as directed on page 84, lower Transferring Reel into Cup, with the end containing crossbar *up*. (Fig. 7.) Let Reel slide down slowly. The operation of removing reel from box can be done in the light of an ordinary room, but for safety it is well that the light should not be too bright. The total length of time for development is 20 minutes.

NOTE.—Immediately after lowering Reel into solution cup, catch it with wire hook and move slowly up and down two or three times, taking care, however, not to raise any part of Reel above the surface of solution. This is to expel air bubbles.

FIG. 7.

FIG. 8.

Then place the cover on the cup (Fig. 8) putting lugs on cover into the grooves and tighten cover down by turning to right.

Now turn the entire cup end for end, and place in a tray or saucer to catch any slight leak in the cup.

At the end of three minutes again reverse the cup, and, thereafter reverse every three minutes until the time of development (20 minutes) has elapsed.

Turning the solution cup in this manner allows the developer to act evenly and adds brilliancy and snap to the negatives.

The wire hook is to be used for lifting the reel out of the cup. Hook on to the cross bar in one end of reel. (Fig. 9.)

14. When development is completed pour out developer and fill cup with clear, cold water and pour off, repeating this operation three times to wash the film. Then remove Transferring Reel; separate film from duplex paper and place immediately in the Fixing Bath, which should be in readiness, prepared in accordance with directions on page 86.

FIG. 9.

The film may be separated from duplex paper in light of an ordinary room if the developer is thoroughly washed out.

The operation of separating film and duplex paper should be done over a bowl, bath tub, or sink.

When the duplex paper does not free itself readily from back of film, split the paper where possible, this will remove the hard outer surface of the paper, the remaining portion will soon become soaked and can then be removed easily by rubbing gently, *while immersed,* with the ball of the finger. This adhering of the duplex paper to the film is almost invariably caused by the use of too warm developer.

After developing a roll of film the apron must be wiped dry before developing another roll. The apron will dry almost instantly if immersed for a moment in very hot water.

Keep apron wound on axle "D" when not in use. Never leave apron soaking in water.

Developing Several Rolls of Film at Once: Several rolls of film may be developed at the same time if the operator wishes. To do this it is necessary to have a "Duplicating Outfit" consisting of 1 Solution Cup and cover, 1 Transferring Reel and 1 Apron for each additional roll of film to be developed. The extra rolls of film may then be wound on to Transferring Reels as previously described and immersed in the Solution Cups.

Preparing the Developer: We recommend the use of Pyro. The Kodak Tank Developer Powders, put up by us, are prepared especially for use with our film and the Kodak Film Tank, and are made from carefully tested chemicals. Put four or five ounces of lukewarm water into the Solution cup and dissolve in it the contents of the large package. Fill the cup with cold water to the embossed ring—not to the top. Now dissolve the contents of the small package in this solution and the developer will be ready. The temperature of the developer should be 65 degrees Fahr.

If some of the contents of the small package stick to the paper, dip the paper into the solution to remove.

The developer must always be mixed fresh and used for only one roll of film.

Short Development: If it is desired to shorten the length of development good results may be obtained by using two pairs of powders and developing for ten minutes.

Developer Formulae: Those who prefer to prepare their own developer may do so, but care must be exercised in securing absolutely pure chemicals and correct weights.

FOR 20 MINUTE DEVELOPMENT.

Brownie Tank.

10 grains Pyro.
20 grains Sulphite of Soda, (desiccated).*
20 grains Carbonate of Soda, (desiccated).*

Dissolve the chemicals in order named in five or six ounces of lukewarm water, then add cold water to fill tank to embossed ring.

Three and One-Half Inch Tank.

22 grains Pyro.
44 grains Sulphite of Soda, (desiccated).
44 grains Carbonate of Soda, (desiccated).*

Dissolve the chemicals in order named in five or six ounces of lukewarm water, then add cold water to fill tank to embossed ring.

Five and Seven Inch Tank.

30 grains Pyro
60 grains Sulphite of Soda, (desiccated).*
60 grains Carbonate of Soda, (desiccated).*

Dissolve the chemicals in order named in five or six ounces of lukewarm water, then add cold water to fill tank to embossed ring.

TEN MINUTE TANK DEVELOPMENT.

Brownie Tank.

20 grains Pyro.
40 grains Sulphite of Soda, (desiccated).*
40 grains Carbonate of Soda, (desiccated).*

Dissolve the chemicals in order named in five or six ounces of lukewarm water, then add cold water to fill tank to embossed ring.

Three and One-Half Inch Tank.

44 grains Pyro.
88 grains Sulphite of Soda, (desiccated).*
88 grains Carbonate of Soda, (desiccated).*

Dissolve the chemicals in order named in five or six ounces of lukewarm water, then add cold water to fill tank to embossed ring.

Five and Seven Inch Tank.

60 grains Pyro.
120 grains Sulphite of Soda, (desiccated).*
120 grains Carbonate of Soda, (desiccated).*

Dissolve the chemicals in order named in five or six ounces of lukewarm water, then add cold water to fill tank to embossed ring.

Temperature of Developer, 65° Fahr.

---

*If crystals are used, double the quantity.

NOTE.—Avoirdupois weight is the standard used in compounding photographic formulæ.

TIME AND TEMPERATURE FOR TANK DEVELOPMENT.

It sometimes happens that the amateur is not able to obtain or maintain the standard or normal temperature of 65 degrees Fahr. when using the Kodak Tank and the Kodak Tank Developer Powders. In such cases the following table will be found of value:

Temperature.	Time One Powder.	Time Two Powders.
70 Degrees	15 Minutes	8 Minutes
69 "	16 "	
68 "	17 "	9 "
67 "	18 "	
66 "	19 "	
65 " NORMAL	20 " NORMAL	10 " NORMAL
64 "	21 "	
63 "	22 "	
62 "	23 "	11 "
61 "	24 "	
60 "	25 "	
59 "	26 "	12 "
58 "	27 "	
57 "	28 "	
56 "	29 "	13 "
55 "	30 "	
54 "	31 "	
53 "	32 "	14 "
52 "	33 "	
51 "	34 "	
50 "	35 "	15 "
49 "	36 "	
48 "	37 "	
47 "	38 "	16 "
46 "	39 "	
45 "	40 "	17 "

With Speed Film develop 25% longer.

Temperature of Developer must not exceed 70 degrees Fahr., as above that point there is danger of the film frilling. 45 degrees Fahr. is the lowest temperature at which the developing powders can be dissolved and even at this temperature the powder must be finely crushed and added slowly to the water.

It is best to use the normal temperature (65°) when possible as the use of a developer that is colder than normal has a slight tendency to increase the contrast in a negative, while the use of a developer warmer than normal slightly flattens the negatives.

The Fixing Bath: Provide a box of Kodak Acid Fixing Powder which should be prepared as per instructions on the package. Put this into a tray or wash bowl. When the powder is thoroughly dissolved add to the solution as much of the Acidifier, which you will find in a small box inside the large one, as directions call for. As soon as this has dissolved

the Fixing Bath is ready for use. Any quantity of the bath may be prepared in the above proportions.

Pass the film face down (the face is the dull side) through the fixing solution as shown in the cut, holding one end in each hand. Do this three or four times and then place one end of the film in the tray, (8 x 10 inches is a good size) still face down, and lower the strip into the solution in folds. Gently press the film where the folds occur, not tightly enough to crack it, down into the solution a few times during the course of fixing. This insures the fixing solution reaching every part of the film. Allow the film to remain in the solution two or three minutes after it has cleared, or the milky appearance has disappeared. Then remove for washing.

NOTE.—If preferred negatives may be cut apart and fixed separately.

Eastman N. C. Film must always be fixed in an acid bath. There is nothing superior to the Kodak Acid Fixing Powders, but the following formula may be used if desired.

Water, - - - - - -	16 ozs.
Hyposulphite of Soda, - - -	4 ozs.
Sulphite of Soda (desiccated), -	¼ oz.

When *fully dissolved,* add the following hardener:

Powdered Alum, - - - - -	⅛ oz.
Citric Acid, - - - - -	⅛ oz.

This bath may be made up at any time in advance and be used so long as it retains its strength, or is not sufficiently discolored by developer carried into it to stain the negatives.

Washing: All negatives must be thoroughly washed so as to remove every trace of hypo and other foreign substance. Where running water is accessible the films may be placed in a tray or washing box and left under a tap from which runs a gentle stream, for about an hour. Films should be moved about from time to time, so that a complete and thorough washing may be had. Do not crowd too many films in too small a tray during this process. When running water is not accessible, the negatives may be placed in a tray or bowl of cold water, and left to soak for five minutes, when the water should be changed and the process repeated five or six times.

Drying N. C. Film Negatives: When thoroughly washed, snap an Eastman Film Developing Clip on each end of the strip and hang it up to dry or pin it up. Be sure, however, that it swings clear of the wall so that there will be no possibility of either side of the film coming in contact with the latter.

Drying with Clips.

If the film has been cut up, pin by one corner to the edge of a shelf or hang the negatives on a stretched string by means of a bent pin, running the pin through the corner of the film to the head, then hooking it over the string.

Over-Development: Over-development may be caused by a mistake in leaving films in the developer too long, by using the solution too warm, or by those who mix their own chemicals, in getting the developing agent too strong.

In such cases negatives are very strong and intense by transmitted light, and require a long time to print.

The remedy is to reduce by using Eastman Reducer, or by the following method:

REDUCER.

First soak negative 20 minutes in water, then immerse in:

Water, - - - - - - -	6 ounces.
Hyposulphite Soda, - - -	½ ounce.
Ferri-Cyanide Potassium (saturated solution) Poison, - - -	20 drops.

Rock tray gently back and forth until negative has been reduced to the desired density, then wash 10 minutes in running water or in four changes of water.

Negatives may be reduced locally by applying the above solution to the dense parts with a camel's hair brush, rinsing off the reducer with clear water frequently to prevent it from running onto the parts of the negative that do not require reducing.

Should any yellowness or staining appear in the reduced negative, it may be removed by replacing same in the Acid Fixing Bath for a few minutes.

Under-Development: This defect would be caused by a mistake in removing films from the developer too soon, by using solutions too cold, or by an error in compounding chemicals.

It is obvious that neither of these defects will occur if instructions for tank development are properly followed.

The remedy for under-development is to intensify by re-development (See page 89), or by the following method:

Intensification.—After fixing and thorough washing, lay the film while wet, face up in an empty tray and pour over it sufficient Intensifier to fully cover it; allow it to act until the film is all of one even color and then pour the Intensifier back into the bottle and wash the film in four or five changes of water for fifteen minutes.

Intensifier may be purchased already prepared or the amateur may put it up himself, using the following formula:

INTENSIFIER.

No. 1, 75 gr. Bi-chloride of Mercury, (corrosive sublimate)
Poison, - - - - - - - 5 oz. Water.
No. 2, 112 gr. Iodide of Potassium, - - 2½ " "
No. 3, 150 gr. Hypo-sulphite of Soda, - 2½ " "

Dissolve separately and combine No. 1 with No. 2 and the resulting mixture with No. 3.

Intensification by Re-velopment: While the method of intensification by re-development is comparatively new, Velox and Royal Re-developer for Sepia tones on Velox and Bromide prints in a most effective and simple means of intensifying film negatives.

Velox or Royal Re-developer may be used in exactly the same manner as for producing Sepia tones on developing papers.

Negatives intensified by re-development are built up evenly, without undue contrast and without the chance of staining.

The advantage of being able to use the chemicals for two different purposes (Sepia toning prints or intensifying negatives) is obvious, the results in either case being all that could be desired.

Preparing the Cartridges: For use with the Kodak Film Tank the cartridges must be specially prepared by sticking the loose end of film to duplex paper, which operation can be accomplished in the following manner:

Just before you are ready to develop (holding spool with the *black* side of the duplex paper up) unroll the duplex paper carefully until you uncover the piece of gummed paper which is fastened to end of film and is to be used as a means of fastening film to duplex paper. Moisten the gummed side of sticker evenly for about an inch across the end and stick it down to duplex paper, rubbing thoroughly to secure perfect adhesion. Wind end of duplex paper on spool again and the cartridge is ready to insert in machine.

At Your Option: Some photographers prefer to wet the surface of their films or plates before applying the developer, in order to insure an even flow of same and avoid the possibility of streaks. This can be readily done with the Kodak Film Tank. Instead of putting the Transferring Reel immediately into the developer, first fill the Solution Cup with clear, cold water. Immerse the Reel in this for a few seconds—pour off and proceed as described with developing.

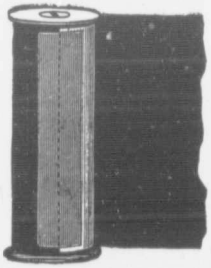
A Short Cut: Sometimes when one is travelling, a glass graduate for measuring developer is more or less of a nuisance, on account of its bulk and the liability of breakage. This can be dispensed with by half filling an ordinary tumbler with water (about 75° temperature) and dissolving the developer powders therein.

Pour this into the tank and add *cold* water to embossed ring. By previous experiment without the chemicals, you can find out

what proportions of the lukewarm and cold water to use, so as to get the proper temperature, 65°.

The fixing bath may also be prepared without a graduate. The average tumbler holds approximately eight ounces; you can, therefore, get your fixing bath nearly enough of the right strength by its use, as a little variation in the strength of the solution makes no difference, provided only that you fix for five minutes after the milky appearance has disappeared from the back of negatives.

Special Directions: Cartridge Roll Holder Film may be developed in the Kodak Film Tank by following these directions:



Place the small metal adapter, which comes with Film Tank, on the pivot on the movable side of spool carrier. Then place the cartridge in carrier so that the duplex paper will draw from the bottom instead of from the top. This is exactly opposite to the way in which a Kodak cartridge is inserted.

All Cartridge Roll-Holder Films have a piece of gummed manila paper on the loose end of the film. To prepare same for Film Tank, unroll the duplex paper until the manila paper is reached. Moisten the gummed side and paste it to duplex paper as shown in cut. Again wind paper on spool.

The cartridge is now ready for insertion in the Film Tank box.

With the Roll-Holder Cartridge the "Stop" warning is not printed on the duplex paper, but instead the operator is to "Stop" when about one inch of the manila paper, with which the end of the film is fastened down, appears.

From this point proceed in the same manner as with a Kodak Cartridge.

THE DARK-ROOM METHOD.

The first essential is a dark-room. By a dark-room is meant one that is wholly dark—not a ray of light in it. Such a room can easily be secured at night almost anywhere. The reason a dark-room is required is that the film is extremely sensitive to white light, either daylight or lamplight, *and would be spoiled if exposed to it* even for a fraction of a second.

If possible have running water, but if this is not available provide a pitcher of cold water (ice water in summer), a shelf or table on which to work and a pair of shears.

Also provide a Developing and Printing Outfit which should contain:

1 Dark-Room Lamp,
4 Developing Trays,
1 4-Ounce Graduate,
1 Stirring Rod.
Package Developer Powders,
1 lb. Kodak Acid Fixing Powder,
1 Package Bromide Potassium,

Such an outfit need not cost more than one or two dollars and will be sufficiently elaborate for your first work.

Having provided a room or closet, where, when the door is closed, no ray of light can be seen:

Set up on the table or shelf the Dark-Room Lamp.

The lamp gives a subdued red light which will not injure the film unless it is held too close to it. Set the lamp on the table at least eighteen inches from the operator. Never use a yellow light with N. C. Film or fog will be the result.

1. Fill one of the trays nearly full of water (first tray).

2. Open one of the developer powders, then put the contents (two chemicals) into graduate and fill it up to the 4-ounce mark with water. Stir until dissolved with the wooden stirring rod and pour into second tray.

3. To develop, unroll the film and detach the entire strip from the duplex paper.

4. Pass the film through the tray of clean, cold water as shown in the cut, holding one end in each hand. Pass through the water several times, that there may be no bubbles remaining on the film. When it is thoroughly wet, with no air bubbles, it is ready for development.

5. Now pass the film through the developer in the same manner as described for wetting it and shown in cut on page 87. Keep it constantly in motion, and in about one minute the high lights will begin to darken and you will readily be able to distinguish the unexposed sections between the negatives, and in about two minutes will be able to distinguish objects in the picture. Complete development in the strip, giving sufficient length of development to bring out what detail you can in the thinnest negatives. There is no harm in having your negatives of different density. This can be set right in the printing. The difference in density does not affect the difference in contrast.

Keep the strip which is being developed constantly in motion, allowing the developer to act 5 to 10 minutes. The progress of development may be watched by holding the negatives up to the lamp from time to time.

When developing Eastman N. C. Film, use a red lamp and take care not to hold the film close to the lamp for any length of time. This film is very rapid and is orthochromatic, therefore liable to fog unless handled very carefully.

6. After completing development, transfer to the third tray and rinse two or three times with clear, cold water, and transfer to fixing bath. (Page 86).

NOTE.—Fog is sometimes caused by the light coming in contact with film other than that which comes through the lens during the proper exposure. Frequently it is caused by exposure to an unsafe light during development; also by light entering the dark-room through the key-hole or a crack in the door. Examine your dark-room thoroughly before developing and see that all white light is excluded. Fog is also often caused by the negative being exposed to light after development but before fixing, and if the negative is exposed to light before the developing solution has been washed out a reversal of the image will frequently be found.

DEVELOPING PREMO FILM PACK FILMS IN PREMO FILM PACK TANK.

The Premo Film Pack Tank consists of two pieces—a metal receiver or cage for the films, and a tank with cover for the developing fluid. The entire outfit is self contained and can be easily carried.

The cage is divided into twelve compartments—in the 5x7 size, six—each accommodating one film.

To Prepare the Developer: Remove the cover of the tank by turning it to the left. The cage or holder for the separate films can then be removed from the tank.

Pour into the tank sufficient developer to bring it even with the embossed ring at the top which shows the proper level for the developing fluid. *If the tanks are not filled to this point, any portion of the film which projects will remain undeveloped.*

The temperature of the developer when ready for use should be 65 degrees Fahrenheit.

To Prepare the Fixing Solution: Dissolve a pound package of Kodak Acid Fixing Powder in 64 ounces of water. (This solution may be bottled and used over and over again until it loses strength.)

At this point all white light should be excluded from the dark-room. If no dark-room is available, this work can be done at night in any room in which there is a tap of running water, care being taken that there is no white light in the room during the few minutes when the films are being transferred from the pack to the cage.

To Remove Films From Pack: When all exposures in the film pack have been made it is light tight, and may be taken from the camera in daylight. Provided exposed films have previously been removed, as described below, the Film pack should be resealed immediately after removing it in daylight from the camera or adapter after the twelfth exposure has been made, by moistening the inside of the corner flaps, when they may be stuck firmly to the sides.

When ready to develop break the red seal at the sides and pull down bottom flap. (See Fig. 1.)

FIG. I.

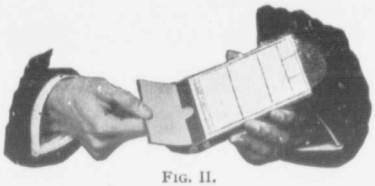


FIG. II.

This gives access to exposed film which may be removed as shown in Fig. 2.

To remove one or more films for development before the entire package is exposed:

Take the camera or adapter to the dark-room, remove the pack and break the red seal as above. After removing the exposed film, the pack can be replaced without sealing in the camera or adapter before leaving the dark-room and everything is ready for additional exposures.

IMPORTANT—When removing any films for development before all are exposed, do not remove papers of safety cover, but leave same to protect top film after all have been exposed and the pack removed in daylight.

To Load Films Into Cage:

When all is ready load each film into its respective compartment of the cage *without detaching the black paper.* This is readily done by holding the film between the thumb and fingers with the black paper toward the hand, and doubling the edges together as shown in Fig. 3. Slide them carefully down to the bottom of each compartment, with torn edge up, and see that the center piece protrudes between the edges of the film, preventing them from coming together during the process of development.

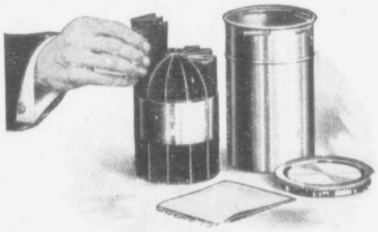


FIG. III.
THE PREMO FILM PACK TANK.

When all the films are loaded, place cage into developing tank (Fig. 4) and raise and lower it slightly below the surface of the developer, two or three times, to expel air bubbles. Replace the cover of the tank by dropping it on and turning it to the right as far as possible.

NOTE.—The cage of the No. 1 Tank, as compared with illustration Fig. 3, is slightly different in appearance but the method of loading and using is exactly the same.

The white light may now be turned on and the time noted. The time may be marked on the dial which appears on the face of the container that comes with the developing powders.

During the process of development the tank should be turned end for end four or five times to secure uniform and even development. At the expiration of twenty minutes the top may be removed in dark-room or very subdued light and the devel-

oper poured off. The tank should now be held under a tap of running water or immersed for a few seconds in a vessel of clear water. The films are then ready for fixing. Page 86.

The fixing bath may be prepared in a tray or other vessel, the receiver taken from tank—the metal hook being intended for this purpose—and the films removed from the cage, the black papers pulled off and films placed in the bath, leaving the tank and cage available for the next pack. The films should be changed about two or three times to insure evenness of fixing.

FIG. IV.

After the films have been fixed a sufficient length of time so that all the shadows are perfectly transparent and no yellowish spots appear, they should be placed in a tray under running water and washed for half an hour. Before washing be sure black papers are all detached. If running water is not available they should be left in the water about three-quarters of an hour and the water changed six or eight times to remove all trace of hypo. For drying films see page 87.

The above instructions, if carefully followed, will produce the most satisfactory results, provided anything like proper exposures have been given. We recommend the use of the regular Premo Developing Powders in these tanks, as they have been compounded from the purest chemicals for this purpose.

For those who wish to mix their own solutions, we give the following formulæ:

STOCK DEVELOPING SOLUTION—PYRO FORMULA.

PYROGALLIC ACID SOLUTION.

Pyrogallic Acid, - - - -	1 oz.
*Sulphuric Acid, - - - -	20 minims.
Water, - - - - - -	28 ozs.

*If Eastman Permanent Crystal Pyro is used the acid should be omitted.

SODA SOLUTION.

Sulphite Soda (desiccated), - -	3 ozs.
*Carbonate Soda (desiccated), -	3 ozs.
Water, - - - - - -	30 ozs.

*This solution is based on the strength of Eastman Sulphite and Carbonate, and if possible, these chemicals should be used.

FOR NO. 1 FILM PACK TANK—28 OZS., TAKE:

Pyro Solution, - - - -	1½ ozs.
Soda Solution, - - - -	1½ ozs.
Water, - - - - - -	25 ozs.

Develop 20 Minutes 65° F.

FOR NO. 2 FILM PACK TANK—52 OZS., TAKE:

Pyro Solution, - - - -	3 ozs.
Soda Solution, - - - -	3 ozs.
Water, - - - - - -	46 ozs.

Develop 20 Minutes 65° F.

FOR NO. 3 FILM PACK TANK—68 OZS., TAKE:

Pyro Solution, - - - -	3½ ozs.
Soda Solution, - - - -	3½ ozs.
Water, - - - - - -	61 ozs.

Develop 20 Minutes 65° F.

NOTE.—Premo Film Pack Speed Film should be developed 25% longer than the regular Premo N. C. Film.

Developing by the Dark-Room Method: After removing the exposed Films from the Pack, (see page 92), the black paper to which they will be found attached should be removed and each film placed, emulsion side down, in a tray of water. (The emulsion side, or face, is the dull side.) They should be allowed to stand two or three minutes and then each film should be placed separately in the developing tray, still face down. The tray should be rocked gently from time to time, the films never being allowed to mat together, and the progress of development ascertained by holding the film up to the light of the lamp.

After completing development transfer to fixing bath. See page 86.

DEVELOPING DRY PLATES.

The foregoing directions apply to dry plates as well as films, the chemical treatment being the same, except that the preliminary wetting may be omitted with plates.

Plates, however, must be handled in the solutions one at a time as they would scratch each other if a larger number were put into the trays simultaneously. They should also be developed *face up.*

NOTE.—Plates should be developed to the same density as film negatives and may be examined, while developing, before the dark-room lamp in the same manner.

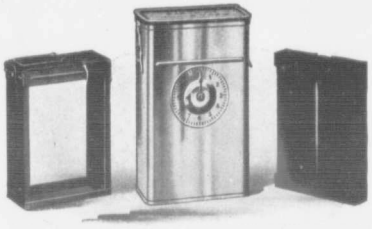
For fixing plates it is best to procure a fixing box, which is arranged with a set, usually of twelve grooves. Each plate may thus be dropped into a groove for fixing, thus eliminating the danger of scratching or over-lapping.

Washing: In washing plates be careful that they do not overlap or touch each other, owing to the likelihood of the corners scratching the emulsion.

After the negatives have been thoroughly washed they must be dried:

Plates should be placed in a drying rack and kept in a cool place until dry. They are then ready for printing.

DEVELOPING PLATES WITH THE EASTMAN PLATE TANK.



The Plate Tank is the same in theory as the Kodak Film Tank, with, of course, such modifications as are rendered necessary by the physical difference between plates and film. The Eastman Plate Tank consists of a metal solution cup with tightly fitting cover, a cage for holding twelve plates, or less, during development and an ingenious loading block for loading the plates into the cage in the dark-room.

The exposed plates are loaded into the cage and placed in the tank in the dark-room, and the tank cover fastened in place. On the front of the tank is a dial for registering time. Development is allowed to continue for fifteen minutes, the tank being reversed several times. After development the developer is washed from the plates, the cage removed from the tank in subdued light, and the plates placed in fixing bath. (See page 86). After fixing the plates are ready for washing in the usual manner.

The Developer: We recommend the use of Pyro. The Kodak Tank Developer Powders are prepared for use with the Eastman Plate Tank and are made from carefully selected and tested chemicals.

For the 4 x 5 Eastman Plate Tank, use a "3½ Inch" Kodak Tank Developer Powder, and for the 5 x 7 Tank, use a 5 x 7 Plate Tank Developer Powder.

For those who prefer to mix their own chemicals full instructions will be found with each Tank.

What Developer to Use for Dark-Room Development: It is well not to try too many developers at the beginning. To understand one thoroughly, or at the most two, will give you results from which you will obtain more satisfaction than should you dabble with the various formulas on the market to-day. Thoroughly master one before trying others. One may start with "Pyro" or "Hydrochinon", which are without doubt two of the best.

Pyro the most popular, has a decided tendency to stain the fingers. Should this be objected to, Hydrochinon in connection with Elon or Metol (which is free from that objection) can be used with good results. Not every photographic beginner owns a pair of chemist's scales, which are a necessity should he wish to compound the formula himself. Rather than be uncertain as to correctness, we would advise the use of developing powders.

Eastman Special Developer Powders are particularly desirable as they do not stain the fingers. If, however, the amateur desires to mix his own developer, the following stock solutions used as below will be found excellent developers for the dark-room.

PYRO DEVELOPING FORMULA.

Pyrogallic Acid Solution.

"A"	Avoirdupois.	Metric System.
Pyrogallic Acid,	1 oz.	30 grams.
Sulphuric Acid,	20 minims.	1 c. c.
Water,	28 ozs.	900 c. c.

Soda Solution.

"B"	Avoirdupois.	Metric System.
Carbonate Soda (desiccated*),	2 ozs.	60 grams.
Sulphite Soda (desiccated*),	3 ozs.	90 grams.
Water,	28 ozs.	900 c. c.

For Dark-Room Development Take

"A,"	½ oz.	(15 c. c.)
"B,"	½ oz.	(15 c. c.)
Water,	4 ozs.	(120 c. c.)

This developer will then contain 1.56 grains Pyro per ounce.

ELON-HYDROCHINON OR METOL-HYDROCHINON.

Solution A.

Elon or Metol,	60 grains.
Hydrochinon,	30 "
Sulphite of Soda (desiccated*)	¾ oz.
Water,	20 ozs.

Solution B.

Carbonate of Soda (desiccated*),	½ oz.
Water,	20 ozs.

To Develop: Take Solution A 1 oz., Solution B 1 oz., Water 2 ozs. Add one or two drops of a 10 per cent. solution Potassium Bromide to each ounce of developer.

*If crystals are used, double the quantity.

NOTE—By making a comparison between the developing solutions used in the developing Tanks with those in use for dark-room development, Sulphite of Soda is in excess. The reason for this is that, owing to oxidation when exposed to the air as in dark-room development the Sulphite of Soda is necessary to prevent the negatives becoming too yellow. By the tank method we may use a minimum of sulphite as the negatives are not subject to this fault.

A FEW REMARKS UPON DEVELOPMENT.

The foregoing pages fully cover the subject of development so far as telling the beginner exactly what to do is concerned, but a word of the theory of development will nevertheless prove valuable.

An exposed and unexposed film do not differ, so far as the eye can judge. It is necessary, therefore, to "develop" the exposed film to reveal the action of the sun's rays.

The chemicals of the developer are:

The active or developing agent, such as Pyrogallic acid (commonly known as Pyro) Hydrochinon, and Hydrochinon in combination with Elon or Metol, affect the latent image by reducing to metallic silver those parts which have been affected by the light. In other words, it blackens them. But these agents require the use of another substance to give them energy:

Accelerator: An alkali when mixed with the active developing agent gives it a greater affinity for oxygen; it therefore becomes more energetic as a reducer. This alkali is called an accelerator. The alkalies most commonly used are Carbonate of Soda (known as sal soda and washing soda) and Carbonate of Potassium.

Restrainer: A restrainer is a substance that has the power to restrain or retard the action of development. Bromide of Potassium, most commonly used for that purpose, has the property of dissolving a certain amount of Bromide of Silver from the film, thereby forming a double salt which is less easily reduced by the developer. This action having taken place, the development is much slower; hence the name, "restrainer".

Preservative: The preservative is a substance that will keep the developer from discoloring and oxydizing when it is to be kept for future use. "Sulphite of Soda" is most commonly used for that purpose; it also has much to do with the color of the negative. If only a small portion be used the negative will be brown, the quality being harsh and hard and one that will give you a print of much contrast, while the use of a greater portion gives a gray, soft negative with more detail.

Fixing the Negative: The fixing or clearing of a negative is due to the action of the "Hyposulphite of Soda" eating out the Bromide of Silver not acted upon by the light, and until this has been accomplished it is still sensitive. When the creamy appearance on the back of the negative disappears it may be called "fixed", and can then be taken from the bath and exposed to any light without fear of injury.

Washing: After fixing the negative must be thoroughly washed to remove hypo or staining will result. The hypo unless fully removed would also ruin the sensitive paper upon which the print is to be made, even before it would show stain on the negative.

PRINTING.

Having developed the negatives the final step in the picture making is now in order—making the prints. For printing there are many papers—grouped under two general classes, "printing out" papers, where the image is visible after printing and "developing out" papers which require a developing solution to make the image visible.

For the amateur there is no more satisfactory printing process than that offered by the use of Velox. Prints made by this process give a rich, soft Platinum effect not excelled by any other paper.

Velox can be printed by either artificial light or daylight, and like an exposure on film the image is not visible and it must therefore be developed.

The process is simple, but like all others it requires some skill and judgment, both of which can easily be acquired by strict adherence to the given rules and formula.

Velox is suitable for every class of work as is fully demonstrated under the heading of "Surfaces and Grades". Velox should not be confused with Bromide or any other paper; it has distinctive qualities of its own which have never been successfully imitated. Many improvements have recently been made in its manufacture and to-day Velox is the perfected product of years of experiment.

The different surfaces and grades in which it is manufactured enable the user to produce good prints from almost any negative, suiting his tastes as well as the peculiar requirements of the negatives.

Surfaces and Grades: Velox is made in six different surfaces and divided broadly into two grades of papers, called "Regular" and "Special". As these trade terms have reference to contrast and not to surface, we could as well say "hard" and "soft". In each grade will be found a variety of surfaces. Choose the surface which best suits you and which will harmonize with the subject of your picture. Select your negative, remembering that the "Regular" papers develop quickly, and are adapted to negatives lacking contrast, and known as "thin" or "weak" negatives. "Special" papers require longer development (as compared with the "Regular") and are for use with "contrasty" negatives. Such negatives are also referred to as being strong, thick, dense or hard.

Royal Velox is furnished in both "Regular" and "Special" but in one weight only and differs from the other Velox papers in that it is coated on a stock having a cream tint, just a soft mellow tone that prevents harshness in the high lights. The stock is somewhat heavier than the usual Velox stock, about half way between the single and the double weight.

Royal Velox prints are delightful when developed in the ordinary way, but to get their full value should be re-developed. (See page 112.

The following table of grades and weights of Velox should be an aid to those contemplating using this paper.

SURFACES, WEIGHTS AND GRADES OF VELOX.

GRADE	SURFACE	CONTRAST
*Velvet Velox	Semi-Gloss	Special
*Velvet Velox	Semi-Gloss	Regular
*Portrait Velox	Smooth Matte	Special
Carbon Velox	Matte	Regular
Carbon Velox	Matte	Special
Rough Velox	Matte	Special
*Glossy Velox	Enameled	Regular
*Glossy Velox	Enameled	Special
Royal Velox	Matte	Regular
Royal Velox	Matte	Special

*Furnished also in Double Weight Velox; double weight papers require no mount and when printed under a mask which will insure a white margin, afford a very artistic effect.

Manipulation: Velox prints may be successfully made, using daylight for exposure, but we strongly recommend that artificial light be used, as it is much more uniform, and it will therefore be easier to obtain satisfactory prints. If daylight be used select a north window, if possible, as the light from this direction will be more uniform.

Owing to its sensitiveness the paper should be handled in a very subdued light, otherwise it will be liable to fog. Proper precautions should be taken to pull down the window shades and darken the room sufficiently during manipulation. To test your working light, place an unexposed sheet of Special Velox, emulsion side up, on your work table in the same position that your developing tray occupies; cover one-half of it with a sheet of cardboard and let it remain there for two minutes, then develop it face down for 45 seconds. If the half of the sheet which was uncovered turns gray or black, and the covered portion remains white, it is a positive indication that the light you are using is too strong. If, however, the entire sheet remains white, your light is safe. Never handle Velox in a light that will not stand this test. If the light is too strong for printing it should be subdued or diffused by the use of several thicknesses of white tissue paper. In the following instructions for manipulating Velox, it must be understood that artificial light, preferably gas with a Welsbach burner, will be the light used. A kerosene lamp, fitted with a round burner,

(known as Rochester burner) may be used, but owing to the decidedly yellow light this affords, a considerably longer exposure will be necessary than when using a Welsbach light.

The comparative exposures with Velox using various sources of light is as follows:

Size of Negative	Distance from Light.	Welsbach Burner	32 c. p. Electric or 6 ft. Gas Burner	16 c. p. Electric or 4 ft. Gas Burner	Average Oil Lamp
4 x 5 or Smaller	7 Inches.	10 Seconds.	20 Seconds.	30 Seconds.	40 Seconds.

This table is only approximate, as owing to the different lights used and the varying densities of negatives it is impossible to give an absolute rule. It serves, however as a guide to enable the beginner to approximate the correct exposure. From this you can obtain the correct time, always being guided by the rule as to the time of development given on page 105.

The Right and Wrong Paper to Use: Any negatives which will produce good results with printing-out paper should be printed on Special, while Regular Velox is adapted to negatives which are too soft for other photographic papers, or when hard, contrasty prints are required.

To those familiar with Velox paper it is an easy matter to select the grade which is best suited for the results desired. The novice, however, is guided usually by the advice of others and often is misled into using a wrong grade of Velox, thereby failing to secure the results expected and is inclined to believe that the paper is at fault.

The following illustrations will act as a guide to the best paper, Regular or Special Velox, to be used with negatives varying as to their contrasts.

FIG. I.

This represents a weak negative, one with little contrast between the highlights and shadows, and is therefore adapted to use with Regular Velox.

FIG. II.

This represents a negative of strong contrasts. This kind of negative should be printed on Special Velox.

FIG. III.

This shows the result of printing from a weak or flat negative (Fig I.) on Special Velox. The wrong paper to use.

FIG. IV.

This represents a print from negative shown in Fig. II. on Regular Velox showing very little detail in highlights. The wrong paper for a contrasty negative.

FIG. V.

This represents a print on Regular Velox from negative shown in Fig I. The right paper for a thin or flat negative.

FIG. VI.

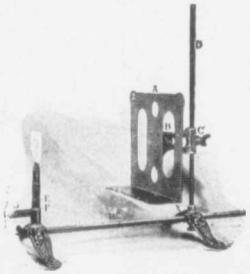
This shows result of printing on Special Velox from negative shown in Fig. II. The right paper for a contrasty negative.

An over-exposed and over-developed negative (difficult to illustrate) is dense throughout, necessitating a very long exposure to the light in order to affect the paper.

Such a negative is best printed on Regular Velox.

Printing Requisites: The absolute necessities for making Velox prints are few in number and simple in character. Either daylight or artificial light are of course essential, also developing solutions and water for washing the prints. The ordinary printing frame is used in making exposures. The artistic possibilities of Velox make it worthy of the study of all photographers and a convenient apparatus for measuring the distance from the light and for adjusting each negative to the proper angle of exposure is of great assistance. As an aid we recommend the Velox Amateur Printer, not only to help those who are already making good Velox prints, but to assist the beginner in mastering the delightful art of Velox printing in the shortest possible time.

The construction of the Velox Printer is simple and it is furnished with attachments for use either with gas or electricity.



Aside from suitable light and work room, you will require:

3 trays, preferably enameled iron (a full size larger than the prints to be made).

1 printing frame (and glass to fit, if films are to be printed).

1 4-oz. graduate.

1 bottle Nepera Solution.

1 bottle Velox Liquid Hardener.
1 lb. Crystal or Granulated Hypo.
1 package each Regular and Special Velox.

Arrange the three trays before you on your work table in this order:

2 ozs. Nepera Solution 4 ozs. Water 1	Clean Water 2	X Towel	4 ozs. Hypo. 16 ozs. Water 1 oz. Velox. Liquid Hardener 3

In the center of the above spaces we have indicated the solution which each tray should contain when developing either Regular or Special Velox. Do not be too sparing of the amount of solutions used, especially of your fixing bath (Tray No. 3); if making three or four dozen prints (4x5) use a full pint (see formula, page 107); and do not keep it after using, as a fresh bath will give best results.

Proper temperature is important and for best results the developer should be 70 degrees Fahr. and the fixing bath and wash water 50 degres Fahr. If the developer exceeds 70 degrees the prints are liable to fog and the emulsion soften. If too cold, chemical action is retarded, resulting in flat, weak prints.

Printing: You are now ready for exposure and the printing frame should be filled. Place the sensitized side of the sheet of Velox against the film or dull side of the negative. The paper curls slightly, the sensitive side being concave. An absolute test is to bite the corner of the sheet; the sensitive side will adhere to the teeth.

Place the printing frame the correct distance from the artificial light used, holding the frame away from the burner a distance equal to the diagonal of the negative. To prove that the light is evenly diffused at the point selected for exposure, take a piece of white cardboard, the size of the negative, and move its position with reference to the light, until you find the shortest distance at which an even illumination is secured. A few seconds exposure will be required when printing an average negative on Velox. We would suggest before making the first exposure, the cutting of a piece of Velox paper into strips about an inch wide and placing one of them over an important part of the negative, make the exposure, using your best judgment as to the distance from the light and the time of printing. Develop it and if not satisfactory try another strip, varying the time as indicated by the first result. When the desired effect is secured, you can make any number of prints from the same negative, and if the time of exposure, distance from light as well as the time of developing are identical, all the prints should be equally good. By comparing your other negatives with the one you have tested, you will be able to make a fairly accurate estimate of the exposure required by any negative.

After taking the exposed piece of paper from the printing frame, in a safe place previously selected, it is ready for development. The *dry print* should be immersed face up in the developer (Tray No. 1) and quickly and evenly covered with the solution. *Regular Velox should be developed to the proper depth in from fifteen to twenty seconds; Special about thirty seconds.* With our prepared liquid developers, the addition of Bromide of Potassium is unnecessary, the correct proportion being in the solution. As soon as the image has reached the desired depth remove from the developer to tray (No. 2) and rinse for a moment, turning the print several times, then place it in the acid fixing bath (Tray No. 3) *keeping the print moving for a few seconds, the same as was done when rinsing, so as to give even and thorough fixing, preventing stains and other troubles.* Leave the prints in this solution until thoroughly fixed; this will take about fifteen minutes. When fixed remove from fixing bath and wash thoroughly for about an hour in running water, then dry. After drying, prints may be trimmed and mounted.

You should be systematic in working, remembering that cleanliness is essential in photography. Care should be taken to prevent the Hypo in any way getting into the tray containing the developer. Have a clean towel when beginning the work and rinse and wipe you hands each time after you have handled prints in Hypo solution.

Notes on Development: Velox requires a special developer and should not be used with one made for plate and film development only. Nepera Solution, however is a universal developer—see page 106. Various developing agents are used in the production of Velox prints and are marketed under different trade names such as Amidol, Ortol, Edinol, Elon, Metol and Hydroquinone, etc. Amidol affords a very blue-black tone, but owing to rapid oxidation, a fresh solution should be mixed each time prints are to be made. Ortol and Edinol afford very satisfactory results. It has been proven, however, that Elon or Metol and Hydroquinone in combination yield the very best results on Velox when used in the proportion given in our formula. Owing to the difficulty many have in securing absolutely pure chemicals and the trouble and subsequent loss of material to those attempting to compound their own developers, we recommend the use of our liquid Developers, Nepera Solution and N. A. Velox Liquid Developer, for Velox papers. To those who prefer to prepare their own solution, we advise the following formula:

M. Q. DEVELOPER.

(Dissolve chemicals in the order named.)

	METRIC SYSTEM.
Water, - - - - - -	10 ozs.=300 c. c.
Elon or Metol, - - - -	7 grains=½ gramme
Hydroquinone, - - - -	30 grains= 2 grammes
Sulphite Soda (desiccated), -	110 grains= 7 grammes
Carbonate Soda (desiccated), -	200 grains=13 grammes
10 per cent. solution Bromide Potassium, - - - -	40 drops=40 drops

This solution will keep indefinitely if placed in bottles filled to the neck and tightly corked. It should be used full strength for "Regular Velox", but can be diluted with equal parts of water when "Special" papers are developed.

N. A. Velox Liquid Developer: This is an excellent ready-to-use concentrated developer for Velox papers. Unlike any other developer, it has certain qualities which make it unique in photographic work. N. A. (non-abrasion) means that all abrasion or friction marks, to which all glossy developing-out papers are peculiarly susceptible, will be prevented by this solution. Another feature is the guide it gives to thorough fixing—the print is not absolutely fixed until the canary yellow color entirely disappears by fixing in a correctly prepared Acid Hypo Bath.

Developer for Regular or Special Velox:

N. A. Velox Liquid Developer, - - 2 ozs.
Water, - - - - - - - - 4 ozs.

It is important that the temperature of the developing solution should be 70 degrees Fahr. In summer, if found necessary to cool the developer, do not place ice *in* the solution, as it will dilute it. Place the tray containing developer into one of larger size, packing ice around it. N. A. DEVELOPER SHOULD NOT BE USED FOR DEVELOPING PLATES, FILMS OR BROMIDE PAPERS.

Nepera Solution: This is known as the "universal" developer because it may be used not only for Velox, but Azo, Bromide paper, films or plates. Like all Nepera liquids, it is a concentrated solution with the combination of purest chemicals which will give the best results. It differs from N. A. Velox Liquid Developer in that it does not possess the non-abrasion and fixing-guide properties; but on the other hand, when used in combination with Nepera Capsules, it is excellent for films or plates, giving negatives of the quality best suited for developing-out paper.

For Regular or Special Velox use:

Nepera Solution, - - - - - 2 ozs.
Water, - - - - - - - - 4 ozs.

The temperature of the bath should be 70 degrees Fahr.

For Bromide papers use:

Nepera Solution, - - - - - 1 oz.
Water, - - - - - - - - 6 ozs.

For Film in Kodak Film Tank use in the following proportion:

Nepera Solution, - - - - - -	½ oz.
Water, - - - - - - -	12 ozs.

Contents of one Nepera Capsule.
Develop N. C. Film for twenty minutes.
Develop Eastman Speed Film for twenty-five minutes.

The above formula may also be used for dark-room development if desired, in such case the development of course being continued until the proper density has been obtained.

Fixing: Sodium Hypo-Sulphite (or Hypo, as commercially termed) may be obtained for use in either a granulated or crystal form. Its purpose is to dissolve the silver salts which have not been acted upon by light. The importance of this chemical is evident, but it is probable that no part or process of photography is more abused than that of correctly preparing a fixing bath and properly fixing prints. To secure permanency, prints *must* be fixed in a fresh, acid fixing bath. When Hypo is first dissolved in water, the temperature of the solution is materially reduced. *It is important that the temperature of a fixing bath should be maintained as near to 50 degrees Fahr. as possible.* Probably more prints change color from insufficient fixing than lack of washing, so these points should be given attention. Have plenty of solution strong enough to thoroughly fix prints in at least 15 minutes. *Always use the acid hardener in the bath, as it will overcome the tendency of the fixing bath to cause blisters and stains, and move the prints about for the first few seconds after immersion to stop the action of the developer at once over the entire surface of the print.*

Our formula for preparing the Acid Hypo fixing bath is as follows:

Water, - - - - - - - -	64 ozs.
Hyposulphite of Soda (crystal or granulated), - - - - - -	16 ozs.

When thoroughly dissolved, add the following hardening solution, dissolving the chemicals separately and in the order named:

Water, - - - - - - - -	5 ozs.
Sulphite of Soda (desiccated), - -	½ oz.
Acetic Acid No. 8 (containing 25 per cent. pure acid), - - - - -	3 ozs.
Powdered Alum, - - - - -	1 oz.

This solution will keep if placed in tightly corked bottles, and one pint of it will fix one-half gross of 4 x 5 prints. If sulphite and carbonate of soda in crystal form are substituted for desiccated, double the quantities mentioned should be used.

Amateurs will find it advisable to use our prepared solutions, and the concentrated Velox Liquid Hardener is especially recommended:

Water, - - - - - - - -	16 ozs.
Hyposulphite of Soda, - - - -	4 ozs.
Velox Liquid Hardener, - - -	1 oz.

NOTE.—To those who wish to purchase the Developer and Acid Fixing Bath in dry form, we recommend our tube developers and Kodak Acid Fixing Powders.

Notes on Washing: The finished prints must be entirely free from Hypo. To wash a batch of 100 4 x 5 prints, using two trays of suitable size and transferring each print separately from one tray to the other, changing the water at least twelve times, will take a full hour for the process. In running water, where the prints can be kept constantly moving so that each individual print has a thorough washing, from one-half to one hour, according to the number of prints, will be required. Prints do not wash if piled in a bunch in a tray and the water simply runs in at one end of the tray and out the other. In some localities where there is an excessive amount of iron or impurity in the water, the whites in the prints may have a slight yellowish tone or small red spots may appear. These may be prevented by filtering the water used through several thicknesses of muslin or one thickness of canton flannel. Prints need not be washed any longer than is necessary to completely free them from hypo. The temperature of the water in winter should be kept as uniform as possible, as ice water will cause blistering. When running water is used for washing, the stream should not be allowed to fall directly on the prints as it will cause breaks in the fibre of the paper, producing blisters. Place a tumbler or graduate in the washing tray and allow the water to run into it and overflow into the tray. To determine when the print is thoroughly free from hypo, the following test formula may be successfully employed:

Permanganate of Potash, - - -	8 grs.
Caustic Soda, - - - - -	7 grs.
Water (distilled), - - - - -	8 ozs.

This solution should be made up fresh at least once a month. Fill a glass with pure water to which you have added three or four drops of potash solution. Then take a couple of prints from the wash-water and allow the water from the print to drip into the glass. If hypo is present, the violet color of the water in the glass will change to a slight greenish tint in from five to seven minutes. In such case return prints to the wash-water to remain until similar tests show that the hypo has been entirely eliminated.

Drying: After prints have been thoroughly washed, remove from the wash-water and place on a clean glass in a pile face down and press out superfluous water. Then lay out separately, face down on cheese-cloth stretchers. These may be constructed by making a frame work of light wood and tacking unbleached cheese-cloth tightly over it. Prints dried in this manner will curl but a trifle.

If stretchers are not to be had, dry the prints face down on clean, uncolored cloths, or towels, which are free from lint.

Never dry Velox prints *between* blotters or on papers. They are likely to stick and cause much annoyance.

Enameled Surface Paper: Glossy Velox prints can be burnished or squeegeed. Take prints from the wash-water and place face down on a ferrotype tin, squeegee into absolute contact and allow to become bone dry, when they will peel off with the desired luster. If the tin has been in use for some time, portions of prints may stick; to prevent this, prepare the tins as follows:

Dissolve ten grains of beeswax in one ounce of benzine; allow this to stand for a few hours, in which time a precipitate will be formed. The clear solution should be used for polishing the tins, applying to the surface of the ferrotype plate with a soft cloth (canton flannel). When the surface of the tin has been thoroughly covered with this preparation the tin should be polished with a piece of dry canton flannel to remove as much of the beeswax as possible. As beeswax varies in its composition to a certain extent, the solution may vary somewhat in consistency, so that an addition of benzine may be necessary to permit polishing the tins easily.

Clean the tins occasionally with scalding water, in order to remove any particles of gelatine which may remain on them from former prints.

Mounting: Prints should be trimmed to size desired before mounting. They should be dry and perfectly flat for trimming, and a trimming board should be used instead of a knife and ruler, for with the board absolutely true edges may be obtained.

The simplest and most satisfactory way to mount prints is by using Kodak Dry Mounting Tissue, as by this process the prints are mounted in absolute contact and will not curl even on the thinnest mounts—especially advantageous in multiple mounting.

Two prints may be mounted back to back, and being free from curl can then be used as an album leaf.

The Kodak Dry Mounting Tissue is dry and not sticky to handle, mounting is accomplished quickly and no time is lost waiting for prints to dry after mounting.

Any print may be mounted with the tissue, and as the tissue is water-proof there is no possibility of the print becoming stained from any chemical in the mount stock.

To use the tissue, lay a print on its face and tack to its back a piece of tissue of the same size by applying the point of a hot iron to small spots at opposite ends.

Turn the print face up and trim print and tissue to desired size. Place in proper position on mount, cover the print with a piece of smooth unprinted paper and press the whole surface with a hot flatiron; press, don't rub.

The iron should be just hot enough to siss when touched with a wet finger. If the iron is too hot the tissue will stick to the mount and not to the print; if too cold, the tissue will stick to the print and not to the mount.

Remedy—Lower or raise the temperature of the iron and apply again.

For mounting with paste the following plan is best to employ: After prints are trimmed, immerse them in a tray of clean water, allowing them to soak long enough to become thoroughly limp. Remove to a good sized piece of clean glass, placing them in a pile face down. Cover with a piece of clean blotting paper and with a roller squeegee, press all the superfluous water from the pile. Then with a good bristle paste brush apply a thin, even coating of starch paste. Raise the print by taking hold of the two opposite corners and turning it over, place in position on the mount. Lay a clean, dry blotter over the print and with the roller press into contact. Any lint or fuzz from the blotter, or any paste on the surface of the print should be immediately removed with a soft sponge or dampened cloth. Any imperfections in the finished print may be corrected by spotting, using a fine sable brush and spotting color of India ink. Care should be exercised to select mounts which harmonize with the tone of the print. If Sepia prints are to be mounted any shade of brown or some of the deeper reds may be used, but these same mounts would not be suitable for black and white tones. For the black and white prints any shade of gray, carbon black, buff or cream color may be successfully used.

Double weight papers may be mounted solid, but are best used for folder effects. A very artistic way of making prints with the Double Weight is to use a sheet of paper considerably larger than the negative to be printed from. This will necessitate the use of a larger frame ($6\frac{1}{2} \times 8\frac{1}{2}$ or 8×10). Have a piece of clear glass the full size of the frame and fasten your negative to the center of this glass with strips of gum paper, cut a mask of opaque paper the full size of your glass and from the center cut an opening at least one-quarter of an inch smaller than the size of the negative. Place the mask in the printing frame between the paper and the negative, then print and develop the exposed paper in the usual way. This will give a print with a very wide white margin and when thoroughly dried and straightened, by using an embossing board, an imprint or counter-sunk margin about half an inch around the edges of the print will give a fine etching or engraved effect. Enclosed in a folder mount made of cover paper of desirable tone, you have as artistic a result as can be produced.

Finishing Velox Post Cards: The process of making prints on Velox Post Cards is identically the same as that for making Velox Prints. The cards are sensitized on one side only and the reverse side is printed to conform with the Canadian Postal regulations. A printing frame and a glass a size larger than the negative should be used, and the cut-outs found in each package of cards may be used for masking the negative. Place the mask between the negative and the sensitized

side of the Post Card and the result will be that when exposed, developed and fixed the same as an ordinary sheet of Velox paper, you will have your picture at one end of the card surrounded with a white edge of the part which was protected by the opaque mask. Your negative should be selected the same as when printing with Velox paper and both Regular and Special Post Cards should be used. Where contrast is desired, the Regular Velvet, Regular Glossy, or Regular Royal Post Cards will give the best results and should always be used with thin negatives; the Special Velvet, Special Portrait, Special Glossy and Special Royal Post Cards should be used for stronger negatives and when soft effects are desired.

Double Printing: Effective and artistic work may be done on Velox Post Cards by double printing. By this process gray borders and ground may be produced. The work requires careful and exact cutting of the necessary opaque masks and accurate registry of the cards when printing. Provide a number of pieces of clear glass, cut to size 5 x 7 (old negatives from which the emulsion has been thoroughly cleaned by soaking in a solution of hot water and sal-soda are suitable), also a few sheets of opaque paper the same size (5 x 7). From one of these sheets make a mask as shown in Fig. 1. (Page 112.)

Measure from edges A and B a space five-eighths of an inch wide, then cut an opening 2 x 3 inches through which your negative and card are to be exposed. Fasten the negatives with strips of adhesive paper to one of the pieces of clear glass, placing that portion to be printed directly in under the opening in the mask. Adjust glass, negative and mask in printing frame, lay on the Velox Post Card, sensitized side down, so that one end covers the opening in the mask. Be careful to have the edges A and B of glass, mask and card fit flush against the corresponding sides of the printing frame. Expose to printing light, giving correct time required for a perfect print, remove the entire outfit from the printing frame and insert glass and matt No. 2, which you will have previously prepared, as shown in Fig. 2.

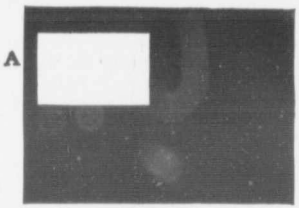
From another piece of opaque paper 5 x 7 cut an opening 3 x 5 inches and measure exact so as to leave margins of one-quarter inch on the sides A and B. Gum this matt securely to another glass, then cut a piece of opaque paper 2¼ x 3¼ inches and gum this in a clear space at a distance of exactly one-half an inch from edges A and B. Place this entire outfit in printing frame, lay on Velox Post Card, previously exposed under No. 1 matt, fit edges flush into the corner of the frame and expose. This second exposure should be just enough to produce the desired tint, governing time by grade of Velox used. If the exposure has been too great the border will be dark, if under exposed the border tint will be light. A little practice may be necessary in order to secure the tint desired.

Now, if you have made all measurements accurately and exposure and development have been correct, you will have on a finished post card your picture 2 x 3 in size surrounded by a gray border

one quarter of an inch wide on top and one side, and one half inch wide at bottom and one and one-half on other side. The tint of this border should be a slaty gray and should harmonize with the black tone of your print.

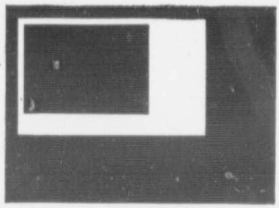
Other forms, such as ovals and circles, may be made and the process for their making is the same as already described.

No. 1



Shaded portion represents opaque paper. White portion shows part cut out.

No. 2



Shaded portion represents opaque paper. White portion shows part cut out.

Sepia Tones on Velox: There are occasions when it is desirable to modify the tone of Velox prints, in order to secure some effect more in keeping with the subject than the original color produced by development only. The Sepia Tone is permanent and may be secured in various ways, but we will describe only two of these: the first known as the hypo-alum process, and the second, Velox Re-development. The hypo-alum process is a slow and somewhat uncertain way of obtaining good results and consists of a solution of hypo and powdered alum in boiling water, into which, when cooled, the prints are immersed, and left until the desired tone has been reached. The process requires from one to twelve hours and is uncertain in exact results. The Velox Re-development process will give the best results in a much shorter time, yielding equally pleasing and permanent tones. Prints on any grade or surface of Velox afford most pleasing tones when re-developed, but re-development is perhaps specially advantageous for prints on Royal Velox, as the process brings out and accentuates the full value of the soft, creamy stock upon which Royal Velox is coated; the finished prints possessing an almost indescribable softness and delicacy.

Velox prints of any grade or surface, which have been evenly and thoroughly fixed and washed will give desirable results with the Re-developer, but some subjects, such as marines and snow scenes, are best rendered in the black and white. Landscapes, autumn scenes, and portraits are given greater artistic values by the warmth of tone which the Re-developer affords.

A package of Re-developer consists of a box of 14 Capsules and a bottle of solution. Each Capsule contains chemicals which

require only the addition of a certain quantity of water to make a bleaching bath for the reduction of the print before re-development. The liquid contained in the bottle is highly concentrated and should be used carefully, the entire contents of a 4-oz. bottle being sufficient to re-develop about four hundred 4 x 5 Velox prints. It is important that the prints should have been thoroughly washed so that no trace of hypo remains. Placing the black and white print in the bleaching solution, let it remain until all trace of black has disappeared from the shadows; it should then be removed and rinsed thoroughly in fresh water, then placed in re-developing solution, where the faint image immediately changes to a warm brown tone, gradually deepening until all its former brilliancy returns, but changed to a Sepia tone instead of black and white. A final washing is then given the print, the whole process requiring only a short time, so the advantages of using this over the hypo-alum process are quite evident.

Velox Re-developer will also produce excellent Sepia tones on any Bromide or gas-light paper; the age of the print does not seemingly make any difference in the tones obtainable. Best resuts are obtainable from prints which have a good bluish-black tone, rather than a green or olive tone, such as is produced by the use of too much bromide. Both the bleaching and the re-developing baths will retain their strength for some time, if kept in well stoppered bottles. If the print shows a tendency to blister, it doubtless comes from insufficient hardening of the black and white prints. Remedy—use a fresh and absolutely correct acid hypo bath at a temperature of 50 or 60 degrees, fixing the prints 20 to 25 minutes. Too strong a solution of Re-developer or too long immersion in this solution will also cause blisters. After re-development and before the final washing the prints may be immersed in a hardening bath composed of Velox Liquid Hardener, 1 ounce; water, 16 ounces. This will also correct any tendency to blister.

How to Make Prints from Wet Negatives: The negative must be thoroughly washed and freed from any trace of hypo. Immerse a piece of Velox paper in clean water for a few seconds, then placing it on the film side of the wet negative squeegee it carefully so as not to break the film. Expose without the use of a printing frame. After exposure place both negative and paper in water, allowing them to soak for a moment before trying to separate them. Develop and fix the print in the usual way.

How to Make Good Starch Paste: Ordinary gloss starch dissolved in just enough cold water to make a thick solution is prepared, and enough boiling water poured into it so it thickens in a clear, transparent jelly. Set aside and when cool remove the skin which forms and use the clear paste.

To Remove Friction Marks from Glossy Velox Prints: Rub the surface of the dry print with a tuft of cotton wet with wood alcohol. Do not rub hard enough to break the surface of the film and be careful to have the print on some level surface, such as a piece of glass.

N. A. Velox Liquid Developer entirely prevents abrasion marks.

After a careful perusal of the above instructions you should be able to produce satisfactory results on any grade of Velox paper.

Causes of Non-Success: By consulting the following causes of failure you will probably be able to locate any trouble you may have had.

PRINTS ARE TOO BLACK.

Over-exposure.
Over-development.
Insufficient Bromide of Potassium.
Negative too weak or thin.
Perhaps wrong grade of paper used; try Regular Velvet Velox.

PRINTS ARE TOO LIGHT, LACK DETAIL.

Under-exposure.
Negative too dense for Regular paper.
Try Special Velvet, or Special Portrait Velox.

GRAYISH WHITES THROUGHOUT ENTIRE PRINT.

Chemical or light fog.
Insufficient Bromide of Potassium in developer. Old paper.

GRAYISH MOTTLED OR GRANULATED APPEARANCE OF EDGES OR ENTIRE PRINT.

Under-exposure, forced development.
Old paper.
Paper kept in damp place.
Moisture.
Chemical fumes, Ammonia, etc.
Illuminating or coal gas.

GREENISH OR BROWNISH TONES SOMETIMES MOTTLED.

Developer too old or too weak.
Excess of Bromide of Potassium.
Over-exposure.

GREENISH YELLOW STAINS NOTICED WHEN N. A. VELOX LIQUID DEVELOPER HAS BEEN USED.

Under-exposure and forcing.

CANARY YELLOW STAINS PRODUCED WHEN N. A. V. L. D. HAS BEEN USED.

Fixes out entirely in correctly prepared acid Hypo bath. (See page 107 for formula.)
The entire disappearance of this color insures correct fixing.

BROWN OR RED STAINS.

Old or oxidized developer. (Never use developer after it is much discolored or muddy.) Imperfect fixing.
Developer too warm.
Fixing bath lacks sufficient acid and prints were not kept moving to allow even fixing. (See page 107.)

PURPLE DISCOLORATIONS. (*Not Frequent.*)

Velox paper has been used as a printing-out paper.
Incomplete fixing.

ROUND WHITE SPOTS.

Air-bells on the surface of paper.
To avoid, develop prints face up, brushing off any air-bells that may form.

ROUND OR IRREGULAR DARK SPOTS.

Caused by air-bells forming on the surface of print when placed face down in fixing bath, and failing to keep prints in motion.

WHITE DEPOSITS ALL OVER SURFACE OF PRINTS.

Milky Hypo bath.
If print is thoroughly washed and deposit is removed before drying it does no harm.
Correct fixing bath by adding more No. 8 Acetic Acid.

PICTURE GOOD, BUT SURFACE COVERED WITH BLACK MARKS.

Abrasion marks (See page 106.)

BLISTERS.

Prints have been creased or broken while washing.
Do not allow water from the tap to fall directly on the prints.
Too strong acetic acid used in hardener.
Too great difference between temperature of solution and wash-water.
Fixing bath lacks sufficient hardener.
Never use a plain Hypo Fixing bath; always acidify with Velox Liquid Hardener.

BLISTERS OCCURRING DURING RE-DEVELOPMENT.

(See page 113.)

FREAKS.

Picture develops irregularity and appears to be covered with greasy streaks and finger marks and gives the impression that there are spots on the paper which have never been coated. Of all complaints received regarding Velox paper, none are caused by any condition more annoying than this "freak" trouble. It is annoying to the photographer be-

cause he feels sure the fault is in the paper, and annoying to us because we know that the fault lies in incorrect solutions. We publish herewith a half-tone of this curious effect. It is in warm weather when the humidity is great that these "freaks" most frequently occur.

Developed in M. Q., half as strong as that advised in instruction sheet.

Developed in M. Q., strength as advised in instruction sheet.

Undoubtedly the paper absorbs moisture unevenly and in certain spots becomes repellent to the action of an incorrect developer. In making up a developing solution it is absolutely essential that pure chemicals be used, and as Velox requires a bath that contains nearly twice as much Carbonate of Soda as Sulphite of Soda, it is easy to see that any mistake made in the proportion of either chemical would be apt to cause trouble. The remedy for "freaks" is to throw out your developer and mix a fresh solution, and, if necessary, use it stronger.

It sometimes happens that one package of Velox will freak in a certain developer while another will not. This is not proof that the paper is defective, but simply shows that one package has been kept under different conditions from the other at some time since it left our factory, and because of this is more susceptible to the action of an incorrect developer. Both packages, however, will give good results if the solution used is absolutely correct.

YELLOWISH WHITES WHEN OTHER THAN N. A. HAS BEEN USED.

Stain all over prints is result of under-exposure and forcing.

Prints not kept moving for the first seconds after immersion in the hypo fixing bath.

Too weak developer.

Insufficient washing and fixing.

Iron in wash-water—may come from rust in water pipes.

Sea air will affect Velox, causing yellow whites, so packages should not be left open and prints should be developed immediately after exposure.

Permanency: The permanency of Velox prints has never been questioned. Permanency of any Velox prints depends upon the thoroughness of manipulation. It is beyond question that with correct developer freshly prepared and with thorough fixing and washing, Velox prints will be absolutely permanent. Many dealers have sample prints that were sent to them years ago and have exposed them continually to every conceivable atmospheric condition. This is an unanswerable argument in favor of Velox permanency.

KODAK VELVET GREEN.

Kodak Velvet Green is a developing-out paper and like Velox the image is invisible after exposure to light, until a developing solution has been applied.

The natural color of Kodak Velvet Green prints is a rich, true green secured by the use of a one-solution developer.

As much of the beauty of a photographic print depends upon the color or tone in which it is rendered, a paper such as Kodak Velvet Green will be especially appreciated for marine and landscape subjects.

Its use gives pleasant relief from the cold tones of the ordinary black and white print and affords every opportunity for the production of permanent prints of delightful tone and quality by a very easy and simple process.

Kodak Velvet Green is made in one surface (semi-gloss) and one printing speed but two weights of paper stock, single and double. Although the paper is sensitive to white light and should be properly protected when handled, exposure of prints should be made to daylight rather than to artificial light.

With a negative of average density, the exposure by subdued daylight (a north light is preferable as it is more uniform), will be about 20 seconds. A strong or dense negative will of course require a longer exposure than a weak negative. Full development is recommended to produce the full brilliance of color and quality.

By comparing your other negatives with the ones you have tested, you will be able to make a fairly accurate estimate of exposure required by any negative.

DEVELOPING SOLUTION FOR KODAK VELVET GREEN.

Nepera Solution, - - - - - -	1 oz.
Water, - - - - - - - -	4 ozs.

After taking the exposed piece of paper from the printing frame, in a safe place previously selected, it is ready for development. The *dry* print should be immersed face up in the developer and quickly and evenly covered with the solution.

If the time of exposure and the temperature of the solution are correct, the print should fully develop in 45 seconds *although a somewhat longer immersion may be necessary* and not harmful. Full development of prints on Kodak Velvet Green is the one important feature in connection with their manipulation, for on this depends the final tone. In case of over-exposure and under-development prints will assume a yellowish-green color, which is objectionable. The true green tone, the feature of this paper, will be obtained by careful attention to exposure and development of prints.

As soon as the image has reached the desired depth remove from the developer to tray and rinse for a moment, turning the print several times, then place it in the acid fixing bath.

Kodak Velvet Green prints may be fixed, washed and mounted the same as Velox. See pages 107-108.

To those who prefer to prepare their own solutions, we advise the use of the M. Q. formula on page 106.

NOTE.—N. A. Velox Liquid Developer or any developing solution containing Potassium Iodide should not be used.

PRINTING-OUT PAPERS.

Printing-out papers are so called because, unlike a negative, the image appears without development, and they require only toning and fixing. Printing-out papers are simple to handle, and are used by both professionals and amateurs.

Solio is a Gelatino-Chloride Printing-out paper, with which the silver chloride and other salts are held in position in gelatine.

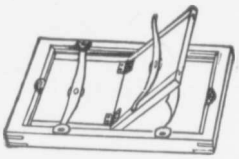
In the printing-out paper the image "prints-out" at once. Before it is toned and fixed it is in the same condition as a proof received from the photographer. The chemical action clears the high lights and shadows, gives the proper tone and "fixes" the print, i. e., makes it permanent.

The process of toning and fixing may be combined in one bath or may be done separately. For convenience we recommend the combined bath to the amateur, but care should be exercised not to overwork the bath. This bath will continue to give satisfactory tones long after the gold has been exhausted. This toning without gold, however, is not permanent and no attempt to economize by overworking the toning bath should be made, as disappointment will be the inevitable result.

The Paper: Keep your paper in a dry place. Do not expose it to moisture or the fumes of coal gas, it being very sensitive to either.

Untoned Prints: When you have taken the print from the printing frame it is still sensitive, containing as it does, most of the original silver chloride, and should you expose it to the light it would soon blacken all over. Keep your prints, after removing from the printing frame, in a dark box until you are ready to tone. Handle as little as possible and do not allow the fingers to come in contact with the surface of the paper.

Method of Printing: Open the printing frame and lay the negative back down upon the glass (the back is the shiny side). [NOTE—When printing from glass plate negatives no glass is needed in the printing frame, the plate itself fitting into rabbet of frame.] Place upon this a piece of Solio paper, face down. Replace the back of the frame and secure the springs. The back is hinged to permit of uncovering part of the print at a time to inspect it without destroying its register with the negative. The operation of putting in the sensitive paper must be performed in a subdued light, that is to say, in an ordinary room, as far as possible from any window. The paper not used must be kept covered in its envelope.



THE PRINTING FRAME.

The printing frame, when filled as directed, is to be laid glass side up in the strongest light possible (sunlight preferred) until the light, passing through the negative into the sensitive paper, has impressed the image sufficiently upon it. The progress of the printing can be examined from time to time by removing the frame from the strong light and opening one-half of the hinged back, keeping the other half fastened to hold the paper from shifting. The printing should be continued until the print is a little darker tint than the finished print should be.

As soon as the print is finished place it in a drawer or box where it will be protected from the light until your batch of prints is ready for toning.

How Deep to Print: For the combined bath the printing should be carried about two shades deeper than you desire the finished prints to be as they will lose considerable in toning and fixing. For the separate bath about one shade deeper.

Prints will keep three or four days before toning, providing they are stored in a dark box.

TONING WITH THE COMBINED BATH.

For one just starting to tone prints, we would recommend the combined bath. This will be by far the most simple in manipulation (the toning and fixing being done in one bath) and with proper attention to the instructions you should be able to secure prints of a soft, rich tone, ranging in color from a warm sepia to a dark purple. Solio Combined Toning and Fixing Solution may be had of any Kodak dealer.

Place prints without previous washing in the following combined toning and fixing bath.

2 ozs. Solio Toning Solution.
4 ozs. *cold* water.

Pour the toning solution into a suitable tray and immerse the prints one after the other. Five or six prints can be toned together if they are kept in motion and not allowed to lie in contact. Turn the prints all face down and then face up and repeat this all the time they are toning. The prints will begin to change color almost immediately from reddish brown to reddish yellow, then to brown and finally to purple. The change will be gradual from one shade to another and the toning should be stopped when the print gets the shade desired.

Six ounces of the diluted toning solution will tone two dozen 4 x 5 prints; after that a new solution should be made same as before.

When the proper shade has been attained in toning bath the prints should be transferred for five minutes to the following salt solution to stop the toning.

Salt, - - - - - - - -	1 oz.
Water, - - - - - - - -	32 ozs.

Then transfer the prints to the washing tray and wash one hour in running water, or in sixteen changes of water.

The prints are then ready for mounting or they can be laid out and dried between blotting papers.

If desired the amateur can mix his own toning bath, but in so doing should exercise great care in getting pure chemicals and using exactly the proper proportions.

STOCK SOLUTION.

A	Hypo-sulphite of Soda, - - - -	8 ozs.
	Alum (crystals), - - - - -	6 ozs.
	Sugar (granulated), - - - -	2 ozs.
	Water, - - - - - - - -	80 ozs.

Dissolve above in *cold water,* and

When dissolved add Borax, - - -	2 ozs.
Dissolve in hot water, - - - -	8 ozs.

Let stand over night and decant clear liquid.

STOCK SOLUTION.

B	Pure Chloride of Gold, - - -	7½ grains.*
	Acetate of Lead (Sugar of Lead), -	64 grains.
	Water, - - - - - - -	8 ozs.

Solution B should be shaken up before using and not filtered.

*Or double the quantity of chloride of gold and sodium.

To tone fifteen 4 x 5 prints take:

Stock Solution A, - - - - - -	8 ozs.
Stock Solution B, - - - - - -	1 oz.

Place prints without previous washing into the above.

Tone to desired color and immerse prints for 15 minutes in following Salt Solution to stop the toning:

Salt,	1 oz.
Water,	32 ozs.

The extra fixing bath should be used to ensure *thorough fixing.* After the salt bath, give one change of cold water and fix for 10 minutes in the

EXTRA FIXING BATH.

Hypo-sulphite of Soda,	1 oz.
Sulphite of Soda (crystals),	60 grains.
Borax,	¼ oz.
Water,	20 ozs.

Wash one hour in running cold water or in sixteen changes of cold water, when prints may be mounted.

The combined bath must be started cold, not above 50° Fahr., and must not be allowed to rise to temperature above 60° Fahr. This condition can be obtained by placing a piece of ice in the bath when toning. If the bath is too warm, you will get yellow prints with a greenish cast in the half-tones.

Use a thermometer and keep it in toning bath all the time.

The combined bath is an acid solution. The borax neutralizes only the *excess* of acid in the alum. Any attempt to neutralize the bath will precipitate the alum.

The combined bath should not be used a second time.

If troubled with white spots or blotches on prints, clean trays with nitric acid or sulphuric acid and water.

TO CUT GOLD.

Those who desire to cut their own gold can make Stock Solution B as follows for the combined bath:

Metallic Gold,	1 pennyweight, (24 grains).
Nitric Acid,	1 dram.
Muriatic Acid,	3 drams.

When gold is cut (or dissolved) in above solution add water 48 oz. and then add sufficient Bi-Carbonate of Soda to *almost* neutralize, leaving the solution slightly acid. Filter, and add 384 grains Acetate of Lead.

TONING WITH THE SEPARATE BATH.

Washing the Prints: After taking the prints from the print frame, immerse them one at a time in a tray of running water. (When washing and toning prints use trays that have never come in contact with Hypo, as the least trace of that chemical will cause dark brown stains that cannot be gotten rid of.) Keep them moving so that all shall receive an equal amount of washing.

When you place a print in the water the soluble silver, or that portion not used to form the image, dissolves and is washed out; this forms with other substances in the water a new combination which can easily be detected by its white, milky appearance. Prints to be properly washed should remain in the running water until this has entirely disappeared. Should you not have running water, they can be washed by using two trays and transferring the prints (one at a time) from one to the other, changing the water each time.

This should be done quickly at first but after you have washed out most of the free silver, the changes may be made five minutes apart. The temperature of the water should be as near 60° Fahr. as possible.

The Toning Bath: Tone in a plain gold bath, using about 1 gr. of gold to 48 ozs. of water. Neutralize by adding a saturated solution of borax, bi-carbonate of soda or sal-soda.

This should be made up at least one-half hour before using; this gives the chemicals a chance to harmonize. When making the toning bath, first measure the water and pour into the tray or dish you are to use, then add the gold. Now take a piece of red Litmus paper (this is very sensitive to acid or alkali) and place in the solution. Then add the borax solution drop by drop (this is a strong alkali and should be kept in a bottle, the cork of which has a small slit in it allowing the solution to drop, not run out) just enough to turn the Litmus paper blue in five minutes. This will make the bath almost neutral, i. e., slightly alkaline. The bath is now ready for use. Should the prints tone fast enough in the high lights, or light parts of the prints, leaving the shadows, or dark parts, very red, and when finished have a muddy (not clear) appearance, that indicates that you have used too much borax or alkali. On the other hand, had the Litmus paper remained its original color (red) that would indicate that the bath was acid and that you had not used sufficient alkali. With the bath in that condition your prints would not tone but bleach, lose their brilliancy and become flat.

When toned, immerse prints in running water where they may remain until all are ready for fixing.

If running water cannot be had put prints into

SHORT STOP:

Salt,	1 oz.
Water,	1 gal.

If there is a large batch of prints to be toned do not allow prints to lie in short stop solution. Put them into a tray containing clear water where they may remain until they are ready for fixing.

FIXING BATHS.

Fix twenty minutes in

Water,	1 gal.
Hypo,	13 ozs.
Solio Hardener,	½ oz.

Solio Hardener may be had at any dealers.

To mix with Hydrometer, take water 1 gal., add sufficient Hypo to test 25 gr. to the oz. and add ½ oz. of Solio Hardener.

On account of its simplicity and cheapness, we advise the Solio Hardener Fixing Bath, but give the alum fixing bath for the benefit of those who prefer it.

ALUM FIXING BATH.

Hypo-sulphite of Soda, - - - -	6 ozs.
Alum (Crystals), - - - - -	2½ ozs.
Sulphite of Soda (Crystals), - - -	⅜ oz.
Water, - - - - - - -	70 ozs.

When dissolved add ¾ oz. of borax dissolved in 10 ozs. hot water.

This fixing bath must be made about 10 hours before use. As it keeps indefinitely before use it may be made up in large quantities.

After fixing in one of the foregoing baths, wash 1 hour in running cold water or in 16 changes of cold water, keeping prints separated so the water may have a chance to eliminate the chemicals.

Details: The separate toning bath should tone in 6 or 7 minutes.

Tone by transmitted light for the high lights and half tones only, paying no attention whatever to the shadows.

We recommend a neutral bath and advise the use of Squibb's red litmus to test with.

If the bath tones uneven or streaky, add water until it tones in 8 or 10 minutes, and make it slightly alkaline.

One gallon of fixing bath is sufficient for one gross 4 x 5 size Solio or its equivalent.

Prints allowed to stand over night in water are liable to turn yellow; they should therefore be mounted as soon as washed.

To make Solio Hardener:

Chloride of Aluminum, - - - -	3 ozs.
Bi-Sulphite of Soda, - - - -	2½ ozs.
Cold Water, - - - - - -	12 ozs.

Put both chemicals in the water and shake until dissolved.

Glossy Prints: Few amateurs care to go to the expense or trouble of burnishing their own prints, but they can readily obtain a beautiful glacé finish in a simple manner by drying prints on ferrotype plate in the following manner:

1. Clean the ferrotype plate with hot water each time it is used. Polish with a soft cloth until plate is absolutely free from dirt or specks of any description. Swab with a tuft of soft cloth or cotton batting, wet with a solution composed of benzine 1

oz., paraffine 10 grs. Rub dry with a clean cloth, and polish with a chamois skin or very soft cloth. Use a soft brush to remove particles of dust from plate.

2. Lay the wet print on the ferrotype plate. It must be in perfect contact to produce a uniform glossy surface. This contact is better secured by avoiding air bells in laying the print down than by endeavoring to expel them by heavy pressure—light rolling with a print roller (with cloth between) is all that is required—heavy pressure being liable to make prints stick in spots.

3. If prints are to remain unmounted, when surface is almost dry brush over the back (while still on the plate) with a thin solution of white glue.

4. When "bone" dry strip the print from the plate.

If print is to be mounted we advise the use of Kodak Dry Mounting tissue. See page 109.

The Story Book.

PLATINUM PAPERS.

The simplicity of platinum printing will prove a revelation to the amateur photographer who imagines that the process must be difficult because so much employed by advanced workers. As a matter of fact, platinum printing presents no more difficulties than the ordinary blue print process so familiar to the novice.

With the exception of carbon, where any colored pigment may be used, no printing process affords so wide a range in tone value, from a pure sepia and velvety black down through all the intervening tones to a shade scarcely darker than the pure white and buff of the paper support. It is this ability to preserve the most delicate half tones that affords the charming atmospheric effect so evident in all good platinum prints.

Platinum prints are absolutely permanent, consisting of a deposit of metallic platinum on a pure paper support, and a properly manipulated print will retain its quality so long as the paper support itself exists.

Platinum paper does not demand a negative of special qualities, a negative that will yield a good print on any paper will answer equally well for platinum.

The fact that platinum paper is a semi-developing out paper, and that the image is only partially visible when printing is complete, has lead many to believe that much experience is necessary to judge of the proper printing depth. As a matter of fact, a few trial exposures with negatives of varying density will afford all the experience necessary and the making of prints of proper and uniform quality becomes a simple matter.

All platinum papers are exceedingly sensitive to dampness and for this reason are packed by the manufacturers in sealed cans or tubes, each package containing a small piece of asbestos saturated with calcium chloride to absorb any moisture in the tube.

Platinum paper will keep for months in a cool dry place, and in warm climates, if not for immediate use, is best kept in a refrigerator.

As platinum paper is capable of rendering the slightest half tone it is naturally quite sensitive to light, much more so than the gelatine and collodion printing out papers, and should be handled in a subdued light, not out of doors or close to a window.

When printing, remove only sufficient paper from the tube to fill the frames in immediate use, packing away the remainder as received and placing the cover on the can or tube.

In printing, the paper is placed in contact with the negative in the printing frame in the ordinary manner and exposed to daylight, direct sunlight will do no harm and is preferred to shade printing by many prominent workers.

The back of the frame may be opened to note the progress of printing, but in so doing turn your back to the window to avoid sunning the print.

Moisture must be guarded against as it is the greatest enemy of platinum paper, and to secure clear brilliant prints, the paper, printing frame and negatives must be absolutely dry.

When the manipulation has been fully mastered, certain modifications will suggest themselves for special purposes.

The temperature of the developing bath has a decided influence on both the tonality and the color of the image.

Damp paper will yield a print of a brownish black color, with a tendency to mealiness, therefore in taking up platinum printing, follow the manufacturer's instructions exactly.

ANGELO SEPIA PLATINUM PAPER.

Printing: Angelo Sepia Platinum Paper, like all Platinum papers, is a semi-developing-out paper, the image being only partially visible when printed. The full depth and brilliance is attained by immersion in the Angelo Sepia Developing Solution. Place paper in printing frame with the sensitive yellow side in contact with the negative.

Print in sunlight until the half tones are visible. Print deep for the high-lights; pay no attention to the shadows. As the paper is quite sensitive, it should be loaded into the frame and inspected during printing in a subdued light.

The image will come up stronger, more like the ordinary printing out paper than most platinum papers, but development is slower; this is an advantage as it affords much greater control during development.

Good results can be obtained from any good average negative.

Developing: Immerse print face up in the *cold* developing bath prepared as follows:

Dissolve the contents of the package of Angelo Sepia Salts in the amount of boiling water indicated on the package.

For the True Sepia Tone add one ounce of Angelo Sepia Solution to each ten ounces of the above bath.

For Warmer Tones add more of the Sepia Solution.

After the Sepia Solution has been added to the developer allow the mixture to boil for a few moments.

When cold the bath is ready for use.

Allow the prints to remain in the bath until full strength and brilliancy have been obtained.

It is obvious that an under-exposed print will not develop full strength and that an over-exposed one will develop too dark.

Retain the developing solution for future use, allowing the solution to settle, and making use of the clear portion only. When the greater portion of the old developer has been used, make up a fresh supply in the usual manner and add to the old bath.

It is not necessary to filter the bath, so long as only the clear portion is used.

Always keep away from the strong light.

Clearing Bath: When the print is fully developed, immerse it face down in the clearing bath prepared as follows:

Water, - - - - - -	80 ozs.
Muriatic Acid, c. p., - -	4 drams.

The prints must go through three clearing baths and remain at least five minutes in each bath.

Separate prints each time they are washed.

Be careful not to carry any of the acid bath on your fingers into the developing bath.

EASTMAN ETCHING SEPIA PLATINUM.

A new hot bath paper of unusual brilliancy, combined with extreme richness of tone and coated on a mellow buff stock. Made in both smooth and rough surfaces. Print same as for Angelo Sepia.

Developing: Immerse print, face up, in a developing bath prepared as follows:

Dissolve the contents of a package of Eastman E. S. Developer in the amount of hot water indicated on the package. The following will also give good results: Dissolve four ounces Neutral Oxalate of Potash in 25 ounces of hot water and add ¼ ounce of Citric Acid. Use hot at 150° Fahr.

Prints should remain in the developer until the shadows are clear and strong.

Clearing Bath: When the print is fully developed, immerse, without rinsing, face down, in a clearing bath prepared as follows:

Water, - - - - - - - -	64 ozs.
Muriatic Acid, c. p., - - - -	1 oz.

Commercial Acid must not be used

The prints must go through four clearing baths, prepared as above, remaining for a least five minutes in each bath, and separated occasionally.

Separate prints each time they are changed.

EASTMAN ETCHING BLACK PLATINUM.

A black and white platinum with a soft pleasing warmth, found in no other platinum paper—decidedly away from the ordinary cold blue black. Perfectly simple cold development. Two surfaces, smooth and rough.

Print same as for Angelo Sepia and Eastman Etching Sepia Platinum.

Developing: Immerse print, face up, in a developing bath prepared as follows:

Dissolve the contents of a package of Eastman E. B. Developer in the amount of warm water indicated on the package. The following will also give good results: Dissolve four ounces Neutral Oxalate of Potash in 16 ounces of warm water and add one dram of Oxalic Acid. Use when cold.

Prints should remain in the developer until the shadows are clear and strong.

Clearing Bath: See formula for Eastman Etching Sepia Platinum. Page 127.

Washing: After the prints have been fully cleared, wash for one-half hour in running water, or in six changes of water, separating them one by one in each change.

Drying: Prints may be suspended by one corner to dry, or they may be placed between blotters to remove the greater part of the moisture, and then replaced between clean dry blotters to dry under light pressure.

Avoid the use of the ordinary and colored blotters, use only those specially made for photographic use.

Note: The following are the most important points in connection with the manipulation of Platinum paper and should receive careful attention.

Keep paper dry at all times before development.

When placing paper on negatives or examining prints, do not expose to strong light; weak daylight or gaslight will answer.

Keep up strength of developer, and do not use it too cold.

Slide prints under developer, face up, to prevent the formation of air bells.

Place prints directly from the developer into the acid clearing bath without previous washing.

See that clearing of prints is thorough. The last clearing bath should be free from any yellowness.

Use chemically pure muriatic acid for clearing bath.

If developer crystalizes on surface of prints, causing numerous fine, dark spots to appear during development, reduce the strength of solution by adding from one to two ounces of water to twelve ounces of developer.

ENLARGING.

Most amateurs are aware that beautiful enlargements of almost any size can be made from Kodak or any small negatives, but are possessed of the idea that the process of enlarging is intricate and requires a great deal of apparatus and technical skill. As a matter of fact the making of an enlargement is simple and requires practically no apparatus beyond the Kodak.

In the following pages we clearly describe the characteristics and uses of Bromide and Velox Papers and demonstrate how the Kodak and many of the other hand cameras may be utilized for the making of enlargements. No attempt is made to describe the more intricate and costly apparatus demanded by the professional, but we confine ourselves to the demands of the average amateur.

Bromide Paper: Bromide Paper is a pure photographic paper coated with a sensitive compound, composed principally of bromide of silver and white gelatine and similar to the emulsion of the ordinary dry plate or film, only of much less rapidity, permitting manipulation by a stronger light than would be safe for plates.

Bromide of silver gives a pure black tone when exposed to light and then developed, the unexposed portions of the paper coated with this emulsion remain perfectly white except with Royal Bromide paper which is coated on a delicate cream stock.

If the beginner will consider the sheet of bromide paper as practically the same as a slow dry plate, and that a positive image is produced by photographing through the negative on to the sheet of Bromide paper with the negative and sheet of paper some distance apart instead of in contact, as in making an ordinary print, a clearer understanding of the process will be afforded.

Bromide paper has remarkable keeping qualities both before and after exposure, and the developed print when carefully fixed and washed is as permanent as the paper support itself.

What is an Enlargement? An enlargement, in the usual sense, is a positive image or picture obtained by permitting rays of light to pass through a negative, then through a lens and focusing on a sheet of sensitive bromide paper; the size of the projected image depending upon the distance between lens and sheet, the further the sheet is from the lens the greater the enlargement, which will be readily understood by reference to diagram on page 130.

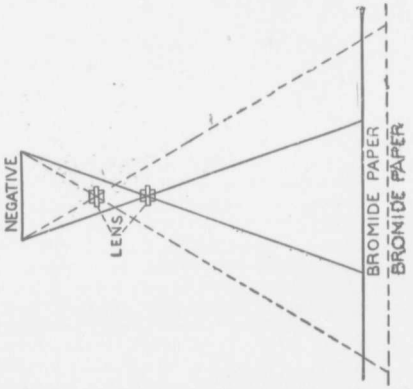
An enlarged negative can also be made in the same manner by using a small positive, the projected image focusing on a dry plate instead of on bromide paper.

Utilizing the Kodak for Enlarging: Most of the present models of the Kodak can be utilized for enlarging, excepting only those models not permitting the removal of the back and the racking back and forth of the lens.

The use of Kodaks such as the No. 2 Flexo and No. 2 Bulls-Eye for enlarging is limited, as the distance between the focal plane and the lens is fixed and prevents the making of enlargements beyond a certain size. The folding Kodaks (except the No. 1 and No. 1A) and the Cartridge Kodaks, including the Screen Focus Kodak, lend themselves particularly well to enlarging.

The method of utilizing these instruments is shown in the following:

In enlarging by daylight with the Kodak all that is required is a room with a north window preferred, through which the light can enter without obstruction from trees or near by buildings.



A room with one window is preferable as this of course lessens the difficulty in excluding white light. It must be remembered that although Bromide paper is much less sensitive than a dry plate, an instant's exposure to white light will ruin it.

The window should be blocked up to exclude white light by means of a closely fitting wooden shutter, or any perfectly opaque substance such as heavy card or press board fastened in place with small nails. An opening will of course have to be made in this shutter to receive the Kodak holding frame as will appear in the following diagrams:

Figure 1 illustrates the frame for holding the Kodak when used as an enlarging camera. This frame is simply a shelf with a projection to hold the Kodak and negative firmly in position, and can easily be constructed with the simplest tools.

The Shutter to exclude light from the window, and to which the holding frame is attached, need be of wood only where the

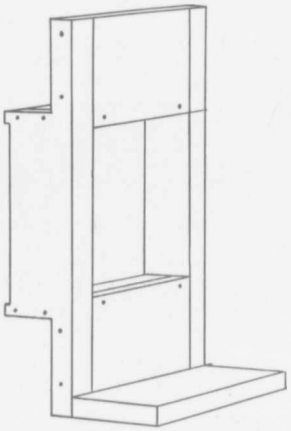


FIG. 1.

frame is attached, the remainder of the window may be blocked up with pressboard or opaque cloth. This will lessen the expense and also facilitate the putting in place and removal of the frame.

Figure 2 shows the Kodak and holding frame in profile and illustrates method of holding Kodak in position with rubber bands.

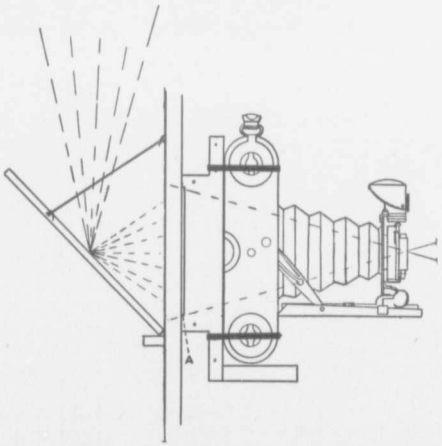


FIG. 2.

To place negative in position for enlarging, procure two pieces of plain glass, the same size as the negative, or that will fit opening A in the holding frame; see that the glasses are without flaws and perfectly clean, place the negative to be enlarged from, between the glasses, binding ends of glasses with a small piece of adhesive binding paper to ensure the negative lying flat. Then insert glasses in groove A, with the negative upside down and with the dull side facing into the room.

Next remove the back from the Kodak (as it will not be used while enlarging), and place the Kodak in the holding frame as

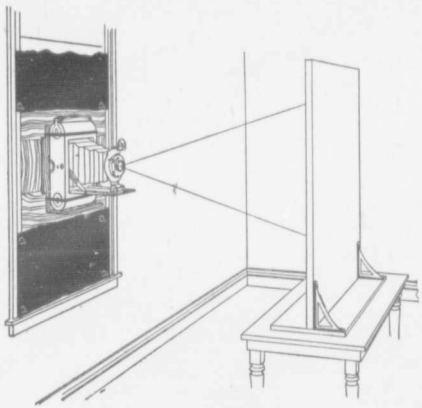


FIG. 3.

shown in Fig. 3, securing the Kodak to the frame with heavy rubber bands as shown; by using rubber bands the Kodak is held firmly in position and without danger of marring or scratching the leather covering.

When it is the intention to use one of the Folding Pocket Kodaks the holding frame should be constructed so as to allow a distance of at least three inches between negative and back of Kodak, as this will, with the Kodak Portrait attachment in place, increase the focal capacity of the Kodak sufficiently to permit the making of two time enlargements from the whole negative.

In many instances the actual picture is contained in a comparatively small portion of the negative, and in such cases all unused portions of the negative may be covered with a mask of post office or black paper.

If any light enters from between the Kodak and the holding frame it may be excluded by throwing an opaque cloth over the frame.

The Cartridge Kodaks and the Screen Focus Kodak may be utilized in practically the same manner as will appear by referring to Fig. 4. The Kodak is easily held firmly in place as shown in the diagram.

Any Plate Camera of the so-called cycle type may be used for enlarging by making use of the holding frame.

The negative in such cases is best secured in position by utilizing an old plate holder with the center septum and dark slides removed, insert the negative in the plate holder upside down and with the dull side toward the lens, placing the holder in the back of the camera in the usual manner.

If ground glass in the back of the camera intercepts too much light it should be removed.

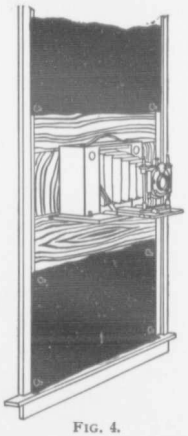


FIG. 4.

Unless the window you intend to use commands an unobstructed view of the horizon, a piece of heavy white cardboard about 15 inches long and 12 inches wide or larger should be placed just outside the window at an angle of 45° to reflect the light from the sky. (See Fig. 2.)

To ascertain if the reflector is in the proper position place a sheet of ground glass over the opening in the holding frame. If properly placed the ground glass will be evenly illuminated. No harm will result if the sun shines on the ground glass and reflector, provided it strikes evenly; if the light is too strong the lens can be stopped down.

The easel or copy-board for holding the Bromide paper may be constructed as shown in Fig. 3, or it may be modified to suit individual needs or conditions.

In cases where the window is some distance from the floor, or the window surface is exceedingly large, the Kodak holding frame

may be placed directly on the lower sill and the light excluded by covering the balance of the window as previously suggested. The whole apparatus is so exceedingly simple that modifications to suit individual requirements can easily be made.

Care must be observed to keep the easel front exactly parallel with the negative.

The best negative for enlarging from is one not too dense or too weak but with good detail in the shadows and transparent in the high-lights.

The Size of the Enlargement Depends upon the focus of the lens and the distance of the easel or copy-board from the negative. Even when using the No. 4A Folding Kodak with its lens of 8½ inch equivalent focus, a six times enlargement will only require a distance of five feet from the lens to the Bromide paper, so it will be seen that only a small space is necessary for all ordinary requirements.

The Lens: Any lens that will make a good negative may be used for enlarging. The proper size (focal length) of the lens depends entirely upon the size of the negative to be enlarged from and not at all upon the size of the enlargement to be made.

The lens that made the negative will be suitable for enlarging from that negative. If the lens will cover the negative it will make an enlargement from it of any size. Any Kodak lens is suitable for enlarging from negatives made with the Kodak to which it is fitted.

Making the Exposure: Having placed the negative in position, and taking care that the package of bromide paper is well protected, set the shutter for time and press the release to open same, an image more or less blurred will appear on the easel, now move the easel back and forth until the desired size of the enlargement is secured, then focus the image sharply by racking the lens back and forth.

The nearer the lens is placed to the negative the greater the size of the enlargement and the copy-board will have to be moved back correspondingly to obtain sharp focus.

Focus with the lens fully opened, then stop down to at least stop .16. This not only insures good definition but by lengthening the time of exposure permits greater control during exposure, affording time to shade or locally increase the exposure on any portion of the image.

After having obtained the desired size and correct focus close the shutter and place the sheet of Bromide paper in position on the easel or copy-board. Before capping the lens or closing the shutter the correct position for placing the sheet of Bromide paper should be marked on the copy-board.

A deep colored ray screen may be utilized as a lens cap, as the light coming through this screen will not affect the Bromide paper for a few minutes, and the operator can by this means see just where to fasten the sheet of Bromide. It is perhaps unnecessary

to state that the coated or emulsion side of the paper should be out. (The coated side is slightly concave.)

Before opening the package of Bromide paper see that no white light enters the room. It is well to provide a good sized box with a hinged, light tight cover to keep the Bromide paper in until needed, with also a compartment to hold the exposed sheets when making a number of enlargements to be developed later.

Test Exposures: After the correct size and focus has been obtained the next step is the exposure.

Provision should have been made for a non-actinic yellow or orange dark-room lamp, or a small window opening outside covered with several thicknesses of yellow or post office paper.

In first attempting the making of enlargements, test strips for determining the accuracy of focus and proper duration of the exposure should be employed.

A strip one or two inches wide and long enough to extend diagonally across the focused image will be sufficient.

Correct exposure depends on several factors; the intensity of the light, density of the negative, size of the enlargement, and aperture of the lens.

The first test exposure will be purely arbitrary; if the light be good and the negative of average density, say ten seconds.

Cover up two-thirds of the strip with a piece of cardboard, and expose for five seconds, move the cardboard and give the next portion five seconds, making ten for the first, then remove the cardboard entirely and expose the remainder of the strip five seconds, the fully exposed strip will now contain three different exposures, one of five seconds, one of ten and one of fifteen seconds.

While the exact time for the development of a correctly exposed Bromide enlargement cannot be given, the proper exposure may be readily determined by appearance as the image will appear gradually, developing brilliantly and attaining full strength in about one and a quarter minutes. Develop this test strip (see page 136 for directions). If these test exposures are all very much over or under exposed make another set of test exposures, being guided as to time by the first strip. If the image comes up rapidly, but dull and full of detail in the highlights, it has been over exposed; if weak and without detail, it is under-timed. Under different conditions the time required for exposure varies from five seconds to five or ten minutes, according to the light, density of negative, etc. However, a few trials will narrow the exercise of judgment down to the intensity of the light and the making of correct exposures becomes a simple matter.

In making enlargements of different sizes it must be remembered that light intensity decreases as the easel is moved further away from the lens. As an example: If an enlargement eight by ten in size requires ten seconds, one sixteen by twenty (which is four times as great in area) would require four times ten, or forty seconds exposure. Do not attempt to count seconds; use a watch or clock.

No printing process affords so many opportunities for modifying in the print the characteristics of the original negatives as Bromide enlarging.

Stop down the lens so as to afford plenty of time during the exposure, and we can shade a little here, give a little longer exposure there and obtain just the result desired, bringing out detail in shadows or softening a high light at will.

In shading any portion during exposure, hold the shade nearer the lens than the copy-board to avoid sharp lines and obtain the proper diffusion.

Development: After the exposure has been made the next step is development, which is accomplished in practically the same manner as in the development of a plate or film.

Provide a ruby or deep orange lamp, graduate, stirring rod and three trays, preferably of hard rubber or rubber lined, at least an inch larger each way than your sheets of Bromide paper, to facilitate handling.

A rubber lined tray of any size is easily constructed by glueing a sheet of gossamer rubber cloth into a wooden box or tray.

As the Bromide paper is not as sensitive to light as a dry plate or film a somewhat stronger light may be employed for developing. A small window opening outside, covered with two thicknesses of yellow post office paper will serve, or the ruby glass may be removed from the dark-room lamp. The remaining orange glass will be ample protection against fog and allow the process of development to be observed with greater ease.

Use developer at a temperature of about 70° Fahr. After exposure, soak the paper in water until limp and brush lightly over the surface, while wet, with a tuft of cotton and flow developer over the print.

With Nepera Solution 1 to 6 at 70° temperature the image should appear in from 12 to 15 seconds and the print allowed to develop for at least 1 minute to 1½ minutes. If the prints develop in less than one minute under the above conditions, the exposure has been too long. If the print is not fully developed in 1½ minutes under the above conditions, the exposure has been too short.

After development is complete the print should be rinsed in clean water for a few seconds and then immersed in the fixing bath. Do not attempt to develop too many prints in one portion of developer. (See page 137.)

There are a number of developers that will produce good results on Bromide papers, when used by experienced hands, understanding their limitations. The professional photographer enlarges from a uniform quality of negative and for a certain effect; on the other hand, the amateur, from the wide diversity of his attempts, finds his negatives varying in density and quality, and the best developer for him to use is the one affording the greatest latitude in exposure and development, and the one that keeps well in solution.

Without question Nepera Solution is the best developer for this purpose. Nepera Solution is known as the universal developer, as it may also be used for plates, films and Velox paper.

For use with Bromide paper, take

Nepera Solution,	1 ounce
Water,	6 ounces

Six ounces of the prepared solution will develop six 8 x 10 prints or their equivalent, after which a fresh solution should be prepared. When Nepera Solution is not obtainable, the following formula should be used:

ELON-HYDRO OR METOL-HYDRO DEVELOPER.

Hot Water,	8 ounces
Elon or Metol,	17 grains
Hydrochinon,	72 grains
Sulphite of Soda,	264 grains
Carbonate of Soda,	437 grains
Bromide of Potassium,	10 grains

The above formula should be prepared with desiccated sodas, preferably Eastman; if crystals are used, double the quantity of both sulphite and carbonate of soda.

In cold weather 1 oz. of wood alcohol should be added to the above to prevent precipitation.

This concentrated developer will keep indefinitely in full bottles well stoppered.

TO DEVELOP.

Take in a suitable tray—

Concentrated Solution,	1 ounce
Water,	6 ounces

This amount is sufficient to develop six 8 x 10 prints or their equivalent.

Fixing: If Bromide prints are fixed in the fixing bath prepared according to the following formula, there will be no evidence of blisters or frilling.

Hyposulphite of Soda,	3 ounces
Water,	16 ounces

A fresh fixing bath made up as above, should fix twelve 8 x 10 prints or their equivalent, after which the bath should be discarded.

The prints should remain in the fixing bath for at least fifteen minutes, but not longer than one-half hour, and should be moved one over the other occasionally to insure even fixing and to avoid staining.

After all prints have remained in the fixing bath for a few minutes, the yellow shade may be removed from the light and the balance of the operation continued by ordinary light. Be-

fore permitting white light to enter, be sure that any unexposed or undeveloped sheets of the Bromide paper have been carefully protected from the light.

After fixing, immerse prints for about ten minutes in a hardening bath composed of water, 16 ozs.; Alum, 1 oz. When removed from the hardening bath, the prints should be washed for at least one hour in running water, or in at least twelve changes of water, in a tray sufficiently large to permit the water to reach all portions of each print.

Move the prints one over the other occasionally to ensure the full elimination of the fixing solution.

If the following fixing bath is used, the alum hardening bath may be omitted:

Hypo, - - - - - -	16 ounces
Water, - - - - - -	128 ounces

When dissolved, add:

Metabisulphite of Potash, - -	½ ounce
Alum, - - - - - -	½ ounce

Drying: After the prints have been thoroughly washed, they may be suspended by means of pins from the edge of a table or shelf. Upon removal, when dry, they will curl but slightly and can be made to lie perfectly flat when required, by moistening the back only and re-drying between blotters under heavy pressure.

Do not use the ordinary commercial blotter as it usually contains a large percentage of hypo and other injurious chemicals.

Avoid also the use of colored blotters and those containing printed matter, as the coloring and printers ink are apt to impress themselves unpleasantly on the print.

Mounting: A very satisfactory way for mounting small enlargements, not larger than 6½ x 8½, (Above that size they are best mounted wet with a good starch paste as a Kodak Dry Mounting Press would be necessary with the tissue in the large sizes and this, of course, the amateur would not be likely to have in his equipment,) is by the use of Kodak Dry Mounting Tissue, as the print lies absolutely flat in perfect contact, even on the thinnest mount and *without curl.* See page 109.

To mount with paste proceed as follows:

On Card—Bromide prints may be mounted wet. Lay the wet print face down on table covered with oil or rubber cloth or sheet of glass and squeegee off all the surplus water, then brush over the back with thin starch paste, lay the print on the mount, then cover the print with a clean sheet of paper, and press into contact with a squeegee or rubber print roller.

Straightening Unmounted Prints—After drying, prints may be straightened by the scraping action of a sharp edged ruler applied to the back; the corner behind the ruler being lifted as the ruler is passed along.

Hints: MEALY MOTTLED PRINTS—Over exposure and short development.

GREENISH TONES—Over exposure or too much bromide.

FACE OF PERMANENT BROMIDE PAPER can always be distinguished by looking through it or upon it in a good light; unfixed portions will be a greenish yellow.

RUNNING WATER is not so sure a means for washing prints as changing them from one tray to another, allowing them to soak at least ten minutes in each change of fresh water; twelve changes are sufficient; no less.

If one has a weak negative to enlarge by daylight, a strong print may be obtained from it by varnishing the back with ordinary negative varnish slightly tinted with a yellow aniline dye. Where many such negatives have to be treated, separate glasses, tinted to various shades of yellow, may be employed; one of these glasses being put directly behind the negative, between it and the source of light. Only a very slight yellow tint is required to increase the contrast in the resulting print to a marked degree.

A glass tinted with blue varnish will reduce contrast.

What Paper to Use: Eastman Permanent Bromide papers, since their introduction thirty years ago, have been considered standard by the photographic public, and testimony as to their superiority is constantly being received.

The list and description of the various kinds of Eastman Bromide paper, and statement of use to which each is best adapted, is as follows:

VELVET BROMIDE: Suited to negatives having broad shadows, the slight sheen of the semi-gloss surface giving to enlargements from such negatives a life and brilliancy which is highly pleasing. Velvet Bromide is especially appreciated by those who enlarge from amateur or landscape negatives.

STANDARD BROMIDE PAPER is a natural surface Bromide paper, which is especially adapted to all kinds of enlargements, particularly copies on which crayon or pastel work is to be done.

The emulsion is coated on three different weights of paper—A, thin smooth—B, heavy smooth—C, heavy rough.

The A thin smooth, for contact prints or small enlargements which are to be spotted or finished in India ink or water colors.

The B, heavy smooth, for large enlargements which are to be spotted or finished in water colors, India ink or oil.

The C, heavy rough, is best adapted to rough work, which is to be finished in crayon or pastel; it can also be finished in India ink or water colors.

The BB, double weight, same surface as A, and the CC, double weight, same surface as C, need no future description. Their use for unmounted prints and large work is constantly increasing.

PLATINO BROMIDE PAPER gives results so nearly like platinum that the difference, if any, is difficult to detect. It has a fine surface and is best adapted to contact prints and enlargements from portrait negatives.

Made in two weights—A, thin smooth—C, heavy rough.

The A, thin smooth, should be used for contact prints or small enlargements which are to be spotted or finished in India ink or water colors.

The C, heavy rough is intended for large work which is to be spotted or finished in crayon or pastel, India ink, water colors or oil.

MATTE-ENAMELED BROMIDE PAPER—Rich carbon blacks and a smooth velvety Matte surface tinted just enough to lend warmth to the high lights and half tones.

ENAMELED BROMIDE PAPER—A glossy Bromide paper gives enlargements which closely resemble glossy contact prints. When squeegeed to ferrotype plate it gives a gloss which is fully equal to that produced by the glacé process. It is furnished in medium weight paper only.

ROYAL BROMIDE PAPER—Sepia toned enlargements made through bolting cloth on Royal Bromide Paper have the breadth and softness of fine old etchings.

Negatives having a dark, sketchy background, deep shadows and snappy high lights will combine to produce an effect with Royal Bromide not obtained with any other Bromide paper.

Royal Bromide is not intended for use when vignetted prints with white backgrounds are wanted, as it is coated on paper having a delicate cream tint, the yellowish cast in high lights harmonizing beautifully with dark backgrounds.

Silk bolting cloth helps to produce the general artistic effect by increasing the softness and breadth.

Made in two surfaces, rough and smooth.

Special Effects: Pictures of beautiful softness and breadth can be made on Royal Bromide by making the enlargement through a screen of silk bolting cloth.

The screen softens the heavy mass of shadows and blends them in harmony with the higher tones.

The most convenient way to use the bolting cloth is to stretch it over a frame or strainer. If the screen be used in direct contact with the paper, the enlargement has the effect of being made on fine meshed canvas.

To secure great diffusion place the screen at a distance of ¼ inch to one inch from the paper.

The further the screen is removed the greater the diffusion of light.

The use of the screen increases the exposure about one-third. Focusing should be done before the screen is put in place. With smooth paper the fine mesh bolting cloth should be used. With rough paper use either the medium or coarse mesh. For small prints use fine mesh. For the convenience of our customers we have arranged to furnish the best quality of silk bolting cloth and will ship same in rolls, thus avoiding all folds or creases in the cloth.

Sepia Tones: There is a growing demand for warm-toned bromide paper prints, which will be satisfied by Royal Re-Developer.

Permanency—Prints toned in Hypo-Alum have been proved permanent by thousands of users and Royal Re-Developer affords

results chemically identical with those obtained by the Hypo-Alum toning. Re-Developed prints suffer *no change* in detail or gradation.

A Bromide print of any texture of surface, which, when made, was *evenly fixed* and *thoroughly washed,* will give a desirable result when Re-Developed.

Some additional features of Royal Re-Developer are as follows:

Uniformity—Following the directions given herewith will insure absolute uniformity.

Rapidity—A Bromide print can be turned Sepia is less than two minutes' time.

To Prepare Solutions: To prepare bleaching bath dissolve contents of tube marked "Bleaching Agent" in 20 ounces of water, to which should be added twelve drops of aqua ammonia.

To prepare re-developing solution, dissolve the contents of a tube from the carton marked "Re-Developer" in 32 ounces of water.

The process for Sepia Toning Bromide Prints is the same as for Velox. See "Sepia Toning on Velox", page 112.

Contact Printing: Eastman Bromide Papers may be used for contact printing by either artificial or daylight, but we would recommend for this purpose Velox paper, as that is manufactured especially for such purpose.

Eastman Bromide paper is very sensitive. It cannot be handled in an ordinary light and the printing frame must be loaded and the unexposed paper handled only by yellow or orange light.

For daylight about two thicknesses of yellow post office paper over the dark-room window would be safe or one thickness when working by gas or kerosene.

The exposure varies with the intensity of the negative and quality and intensity of the light. An average negative would require approximately one-quarter second by daylight or ten seconds at a distance of one foot from a number 2 kerosene burner.

ENLARGING ON VELOX.

Special Velox, instead of Bromide paper, may be employed for making enlargements, but we do not recommend it for daylight enlarging except in cases where the negative can receive the full light from the sky.

In cases where the light is reflected upon the negative Velox is not of sufficient rapidity to prove of practical value.

While Velox entails a very much longer exposure to the light than Bromide paper, it possesses the great advantage of being handled in a much stronger light and does away entirely with the dark-room for any of the operations. The contrast of Velox makes it specially well adapted for enlarging from small, weak negatives and a great latitude in exposure and development enables

the amateur with but little experimenting to secure first-class results.

When using Velox, there is of course, no difference in the method of loading the camera, from that when using Bromide paper, except that no dark-room is necessary; the window shades should, however, be pulled down and the paper handled in a corner of the room furthest from the outside light.

For enlargements up to 8 x 10, with negatives of average density, an exposure of about thirty minutes under a bright sky will be approximately correct. One or two test exposures with an average negative will determine the exposure time for all negatives under similar conditions. It must be remembered that negatives of a yellowish color will require much longer exposure and also that the light in the winter months is very much slower than in the summer, and that a proportionately longer exposure must be given:

After the exposure has been made, development and fixing are carried out in the same manner as when making contact prints. For developing Velox enlargements, we recommend Nepera Solution.

Nepera Solution, - - - - -	2 ounces
Water, - - - - - - -	4 ounces

Temperature 70 degrees Fahr.

If you wish to prepare your own developer use formula on page 137, diluting as above.

After the Velox enlargement has been developed, immerse for a moment in a tray of clean water and then transfer to the fixing bath.

NOTE—Velox enlargements may be fixed and washed the same as Velox contact prints. See pages 107-108.

After fixing and washing the print should be dried in accordance with the directions for Bromide paper. See page 138.

THE BROWNIE ENLARGING CAMERA.

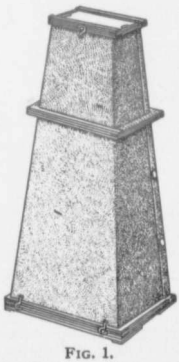


FIG. 1.

The Brownie Enlarging Camera idea is this: To dispense with all fancy adjustments and to furnish at Brownie prices, just the result-producing parts necessary for daylight enlargement.

How well this idea has been carried out may be seen from the low prices at which these cameras are furnished and the fact that with them, enlargements up to the 8 x 10 size may be had, enlargements of as good quality as can be obtained by any method whatever.

The Brownie Enlarging Camera is simply a cone-shaped box, constructed of substantial material, with a holder for the paper, at the large end, negative holder at the small end. The box is collapsible for convenience in carrying. It can be set up,

ready for use, in a few seconds. The lens (which comes with each Enlarging Camera) is fitted inside the cone at just the right distance to insure a sharp focus always; an out of focus enlargement is impossible if the negative is sharp.

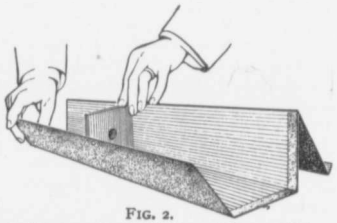


FIG. 2.

In making an enlargement, one merely sets up the box, places the negative in its holder, a sheet of Bromide or Velox in the paper holder, and makes the exposure by setting the camera where the full, unobstructed light (not direct sunlight) of the sky will fall upon the negative. When sufficient exposure has been given (explained in the Brownie Enlarging Camera Manual) the paper is developed in the usual manner.

If Velox paper is used no dark-room is necessary for any part of the process. If Bromide paper is used, owing to its greater sensitiveness to light, the loading and development of the paper must be done in the dark-room, but there is a gain in that the length of the exposure is decreased.

The No. 2 Brownie Enlarging Camera makes 5x7 enlargements from 2¼x3¼ negatives, or 5 x 5 enlargements from 2¼ x 2¼ negatives.

The No. 3 Brownie Enlarging Camera makes 6½ x 8½ enlargements from 3¼ x 4¼ negatives.

The No. 4 Brownie Enlarging Camera makes 8x10 enlargements from 4 x 5 negatives and will also enlarge from 3¼ x 5½ negatives.

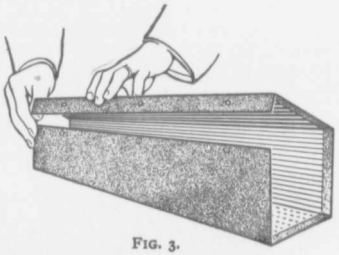


FIG. 3.

One of the greatest evidences of the practical merit of these cameras is the fact that they have been adopted by people who make a business of enlarging for amateur photographers.

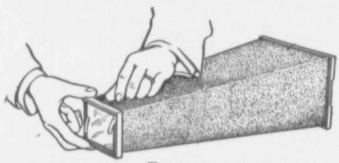


FIG. 4.

The ease of setting up the Brownie Enlarging Camera is shown in the accompanying illustrations. On opening the collapsible cone, about six inches from the front or small end will be seen four cleats or cross pieces, one on each section. These serve to retain the lens board in position when cone is erected.

The lens board is to be placed just back of the cleats and the cone closed, as shown in Figs. 2 and 3. The cone is fastened by

buttons along the side, which hold the cone securely while attaching the negative and paper holders.

The negative holder is a small frame containing two sheets of glass and is fastened to small end of cone by means of hooks (Fig. 4). The paper holder is attached to the large end in the same manner. A binding frame is then slipped over the cone and forced towards the base until it fits tightly, thus holding the cone absolutely light-tight (Fig. 5).

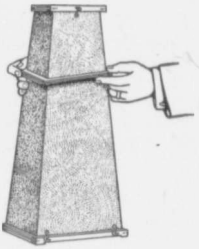


FIG. 5.

The camera is now ready, and the negative from which the enlargement is to be made should be placed in the front frame between the two glasses.

The paper holder is loaded with a sheet of Bromide (in the dark-room) or Velox (in subdued light) and all is ready for the exposure, the duration of which is explained in the enlarging camera manual.

THE BROWNIE ENLARGING CAMERA ILLUMINATOR.

The Brownie Enlarging Camera Illuminator adds greatly to the pleasure in the use of the Brownie Enlarging Camera; with it enlargements on Bromide paper may be made in the evening, or at any time, wherever the ordinary electric current is available.

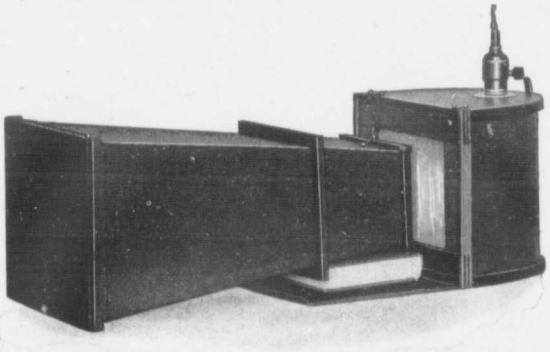


FIG. 1.

As shown in Figure 1, the Illuminator consists of a light tight box, provided with a semi-circular reflector, and adapted to enclose a Tungsten electric bulb. The rays of light are reflected upon an opal glass screen, affording an even and full illumination of the negative.

In front of the opal glass screen is attached a screen of orange fabric, which is dropped down out of the way when making an exposure as shown in Figure 2.

When this orange screen is returned to its original position (where it is secured by snap buttons) it forms an ideal light for developing the enlargements.

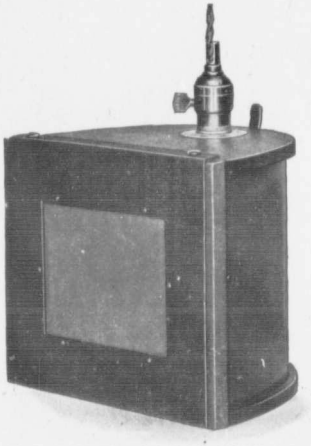
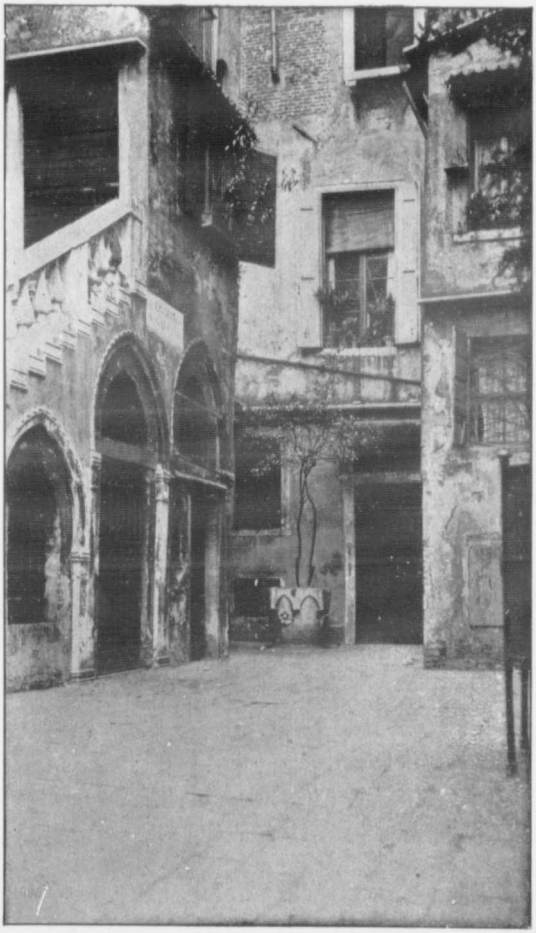


FIG. 2.

The Illuminator is substantially constructed, and so that it may be taken apart and packed flat for shipment or storage when not in use. It is as easily assembled as the Brownie Enlarging Camera and may be put in commission in a few moments.

With a 100 watt Tungsten lamp, (equal to 75 candle power) which we recommend for use, fully timed enlargements may be made in from one to ten minutes according to the density of the negative.

The necessary lamp, cord and socket attachment can be obtained from any dealer in electric supplies. The price of the Illuminator is three dollars and a half.



An Italian Court Yard.

CLOUDS AND THE LANDSCAPE

The subject of clouds in photography is one that, although given some thought by advanced amateurs, has not been given the attention which it deserves. It is not alone an interesting study, but it is necessary that one understand how to produce clouds in his pictures when he is unable to obtain them directly in the negative. Frequently we pick up a landscape; both the composition and lighting are good but there is something lacking to that harmony which is so essential in landscape work. Above the landscape we see a blank white space and a second thought suggests that a cloudy sky would have given a finish to the picture that could be obtained in no other way.

There are two methods of obtaining clouds: First, to photograph the landscape when there are clouds in the sky; second, to obtain the clouds by the printing-in process. Both have their advantages. With the former the great difficulty lies in being able to give an exposure that will allow of obtaining a negative having a sky and foreground of proper relative printing densities. In most cases we expose for detail in the foreground and by so doing we over-expose the sky, and the result is that that portion of the negative is strong or dense and lacks almost entirely in detail. If we expose for the clouds, we under-time the foreground.

N. C. Film is particularly adapted to this class of work because of its orthochromatic qualities, which makes it possible to obtain better color values. This results in a negative having more even density. We may also use the color screen, or filter, which in a large degree compensates for the want of agreement between the sensitiveness of film and the sensitiveness of the eye relative to color. The best results, however, are obtained by the combination of N. C. Film and the color screen. Occasionally, even when using orthochromatic film in connection with a color screen, we obtain a dense sky, due to over-exposure and sometimes to over-development. It then becomes necessary to reduce the strength of that portion of the negative if we would obtain detail in our prints.

The following formula for reducing will be found to give very satisfactory results if the instructions are properly carried out:

To 1 oz. of Red Prussiate of Potash add 16 ozs. of water. Dissolve and keep from the light in a tightly corked bottle. Then make a separate solution composed of 1 oz. of Hypo-Sulphite of Soda to 12 ozs. of water, to be kept in a separate bottle. With the above solutions, a couple of trays, plenty of water and several tufts of absorbent cotton you are prepared to do the work.

After placing 4 ozs. of the Hypo solution in a tray, add about one teaspoonful of the Potassium solution. This is known as the reducer. If, after a trial, this is found to be too weak, add more of the Potassium; if too strong, add water. After thoroughly washing your film or plate place it against a sheet of

Over Yonder.

ground glass (sky down) which has been inclined at an angle of 45 degrees, over a tray that will catch the drip, and before a light that will enable you to see through the negative. Now take a tuft of cotton soaked in the solution and gently rub that portion of the negative that you wish to reduce. You should also go over the surface every three or four minutes with a second tuft of cotton saturated with clear water in order that the negative reduce evenly. Be sure to keep the reducer off any portion of the negative that you do not wish it to act upon. Watch the action of the solution closely so that it does not go too far. When the negative is reduced to the proper density, place it in running water for an hour or so in order to stop all action of the reducer.

The Printing-in Method: Before attempting to add clouds to your landscapes by the printing-in process, it would be well to obtain a collection of cloud negatives in order that you may be able to select one that will fit each case, for it must be remembered that the clouded sky needed in each instance depends almost entirely upon the conditions existing at the time the landscape negative was obtained. For instance, should you picture a landscape when the sun is directly back of the camera and then print-in from a negative, the clouds of which have received their illumination from immediately in front of the instrument, you can readily imagine the result, due to cross lights throughout the picture.

Then again, if the landscape is illuminated from the left, see that the clouds in the negative used are illuminated from the same point. Do not combine clouds taken on a sunless, lowry day with a landscape taken when illuminated by the direct rays of the sun, or vice versa.

Cloud negatives that are to be used for printing in should be thin. They should, however, have sufficient strength to give brilliancy to the print. There are several advantages in using a cloud negative which is more or less transparent, as you can see through it and better judge as to its adjustment over the print to which you propose to add the clouds.

The Negative: When obtaining negatives for printing-in, it is necessary to make very short exposures because if we over-expose, even very slightly, we destroy the delicate contrasts that exist between the high-lights and shadows and thereby flatten the negative. For instance, if we make an exposure of $\frac{1}{50}$ of a second with stop U. S. 8 for an ordinary landscape fully illuminated by the direct rays of the sun, we in most cases properly time the foreground but overtime the sky, destroying its beauty, and for that reason, when exposing for the sky alone, $\frac{1}{50}$ or even $\frac{1}{100}$ of a second with stop U. S. 32 will in most cases give perfect detail.

An exposure thus obtained should be carefully developed, too much contrast avoided and development stopped the moment that full detail appears. You will then have a negative that will print rapidly and give you all the gradations of light and shade that were impressed upon the eye at the time the exposure was made.

It would be well to add that if a light color screen is used, it will improve your negative somewhat but will increase the length of the exposure required.

The Process: In the first place, it is necessary, when printing the foreground to obtain a white sky. In order to do so you must mask that portion of the negative in order that the light may not penetrate the film and affect that part of the print underneath it. First, take a sheet of thin strawboard and roughly sketch across its surface (about midway between the top and bottom) a mark to correspond as nearly as possible with the sky line of your negative; then cut your board along this line. Save both halves because you will need them later. Now procure a print frame (containing a sheet of glass) somewhat larger than the negative you are to print from and after locating said negative in the proper position, fasten it to the glass with small stickers, then tack the upper half of the cardboard to the face of the frame so that only that portion of the negative which you wish to print from will show. Now cover the entire face of the frame with tissue paper and you are ready to print. After removing the print from the frame, if you use printing-out paper, you will find a properly printed foreground with a pure, white sky.

Now place your cloud negative in the print-frame and properly locate the print over it, using the lower half of the cardboard to cover up the foreground so that the light will reach the sky only. It should be borne in mind that the cardboard (which we will call a mask, or vignetter) when tacked on the frame should be raised up from the glass about one-quarter of an inch, so that, when printing, the light will diffuse and not produce a sharp line on your print. When using Velox, as the image does not show before development, it will be necessary to mark the paper at the edge in order to tell just where the sky line comes: otherwise you will be unable to properly locate your cloud negative. When using developing papers it would be well to paste two or three thicknesses of tissue paper over your frame.

LANTERN SLIDES.

The making of lantern slides is one of the most fascinating and at the same time one of the simplest branches of amateur photography.

A well selected and prepared set of lantern slides will provide a most pleasant evening's entertainment, and as the apparatus necessary for projection does not entail a great outlay, the amateur pursuing this branch will find his efforts well rewarded.

The first essential for a good lantern slide is a good negative, one not only of even gradation, but free from physical blemishes such as pin holes or scratches. It must be remembered that the picture thrown on the screen is magnified many times and imperfections almost too small to be noticed in the negative or slide will show up most alarmingly on the screen.

On the other hand it is quite possible to produce a good slide from an indifferent negative, by alterations in exposure and development:

For instance, a flat negative may be made to yield greater contrast in the slide by a slight under exposure and a little longer development, or if the negative has more than the proper contrast a little longer exposure will tone this down, thus evening up the gradation in the slide.

In selecting negatives to be used in making slides, examine them carefully, spotting out with extreme care, pin holes, scratches and the like.

In spotting be careful to match the surrounding density as nearly as possible for if your fill in is too strong, it will result in corresponding transparent spots on your slide which will be exceedingly difficult to doctor.

Making the Slide: There are two methods of making lantern slides, by contact, and by reduction. The contact method being the simpler of the two will, no doubt, appeal to the beginner.

The contact method entails no apparatus beyond an ordinary printing frame. With this method the negative is placed face up in the printing frame, and the lantern slide plate is placed in contact with it, the exposure being made in the same manner as when making a Velox print. It stands to reason, that by the contact method, if the negative is larger than the slide plate, only such portions can be used, as will come within the limits of the slide plate.

In a great many instances the actual picture is confined to a small portion of the negative, and the area of the slide plate will be found sufficient to encompass it.

When such is not the case the reduction process must be resorted to.

In making slides by contact it will be well, though not absolutely necessary to select a printing frame several sizes larger than the negative employed.

NOTE—If you are working with film negatives, the printing frame should be provided with a sheet of clean clear glass as a support.

As lantern slide plates are as sensitive to white light as a sheet of bromide paper, the operations of exposure and development must be carried on in the dark-room, making use of the regular dark-room lamp; the actual exposure, of course, being made by white light.

After placing the negative in the printing frame, face up, place the lantern slide plate film side down, in contact with the negative, covering with a black paper mask such portion of the negative as you do not desire to have included in the slide. Remember, that as all slides are used in the lantern horizontally, no slides can be made vertically on the slide plate.

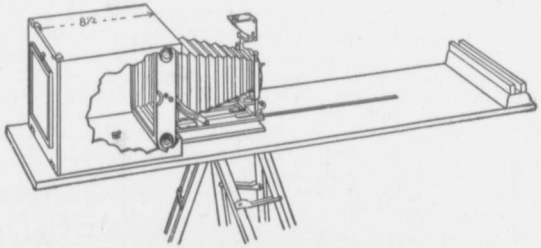
Having adjusted the slide plate on the negative to your satisfaction, place the back of the printing frame in position, and before making the exposure, see that the cover is on the box of unexposed slides. The exposure should be made by artificial light, such as the ordinary oil lamp, or a gas or electric lamp. To secure even illumination the printing frame should be about twelve inches from the light.

The time of exposure will, of course, vary according to the density of the negative and the intensity of the light, and as the various brands of lantern slide plates differ in rapidity, a test exposure will be necessary.

As a basis for a test using a Welsbach gas burner, select a negative of average density, cover one-half, and make an exposure of six seconds, then uncover and make another exposure of six seconds, you will then have one-half of the plate with twelve seconds exposure, and the remaining half with six.

Develop, fix and wash the same as for a dry plate (using the formula recommended by the maker of the plate you are using) and determine the correct exposure from this test.

Slides by Reduction: When making slides by reduction, the whole or any part of the negative may be reproduced in the slide, as the negative image is projected upon the surface of the plate, in a manner similar to that employed in the making of enlargements.



Utilizing the Kodak for slide making.

The above illustration clearly shows how any one of the Folding Kodaks (except the Nos. 1 and 1A) may be utilized for slide making by reduction.

As the bellows extension of the Kodak is insufficient for producing full sized slides, except from very large negatives, the necessary focal length is obtained by means of an extension at the back. This extension is simply a rectangular wooden box, with an opening in the front just wide enough to admit the extended bellows and base board of the Kodak when pushed through from the inside of the box. (The back of the Kodak, of course, being removed.)

The body of the camera being held in position against the front of the box by means of two small metal hooks.

The length of the extension is determined by the bellows length of the Kodak. The Kodak used in the illustration is the 3A, the extension being 8½ inches. This is sufficient for producing full size slides 3¼ x 4 inches from 3¼ x 5½ negatives, or larger. The back of the box is hinged at the bottom, allowing it to drop down to admit the Kodak, fastening at the top by means of a spring catch.

An opening is cut in the back of the box 3⅜ x 4⅛ inches and rabbets fitted to receive a sheet of ground glass in a frame, or a 3¼ x 4 plate holder.

The frame holding the sheet of ground glass for focusing should be the same thickness as the plate holder and care exercised that the ground glass and lantern plate are in exact register.

NOTE—A 4 x 5 or 3¼ x 5½ plate holder may be used if fitted with a 3¼ x 4 kit.

The back of the extension should rest against small cleats inside the extension, so as to make it light tight, and the interior painted a dull black to avoid reflections.

The illustration shows the Kodak and extension fitted to a board 3½ feet long and 6 inches wide.

The board is slotted, to receive a tripod screw fitting into a socket in the bottom of the extension, so that the Kodak may be firmly locked at any point.

The front end of the board is rabbeted to receive an ordinary printing frame, without the back, for holding the negative.

The negative is placed in the frame, with the emulsion side facing the Kodak, and held in place by means of turn hooks or thumb tacks.

A good strong tripod forms a splendid support for the outfit, or it may be placed on an ordinary table.

For exposure, a north light is preferable, and one unobstructed by trees or buildings. If this is not possible, place a sheet of finely ground glass back of the negative to diffuse the light evenly. All windows should be blocked, except a space a little larger than the negatives used, and the negative placed as close to this opening as possible. The image is focused on the ground glass panel at the back of the extension in the ordinary manner, after which the plate holder is inserted and the exposure made by means of the shutter.

As the speed of lantern slide plates is practically the same as that of bromide paper, see page 135 for suggestions as to exposure.

SUGGESTIONS.

Trim, Trim, Trim.

Trim your prints mercilessly. It is safe to say that three pictures out of every four can be improved by a judicious use of the shears. One picture has too much sky, another too much foreground and another one a whole side with nothing in it worth keeping. When a portion of a picture has nothing in it that is interesting or necessary to the balance of the picture cut it out. Note, if you please, the improvement made by cutting off the foreground in the accompanying illustration. Left untrimmed, as in Fig. 1, the

FIG. 1.

FIG. 2.

Illustrating the value of judicious trimming.

picture has little to recommend it, but with a snip of the shears we have cut out the flat uninteresting foreground and have secured a picture of far more than usual interest and beauty (Fig. 2). Take two cards and experiment with your photographs if you have not the heart to attack them with the shears, laying the cards on them in such a way as to cut out from view what seems to be undesirable parts. An experiment of this kind will soon satisfy you that the shears can be used to advantage.

Helpful Hints:

Don't use your hypo tray for anything but hypo.
Look on your ground glass, not through it.
Keep films, plates and paper in a cool dry place.
Label your chemical bottles and keep them well stoppered.

Always dust out your plate holders and dust plates well before loading. A speck of dirt on the plate will leave a transparent spot which will in turn leave a black spot on the print.

Film cartridges are dirt as well as light proof and so the film requires no dusting. Dust will, however, sometimes settle on the sections of film in place in the focal plane inside the camera if a long time elapses between winding the film into position and making the exposure. A famous lecturer and photographer overcomes this difficulty when motoring over very dusty roads by not turning the key until he sees a picture he wants to take—a very good idea *provided you don't forget to turn the key.*

Dust on the film *after* exposure does little harm as it cuts off no light.

When in doubt, over-expose.

Do not develop in warm water as it is likely to cause frilling. The developer should be about 65° Fahr.

A Saturated Solution is one in which the liquid has taken up all of the solid which it will.

USEFUL TABLES.

AVOIRDUPOIS WEIGHT.	LIQUID MEASURE.
27.34 Grains=1 Dram=27.34 Grains.	60 Minims=1 Dram.
16 Drams=1 Ounce=437.5 Grains.	8 Drams=1 ounce.
16 Ounces=1 pound=7000 Grains.	16 Ounces=1 Pint.

In purchasing or weighing chemicals it is always safe to use grains as the standard of weight, as they are alike in Avoirdupois, Troy and Apothecaries' tables, while the other terms vary.

NOTE.—Avoirdupois weight is the standard used in compounding photographic formulas.

GLOSSARY OF
PHOTOGRAPHIC TERMS.

ACID—A sour substance in crystal or liquid form, being a compound of hydrogen, in which all or part of the hydrogen may be exchanged for a metal, forming a new compound. Acids have the power to decompose most carbonates.

ABERRATION—A defect in a lens causing it to give a distorted image or one not perfectly sharp.

ABRASION MARKS—Black lines or markings produced on the surface of photographic paper by rubbing or pressure.

ACTINIC—The "actinic rays" of light are those which produce chemical changes or photographic action.

ACCELERATOR—A chemical added to a developer to bring out the image more quickly—carbonate of soda is commonly employed.

AIR BELLS—Bubbles on sensitized surface of prints, produced by immersing the paper face down in the developer or using too small amount of solution.

ACHROMATIC—Colorless; applied to a lens whose chemical and visual focus coincide. (See page 6.)

ALKALI—The direct opposite of an acid, and with power to neutralize acids and form fresh compounds called salts. Sulphite and Carbonate of Soda.

ANASTIGMAT LENS—One free from astigmatism, or the fault of not bringing vertical and horizontal lines equally well to a focus.

ANHYDROUS—A chemical term signifying that a substance is absolutely free from water.

ASTIGMATISM—A defect in a lens that prevents it from rendering vertical and horizontal lines equally sharp.—See Anastigmat.

BACKING—A coating of non-reflecting material applied to the back of a plate, to prevent halation. (Note.—Use Eastman N. C. Film and avoid halation.)

BATH—A term applied to a toning, developing or other solution.

BRONZING—A metallic appearance in the shadows of a print, due to over-printing.

BUBBLES—See air bells.

BURNISHER—A device for securing a high gloss or polish on certain photographic papers.

CONCENTRATED—As applied to liquid preparations means that the chemicals which comprise them have been dissolved in the least possible quantity of water.

CONTRASTY—A term applied to prints meaning hard, "chalky", extremely black shadows and white highlights; lacking in detail as applied to negatives.

CONVERTIBLE LENS—One whose parts may be differently arranged, or used separately, so as to produce different focal lengths.

COVERING POWER—The limit within which a lens is capable of giving a well defined image.

CURVATURE OF FIELD—A defect in a lens affording sharper defintion at the center of the plate than at the edges.

DEFINITION—Clearness and sharpness of image.

DENSE—Applied to negatives which have been over-developed.

DENSITY—The printing capacity of a negative.

DESICCATED—Anhydrous. Dry powder, not crystals. Applied to chemical salts from which all water has been removed.

DEVELOPING-OUT PAPER, OR D. O. P.—Sensitized paper upon which the photographic image is invisible until development has taken place. Applied to "gas-light" papers or those printed by artificial light. Generally applied to papers which require longer exposure than Bromide papers.

DEPTH OF FOCUS—The power of a lens to render sharply both near and distant objects at the same time.

DETAIL—The definition recorded by the lens of the minute parts of a subject.

DEVELOPER—A chemical solution employed to bring out or render visible the latent image.

DEVELOPMENT—The process of converting the latent or invisible image on a film, plate or paper into a visible image.

DIFFUSED LIGHT—Such as comes from a clouded sky, in contra distinction to direct sunlight. Light which does not strike directly, but is arrested and diffused by some medium such as ground glass.

DIFFUSION OF FOCUS—Throwing the image a little out of focus to produce a soft effect.

DISTORTION—An incorrect rendering of the image.

DODGE—To dodge is to prevent light from striking a portion of a negative when printing by shading that portion with some opaque body.

DOUBLET—A lens composed of two separable lenses.

EMBOSSING BOARD—A device for producing prints having countersunk margins.

EMULSION—The sensitive material used in coating a film, plate or paper.

EQUIVALENT FOCUS—The distance from the optical center of a lens to the ground glass when focused on a distant object.

EXPOSURE—The act of submitting sensitized surfaces to the action of light.

FERROTYPE PLATE—A highly polished enameled plate of thin metal frequently used for obtaining a high gloss on prints, by drying the print with its face in contact with the plate.

FIXING—The process of removing the unacted upon silver salts from a negative or print, usually by immersion in a solution of hyposulphite of soda.

FLARE SPOT—A circular patch of light in the center of the image caused by a defect in the lens.

FLAT—Lack of vigor or contrast in a negative or print.

FLATNESS OF FIELD—That quality in a lens affording sharp impressions at both center and edge of plate.

FOCUS—The point at which converging rays of light from a lens meet, forming an image. A picture is said to be in focus when all details are sharp and well defined.

FOCUSING SCALE—A graduated scale for different distances, affixed to the base board of a camera, which permits of focusing for any given distance, without using a ground glass screen.

FOCUSING SCREEN—A sheet of ground glass at the back of the camera on which the image is focused and arranged before exposure.

FOG—A deposit of metallic silver all over the plate or film, including those parts which should not have been affected by light.

FORCING—Attempting to bring out detail in an under-exposed, film, plate or print, usually by the addition of accelerator—liable to produce fog.

FREAKS—Peculiar white markings caused by incorrect developing solutions. (See page 115.)

FRILLING—The puckering up and detachment of the film around the edges; happens oftenest in hot weather, or through too much alkali in the developer. (Easiest avoided by employing tank development.)

HALATION—A blurred effect, resembling a halo, usually occurring around a window opening, or other exceedingly strongly illuminated portions of the image; caused by a reflection of the rays of light from the back of the plate. (Eastman N. C. Film is non-halation.)

HALF-TONES—All gradations between highlights and deepest shadows.

HARDNESS—Excessive contrast in negatives or prints, too great difference between lights and shadows.—See Contrast.

HIGHLIGHTS—The portions of a picture upon which the greatest amount of light is concentrated. The denser portions of a negative or the lightest parts of a print.

HYDROMETER—An instrument for testing the specific gravity of liquids. (In photography the silver Actinometer.)

IMAGE—The picture thrown by the lens upon the focusing screen, or sensitive film.

INFINITY—A lens is said to be set for infinity when focused at a point beyond which all objects are sharply defined.

INTENSIFICATION—Increasing the density of a negative or print.

LATENT IMAGE—The image impressed upon a film or plate by light action, and which is invisible till chemically treated by the process known as development.

LATITUDE OF EXPOSURE—That quality in a film or plate which allows of variations in exposure without detriment to the quality of the negative. (Eastman N. C. Film has this quality in the highest degree.)

LENS—A circular glass or combination of glasses, optically ground and polished, mounted in a metal cell.

LIGHT FILTER—See color Screen.

LIGHT FOG—A graying of the image, produced by an unsafe dark-room lamp, or accidental exposure to white light, through a defect in apparatus.

MILKY—Appearance of some incorrect fixing baths. Often the results of using impure chemicals.

NEGATIVE—A photographic image on a plate or film in which the dark portions of the subject appear light, and the light portions dark.

NON-ACTINIC—Those colors or rays of light which do not affect sensitive emulsions.

ORTHCHROMATIC—Color sensitive. A film or plate is said to be orthochromatic when it is sensitive to colors of the spectrum other than the blue and ultra violet. (Eastman N. C. film is highly orthochromatic.)

OXIDATION—As applied to developer—a deterioration due to the presence of oxygen. An oxidized developer is dark in color and usually causes discoloration of the negative or print.

OVER-EXPOSURE—Too long exposure to printing light.

OVER-DEVELOPMENT—Too long a time in the developing solution.

PIN HOLES—Minute spots or holes in a negative, usually caused by dust settling on the surface before development.

PNEUMATIC RELEASE—A rubber bulb and tube connecting with the valve of a shutter, permitting its release when the bulb is pressed.

POSITIVE—A term used in contradistinction to negative.

P. O. P. OR PRINTING-OUT PAPER—Sensitized paper upon which the image becomes visible on printing and is made permanent by toning and fixing.

PRINTING FRAME—A specially constructed frame for making prints. Holds the negative and sensitive paper in contact while printing.

PRECIPITATE—A substance which, having been dissolved, is again separated from its solvent and settles to the bottom of the vessel containing it.

RACK AND PINION—A screw and rack adjustment for easy and accurate focusing.

RECTILINEAR LENS—One which does not distort or show curvature of straight lines in the image.

REDUCER—A chemical solution for decreasing contrast or density.

REFRACTION—The change in direction of rays of light when passing through a transparent medium.

RESTRAINER—A compound or solution that will check or hold back the action of the developer. Potassium Bromide in weak solution is commonly employed.

RETOUCHING—The removal or softening of defects in a negative, by the application of pencil or color.

RETOUCHING MEDIUM—A solution of gum and turpentine, applied to the negative, to afford a "tooth" for the lead or color applied.

REVERSAL—The image or portions of it being positive instead of negative or vice versa. Caused by extreme over-exposure or exposure to white light during development.

SHADOWS—The thinner portions of a negative or the darker portions of a print.

SOFT—Term applied to print or negative; refers to lack of brilliancy or contrast. A "soft" print will contain all possible detail.

SOLARIZATION—See Bronzing.

SPECTRUM—Solar—The seven colors produced by passing a ray of white light through a prism.

SPHERICAL ABERRATION—A lens defect—the inability to bring the marginal and central rays of light to one focus, resulting in a loss of sharpness.

SPOTTING—The filling in of spots or imperfections in a negative or print by means of india ink or color with a fine brush.

SQUEEGEEING—Placing wet prints face down on ferrotype plates to obtain high polish.

SQUEEGEE—Usually a strip of soft rubber set in a handle, or a rubber roller, and used to place a print in contact with the ferrotype plate.

SYMMETRICAL LENS—One whose combinations are of similar curves, and whose combinations may be used singly.

TEN PER CENT. SOLUTION—Approximately, a solution made by dissolving one ounce (by weight) of dry chemical in nine fluid ounces of water.

TONE—The shade, hue or degree of color prevailing in a negative or print.

THICK—(See Dense.)

UNDER-EXPOSURE—Too short an exposure for perfect results.

WEAK—Thin, soft, lifeless, lacking contrast.