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PRACTICAL INSTRUCTIONS

FOR

AMATEURS.

HOW TO MAKE PHOTOGRAPHS

BY

FRANKLIN PUTNAM.

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HOW TO MAKE PHOTOGRAPHS:

Practical Instructions For Amateurs.

BY FRANKLIN PUTNAM.

BREVITY, Simplicity, and Clearness, is the chief aim of the writer. Everything that tends to unnecessarily tax the memory or confuse the understanding, and all ambiguous, technical terms and words are studiously avoided.

To make Photographs, first rid your mind that it is a very mysterious and difficult process; on the contrary, it is quite simple—so simple, in fact, are some of the instructions herein given, the amateur will not attach sufficient importance to them, and herein lies his chief danger of failure, from *haste, carelessness and neglect to do simple things in the exact manner, at the exact time as he is told.* It is a very simple thing to wash one's hands, but neglect to do it when you are told may ruin all the work you have done.

It is a very simple thing to turn a thing one side upward or outward as you are told, and rejoice at your success; and it is just as simple to blunder and turn it the other side out with a result that will send your heart into your boots in despair. The light that flashes through your lens or in any other way strikes the plate or goes through the keyhole for a brief quarter of a second at a time when it ought not to, is so simple you will not be sufficiently watchful, but that it will happen

in your eager haste, and you will remember all too late the double caution you have neglected on that point.

If you are told to put eight ounces of one thing into six ounces of another thing, see to it that you do it *that way*, and not imagine in your ignorance it makes no difference if you reverse the method by putting the six ounces into the eight ounces; and finally if you would succeed from the very beginning, let me repeat and impress on your mind this one thing—if you forget everything else, remember this—do everything at the *exact time* and in the *exact manner* you are told.

WHAT PHOTOGRAPHS ARE.

Before attempting to make photographs you should have a clear and definite idea of what they are; for on that depends all your success.

Take a photograph in your hand and examine it, you find it is composed of black and white, or *light* and *shade* only. Simple as this fact is, many people do not realize it; it is a very *important fact for you to remember*.

A photograph then is at first only a piece of paper with a *white or nearly white glossy surface all over on side*.

Soon as some *shades* are *properly* distributed on the white glossy surface it is then a complete and perfect photograph.

All you have to learn, as we shall see, is how to *correctly place* the *shades* on the white paper, then you will be master of the art.

The Paper, on which photographs are made, is chemically prepared with the nitrate of silver in solution; it has the peculiar property that while kept from light it stays *white*, but as soon as it is *exposed to light* it turns *black* in a short time.

To begin with, then, we have the whole elements of the finished photo in the chemically prepared paper; we have found that a perfect photograph is a piece of paper, part white and part black; and we know this white paper will turn black soon as it is exposed to light; and if there is nothing to control the light it will turn *black all over* and simply be a piece of black paper instead of white, as it was before exposing to light.

To turn the white paper into a photograph, then, we have only to keep the light from acting on the paper where it should appear *white* in the finished photo, while it is acting to make the black, or shades.

Briefly stated, the white paper is one-half the photo, and by exposing it to *controlled light* makes the *shade*, which is the other half.

How is the light controlled?

It is controlled by a glass plate, with the picture drawn on it by the camera, called a *Negative*.

Before the picture is drawn on it, in common parlance, it is called the *Dry Plate*.

They are called *dry* plates to distinguish them from the old process plate, which had to be prepared by the artist and used at once, while it was still *wet*, for as soon as it became dry, which would occur in a few moments, it was worthless.

It is not my purpose to here divert attention from our lesson by going into a lengthy explanation of the difference between the wet and the dry plate process; it is sufficient to state the fact that the discovery and use of the dry plate does away with the years of practice and experience that was formerly required to make photographs, besides, much that was difficult, distasteful, unclean and unhealthy. The new dry plate process enables you to master the art by the aid of a simple manual like this.

What is a Dry Plate?

It is a piece of ordinary window glass, of good quality; one side of the glass is coated all over very evenly with a film composed of gelatine, nitrate of silver, and other chemicals; they are made in large factories built especially for the purpose; they are usually put up in packages of one dozen each and sold *ready for use*.

The film that covers one side of the glass plate is dense enough so that light cannot pass through it, therefore if the plate was placed over the prepared photo paper before the image is drawn on the plate it would keep *all* the light off from the paper and no *shades* would print on it and it follows no photograph would be formed.

To draw the image or negative form of the photo on the plate is the next thing we will consider. This is done by the lens and camera, and brings us to the *mechanical* part of the art, which no doubt you have been impatient to arrive at.

Let me say right here that unless you thoroughly comprehend the principle of *light* and *shade* as constituting the whole elements of the photo, then stop! go no further till you *do* understand it, for without this knowledge all that which follows will be useless and of no avail, if you desire to be a *good* artist.

Good Apparatus is indispensable. Presuming you have one of my "outfits" we will proceed to place it in position.

The Tripod, or stand for the Camera to rest upon is composed of three legs. Each leg has three pieces joined by a brass hinge. The middle piece has a spike in the end to keep it from slipping when placed on the floor or ground. The two outside pieces of each leg open outward and turn completely over so that the little wooden pins in the upper end of the middle piece enter them. The outside pieces will then be nearly parallel. Press them together at the top till the *outside* of the

holes in the ends will spring on to two pins of the little *brass top* which will be found packed in the outfit, attach the other two legs to the brass top in the same way, and have this brass top *flat side up* with the big or thumb end of the loose screw in its centre hanging *downwards*. This screw fits into a screw hole on the bottom of the Camera and is to fasten the Camera on top of the legs which, now they are set up, form a *tripod*.

The Camera will be found folded up and occupying nearly the whole of the space in the carrying case.

You are cautioned when removing it from the case to go *slow and careful*; if you are *careless* in handling it the ground glass may drop off and break, which would be very provoking to say the least.

The bottom frame or *bed* as it is called, is in *two* parts, joined together by brass hinges, so that it may be folded into the smallest possible space for carrying about, thereby economizing space and weight of the carrying case.

Unfold the bed and make it *rigid* by inserting a screw you will find, into the hole *near the hinge*, passing it through *both parts of the bed*.

Looking now at the *front* of the camera you see a *black* loose board that fills an opening; this board, you observe, is held in position by a long brass strip at the top and a little brass button at the bottom. Turn the button, remove the board and *reverse it over*, placing it in the opening, *the other side out*; this reversal will bring the *lens* into *proper position*. Turn the little button again, so the board and lens will not drop out.

Lay the plate-holder one side and place the camera on top of the tripod and turn the screw before mentioned till it binds the camera firmly to the tripod.

You can raise or lower the camera to suit your height by simply spreading or contracting the legs at the base.

The Plate-Holder used on my camera is called a *double* holder, from the fact it will hold *two* plates at the same time. It is a skeleton box about $1\frac{1}{4}$ inches thick, with its sides just the size of the face of the camera. It has *three slides*, one on each side and one in the middle.

Before taking a picture we must put some dry plate in the holder. This has to be done where there is *absolutely no light* but *red* or *ruby* light, as it is called.

A single ray of ordinary white light or lamp light even no more than can creep through the keyhole or through a crack at the side or under the door, *ruins* plate *instantly*.

The plates are made in a room where there is *only red light*, and are there placed in the light tight paper box in which you receive them, and you are

Cautioned and warned that they *must not* be exposed for an instant—nay, not for a fraction of a moment—to any light but *red light*, until after they are washed and ready for the *fixing* solution hereafter mentioned. This caution about light is so *important* and so uncompromising a *necessity* I dwell upon it.

It is so common for beginners in their haste to forget this, and in some unguarded moment, to leave the plate box open, or the door is opened by themselves or a friend (accidentally, of course) or they forget to close the slides of the plate-holder perfectly tight, or forget the cap is off the lens, or *some other accident* happens that lets some light on the plate, and it is *ruined*.

A dog is just as dead one minute after death as he is in a year; so it is with a photographic plate; they are just as completely ruined by a flash of light the one hundredth part of a second's duration, as if it was the whole day or year; therefore, if you are aware such an accident has occurred, no matter how trivial it seems, you may as well stop then and there, and throw the plate or plates as the case may be—*throw them away*

They are *dead*, ruined, worthless. "Light-struck" it is called by the professional artist, *there is no remedy*.

Take the package of plates; the red lantern and the plate-holder to some room, closet, or cellar, where you can secure *absolute black darkness*. If no such place is convenient, then you can fill the holders and develop the plates in the *night*, and if you are going where you presume there will be no dark place that you can utilize, you should take as many extra plate-holders as you will need *filled with plates before you start*.

A red lantern is furnished with the outfit which fill as you do an ordinary lamp with kerosene or lamp oil, light it and enter your dark room, close and *fasten* the door to prevent accidents of light by intruders, also observe that there are no cracks or crevices through which light is creeping. All the light you have must come from your red ruby lantern.

Now open your package of dry plates. It is a thick paper box, the lid of which is so deep it makes a *double* box; you separate the inner box from the outer one by slitting the *THIN* paper all around the *lower* edge of the package, which will allow the outer cover to *slide up* and off from the inner one; do not carelessly injure the box in opening it, for you will need it to keep the plates in, secure from light till all are used.

Now draw the *middle* slide entirely out of the plate holder, this is easily done by pressing back the little *brass catch* which you will observe at one corner of the holder which holds the *middle* slide in place.

Now you have the *middle* slide removed; by looking at the *end* of the holder where the slide came out you observe *three* grooves or slots: The *two outside* grooves are where you *slide* the *dry* plates in.

Now take a plate from the package and handle plates with care *at all times*, by having your fingers *wrap* on the *edge* and *not* on the *face*; let *nothing* touch the *face* of a plate except a soft camel's-hair brush.

Now take the plate holder in your left hand and grasping a plate by the *edge* with your right hand, *slide* the plate into one of the *outer* grooves before mentioned.

Be sure when you slide a plate into a holder, that the *face* of the plate is turned *outward* or towards *that* side of the holder; this is *very important*; the easy and frequent mistake of turning the plate the wrong way in placing it in the holder is generally the cause of the beginner getting *no picture at all* for all his anxiety and trouble.

The *face* of the plate is the side *coated with a film*; remember to keep your fingers off from this film.

If you desire to take *two* pictures, then slide another plate into the other outside groove. If you have put them in *properly* the backs or sides of the plates that are *not* coated will be toward each other.

Next return the slide you took out back into the remaining *middle* groove. Shove this slide *clear in* until the spring catch grasps and fasten on to the little pin in the head of the slide. The brass strips which you observed on each side of this middle slide are springs designed to gently press against the backs of each plate to keep the plates from any vibration; these springs work automatically when you shove in the middle slide; therefore they do not require your attention.

Your plate-holder is now filled; examine it closely to see if *all three* of the slides are in clear up to the hilt so that the thin end *passes into* the slot of the holder; in other words, see to it that your holder is *properly closed* all around, light-tight, and also before admitting light to your room see that the *remaining* plates in your *package* are secure; it is well to always attend to this *at once*, so you will not *forget it* to your sorrow. It is best to keep the package that *has been*

opened in a dark box that will not be meddled with by others.

Having secured from light the plates in the holder, and also those remaining in the package, you can now open the door and pass into the light, taking the filled plate-holder with you to the camera, which you previously set up.

The Lens (commonly speaking) is the brass tube that has an oval glass in one end and a black plate or disc, with a hole in the centre, in the other end. This end should point *outward* toward the object to be photo'd, and the glass end, which is screwed into the camera front should look inside the camera; properly speaking, the round, oval-faced *glass* is the actual lens. This glass or lens may be cleaned when dusty with *old, soft* linen, or old *soft* clean white cotton cloth, or with chamois leather, but *never with coarse harsh stiff cotton or silk*; the latter has ruined many a fine lens.

The glass can be removed from the tube to clean the other side by simply unscrewing the thin black rim or collar that holds it in. In returning the glass into the tube make sure that you place the *oval or crowning* side *outward*. *This is important*. If you put the glass into the tube the wrong side out it will not cover the plate, that is it will *not draw the picture sharp and distinctly on the outer edges of the plate*; it turned out this was the trouble with several parties who complained about their lens. It is very rarely that you need meddle with the glass or take it out any more than you need to meddle with the wheels in your watch.

In the other end of the tube you observe a black disc with a hole in the centre before mentioned, and outside of it another circular disc that revolves, having *different size holes* in it. These holes are called

Diaphragms or **Stops**, and are placed there to govern and refract the rays of light. The principle is a law of optics too lengthy, and not necessary to explain.

All you need know for practical use is this, that the *smaller* the hole is at that point, the *sharper* and *better defined* your picture will be at the *outer edges*, but at the same time just in *proportion* as the size of the hole is made *smaller* the *quantity* of light that can pass through is reduced, and the *time of exposure* required is *lengthened*. Do not get nervous now, and say, oh, this is too complicated! I cannot understand it, etc. You can understand it *if you try*.

TAKING THE PICTURE.

Turn the camera so that the lens points at the object you intend to photograph.

The position *must* be so that the sunlight comes from the rear or one side of the camera as the sun's rays *must not* strike into the lens; *this is important*.

The camera must be level, not inclining to one side, for if it does, the picture will be one-sided too.

It must also stand level from the front to the back, that is, it must stand so that the *lens* will be as nearly level as possible and point *neither up nor down*, which causes a *distortion* of the lines of the picture.

If the object you desire to photo is higher or lower than the level of the camera, the sliding front is provided on the 5x8 and 8x10 cameras for the purpose of raising or lowering the picture on the plate without being obliged to point the lens up or down, off from its level; this raising or lowering the picture on the plate when necessary, is observed and done when you *focus* the picture.

Next, uncap the lens.

Focusing. Stand *back* of the camera, and if the lens does not point directly at the object, the camera may be swung round by loosening the screw that binds it to the tripod; when right, the screw must be turned up again, binding the camera rigidly. Put your face on a level with the ground glass and throw a dark or

opaque cloth so that it will cover both your head and the camera; your coat will do, but a rubber cloth is best; it is called a *focusing cloth*.

See that it does not cover the lens.

Its use is merely to keep the external light off from the ground glass, aiding your eye to see the image that is reflected on the ground glass by the lens more plainly.

While your head is thus covered, look *on* the ground glass *not through it*, and draw the back of the camera slowly towards you; as you continue to draw the image will appear first like a blur, then plainer and plainer, until passing a certain point it will begin to grow dim and blurry again; reverse and shove back and forth till you are *sure* of the exact point at which every line and detail of the image appears most *distinct and perfect*; it is then in *focus*. Fasten it there by turning the round head thumb screw tightly.

In focusing do not be surprised or troubled to see everything appear *reversed*; up-side-down, and also *reversed* from the right to the left; such reversal is the *correct way* it should appear.

You will comprehend the simple art of focusing in probably less time than it takes to tell you, but it must not be carelessly done, for if a picture is not sharp in the focus nothing that you can do afterwards will remedy the defect nor make the photo sharp and clear.

After a while, when you get to be an "expert," you will observe that objects which are near, and those which are at considerable distance, say beyond fifty feet from the camera, will *not all focus perfectly sharp at the same time*. That is, when the near object is in perfect focus, the distant one will be slightly out of focus, and "*vice versa*." This is a law of optics that cannot be overcome entirely by any lens. It is called "*depth of focus*."

Therefore whichever object in the picture you are most anxious to have *distinct* and perfect you should

focus on most carefully ; or if there is *no special object* you are desirous about, then *average the focus* ; I repeat *nothing you can do afterwards* will make a good bright picture from a *careless imperfect focus*.

In connection with what I have just told you, your attention is directed to the little round headed brass screw at the lower right hand rear corner of the 5 x 8 and 8 x 10 cameras, which permits the top of the ground glass or plate holder to tilt *forward* or *backward* if desired ; this motion is called the "*Swing-Back* ;" when properly understood it enables one to adjust the focus between objects that are near and far, that I have mentioned. It often, however, does *more harm than good* to beginners, for if improperly managed it *distorts* the picture ; therefore I advise all new beginners to set the swing *plumb up and down*, at right angles with the bed of the camera, so that the top of the plate holder will lean *neither forwards nor backwards*, and set the screw *up hard so it will stay in that position*. It is better that you do not use it in any other position until you are well advanced in the business. Some of our best artists do not use the "swing-back" at all.

Having fastened the sliding back of the camera at the *exact focus*, next unhook the ground glass and remove it from the camera, laying it where it will not get broken.

Next put your plate-holder that has the plates in, on the camera, placing it *exactly where the ground glass frame was* before you removed it. See that the plate-holder is turned so the two heads of the *outside slides* will come to your *right hand*, and also *make sure* the little pins sticking upwards in the camera enter into the corresponding holes for them in the edge of the plate-holder, so that there will be *no crevice between the holder and the camera* after it is hooked at the top by the same hook the ground glass was.

A little reflection will bring to your mind the fact

that *the plate* in the holder on the side nearest the camera occupies the *same position* the ground glass did, and that soon as the slide that covers the plate on that side is withdrawn the image will fall on the *plate* precisely as it did on the ground glass.

Now, keep cool, don't get nervous nor excited, do as you are told.

Next, *place the cap on the lens*.

Next, *see that it stays on*.

Next, I advise to throw the focus cloth over the camera covering plate-holder and everything, *except the end of the lens* ; this may not be strictly necessary, but it is agreed by old artists as being a good thing to do as a precaution against accidents of light creeping in.

Now, put your hand under the cloth and draw out the slide that covers the plate *nearest* the camera and lens.

Do not draw the wrong slide. Draw it steadily and squarely entirely out, being careful not to disturb the camera and upset the focus.

The last moment *before* drawing the slide look and see if the cap is *still on the lens*, something may have knocked it off.

Exposure. After the camera is in position, the focus obtained, ground glass removed and plate-holder put in its place, *cap on the lens*, the dark focus-cloth covering all except the lens, and the slide in the plate-holder *nearest the lens* drawn entirely out, you are all ready for making the *exposure*, which is simply removing the cap from the lens without jarring the camera, and then in a *brief time* recapping the lens.

Time. The length of *time* that the cap should be off the lens and the plate *exposed* to light is pre-eminently one of the most, probably *the most* important, action in the process, and should receive a *large share* of your at-

tention. It is the *one* thing that has to be learned from *observation* and *practice*.

Why?

Because the time depends on how *bright* or *intense* the light is, or more technically speaking, how fast the object being photo'd *radiates light*.

Supposing you were about to photo a *white* house or some other *white* object, and that it was illuminated by direct rays of *brightest* sunlight and that you had a *large* opening diaphragm in your lens, a case like this would combine all the *extremes* that would require a *very quick* exposure, say as quick as you could deftly uncap the lens and recap it again, being one second or less of time.

A case of the opposite *extreme* would be like this, a dull, dark day, no direct sunlight, and the object to be photo'd was dark color, such as dark green foliage or anything of a sombre hue not brightly lighted, and a small opening in the diaphragm, it would then require a comparatively very long exposure, say from twenty seconds to one minute.

The amateur should bear in mind that both of the cases I have mentioned are *extremes*, and that neither would be favorable as a means of producing the best results.

But so many have written me concerning the *time* of exposure, I wish to show clearly why that it is not possible to lay down any exact mathematical rule relating to the *time* of exposure.

I think it is safe to say, however, that any condition of light that requires over ten seconds exposure, especially if a large diaphragm is used, is *too low a grade* of illumination to make a first-class picture. And a good light *outdoors* with next to the smallest diaphragm generally requires not more than *one to three* seconds exposure.

I may say this is a test point of your individual ability, genius, discernment and reasoning power; it is

the special point of the business that requires *thought*, *judgment*, attention, comparison, individual ability, *all* that distinguishes a *man* from a *machine*.

You cannot *control* the light so as to *equalize* its power, but you *can estimate* its power and control its *duration*.

Let me illustrate this again in this way: The plate, in order to receive a good and *perfect* impression requires a certain *quantity* of light, not *too much* nor *too little*; either way is injurious, and if either the deficiency or the excess is *too great* it ruins the impression, making it worthless and *irrecoverable*; now the *quantity* of light that can reach the plate depends, first, on the size of the hole in the diaphragm; second, on how rapid the radiation is, or, in other words, how rapidly the light passes in through the hole, and, lastly, *how long* you allow it to continue to pass in, which is governed by the *time* you keep the *cap off* the lens, commonly called the *exposure*.

Suppose you had a cask which you desired to fill half full of water, no more, no less, and that you could not see into the cask, all the way you had to know when it was just half full, no more and no less, was by *observing the flow* of water as it passed in. The question now arises how *long time* to allow the water to run in? You will say at once, that depends on the *size* of the faucet and the *pressure on the water*, for under great pressure as much water might rush in, in one second as would pass in in an hour with *less* flow and pressure, and you would have to govern the *time* of allowing it to run accordingly. It is precisely the same in deciding the *time* of exposing a plate; it depends on *how fast the light is rushing in* on the plate, and this depends on how clear and *bright the atmosphere and the sunlight* are, and the *size diaphragm* you use; and bear in mind always that light-colored objects radiate light faster than dark ones.

The light indoors is never as powerful as it would be outdoors at the same moment, therefore at a given time it would require *longer exposure indoors* than outdoors.

Photographers find that the best way to judge and decide the *time* of exposure is by observing and comparing the *brilliancy of the picture as it appears on the ground glass* just before exposure.

I advise you to *commence practice outdoors*, and from all I have said the lesson you should learn is to observe *each time* the condition of the light and the *illumination of the object*. Note the result and store *all* in your mind to *compare* with the next attempt. Thus by *watching* and *noting* and *comparing* you very soon become an expert. These little comparisons and attention to *cause* and *effect* is what eventually makes one artist superior to another.

ILLUMINATION. In making photos very, *very* much of your success depends on the proper *illumination* of the person or object photo'd at the moment the exposure is made; thus, if one side is exposed to extreme bright light while the other is in extreme shadow you must expect the photo to look the same. If there is a glare or an ugly shade where there ought not to be at the moment the plate is exposed, you may expect they will *surely appear the same in the photo*.

In making portraits, if *one side* the face, or under the eyes, nose, or chin, if *any part* of the face is *too dark* while other parts are *light*, do not presume or charge this fault to the apparatus or the process, as amateurs generally do, for it is *entirely and solely* caused by *imperfect lighting*, over which the apparatus has no control. You must not imagine there is some hidden magic in the apparatus that will correct and harmonize everything; no; certainly not. The apparatus simply sees and *reproduces* a thing *as it is*; it does not make the crooked straight, nor the old young, nor the homely handsome. There is a deal of truth

in the old saying that, "A thing appears according to the *light* we view it in," and this is literally *true* relating to the art of making photographs.

Illuminating or "*lighting*" the object properly that is to be photo'd, has *vastly more* to do with making *fine work* than the mere ability to do the mechanical work properly. Note where the high lights and the deep shadows are, on the object; the lens will see them just as you see them, and if they do not appear favorably then you must either arrange the *position* differently or else wait till the light itself changes. As a rule the hours from nine o'clock, A. M., to three, P. M., are preferable for making pictures, as then the sun lights up the shadows underneath, but this also, practice and observation will teach you best.

In this connection I will say there is a popular impression—I might term it delusion—that a window overhead commonly called a "skylight" has some magic effect on the light; this is *not true*; it does not alter the quality of the light at all. It simply enables the artist to distribute the light, and many of our best galleries nowadays are built with only large windows or side lights and no skylight at all.

The difficulty amateurs experience in making *portraits* more than other pictures is due solely to their inability to *distribute the light properly on the face* in an ordinary room. For this reason I recommend amateurs to try the experiment of having the person sit just inside of an outside door so that their feet comes about on the door sill, or just far enough inside so the face will be brightly illuminated while the shadow of the ceiling overhead protects the hair on top the head being too light, and also prevents dark shades under the nose and chin which are caused by a strong top light; also observe carefully that no *colored shades* are reflected on

the face from green vines or painted door, etc., nor reflected shades of any kind.

This should be undertaken between 10 o'clock and 3 o'clock when the light is *strong and brilliant*, but *direct sun rays must not strike the sitter*.

The operator you understand is to be *outdoors* with his camera, pointing indoors at the sitter, and the sitter can turn his face squarely front illuminating the whole face evenly, or if preferred turn it slightly to one side giving it a little more shade and character. Remember the whole object of the position is to enable you to *light the face properly*. If this position lights the lower *drapery* so strongly as to make it appear faded in photo, then place something so as to cut off a portion of the light on the drapery.

The lesson you are to learn is that whatever is *lighted*, whether it is the face, or hair, or clothing will appear light in the photo; and whatever is shaded or dark will appear dark in the photo. Remember the source of light should *always* be in *front*, and *not to the rear or side* of the person or object photo'd.

This position sitting just inside an open door *looking outdoors* gives more nearly the *same light that a skylight does* than any position I can think of. Of course it needs *attention and brains* to watch just how *the light strikes the face*, and move the sitter's position or turn his head a little, same as they do in a gallery, till the light is *soft and brilliant* on the face. I implore you *not to pass this over carelessly*, but study, study, *study it well*. Looking out of a window, with the camera outside pointing inside might be utilized in a similar way.

In taking pictures in a room if there are two windows facing each other you should place the sitter between them and *back* just enough so the light will fall *as evenly as possible upon the face*. I do not mean a *glare*, but a *soft, bright light that makes the features look pleasing*. This will bring out your natural artistic ability; and if

there is only one window in the room which throws one side all in light and leaves the other side all in shadow you can obviate this by stretching a white sheet on a movable frame and then placing it on the *shadow* side; it acts as a reflector to the light on that side; it should generally be brought up quite close to the "sitter," say within two feet, more or less. The movable frame or stretcher allows you to move the screen about in different positions and thus *reflect* the light just where it is needed. Any *smart boy can construct* this screen with some strips or laths, say 5x6 foot square, more or less, and stretching a white sheet on them.

Under ordinary circumstances the beginner who desires to grow up into the business will find a very pleasing effect by placing the individual or the group, as the case may be, out of doors where he has plenty of room and plenty of light and the natural scenery for a background is generally more truly artistic and pleasing than any of the artificial counterfeit painted imitations, found in ordinary galleries. He should not however place them in the shadow of green foliage, etc. For portraits, however, I think a position in the open door before mentioned most likely to give *best results*.

We are now ready to make the *exposure*. I know you would be glad to have me lay down some *definite rule of time*, but for the reasons already named I cannot. But outdoors, I will venture to suggest *three seconds* in a fairly good light, and the object fairly illuminated, as I said before the time of exposure *varies* according to the circumstances and you will do well to study and ponder all I have said about that and govern yourself accordingly. The time of exposure may vary all the way from *one second* to *one minute*, but *one to five seconds* outdoors is the range you will be most likely to use, and in an ordinary lighted room it would require *two or three times longer*.

Another fact that suggests itself is, that a combination of circumstances which require an extremely *quick* exposure, is far *more liable to an error of time* than when the circumstances are such that the action is slower, and the plate is not so much affected or injured by a few seconds over or under exposure. For this reason I never send the quickest brands of plates to *beginners* nor advocate anything that is so *quick* it does not allow the mind to act, judge and control the action of the light.

When you think the exposure is sufficient, recap the lens and then *replace the slide* in the holder; make *sure* the slide is *entirely in*. This you were cautioned about before.

If you have another plate in the holder you can now turn the holder over, bringing the plate not yet exposed in same position as the first one; of course the picture taken on the second plate may be in a different place and of a different subject.

One thing you must not fail to remember, to always mark the holder so you can tell which plate has been exposed, otherwise you are liable to expose the same plate over again and ruin it of course.

DEVELOPMENT OF THE PLATE.

This you can do at your convenience. Plates have been exposed in Africa and brought home to develop. Development *must be done by the ruby light only*. The same caution is necessary about this as in filling the holder before described.

Take with you into the dark room the plate holder containing the exposed plates, also the *developing solutions*, a *vulcan tray* and a *glass graduate*, a pitcher of cold water, and also a pail to pour wastes into may come handy; if you have not vulcan trays ordinary glass or earthen dishes if absolutely clean will do, but are not so handy; you *must not use tin nor iron dishes*.

The developer is a combination of *two* solutions, one is the *oxalate of potassium*; the other is the *proto-sulphate of iron*. A bottle of each is furnished with the outfit, with directions for mixing, viz.: *Proto-sulphate iron one part of solution* added to *eight parts of the oxalate of potassium solution*.

These solutions, while separate, are light and clear, like water; but soon as they unite turn instantly a *bright red*, and is then ready for use. If the solution turns *yellow* instead of *red* it is worthless, and indicates the strength of iron is too great for the oxalate, and comes from the oxalate solution not being "saturated" (not strong enough), or else from putting *too much* iron solution into the oxalate solution. Amateurs are apt to put in *too much iron* for no reason except its cheapness, *beware of this*. Neutral oxalate of potassium bought at drug stores is frequently not the correct article.

These solutions are very easily made. They are both what is termed "saturated solutions." A saturated solution is water into which any soluble substance is added *until no more will dissolve*. Thus, the oxalate potassium solution is made by putting *warm water into a bottle and then adding the neutral oxalate of potassium until no more will dissolve, by shaking it occasionally for a few hours*, and then let it stand till it settles. When clear, pour off the top, and add to the fluid you have poured off a saturated solution of *oxalic acid*. Add this acid a little at a time till your oxalate solution will *turn blue litmus paper slightly red*, and no more, which shows it is acid; *this is important*.

The proto-sulphate of iron solution is prepared in the *same way*, by putting the iron into warm water till no more will dissolve. Then, when you pour the clear solution off, add *one drop of pure sulphuric acid* to every *two ounces of the solution*.

FORMULA FOR DEVELOPER.

Saturated solution *neutral oxalate potassium*
with *oxalic acid* in..... 4 ounces.
Saturated solution *proto-sulphate iron* with
sulphuric acid in..... $\frac{1}{2}$ ounce.

Add the iron to the potassium, and never the reverse. This is very important.

Before shutting yourself in the dark room prepare a **Fixing Solution**, as follows:

Hyposulphite of soda 1 ounce.
Water 6 ounces.

Caution. The hyposulphite of soda and its solution must have *separate bottles and trays* for itself, and never, *never use them for anything else.*

This *hypo* is harmless enough; it is not a poison nor a corrosive acid, and yet the smallest particle or a fraction of a drop, or even what may be transferred by your fingers after handling the *hypo* solution and then handling the other dishes, plates or paper, before washing your hands, is sufficient to spoil them. If you use the utmost care and then, after all, the result is not good and you cannot imagine the cause, you can safely charge the mischief to the *hypo*, and nine times out of ten you will hit it right. There is only one remedy, which is—*prevention by forethought, attention and care.* It is well to *label* the *hypo* dish so you will not forget and accidentally use it for something else, and also it is well to wash your hands after handling it and keep it apart from the other articles in the room.

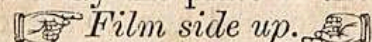
We are now ready to enter the dark room, close out all except the ruby light and proceed with the development of the plate, which is one of the most interesting and wonderful results that chemistry produces.

Fixing Bath
Saturated Solution of Hyposulphite Soda 2
Water 3

First secure the necessary seclusion from outside light. Have your trays, solutions and ruby light previously arranged conveniently on a shelf or table.

Mix your *oxalate* and *iron* solution as before directed and pour it into one of the *vulcan trays* and set the ruby lantern beside the tray.

Now, take up the plate holder in your left hand, remove the *middle* slide and withdraw one of the exposed plates by tipping the holder until the plate slides out so you can grasp it (by the *edge*, remember). You will be surprised to see that the plate *looks exactly as it did when you put in the holder*, but such will be the case. Plunge the plate into clean, cold water before putting it into the developer. Next tip up the tray containing the developer as much as you can without spilling any of the solution and lay the plate in the tray the

 *Film side up.*

Lower the tray to a level at once so the solution will flow *instantly and evenly* all over the plate and not in *tricks.*

Rock the tray slowly, so that the solution will flow in little waves to and fro across the plate; this motion should be *kept up nearly all the time* during the development.

If the *exposure* was *right*, you will see dark spots and lines begin to form on the plate in from one-half to one minute. These are called the *high lights*, and are where the light acted most strongly on the plate. Restrain impatience and *watch* the plate; the beauties of the picture will appear one by one until even the *details* of objects that were in the shade will show clearly. *Do not stop here.* After a little time the milky whiteness will begin to turn gray in color and the plate will darken considerably *all over.* You should allow this to continue until the parts that come out first (the lights of the photo) get *very dark*, remember the *darker* a part is on the negative the *whiter* it will be in the

photo. When it is thoroughly developed you can see an *outline* of the picture on the *back* of the plate.

Then, if there is running water in the room, remove the plate and hold it under a *gentle* stream that will not break the film until it is thoroughly rinsed on *both sides*. Most of the washing however should be done on the *face or film side*. If there is no running water, then pour off the developer and replace it with clean water. Renew with fresh water and rinse again. After *thoroughly washing* it is ready for the *fixing solution*. The plate must not be exposed to light till *after it is* in the fixing solution. Then it may be taken out of the dark room and the fixing process go on in ordinary day light.

FIXING THE PLATE.

You have been informed how to make the fixing solution, and was told to have it in the room ready. The fixing solution should now be put in the tray *reserved for it alone*, and the plate put into it. Again be sure that the *film side is up*.

Allow it to remain in this solution till all traces of a *light milky appearance* on the *back* of the plate has *entirely disappeared*. Understand now—I say *entirely disappeared* from the *back* of the plate, and it will be safer to allow it to remain a minute or two longer. The fixing process can go on in ordinary day light. After fixing, the plate must be most *thoroughly* washed.

It may as well be observed here that the gelatine which forms the coating of the plate is very soluble in warm water; all the solutions above mentioned should be cool, not over 60 deg. Fahr. In cold weather the water used is generally cold enough, but during the summer it must be artificially cooled. As an additional precaution in *warm weather*, the plate, after development should be allowed to lie a few minutes in a saturated solution of alum.

After carefully and completely cleansing the plate, rinse out the *developing tray* and pour it half full of the alum solution, which is mixed according to the formula presented here.

Every particle of hyposulphite of soda should be removed from the film and plate. The washing is done by permitting a *gentle* stream of water to flow over the plate, but nearly all should run over the *film side*. If you have not running water you must pour it on gently, allowing it to run off, and not using that which runs off again; at least half a gallon of water should be used, and more, unless water is very scarce, for each plate. Do not permit the fingers to touch the film, as thus the negative would be marred.

Water, eight ounces, and all the alum it will take and hold in solution, or, in other words, a "saturated solution."

Place the plate, film side up, into the alum bath, and permit it to remain there five minutes, while you cleanse your hands from any adhering soda solution. *The alum bath is not necessary in cold weather.*

Remove the plate from the tray, wash it for a few seconds, and set it up *on edge* to dry.

The plate is now what is termed a *negative*. It should be set upon edge and allowed to dry spontaneously, for if heat is used to accelerate drying, it will melt the gelatine coating and *spoil everything*. When dry it is practically finished.

While this plate is drying we will go back into the dark room and develop another one. Stop! did you have presence of mind and replace the slide that you took out of the holder *before opening the door* of the room; if you did not then the other exposed plate that is in the holder is spoiled. You did close the holder! All right! We will now see how it will act under "treatment." This plate we treat precisely as we did the first one, but the picture does not appear so quickly,

Developing

nor develop so continuously as the other; we know the developer is the same,—what is the matter? It was “UNDER-EXPOSED.” When a plate has been properly exposed the outline of the picture should begin to appear in about *one-half minute* and the entire development occupy two to five minutes, sometimes a little longer, but when a plate is over-exposed and the picture *flashes out quickly*, it then is often fully developed inside of *one or two* minutes. You *must not go by time* entirely. You must go by the *appearance of the plate*. If under-exposed the outline appears very slowly and then appears to rest without change, and comes to a standstill. You will with a little experience be able to discern this. When it happens, you should *immediately pour off the developer* into a clean glass dish (you should have some extra dishes in the room), and add one-half ounce more of the *iron* solution. Shake it up well and then pour it back on the plate—*never* pour the iron right on the plate, but if you had no extra dish you could remove the plate, add the iron, shake it up and then put the plate in again; this will accelerate the development and you will proceed till it is sufficient, which you may know in the same way as I directed about the first plate. This addition of more iron, however, is *seldom*, almost *never*, required, if the exposure was sufficient it is not required; and I repeat the caution before given, not to be hasty or anxious to use too much iron because it is cheap, or you don't know what else to do; it is best to use as *little iron* as possible to secure a perfect development.

So long as any patches of the *light color* remain on the plate you may know it is not fully developed. When fully developed it should have a dark appearance *all over*.

On the other hand, if on placing the plate in the normal or regular developer the image appears *quickly*, and has considerable *detail* in one-half minute, you

may know it was probably OVER-EXPOSED. To correct this *have ready at hand*, in case you need it, a bottle of *Putnam's Lightning Restrainer*.

Lift up the plate and pour say *one-half ounce* of the *restrainer* into the developer. Agitate the tray so as to mix well, and let the plate drop back into it. If development still seems to go on too rapidly, repeat the operation of adding a little more of the restraining solution; this time say not more than one-quarter ounce. This ought to be sufficient to fully correct matters—at any rate do not add any more of the *restrainer*.

The *quantity* of the iron, or of the restrainer, which I have advised you to add to the developer is based on the supposition your developer was about *four fluid ounces*. Probably I do not need to remind you that in case the quantity was less, then the addition of either the *iron* or the *restrainer* should be *less* in the *same proportion*.

Before leaving this subject I might as well say that if the plate is only *moderately* over or under exposed, the remedies I have given will be quite sufficient in correcting the error; but if plates are *too greatly off from the proper exposure either way* they will never make first-class negatives, and you might as well throw them away as soon as you are satisfied such is the case.

VARNISHING THE NEGATIVE.

We left the negative drying, and it must be thoroughly dried before the next process is attempted. My plan is to leave the negative over night to dry. It follows next in order that a coating of varnish (prepared and sold for this purpose) should be put over the film on the negative to preserve and protect it. Warm the plate slightly; do not use much heat—only just sufficient to give the plate an indication of warmth.

Grasp the plate by the lower left-hand corner with the *left hand*. Have the *film side up*. With the right hand remove the cork from the bottle of varnish, and, taking it up, pour enough on the plate to make a pool, which can be spread over the surface of the plate, but not so much that the varnish will run off at the edge. Incline the plate so that the varnish will flow to the *upper right-hand corner*; vary the inclination, and send the varnish to the upper *left-hand corner*, then around to the corner held by the hand, and, finally, to the *lower right-hand corner*. It will, of course, be surmised that the object of these movements is to coat the film on the plate over *evenly* with varnish. When the varnish has reached the lower right-hand corner, the bottle should be placed so that it will catch the surplus varnish. Gradually the corner *distant from the bottle* is raised so that all the excess of varnish will run off the plate, to accelerate which give the plate a slight rocking motion to and fro from right to left.

As soon as the varnish ceases to run off, remove the bottle, cork it, and draw the lower corner of the plate over a bit of paper to wipe off any drops clinging to the edge. Warm the plate to dry the varnish, using only sufficient heat to cause it to dry with glossy brilliancy. Set aside the plate for a few hours for the varnish to harden, it will then be ready for the printing frame.

You can print from a negative without varnishing if you are careful, but if you wish many prints or to preserve the negative *it is best to varnish it*.

SUMMARY.

From the foregoing description, chemical manipulation *may seem* complicated, but the processes are *really not so*. Rather than have the amateur grope along, trying to discover what will bring success, and what

will lead to error, I have endeavored to mark out each step to be taken. Still, if the amateur hesitates and wavers, not trusting his own ability to manipulate a plate, he can have the development done by a professional photographer, and also the printing, toning, and mounting of the picture. I *do not recommend this*. To "go it alone" is the true American way, and believe in *your ability to do what others have done*.

All the preceding instructions can be briefly summarized as follows:

1. Set up the camera and focus it.
2. Put some sensitive plates into dry plate holders.
3. Make the exposures.
4. After taking the plate out of the holder, place it in a tray filled with water.
5. Drain off the water and pour over the plate the mixed developing solution.
6. Wash the plate and place it in the hypo solution.
7. Wash the plate and give it an alum bath.
8. Wash the plate *thoroughly* and set it up to dry.
9. When perfectly dry, coat the film over with negative varnish, and allow that coating to dry. After this the surface of the plate may be touched by the fingers, and it is ready for printing.

PRINTING.

Place the printing frame flat on its face, and remove the doors. The glass *negative* must lay in the frame, the *film or varnished side up*; Gently dust off the negative—don't *wipe or scratch* it. On the negative lay a piece of the photo paper, with the *glossy side down*, bringing it in contact with the *film side* of the negative. Do all this paper handling in the dimmest *ordinary* light you have convenient, and be careful to keep the fingers off the glossy side. Now replace the doors, and

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fasten both springs, to make a uniform contact between the paper and negative.

Expose to a *bright outdoor light*. Never permit anything to throw a *shadow or reflection* on the frame while printing with it. If the negative is thin (lacks density), inclining it to print a harsh hard black picture, by placing a sheet of thin white tissue paper over the printing frame, for the light to pass through, has a tendency to *soften* the picture, or printing in the shade has a similar effect. In about three minutes remove the frame to the shade, open *one door only*, lift up *that end* of the paper and observe *briefly as possible* the progress of printing. Close and *fasten* that door, open the other, etc. Unfastening *both* doors at the *same* time, during printing, will surely *ruin that print*. Continue the printing till it appears about *one-third darker* than a finished photograph.

Make your examinations *brief as possible*, always having in mind that all light striking the paper without passing through the negative is spoiling your print. Print as many as you desire and place them in a dark, light-tight box till you are ready to *tone them all at once*, which is done as follows :

TONING.

In a half light, just strong enough to see what you are doing, put the prints one by one *face downward* on each other into clean water (running water is most convenient, as it changes itself). After soaking a while, seize the bottom print by the edge or corner, gently bringing it on top, *face upwards*, then the next bottom one on top till *all* are turned *face upward*; turn the water off, and renew with fresh; repeat the soaking, reversing prints, and renewing water *several times*, say four times, to thoroughly rid all the free silver.

Next pour into a flat-bottomed *porcelain or glass tray* (do not use tin nor iron) *one ounce of toning solution number one* and add *seven and one-half ounces* of pure water. Then lastly add *one-half dram* (about thirty drops) or a little less of *number two toning solution* and agitate the tray to mix all well. The prints should now be placed in this mixture or "toning bath," and leisurely but continually reverse one by one face upward, then downward, again upward, etc., in the manner before described (only the bath is *not changed*). The reversing is to give uniform tones and to avoid streaks and spots. The prints are supposed to be properly toned, when on examination the whites are found to be clear, and they have a *purplish cast*. * * * See *special information about toning. page 57-58*

FIXING THE PRINTS.

Pour off the toning solution (and save it for future use), and put the prints in the fixing bath, composed of *hyposulphite soda two ounces, common salt one tablespoonful, sal soda (washing soda) one teaspoonful, water sixteen ounces*. Prepare this the day before using, or warm to ninety degrees. Let the prints remain in this bath twenty minutes, turning them over two or three times; pour the fixing solution off, throwing it away—it should not be used again. Wash the tray and your hands thoroughly, and always bear in mind *the tray used for hyposulphite of soda should never be used for anything else about photography*. Forget this, and your memory will be refreshed by a lot of spoiled work.

The fixing bath should be used for but one lot of prints only and not saved.

Lastly, you wash the prints in *several changes* of clean water; if you can leave them in *running water all night*

so much the better, as *every trace of the hypo must be removed*. Thorough washing is *very important*. They are now finished ready to paste on the mount, which is most easily done before they get dry. 38

SPECIAL INFORMATION.

A few parties have written to me about as follows :

"I have tried to follow the instructions closely, but all my efforts produce only *dim* photos of a *red or reddish brown* color. What is the reason?"

The first and *chief cause* of this trouble lies where the amateur least suspects, viz., in the *negative*. When from over or under-exposure or development the negative is *too thin all over*, lacks "density" and "contrast," it will print a dull brownish red into "ready sensitized" paper so firmly, that hardly any amount of toning will entirely remove it.

The next reason is because you printed them only about *one-third* or *one-half* dark enough. You ought to have printed them very, *very* much darker than you desired them to be when finished, as the solutions which follow bleaches them considerable. Your next error was, *not toning them nearly enough*. If the prints have a reddish color before toning, they should be kept in the toning-bath until they change to a decidedly *bluish* or *purple* color. I will now add *two very important* items to the process of printing and toning, which will both *shorten the time* and *improve the result* very much.

Commence with

FUMING.—Take *only as much* paper as you intend to print that day, and suspend it by pins or otherwise, so that the sheets do not stick to each other, in a paper or wooden box that when closed will be *dark inside*. In the bottom of the box, under the suspended paper, place a saucer or shallow dish containing two or three

drams of *concentrated liquid ammonia*; leave the paper in the box exposed to the "fumes" that evaporate from the ammonia, say thirty minutes or longer; but if you are in a hurry, by placing the ammonia dish in another dish containing hot water will increase evaporation and shorten the time by half. All photographers invariably fume the paper before printing, as fumed paper *prints much faster* and *tones much better*, and you will never omit to do it after once trying it.

PRINTING.—Proceed to print in the manner explained till the photo is *very much darker* than it is to be when finished. *You cannot print nor tone by time*; you can tell when they are done enough by *examination only*. With a thin negative and very bright light you can produce the same result perhaps in five minutes that might take a half or a whole day with a dense negative and weak light.

WASHING.—After printing it is *very important* to wash the prints well in two or three changes of water, as explained elsewhere.

SALTING.—After washing well, place the prints, *one by one*, into salt water (common table salt), a tablespoonful to eight ounces of water, to remain only a few minutes. The purpose is to turn the prints *red before toning*, so that afterwards you can tell when they are toned enough. This salting is not an absolute necessity, some artists do it, others do not, you can try it and adopt it or not as you think best. *Before putting them in the toning bath wash them well* in one or two changes of water to remove the salt.

Into the last washing water, before toning, dissolve a teaspoonful of *Carbonate of Soda* let the prints soak in this soda water say ten minutes; this soda water I *strongly advise and recommend*, to remove the acid from ready sensitized paper, putting it in better condition to receive the tone.

TONING.—(See process elsewhere) and be sure to use a

full ounce of No. 1 solution to seven and one-half ounces of water, adding *twenty to thirty* drops of No. 2 solution. Also, be careful to use only *porcelain or glass dishes for toning*, otherwise you will precipitate the chemicals and render the toning bath inactive, so it will not tone. I suspect disobeying my advice about this has caused many failures. If the prints do not tone fast enough add a little more No. 1 solution. If everything so far is all right they generally tone within ten minutes, if the paper *was fumed*, but as I said before you must not go by *time*; you must go by *color*, which should change from red to bluish cast. *Do not forget this*; that a toning bath tones *much faster* when it is *slightly warm*; in fact if it is very cold it will not tone at all.

FIXING.—When toned enough, transfer them to the fixing bath. If they are toned *enough* the slight redness which will appear when first put in the *fixing bath* will recede again in a few moments, and disappear when the prints are dry; but if they are not toned enough they will turn *quite red* and it will not all afterwards disappear. After fixing they should be very *thoroughly washed*, then they are ready to paste on the card, etc. The caution about washing your hands every time they have touched the hypo solution to avoid getting the least particle of hypo into other solutions is repeated here. More than half of the trouble amateurs get into is from lack of caution about hyposulphite of soda.

MOTION.—In every part of the whole process that pertains to the *use of solutions*, including the developing, washing of plates or paper, toning, salting and fixing prints, etc., there should be *motion*; that is, the negative or prints ought not to lie still and stick together in the solution. For developing plates, gently “see-saw” the dish causing the solution to flow in little waves to and fro across the face of the plate, and this wavy motion is also useful for the prints besides

the action of *reversing* them occasionally, as explained elsewhere. The object of *motion* is to increase action; also, to avoid streaks, stains, etc., and to secure uniformity.

TRIMMING AND MOUNTING PRINTS.

Prints can be trimmed, one at a time, by laying a ruler over them, and cutting along the straight edge with a very sharp knife; but the more scientific method is to use *glass forms*, as the picture can be seen through them, and by shifting the form the best portion of the print may be selected. Lay the print on a thick light of glass, over it adjust the *glass form*, and with a sharp penknife cut all around the edges. Better than a knife for this purpose is one of the *straight trimmers* that are made for this *special purpose*.

MOUNTING THE PRINTS.—When through trimming the prints, my plan is to dampen a light of glass, at the same time making sure that it is clean. Then I take each print separately, and immerse it in water until it lies flat. (By this time you realize that prints, as well as negative, must accept the doctrine of total immersion.) Then place it face downward upon the light of glass; on top of it put another print facing down, and so continue until all of them have been dampened and thus piled up. Drain off the surplus water so that the prints will not be too wet.

The paste used for mounting *must be sweet*. Sour paste will spoil your prints. Do not forget this fact, and you will not, after a while, have to lament about the fading and staining of some choice picture. *Patent paste* is the best for an amateur's use, as it *keeps well* and is *always ready for service*. It is only essential to see that the bottle or jar containing it is corked (when not in use) to keep out dust. With this paste keep a

bristle brush—a two-inch brush is best—as a large surface can be spread over with paste in a short time, and it will do the work evenly.

After wetting the brush and squeezing out the water, dip it in the paste, and apply this to the upper surface or back of the top print on the pile, passing the brush backward and forward until an even coating is put on. See that the edges are not neglected. With a knife blade lift one corner of this print, grasp it with the finger and thumb of the left hand, and raise it off the other prints; at the same time take hold of the lower edges and turn it in such a manner that the print will be suspended, paste side down, between the two hands. Now bring it over the cardboard or mount, and poise it over the middle. Gently lower the centre of the print down to the mount, and carefully push one edge, and then the other, down to the cardboard surface. Place a clean piece of paper on the print, and, commencing at the centre, rub with the hand toward one end and then toward the other, to press out all air from beneath the print. If it appears to be smoothly pasted on, lay the mount aside. After you have finished mounting prints, wash off the glass and cleanse the brush.

Set the mounts up separately to dry, and then be *glad and rejoice* that your fears and anxiety are over, that having confidence in yourself to do what others have done, you made the effort, and with earnest care and perseverance have *come off conqueror*, and are that much more fitted to take an active part in life's work, an honorable productive art, benefiting yourself and your fellow-man.

ITEMS TO BE BORNE IN MIND.

The four *most important* things about photography are—

First,—*Lighting the object properly.*

Second,—*Focusing correctly.*

Third,—*Correct time of exposure.*

Fourth,—*Proper development of the plate.*

All of these four things except focusing require all the *special attention, study, and experience* you can possibly give them. All the balance of the process is merely *mechanical*, requiring only care *not to make blunders and mistakes.*

In *summer* keep your solutions *cool*; also use *cold water* in washing the gelatine plates.

In *winter* keep your solutions from freezing.

Should crystallization appear on a negative after it is dry, it shows a failure to thoroughly wash the negative before drying.

Do not use the fixing pan for any other purpose than to hold the hypo. solution. Label the pan *Hypo.* so that there will be no mistake.

Always wash your hands after using the hyposulphite of soda solution, and before handling another plate.

After removal from the fixing solution, the negative must have the hyposulphite of soda thoroughly washed out of the film. *This is important.*

OVER-EXPOSED PLATES, if not properly controlled in the developing, have a foggy appearance, and make weak prints, because they develop too rapidly, thereby not gaining "density" and "contrast;" when fixed an overexposed plate is *too thin all over.*

If the edge of the plates, which were protected by the grooves in the holder, remain clear, then fogging comes from lack of care in developing.

When a plate is *under-exposed* its shadows are clear, but weak. It is also *too thin* after fixing, similar to an over-exposed plate.

Negatives which require a long time to fix show one of two things: Either the hyposulphite of soda solution is *too strong or too weak.* About *one ounce of the*

soda to six ounces of water, is a safe rule to go by in making the solution.

Negatives from which *a number* of prints are required *must be varnished* or otherwise they will turn red from a combination of the free silver in the sensitized paper with the gelatine film of the negative. Exposed plates may be kept some weeks before developing, but the better plan is to do this as *soon as possible* after taking the picture.

Mistakes in timing and exposure are many. The professional photographer may err. If the calculation cannot be made with certainty, have the error on the side of over rather than under exposure, as the former can be controlled in the development.

Too much density in a negative can be reduced by flowing over the film, after it has been washed with water, the following solution: *Water, six ounces; chloride of lime, one drachm.* If the reduction is to be only a slight one, make the proportion of water greater. After a brief period wash the negative, and place it in the fixing solution once more, then wash it well to remove the hypo., and set the negative up to dry. Should only small portions of the negative require reducing, wash the plate; after which, with care, apply the reducer to the parts requiring it, with a soft brush, and then wash the plate and put it in the fixing solution.

Density in a negative may be increased in this way: After the detail is brought out with the oxalate developer you are using, pour it off and flow over the plate some *old* oxalate developer, containing three grains to the ounce of bromide of potassium. If after this treatment you still lack the density you require, fix the plate in a solution made up as follows: Dissolve one ounce of proto-sulphate of iron in three ounces of water. In another bottle dissolve one ounce of hypo-sulphite of soda in three ounces of water. Mix the

two solutions in a tray, permit them to stand a while, and then immerse the negative in the mingled solutions. After fixing, *wash* and dry the negative.

Note-books afford a means of recording everything essential relating to the exposure of a plate in the camera. Do not fail to make use of them. Compare the results, and try to avoid a repetition of the least desirable ones. Number your negatives to correspond with the books.

All trays and measures should be washed out after developing each plate.

Should you pour *too much* iron solution into the oxalate solution it will cause a yellow precipitate to form. *Always* add the iron to the oxalate, and *do not reverse the order*, or the same trouble will ensue.

Never fail to pour clear water over the plate before developing. If you follow this direction, disagreeable markings, resulting from a stoppage in the flow of the developer, will be avoided; and at the same time air bubbles, which cause transparent spots in the negative, will be prevented.

A plate varnished before it is thoroughly dry has a milky appearance.

Keep sensitized plates in a cool, dry place; dampness causes them to mildew.

Clear negatives cannot be produced with an alkaline sample of oxalate of potash. *It must be slightly acid.*

If negatives show too much contrast between the light and the dark portions, weaken the developer by the addition of water.

By taking an *extra ground glass* when going far away from a base of supplies, should the one in use get broken, the second one will be a welcome substitute.

Under-exposure gives clear shadows, but the picture produced from the negative is wanting in detail, and has a hard appearance.

Dust off the surface of gelatine plates with a *soft camel's hair brush*. The so-called pin holes in the negative are caused by *dust*. In this connection it will be well to add, keep the camera, lens and holder well dusted out, for no evil effect will result from it. Quite the reverse.

A COMMON BUT SERIOUS MISTAKE amateurs make in their eager haste is, *turning the sensitized plate or paper the wrong way or wrong side out, and they are thereby astonished at getting no picture at all. This should be carefully guarded against in filling the holders and in the developing and printing process.*

HYPOSULPHITE OF SODA is a harmless chemical, but it is antagonistic and *death* to all the other materials used in photography, and the smallest particle accidentally mixed with them will *destroy their proper action*. If hypo. gets on a finished photo it will in time stain it. For all these reasons you have been repeatedly *cautioned to wash your hands after using it, and never to use the hypo. dish for anything else.*

Plates sometimes commence to pucker at the edge. This is called "*frilling*." Should it show itself at any stage of the manipulation, immediately remove the recalcitrant plate and flow over its surface a saturated solution of alum, wash the plate, and proceed from the point where you left off. A strong solution of hyposulphite of soda often causes frilling; so do warm solutions, and treating the negative with a weak solution of acids.

Fogging. Fogging "is an opaque film covering the negative, which obliterates the forms, preventing them from being clearly distinguished in whatever direction they may be viewed." "When a precipitate is thrown over the entire plate by the action of the developer, so as to *obscure* in the deepest shadows the *transparency of the glass* when looked through, it is fog." The causes

of fog are many. It may result from white light falling on the sensitive plate, "light-struck" as elsewhere explained.

Another cause is defective development.

Another, hyposulphite of soda getting in the developer.

Or chemicals put on the plate from the hands, which were not washed.

Or trying to force the development of an under-exposed plate.

Not properly modifying the developer for an over-exposed plate.

Using an *alkaline* oxalate of potash.

Or exposing plates in an old holder having free silver about it.

When troubled with fog, examine the gelatine plate, and if the edges which were protected by the rabbeted edge of the holder are clear, the fault is chargeable to the development, as the plate was evidently over-exposed and the developer not modified to meet the case. If the fog is all over the plate, it may have come from white lights, from an alkaline oxalate, from under-exposure and forcing the development.

BLUE AND WHITE PHOTOGRAPHS.

Blue and white photographs are the same as black and white photos, except what is *black* on one is *blue* on the other. The blue photos are made on paper specially prepared, called *ferro-prussiate* paper. Before printing it has a green colored face which turns blue as soon as it is exposed to sunlight and immersed in clean water.

It requires *no toning nor fixing*. All that is required is to put it in the printing frame and print it till the image can be *faintly discerned*, then remove it and immerse it in clean water and in a little while renew with

fresh water. A little acid in the water, of most any kind, will improve and accelerate, but is not strictly necessary.

That is all you have to do, and in a few minutes it finishes itself, ready to paste on the card.

They make very pleasing pictures for many purposes, and are so *extremely easy and simple to make*, I advise all to keep a supply of the paper on hand for making them.

How to Make Transparencies. In the dark room, illuminated by ruby light, place a negative, film side up, in the printing frame; on the surface of the negative lay a gelatine plate of the slow kind, film side down. (For this purpose special plates are prepared and sold.) Put the back in the printing frame, fasten the springs, and cover the frame with the focusing cloth, taking it into a room where a gas or kerosene light is burning. Hold the frame with the negative toward the light, and distant about twelve inches from it. Take off the focusing cloth, give from ten to twenty seconds' exposure, according to the density of the negative; recover the printing frame, and go back to the dark room. Use the following developer for the gelatine plate:

No. 1.

<i>Neutral oxalate of potash,</i>	- -	4 ounces.
<i>Water,</i>	- - - -	20 "
<i>Bromide of Potassium,</i>	- - -	40 grains.
<i>A saturated solution of oxalic or citric acid</i> <i>(enough to turn blue litmus paper red).</i>		

No. 2.

<i>Sulphate of iron,</i>	- - - -	300 grains.
<i>Water,</i>	- - - -	3 ounces.

Take of solution No. 1, seven ounces; and of No. 2 solution, one ounce. Mix them, and develop until the detail in the highly lighted portion shows quite plainly. The result should be a fine positive picture or transparency, which is fixed, washed, and dried, and then is ready to be put in a nickel-plated frame with a ground glass at the back, and hung where the light shines through it—probably to adorn a window.

Magic Lantern Slides. To make these slides, proceed in a similar manner to that just described for making transparencies, observing care, however, not to get the positive too dense, or, in other words, so opaque that light shining through it will not throw out all the details in the picture. In short, the positive should be weak, but its details perfect, in order to make a fine lantern slide.

STEREOSCOPIC PICTURES.

How to Make Them. The camera used to make stereoscopic pictures should take a 5x8-inch plate in the holder, have an upright division through the centre, and upon the front board a pair of matched view lenses screwed into the flanges. Such are the requisites for this special service. Make sure that the central partition, called a stereo. division, is fastened in place.

Some discernment is needed in selecting the subject for a stereoscopic view. If the camera points to a distant hillside, and there is no near object included in the range, the view will appear flat when seen through the stereoscope, and will not seem to stand out from the mount. There should be included in the image reflected on the ground glass a near as well as the more remote view. Some shrubbery, the stump of a tree, or

any distant and still object will answer. Stereo pictures made upon this principle have the most seeming actuality about them. If the two pictures seen upon the ground glass are exactly alike, it is a proof that the lenses in use are well matched. After focusing, put the plate holder up in place of the ground glass.

As it is essential to success that the exposure of the two lenses should be made at the same time, place the focusing cloth on top of the camera, falling over to cover the lenses, and keep the cloth tightly drawn over them. Pull out the dark slide and, as usual, lay it on top of the camera. Now, all is in readiness. Raise the focusing cloth quickly. Do this so that light will enter the apertures in the lenses simultaneously. After a proper length of exposure, drop the focusing cloth over the lenses and replace the dark slide. Follow directions elsewhere for the development of the plate, but use care not to get one side of it more intense than the other; in short, the negative should be treated the same as any other.

My 5x8 C. A. B. camera *can be arranged for making stereoscopic pictures*, needing only the extra pair of stereo lenses, and division, which I can furnish at any time. Price for all, \$8.50.

CAUSES OF FAILURES.

I will here mention some of the most prominent causes of *failure* in making photos, especially with *amateurs*, as they occur to mind. If I forget any for the moment, you will find them indicated elsewhere in this work:

- Lack of courage.
- Lack of self-confidence.

Lack of *perseverance*.

Lack of attention to details.

Carelessness.

Forgetfulness.

Slovenliness.

Nervousness.

Too much haste.

Focus not sharp.

Plates *accidentally light-struck*.

Plates *wrong side out* in holder.

Plates *wrong side up* in printing frame.

Plates *wrong side up* in developing and fixing solutions.

Dark room not light-tight.

Dark room door accidentally opened.

Package of plates carelessly left open and contents spoiled.

Plate-holder not properly closed.

Accidents to the camera or the cap, causing them to leak light.

Exposing the *same plate twice*.

Cap off the lens.

Subject not properly lighted.

Exposure, overtimed or undertimed.

Developer too strong or too weak.

Development too quick or too slow.

Development overdone or underdone.

Plate *not washed* enough.

Plate *not fixed* enough.

Prints *not dark* enough.

Prints (usually) not toned enough.

Prints (possibly) toned too much.

Too much iron in developer.

Using same solution too many times.

Hyposulphite of soda.

Using iron or tin dishes.

Oxalate solution *not being acid*.

ACCESSORIES

That are useful and handy. The articles that follow may not be actual *necessities*, still all of them will be useful and *very convenient* to have soon as your means will allow. Foremost among them is the

Glass Graduate. This is an exceedingly useful article, not only for photography, but also for *general use*. It is a wonder to me they are not found in every household; their *special* use is for measuring *liquids* into ounces, half-ounces, quarter-ounces, etc. They are so formed, with a wide diameter at the top and a lip, it is very easy to turn liquids *into* or *out* of them when in a *hurry without spilling a drop*, and to measure the exact quantity with no *guess-work*. There are also small ones for measuring fluid *drams, half drams and drops*. If you have not got one you should get a *large one anyway*, or one of each is better.

Measuring with a Glass Graduate. On the graduated glass you will find lines and figures. The figures 1, 2, 3 and 4 on the left hand of the centre line represent ounces, and so also does the mark $\frac{3}{4}$ designate the same. The short lines between the ounce lines, 1, 2, 3, 4, represent half ounces. On the lower right hand side of the centre line you will find the figures 2, 4, 6, 8. These represent drachms; and the mark or character $\frac{3}{4}$ is used to denote drachms. Example: To measure two ounces and six drachms, fill the graduate to the line with figure 2 at left-hand side, pour this out into the vessel designed for the solution, then fill the graduate to the line with figure 6 on the right-hand side; this is six drachms. Add this to the two ounces just measured, which gives you two ounces and six drachms.

Scale and Weights. For weighing ounces, half-ounces, drachms, scrupules and grains. These little

glass balance scale and weights are useful when you desire to weigh very small quantities *accurately*. The weight of a single hair can be ascertained on these little scales so nicely is the balance adjusted. They also will be found very handy for *general use* and cost but a trifle.

WEIGHTS AND MEASURES.

Apothecaries' Weight.

SOLID MEASURE.

20 Grains	=	1 Scruple	℥
3 Scruples	=	1 Drachm	ʒ
8 Drachms	=	1 Ounce	ʒ
12 Ounces	=	1 Pound	℔

FLUID MEASURE.

60 Drops	=	1 Fluid Drachm	ʒ
8 Drachms	=	1 Ounce	ʒ
20 Ounces	=	1 Pint.	
8 Pints	=	1 Gallon.	

The above weights are those usually adopted in formulas, and are what are used in the foregoing formulas.

Trays. It is presumed that everybody has some *glass dishes* which when thoroughly cleansed will answer for a trial beginning until others can be obtained which are better suited for the various solutions used in photography. The *trays* that are *especially made for this purpose* are not only more *handy*, but are also much more *economical*, their form being such that while it does *not require so much* of the solution, at the same time it has a better chance to do its mission. *Vulcan trays* are cheap and well adapted for *developing negatives*, also for the *hypo. solutions*. But they will

not do for the *toning solution*. The latter *must* be used in *glass* or *porcelain* to insure safety. *Two or three* of the vulcan and *one* of the glass trays does the necessary work very conveniently.


Patent Paste. Glass. Forms. Revolving Trimmers. Paste Brush. The special use of these articles is fully explained on another page, under head of "Trimming and Mounting Prints."

Camel's Hair Duster. This is the only thing with which you can *safely* remove the *dust* that is liable to get on the plate and make *pin-holes* in the negative.

Negative Boxes. When a number of negatives have been developed and varnished, there are two methods of preserving them from the dust and from scratches. One is by putting them in envelopes made of stout paper, and called "negative preservers," which are sold to correspond to different-sized negatives. Another way is by placing the negatives in boxes. These are called "negative boxes," and are constructed to hold twenty-four negatives, which latter are slipped into the grooves at the two sides, and thus kept from rubbing. These boxes are also handy to hold plates and negatives in at other times. They can be closed light-tight.

Extra Plate-holders. Bear in mind that when you are away from your "headquarters" or in traveling from house to house, you may not be able to secure a *dark place* everywhere in which to fill your holders or to develop the plates if you should desire to take *more than two* pictures. In that case you would need to fill *extra plate-holders* and take them with you.

Inside Frames. For *economy* and other reasons it often happens that a person desires to use a *smaller*

plate, than the largest his plate-holder and camera takes. In this case a smaller plate-holder cannot be made to fit the camera without admitting light. Thus a *4x5 plate-holder cannot be used on a 5x8 camera*. This fact has been printed in former editions of this book and yet patrons frequently order a 4x5 plate-holder for the 5x8 camera; if a person is so little concerned and *heedless* of what I tell them as to overlook a plain direct caution like that, what may be expected as to the attention and care they give to the more intricate things I tell them about the business; or *what probability is there of such heedless person making a success of it*. To meet this requirement I can furnish *inside frames* for our regular plate-holder. For 5x8 holders I have one *inside frame* that takes a 4x5 plate, and another that takes a plate *only 3¼x4¼ inches*. The latter is the *smallest plate* that is made, and is the plate generally used by photographers to make *carte de visite* or 2x4 pictures on. For 4x5 plate-holders I can furnish an *inside frame* for the 3¼x4¼ plate. For the 5x8 C. A. B. plate-holder it is generally best to get a *pair of the inside frames*.  In ordering these inside frames you will save *trouble and delay* by *not forgetting* to state plainly *what size your plate-holder is*, and also *what size plate* you want them for. *I repeat, do not forget the size when you order*. *The saving on the plates* pays for these inside frames in a very short time.

Directions for placing the *inside frame*: Put your plate-holder on the camera just as it goes when in use; have the little brass catch on the left-hand end of the holder *uppermost*; now remove the outside slide *next to you*, also the centre slide; next insert your *inside frame* into the plate groove that is *nearest the camera*, and be sure that the side with the little metal corners on faces *outward* nearest to the slide that remains in the holder. Now lay your dry plate in the opening resting on the

corners. Now, if you have turned the sensitized side of the dry plate *outward*, close your slides, and you are ready for action. It is more convenient to do the above off the camera than on it, if you keep the relative position correct.

Briefly stated the inside frame slides into the same groove where you ordinarily put the glass plate. When you are operating convenient to your dark room, so that you need put but *one* small plate in the holder at a time, you will find it far most *convenient* and *handy* to put the plate in and out of the holder, by *removing* the slide and *leaving it out entirely* from *one side* the holder, then when you draw the *middle* slide out, or *partly out*, you can *lay* the *small plate* right into the inside frame, that's on the opposite side without sliding it out of the holder, then close the middle slide and you are ready for business.

Printing Frames. If you are in a *hurry*, with many negatives to print and customers *impatiently waiting*, it is a great saving of time to have *several* printing frames, for you can fill five or six frames with negatives and *watch* the *printing* all going on *at the same time*, just as easily as to attend a single one. Photographers generally have a dozen or more of the printing frames in operation all at the same time, which enables them to make so many photos in one day.

Photo Paper. This paper is imported from Europe in packages. It should be kept in a cool, *dry, dark* box or place, and avoid opening a package or exposing it to light or air *more than is actually necessary*. I think if the sheets in broken packages are kept under pressure to keep the air from the face of the paper it helps to preserve it in good condition.

Dark Room Light. There is no harm in having *plenty of light*, provided it is the *right kind of light*. It

the *quality*, not the *quantity*, which you must exercise great care about. The least glimmer of white light is fatal, and even the light of an ordinary lamp or candle will spoil your plate. But you can make a box (an old soap box will do), cut a big hole in the side, and place a piece of ruby glass over the hole; have your box large enough to hold any good lamp, and a lid on the top for the chimney to ventilate, *but if any light comes through this hole, screen it from your plate*. I use such a home-made lantern as this. It cost about 60 cents, and is just as good as any \$6 lantern I ever saw. If you cannot get ruby glass, I will send you one for 45 cents; ruby glass is dear.

A *long* box set up on end, one that will reach considerably higher than the chimney of your lamp is best; on the *back side* near the *bottom* (or in the bottom, if the box sits on cleats) there should be some small holes, also in the top of the box a hole or holes, for the purpose of giving a draught of air, so that your lamp will *burn freely without smoking*. The opening that is covered by the ruby glass to be in the lower part of the box, about opposite the flame of the lamp.

Ground Glass. You are liable to accidentally break your *ground* glass at any time, and as it might cause quite a long delay before you could get another, it is well to keep *one or two extra ground glasses* on hand. Observe *one side* of the glass is ground, the other side is not; always insert a new glass in the frame so that when placed on the camera *the ground side of the glass will be toward the lens*. It is well to wash the ground glass occasionally, especially a *new one*.

Burnisher. *Gloss* is not *art*, still there are some people who have a great liking for *gloss*. The *double gloss* on the paper I sell I consider sufficient. Photos

receive the *extreme extra gloss* sometimes seen on them by passing them between *heated iron rollers*. This machine is called a *Burnisher*. It is quite expensive, the cheapest costing \$15.

Magnifying Glass. This is a *very useful* and handy thing to have not only for photography, but for other things also; such as silver in your fingers, the texture of cloth, sand that the grocer sells you for sugar and a thousand other occasions that happen in every day affairs. I can furnish a *very fine* and *powerful* magnifying glass for a moderate price.

Glass Cutters. I can furnish a glass cutter for 50 cents that will cut glass *equal to a diamond*. They are so *cheap* and so *handy* everybody buys them, and some agents have made a great deal of money selling them. I can furnish them by the dozen for \$1.50, and at 90 cents retail the agent doubles his money; *all your neighbors will take one*, and you will find them useful to cut a negative or a ground glass or a window pane, etc.

Plate Lifter. This is a simple device, costing but a trifle, and is used to raise plates out of the solution without scratching them nor wetting the fingers.

Developers. Besides the *developer* mentioned in this book there are several others, some of which are put up for sale; nearly every manufacturer of plates has his hobby about the developer; in practical use the result arrived at from using any of them is *all about the same*. I can furnish any of them at the manufacturer's price.

Solutions. All the solutions mentioned in this book can be obtained from me at any time, and are *guaranteed of uniform strength and purity* essential to success, all prepared ready for use at a moderate price. It is more economical, however, for those who can, to

prepare the developing and fixing solutions themselves, they can obtain *reliable* chemicals. The formulas for except the toning solutions and the restrainer (which hold as proprietary) will be found in this book. As the quantity used of the toning solution and the restrainer is comparatively small, by a little forethought and but small outlay, a sufficient stock can always be kept on hand.

Varnish. It is probably unnecessary to remind most of my readers that ordinary varnish will not do at all for varnishing negatives. One of my patrons, however, not realizing this fact, purchased and used some ordinary wood varnish. The result of this experiment was more than he bargained for. The energy of his varnish was so great it cemented the paper to the negative, making a "contact" on that print probably never equalled by a professional. *The Anglo-American Photographic Varnish*, prepared and sold by me, has the reputation among professional photographers as being *unsurpassed* in quality and *durability*.

Card Mounts. The cards I sell for mounting the photos are manufactured by the well-known firm A. M. Collins & Son. This firm manufactures all the cards that are used by *first-class* photo artists in the United States. It is good policy to use as handsome and attractive a card as possible, as it helps give you a *reputation* of doing everything first-class, builds up your trade and puts money in your pocket.

Opaque. This substance is designed for completely obscuring imperfect backgrounds, retouching faulty skies in landscape negatives, coating the inside of lenses or cameras, backing negatives, etc. Wherever you want to keep out light, use Opaque. It is applied with a brush, dries quickly and sticks.

1893

EGYPTIAN CHEMICAL COLORS.

Manufactured expressly for painting Photographs, Views, etc. Also used in connection with the Egyptian Transparent Compound for producing the Egyptian Crystal Photograph. The most lifelike picture in the world.

Special Notice. All photographs colored on the face of the picture, and mounted on convex or flat glass, are done with these colors, under whatever name the picture may be called.

These colors, are put up in polished wooden boxes, labeled "Egyptian Chemical Colors." Each box contains the following colors: Transparent Black, Dark Emerald Green, Orange or Gold Color, Blue, Dark Brown, Light Green, Rose, Violet and Flesh.

For coloring Photographs, Engravings, Views, Maps, etc., these colors cannot be excelled. These colors are used by all parties coloring photographs, under whatever name they call their picture or art, and are the only colors used for the above purpose that give entire satisfaction. *Beware of Imitations.*

Architects will find these colors invaluable, as they can be used with pencil or brush.

These colors are indelible, and will not rub off or wash out.

N. B.—Full and complete instructions for the use of these colors and for making the EGYPTIAN CRYSTAL PHOTOGRAPH, accompany each set.

Brushes. The brushes generally used in photography are the *Camel's hair duster* used for removing dust from plates which causes "pin holes" in the negative. *Bristle Brushes*, used for pasting the prints, and *Red Sable Brushes* used for spotting and coloring photos.