A SYSTEM

OF

PHOTOGRAPHY;

CONTAINING AN EXPLICIT DETAIL OF THE WHOLE PROCESS OF

DAGUERREOTYPE;

ACCORDING TO THE MOST APPROVED METHODS OF OPERATING, INCLUDING ALL THE LATE

VALUABLE IMPROVEMENTS,

AS PRACTICED BY THE MOST SUCCESSFUL ARTISTS; WITH A COMPLETE AND FULL ACCOUNT OF APPARATUS; WITH RECEIPTS AND CAREFUL INSTRUCTIONS FOR MANUFACTURING THE CHEMICLES USED IN THE ART; TO WHICH IS ADDED THE PROCESS OF

GALVANIZING, ELECTROTYPE, CALOTYPE.

AND

HYALOTYPES;

OR

PORTRAITS ON PLATE-GLASS;

ALSO,

M. BECQUEREL'S PROCESS FOR PRODUCING DAGUERREOTYPES WITH THE COLORS OF NATURE.

SECOND EDITION.

BY S. D. HUMPHREY.

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PREFACE.

So LITTLE time has elapsed since we published the first edition of this work, that we can gratify its subscribers with but few improvements in this. It does not exceed two months since the first edition was issued, and the copies are already disposed of; and it is to satisfy the demands of our subscribers, that we present the following hastily-prepared pages to the public.

We are happy to acknowledge the many favors already bestowed upon us, and it shall be our endeavor to lay before artists generally, the principles involved in the Daguerrean Art; and at the same time, give the most approved method of manipulating, through all the different processes. Each particular operation is separately treated, with regard to its intrinsic points. In this, most works on the art fail,—particularly the late publications. Without a guide, no one can succeed; no science, or knowledge of general subjects, can essentially aid him; he must have a plan, definite rules, and by these he must be guided, or he will never arrive at perfection.

This work describes the manner of operating as adopted by the most successful artists in America,—where, it is acknowledged, the art is practiced in its highest state of perfection.

In this work, the author has entered into all the particulars, both of preparation and the actual operation; for, it is chiefly from not understanding these, that operators fail;

since the slightest omission in preparing the plate, or otherwise, would defeat all success: And while it has been the author's object to exclude all irrelevant matter, and to leave ample range for learners to exercise their judgment, he has accompanied all directions with philosophical explanations, so that while following these directions, they see the reason for doing so. In pursuing this course, we trust, we not only aid beginners, but furnish hints and valuable instruction to artists of experience.

Now, with a view of promoting the interest of an art we have so long practiced, and laying before our fellow artists the result of our experience and that of others, we submit these pages, with all due consideration.

PROGRESS OF IMPROVEMENT

IN THE

DAGUERREOTYPE.

In 1839, M. Daguerre, a distinguished chemist of Paris, after several years of laborious research, proclaimed that he had discovered a method of impressing the image of the Camera Obscura on a silvered plate. The French Government, on learning that such was indeed the fact, immediately purchased of him the right of the discovery, by granting him an annuity of ten thousand francs, and published the process to the world.

The impressions then produced were extremely faint and meager; and neither Daguerre, nor his most ardent friends had any idea of the ultimate importance of the discovery. The plate was coated over iodine to a gold color, exposed in the camera to the image of objects in direct sunlight from ten minutes to an hour, brought out over mercury, and washed in hyposulphite of soda. The art was of course confined almost exclusively

to the production of landscapes and views; until an ingenious and scientific American conceived the idea of rendering the plate sufficiently sensitive to produce portraits in the shade. The first step in improving the sensitiveness of the plate was made, if we remember rightly, by Dr. Draper, and published in a communication by Prof. Silliman. It consisted in exposing the plate, after being coated with iodine, over a tall jar, at the bottom of which was uncorked a bottle of chlorine gas. The effect was to shorten the time in the camera, and improve the impression; but the quantity of chlorine thus absorbed by the plate was extremely variable, and the effect uncertain. Soon after, however, the chloride of iodine was substituted for the iodine and chlorine.

The time of exposure was now much reduced, and something like a tolerable degree of certainty obtained; but the impressions were far from being clear, and could scarcely be said to have any tone. Bromide of iodine was soon tried, with far better success; and it was supposed that this must continue to be the chemical in general use.

Up to this time, the lenses used for cameras had been chiefly the plano-convex; which, notwithstanding the best arrangements that could be adopted, were still liable to much chromatic and spherical aberration; so that in operating, after taking the focus on the ground glass, it was

necessary to shove the slide the one-thirty-sixth part the focal distance, in order to bring the plate to the chemical or working focus of the instrument. But the general introduction of the Achromatic camera now put a *new face* on Daguerreotype affairs, and soon cast the old Plano into the shade. The gilding process was also now discovered by Mr. Fizeau, which added more perhaps to the beauty and finish of the impression than any other single improvement. Soon followed the process of coloring; and though in itself a small affair, it has created more popular clamor than all other improvements combined. Bromine water had been used previous to this, both in connection with chloride of iodine and with dry iodine, but was generally rejected, we think, for want of means to determine the relative quantity of bromine absorbed by the previous coating of the plate.

Various compounds of iodine, chlorine and bromine have since made their appearance, under the denomination of Quick Stuffs; and some of the best of these still form the most reliable accelerators in general use. The improvement of coating back over the iodine seems to have been discovered cotemporaneously by many artists; we having practised it nearly a year before supposing it known to any other operator.

The only coating-box used the first two or three years was a simple wooden box, with perhaps a small shallow dish at the bottom to hold the chemical; all the volatile parts of which readily escaped through the pores of the wood. The method of cleaning the plate has also undergone great improvement; the first process being little more than to scour the plate and rub it off with cotton wool. A velvet buff for the "Finishing touch" came into use about the same time with the close coating-boxes.

We have sketched but very briefly and imperfectly the progress of this wonderful art. When we consider how defective was the apparatus, and how meager the process first employed, we are almost surprised that impressions, even poor as they were, should ever have heen produced. None but those who have labored in the advancement of the art, step by step, from the beginning, can conceive with what application and perseverance the present state of perfection has been attained.

THEORY OF THE PROCESS.

Various theories have been devised by which to account for the chemical changes that occur in the Daguerreotype process. Dr. Kane thinks the iodide of silver, or coating of the plate crystalizes under the action of light, but in crystals so minute as to be invisible; and that the mercury decomposing the iodide over the whole surface of the plate, forms a black metalic amalgam with the parts not affected by light, and a crystalline amalgam with the crystalline iodide. Dr. Draper says, "In the shadows no mercury exists; the lights are an amalgam." The light imparts to those portions of iodide on which it has impinged the quality of being decomposed at a lower temperature by the vapor of mercury than the temperature at which an unexposed iodide can be decomposed; an amalgam, therefore, forms on such parts."

But both these theories, and others that might be quoted, seem plausible enough; but they fail to account for all the various conditions observed. We do not presume to put forth our opinion in

opposition to the learned authority upon this subject, but simply to offer a few suggestions which have seemed to us more nearly to accord with our own exprience, and upon which we base our method of operating. Those who have attentively studied the phenomena of the Daguerreotype process, have probably noticed the following facts in relation to it:—

1. An iodized plate, exposed to mercury without previous action of light upon it, is not changed in color, but immediately becomes covered with minute globules of mercury, deposited on the surface like particles of dew.

2. The plate being previously exposed to a certain degree of light, the mercury, instead of being deposited as in the first instance, combines with the coating, and the plate becomes black:—Exposed beyond this change the mercury again deposites in globules.

3. If the action of the light has been strong or long continued, the mercury combines almost indefinitely, and the plate is white.

4. When the mercury is heated much above one hundred and seventy-five degrees, the effect is the same as last stated, though the plate were not exposed to light at all.

Now, as the various salts of silver are decomposed when subjected sufficiently to the action of light, the first effect of such exposure must be to

weaken the affinity of the combining body for the silver, in proportion to the amount of light absorbed. If then a coating of iodide of silver* be exposed to the image of the camera, the affinity the iodine for the silver will be lessened in various degrees at different points, according to the intensity of light at such points; and on being submitted to the vapor of mercury, we conceive that the least exposed portions take on a small proportion of mercury and form a black iodide of silver and mercury; while those parts where the affinity of the iodine for the silver is sufficiently reduced by the action of light, combine with mercury by different equivalents, taking on a much greater quantity, and forming a white instead of a black iodide.

Respecting the greatly increased quantity of mercury required to develope the lights, there can be no doubt, as every experienced artist knows, that those portions never suffer from mercurialization, while the dark shades are easily ruined. It may be observed also that the white parts seem in a measure superimposed upon the surface, and are very easily effaced, while the shadows are more incorporated into the substance of the plate. When the duration or intensity of

* The true sensitive coating of the plate is probably a bromide of the iodide of silver, or bromiodide of silver. Iodine, bromine and chlorine are so similar in their chemical nature, however, that in general any compound of one is a representative for that of the others.

light is sufficient to destroy fully the affinity of the iodine for the silver, we think the liberated iodine combines with a new layer of silver behind the first, and the film of silver thus left free, forms a blue amalgam with the mercury, in the same manner as when a plate is exposed to mercury without iodine. This effect is called solarization. The same thing takes place, though on the shades of the picture, when a plate is replaced over mercury after exposure to the open light.

The distinguishing features then of this theory are briefly these:

1. A certain degree of light is necessary to produce even the darkest shadows.

2. The coating of the plate is not decomposed, (except in solarization,) but its combining force is so modified as to admit of union with mercury in two proportions, forming two distinct iodides of silver and mercury.

3. No amalgam exists except on such parts as have been too much exposed to the action of light.

ROOMS.

If possible, your operating room should face to the north. There are several reasons why a north light is preferable. It is exempt from the direct solar rays, which always occasion much perplexity if allowed to enter your window. It is more uniform in chemical action; varying but little in the time required to obtain the same effect at different times of day. If a north exposure cannot be acquired, a northeast should next be sought; perhaps the subject would be better understood by giving in their order the different exposures:—

1. North exposure, for the reason given above.
2. Eastern exposure, or as nearly north as possible.
3. As near north of northwest as possible.
4. Southeast, or as nearly east as possible.
5. Due east.
6. West.
7. South; which exposure is the most unfavorable of any, since the solar rays at most seasons of the year fall directly in the window.

When obliged to use a window on the sunny side of a building, much of the glimmering effect of sunshine can be avoided by a screen made of

white muslin, and so contrived as to extend out edgewise from the window, on the side next the sun. This can easily be so constructed as to slide at top and bottom on wires; and when not needed, is slipped back close to the window-frame. If you can do nothing more, a piece of blue paper muslin, or tissue paper, spread to receive the direct rays, will aid much by absorbing them. But the best of all is an extra sash with ground glass to use when needed. This is somewhat expensive, but for a permanent room, where the sun is troublesome, it will more than repay expense, as it tends to soften the rays of light, and gives a much finer impression; and where there is light enough, we would recommend that it be used in all cases, whether the sun shines into the window or not.

One window, if sufficiently large, is much better than more. Your light should come as much from one point as possible, and the higher the better. One foot at the top of your window is worth two at the bottom. Use no platform for the sitter, unless the bottom of the window should be three feet or more from the floor.

A sky-light is in most cases preferable, since it it obviates the difficulty so often experienced in taking persons with light blue eyes, as the shadows fall down and throw the eyes in the shade,

which position gives them more clearness than could otherwise be obtained.

A space of five or six feet from the widow for back-ground is valuable when it can be obtained.

DARK ROOM.

In case you have no dark closet convenient for this purpose, one can be readily constructed by putting up a slight frame-work in one corner of your room and covering it with dark muslin. In winter it should be near a stove, and the temperature never below sixty degrees when operating, and seventy or seventy-five is far better. It should also be sufficiently large to enable you to keep your mercury bath at the distance of several feet from your coating-boxes. One of the products of combustion is water; and the constant burning of the mercury lamp saturates the atmosphere for some distance around with watery vapor. In addition to this, the vapors from the boxes, if allowed to come in contact with the plate while placing it over the mercury, would ruin all success. It is this which frequently occasions the bright yellow glistening which sometimes appears, and spoils what would otherwise have been a fine proof. If any one doubts this, let him stand his bath between his coating-boxes and try the result.

From the foregoing, it is obvious that a separate compartment for the mercury is advisable; and when convenience will admit, it should be had, for it will doubly repay the extra expense.

There are various methods of admitting light by which to regulate the coating: By means of an aperture at the top, allowing the light to fall rather feebly on objects within, you will have the plate secure from light in changing from one box to the other, and by turning it face upward you raise it towards the aperture until you have just the degree of light necessary to determine the coating. Perhaps a better plan is to make an aperture, say one by three inches, in a convenient corner, and fasten a sheet of white paper lengthwise of this at the lower edge, extending up over the aperture on an angle of about forty-five degrees with the screen. You examine the plate by holding the face near the paper. The last is recommended, as it admits less light into the dark room, and generally, the less the better. The paper may be thick, or pasteboard, so the less light may pass through it; for having once become accustomed to the *very dark room*, you will probably prefer it, since you will be better able to judge of the colors of the coating, which is sometimes very difficult, and not unfrequently results in failure.

APPARATUS:

CAMERA.

It is of the utmost importance in selecting a set of apparatus to secure a good camera, for without such no one can obtain fine pictures. In testing it, see that it gives the pupil of the eye and lineaments of the features sharp and distinct; and that the whole image on the ground glass has a fine pearly hue. Look also to the field, and observe if the focus is good at the centre and extreme edges of the ground glass at the same time. A poor camera generally gives a misty image, with the lights and shades apparently running together. The best American camera is fully equal to the best imported,* while it costs much less; but there are great numbers sold which are not worth using. When the lenses are foul, clean them carefully with fine tissue paper. Beginners fre-

* At the present time the chances are much against you, for after you have paid for a German Camera, it is very probable you may have obtained only an American; for many of the Cameras said to be German are only American, with engraving to match the genuine This is a base imposition practiced upon purchasers; and the only safe way is to know of whom you buy.

quently get their cameras bewitched by misplacing the lenses in putting them back.

The lenses of the achromatic camera are made of two kinds of glass, crown and flint, which have a different dispersive power in proportion to the power of refraction. By means of a skilful combination of these, an image is obtained without separating the rays of light prismatically, as would be the case with lenses of one kind of glass. The two convex lenses are crown, and the two concave are flint. The object glasses being generally cemented together, are not so liable to get misplaced. The convex, or crown side, goes front. The two remaining glasses are separated by a brass ring about one-eighth of an inch, and so placed that when in the tube the flint glass shall be in front, with its concave surface back, and the crown last, with its most convex side next the flint.

A small scratch or air-bubble is no great injury, and few lenses can be obtained entirely free. The author having once used one of the best

NOTE.—If a camera gives a well defined image on the ground glass it should do the same on the plate. Many a valuable camera has been condemned for failing in this, merely in consequence of the plate-holder not being in focus with the ground-glass. In case of deficiency in this, put an old plate into the holder, lay a rule across the face and measure the distance between them very exactly; measure the ground-glass in the same way, and make the distance agree perfectly by moving the glass either back or forward in the frame, as the case may be, so that the surface of the plate shall occupy precisely the same position as the face of the glass when in the camera.

quarter Cameras, with nearly one-tenth of one of the glasses broken out, could detect no difference between an impression taken with it in that state, and one taken when the glass was entire. All glasses with waves should be avoided, as they tend to disproportion the figure, and render it less distinct. The ground side of the focus glass goes forward.

CAMERA STAND.

Those with cast-iron screw and socket are preferable. It is necessary that they be well made, in order to be firm, and not so small and frail that the Camera will shake during any portion of the time of sitting.

HEAD REST.

The standing iron head-rest is best, and, as now constructed, is not so heavy as to be burdensome to a travelling artist. However, the heavy ones are better for a resident artist.

It is necessary to have two or three chair-rests, to enable you better to take groups.

PLATE HOLDER.

Of this there are a great variety of patterns, the best of which is Lewis', which operates on

the principle of the lever and wedge. The bed-piece, on which the plate rests, should be of iron in summer, as it prevents the plate from becoming too warm in buffing; and of wood in winter, it being then desirable that the temperature should become slightly elevated.

COATING BOXES.

We do not consider a set of apparatus complete without three of these: one for iodine, one for bromine or quickstuff, and the other for such occasional use as circumstances may require. These should all be such as have a deep glass pot, with glass lid, ground and fitted *airtight*. Earthen or stoneware jars will answer, but not as well.

There are many kinds of boxes called bromine boxes, but they are so imperfect, that we leave those who choose to experiment, to fashion one after their own views.

MERCURY BATH.

Those having a thermometer and a scale in front are much the most convenient; and we consider a mercury-tube, in some form, to be indispensable, if you would operate with certainty. Lewis' Bath is recommended, and in all cases for medium plates not less than half size bath,—which is

thought to be better, there being more room for the vapors of mercury to circulate, and to be more uniform on the surface of the plate.

BUFFS.

Two of these are necessary. That part of the stick to be covered should be about eighteen or twenty inches long, and three wide, and made crowning on the face from one end to the other, about one-half inch. Before covering, these are to be padded with two or three thicknesses of canton flannel. The buff should not be too hard, but padded with flannel, so that by drawing it over the plate, it may touch across the surface. The only proper material for buffs is prepared buckskin; and if prepared in a proper manner, this needs nothing but to be tacked upon the stick. Sometimes, however, we find, on trial, that there is oily matter remaining in the skin. This may be known by a milky appearance over the surface of the plate. Should this be the case, wash your buff leathers in spirits of wine, with the addition of a little aqua ammonia. When perfectly dry, fold them face to face, and rub them until soft, being very careful not to touch the face side. Be always sure that your buffs are *perfectly dry*. If you have any doubt respecting it, or if the weather is damp, keep them in the dryer.

POLISHING WHEEL.

This, if used, of course supersedes the buffs entirely. There are various methods of construction; one of the best of which, is to have a cast-iron wheel, say eighteen inches in diameter, with a flat rim four inches wide, hung on a shaft, with a crank to turn by the foot, like a turning-lathe. The covering is fastened on the rim by turning the edges of the leather back and sewing them across on the under side. The ends, if nicely pared to an edge and lapped, by always turning the same way, will not ruff up. A more simple plan, is to place a wooden wheel of about the same diameter on the extreme end of the shaft, and stretch a buckskin over the disk, like the head of a drum, and tack it around the edge with nails. In this case, the flat side of the wheel forms the buff. The plates are either fastened upon blocks, or held by a plate-holder constructed for the purpose. The use of the wheel is of doubtful economy, except for large establishments.

SIDE SCREEN.

The most advisable screen or reflector, for either a travelling or permanent artist, is a frame about six feet in height by seven in length, and

covered with only one thickness of bleached muslin. Mr. Hill, in a late work on Daguerreotype, recommends that two or three thicknesses be used; but we differ from him in this, as it is in all cases advisable that the light fall upon the sitter as much as possible from one point; this, in order that there should be positive shadows and no great amount of cross-light to conflict. If too strong reflection be employed, the tendency is to destroy those shadows which nature gives, and leave us with a faint, flat, indistinct impression. We shall speak more fully upon this, under "arrangement of light."

BACK GROUND.

There are various kinds of back-ground that may be used to advantage at different times. If there is only a distance of one and one-half feet back of the sitter, common nankeen cloth answers well; where there is room, a common woolen blanket is good, and is the one generally used. One should be selected with a short nap, and as close, firm texture as possible; for if the nap be too long, and but little distance back of the sitter, it gives a rough, cloudy back-ground, which is not desirable. Nothing, however, answers as well for a stationary back-ground, as a piece of fine dark-drab broadcloth. This should be regulated

according to the distance; the dark should be used at a short distance, and the light when a greater distance can be had. It gives a fine relief to the image, and imparts a soft, satin-like lustre.

TRANSPARENT OR INVISIBLE BACK GROUND.

Take a large woolen blanket with long nap, the longer and rougher it is the finer will be the effect produced, stretch it on a frame of sufficient size, and suspend the frame at the centre of the upper end by a string fastened to a nail in the ceiling, from three to five feet back of the sitter. Having arranged this, fasten another string to the side of the frame, and while the operation is going on in the camera, swing the back-ground from right to left, continuing this during the whole time of sitting, and you have a clear, "transparent" back-ground, which throws the image out in bold relief, and renders the surface of the plate invisible. If equalled at all it is only by atmospheric back-ground. We consider it to be the best ever known, and think it needs but to be tried to afford satisfactory proof that it is so. Although used by few before, since the first edition of this work at least two-thirds of the artists

have adopted its use; for any one can at once understand the principle and the effect which it produces.

PLATE-CLEANING MATERIALS.

Select some of the best unbleached cotton flannel, with thick, firm body and long nap, free from any specks that will scratch the plate, and cut into patches two or two and a half inches square.

In order to prevent grease or other substance from getting on the face, it should be folded and kept with the nap sides together. Of the best prepared rotten-stone tie up about an ounce in a piece of muslin; old bleached muslin is best, as it assumes a firmer and thicker body after having been washed several times. Take two small bottles, put a quill through the cork of each, and fill one with acidulated water and the other with potassa solution. The preparation of these is described among receipts for chemicals.

POLISHING MATERIALS.

A small quantity of polishing powder tied up, and a brush for cleaning the buffs. A stiff nail-brush, or large tooth-brush will answer for this.

WASHING AND GILDING MATERIALS.

A pair of pliers for holding the plate, two wide-mouthed bottles, one for hyposulphite, and the other for gilding solutions, an earthen bowl for the soda solution, a glass funnel for filtering, a pail, pitcher and wash-bowl for water, and a spirit lamp for gilding, drying off, &c. For two-thirds and whole sized plates, one of Lewis' adjusting gilding frames is very convenient.

COLORING MATERIALS.

A few bottles of different colors, a gold saucer, a soft camel's hair duster, and three or four fine-pointed sable brushes constitute a set. A small drill, with diamond shaped point is excellent for representing brilliants in jewelry, by boring slighly into the silver of the plate.

BATH FOR DRYING AND CALCINING CHEMICALS.

It consists of a circular piece of sheet iron, six inches in diameter, planished out in the centre, and made concave about three-fourths of an inch. Three strips of sheet iron, each six inches long and half an inch wide, serve for legs. By doubling over and hammering down half an inch of the upper end, then bending at right angles in the opposite direction, an inch below, they are made to slip on the edge of the circular plate when in use, and take off when we wish to pack. A small box of dry sand is kept at hand to fill the top when needed, and our gilding lamp, lighted and placed beneath, furnishes the necessary heat.

This we use, without the sand, for drying and calcining chemicals; with it, for slow evaporation, as in manufacture of gold, &c.

BUFF-DRYER.

Since the first edition, we have a better and more simple *buff-dryer*, which is a box of sheet iron twenty inches long, eight wide and five high, with one end left open and the other closed; the cover is made of the same material, with the edges bent over to go on and off. There are several wires running through the centre of the sides, which it is necessary to cover with cloth or paper to absorb all the moisture that may be made by applying the heat, and the buffs are put in and taken out at the open end. In order that the heat may be as nearly uniform as possible, an iron bar one inch wide, eighteen inches long, one-half inch thick, is so bent that the centre is one-quarter inch from the

bottom of the box, and that at least two inches of each end come in contact with the bottom; this being riveted on the bottom, and a lamp with a small blaze applied to the centre of the bar of iron; this will constitute one of the best and cheapest buff-dryers in use. It may be suspended from the wall by placing wires around it, or it may stand upon legs.

OPERATING.

CLEANING THE PLATE.

If there is any one part of the process in Daguerreotype in which operators fail more than all others, it is in cleaning the plate.

All artists of experience have seen the effect of poorly cleaned plates. Many beginners have succeeded in every other respect, the chemical effect being fine, yet the impression would be very imperfect, the imperfection occasioned solely by neglecting to clean the plate properly. We can never be too particular in this operation; as success in all the subsequent operations depends upon the plate presenting not only a *clean*, but a chemically *pure* surface of silver. On this account, we think it most expedient that the plate should be wholly cleaned and buffed at the time of using; for when polished beforehand and allowed to stand, the surface becomes oxydized or tarnished by contact with the air.

There are various methods of cleaning practiced by good artists; some use acid water and rotten stone; some alcohol and aqua ammonia in equal

parts, with rotten stone, and others simply acidulated water and rotten stone. It is not of so much importance what particular method is employed, as that it be *thoroughly* and *skilfully* carried out.

There is a general tendency with beginners to slight the operation, hence the necessity of adopting a method which precludes the possibility of doing so. During eight years of study and practice in the art, we have tried numerous methods and substances for the better accomplishment of the end in view, and have finally settled upon the following as being in our judgment the modus operandi best suited to all circumstances. Under no circumstances would we approve of a method less rigorous or precise.

Having fastened the plate on the holder, take the bag of rotten stone, and dust on lightly until the surface is freely covered.

It should be observed, that if the bag be knocked hard on the surface of the plate, it causes indentations which it will be difficult to remove.

Take a patch of the canton flannel wet with *acidulated water;* then, commencing at one corner of the plate, rub it in circles across, then back—covering one-half of the former row of circles in each crossing—until you have gone over the plate and back to the point of beginning; occupying at least half a minute in the operation, for a small plate, and so in proportion for the other

sizes. Care must be taken to keep the cotton wet with the acid water, so as not to show streaks of wet and dry on the plate; and on the other hand, to add, occasionally, rotten stone sufficient to form a paste, and prevent the acid from running together on the surface in drops. The motion of the hand should be brisk and free, but not hurried, and the pressure about equal to that of a pound weight. When the cotton is disposed to adhere to the plate, and slip from under the fingers, spread the fore and middle fingers half an inch apart; then pressing down, bring them together in such a manner as to form a fold in the cloth between them, by which means you will hold it perfectly secure.

Avoid wetting the fingers, and should they sweat, wipe them often, as the greasy substance penetrates the cotton, and comes in contact with the plate.

After going over the plate and back, as directed, change ends in the holder, and repeat the same operation; continuing thus to shift ends and polish until you have been in all *four times* over the plate and back; then, with a new piece of cotton, rub the surface dry and clean. Now dust over the surface as in the commencement, and repeat the first operation with the *potassa solution*, adding a few drops as it evaporates, and dusting on rotten stone occasionally, until you have been four times

over, as before, taking the greatest care neither to touch the plate with the fingers, nor that part of the cotton which is to come in contact with it. Rub dry with a clean piece, passing in circles over and back twice. Take the same piece of flannel by the opposite corners, snap it smartly to free it from dust and loose fibres, lay it face side up and dust on a little *very fine* rotten stone, or rouge. Be careful to dust it on the cloth, *not* on the surface of the plate. With this, polish across lightly and briskly, in *parallel lines*, passing gradually forward over the whole length, and back, as was done before, in circles: change ends and repeat the same.

Care should be observed not to go too rapidly from end to end, but let the operation be performed with care, that the marks may be as nearly as possible across the plate, since in that direction they show less in the picture; then the plate should be ready for the buff. The plate should now exhibit a bright, clear, uniform surface, with a strong metalic lustre, perfectly free from any appearance of film; if not, the last polishing must be continued until this effect is obtained.

The objection to the use of acid in cleaning the plate has been, that the picture is apt to spot after finishing. The use of the potash solution, however, neutralizes any acid that may remain, and is thought to give a peculiar tone which adds

very much to the impression. When a view is to be taken, or any impression which requires the camera to be turned down, the bed-piece to the plate-holder must be changed round sidewise, and the plate cleaned and buffed in the other direction, as the polish marks must always show horizontal when the picture is in position.

It was formerly thought necessary to subject every plate to the operation of burning. This is not now in general practice, unless the plate has either been gilded, or lost its sensitiveness by mercury deposited on the surface and rubbed into the silver in cleaning,—which fact can be ascertained by observing the numerous black scratches or marks across the surface.

In the last of these cases, clean the plate as above, then taking it in the pliers by one corner, hold it over the spirit lamp, with a large blaze, until covered with a white film; then place on a cold flat surface of stone or metal. When cold, clean as before.

Some say new plates require more polishing than those that have had impressions. Be that as it may, have them *well cleaned*, and it matters not. But in the case of the gilded plate, it is necessary to clean with more care. Use spirits of turpentine and rotten stone with a woolen rag, this being preferable for cutting away the surface

of gold, and laying bare again the silver of the plate. Care should be taken not to make bare the copper, in which case the plate could only be used after being galvanized. As a test, burn according to the directions above, and if no trace of the old image appears, the plate is ready to be used like any other plate.

Plates, as soon as burned, should be placed on a cold even surface of iron or stone, as this in a measure preserves its sensitiveness and increases its refractive powers. A piece of marble slab will be found good, and generally, it is the most easily obtained.

BUFFING.

In the morning, before using them, brush both as clean as possible, in order to free them from dust; then with the blade of your shears, held perpendicular, rub them from end to end; then knock and rub them both together, for this will free them from all dust or other substances; occasionally holding them in the sun, or to the fire.

Take one of the buffs, (reserving the finest and softest for the last operation,) powder over the face with polish, and brush off lightly, leaving only the finest particles in the buff. Rest the fingers of the left hand on the back of the buff, near the

farther end, with about the same pressure as in cleaning; while with the right you bear on the handle to correspond, and give the buff a free, easy, horizontal motion, passing it very nearly the whole length over the plate each time. Continue this, changing ends of the plate occasionally, during at least a minute and a half for a medium, three minutes for a quarter, and five for a half size. The buff once well filled with polish, add but little after,—say a small quantity once in three or four plates. This, as well as the buffs, must be *perfectly dry.*

Now, with the other buff, proceed to give the final surface, on which the image is to be formed; and as you desire a fine picture, in the same ratio you must exercise care and skill in this operation.

Some buff the smaller plates on the hand, by resting them on the fingers in such a manner that the buff cannot touch them; some, by holding the edges with the thumb and little finger, with the remaining fingers under, or on the back; and others buff on the holder. When this last method is adopted, it requires the greatest caution to prevent the dust from getting on the buff. The holder should be wiped clean. The plate frequently slips around, and the buff comes in contact with the bed of the holder. This is very detrimental to the successful operation, and in

such cases, great care should be taken to clean it before farther buffing. We adopt the first method.

The buffing may be continued as before, except without the application of polish powder to the buff. Examine the surface occasionally, and buff more lightly towards the close of the operation, using at last the mere weight of the buff. This last buffing should occupy as long time as the first.

The point to be aimed at, is the production of a surface of such exquisite polish as to be itself invisible, like the surface of a mirror. The secret of producing pictures discernable in any light, lies in this: the more dark, deep, and mirror-like the surface of the plate, the more nearly do we approach to perfection.

In all cases, very light and long-continued buffing is productive of the greater success, since by that means a more perfect polish can be obtained. Lerebours recommends "a white cotton buff for the finishing touch." This gives a black polish of the greatest possible beauty. Colored velvet is not good, for the coloring matter tends to scratch the surface.

COATING.

As there is a separate article on management of chemicals, &c., we shall here confine surselves to the simple process of coating the plate. In general this presents no difficulty save one, which is that of preserving the exact proportion between the quantity of iodine and bromine, or quick.

Mr Edgerton says: "Exprience proves that the impression iodized to a *rather light yellow gold tint*, and brought by the bromine to a *very light rose color*, have their white parts very intense, and their deep shades very black. It is also known that if you employ a thicker coating of iodine, and apply upon it a proportionate tint of bromine, so as to obtain a *deep rose tint*, the oppositions will be less marked, and the image have a softer tone. This effect has been obvious to every one who has practiced the art." Thus we observe that the light coatings produce strong contrast of light and shade, and that this contrast grows gradually less, until, in the very heavy coatings it almost wholly disappears. From this it will readily be perceived that the middle shades are the ones to be desired for representing the harmonious blending of the lights and shades.

Then, if we examine with respect to strength, or depth of tone, and sharpness of impression,

we see that the light coating produces a very sharp, but shallow impression; while the other extreme gives a deep, but very dull one. Here then are still better reasons for avoiding either extreme. The changes through which the plate passes in coating may be considered a *yellow* straw color, or dark *orange* yellow, a *rose* color, more or less dark in tint, or *red* violet, steel *blue* or *indigo*, and lastly *green*. After attaining this last named color, the plate resumes a light yellow tint, and continues to pass successively a second time, with very few exceptions, through all the shades above mentioned.

After having the iodine box clean and dry, put into it three or four drachms of the best iodine, and spread it evenly over the bottom. The manner of charging the other box will of course vary with the kind of quick or other accelerator used, and will be given in connection with the recipe for its preparation. Keep the lid of your box screwed down when not in use.

1. Coating over dry iodine to an orange color, then over the quick, to a light rose, and back over iodine one-sixth as long as first coating, will produce a fine, soft tone, and is the coating generally used for most quicks.

2. The plate iodized to a dark orange yellow, or tinged slightly with incipient rose color, coated

over quick to a deep rose red, then back over iodine one-tenth as long as at first coating, gives a clear, strong, bold, deep impression.

As a rule, the heavier the first coating of iodine, the lighter the re-coating, and vice versa, for the reason that, as a heavy coating tends to destroy the shadows, so the light re-coating tends to strengthen them, and restore the equilibrium.

Our favorite mode of coating is the second, as described above, and which we will now point out more particularly. The temperature of the coating-room should be about seventy degrees. Care is necessary that the plate be of the same temperature as that of the room, or a little higher. This may be accomplished by placing the fingers on the back, when it will soon assume the proper degree for the reception of the vapors of iodine. Rap one corner on some hard substance to free it from dust, and slide it immediately over the iodine. Coat to a dark orange, just bordering on a rose color, then over the quick to a soft rosy red, then back over the iodine about one-tenth as long as first coating, and place it in the tablet immediately, without the least exposure to light.

EXPOSURE IN THE CAMERA.

Position.—It is acknowledged that ease and grace in the position add one-half to a fine picture.

Many fail in this. It should be the study of every artist to see the effect of the lights and shades while arranging the sitter, and at the same time be very particular to give ease in the position.

No matter how successful the chemical effect may have been, should the image appear stiff and monument-like, all is lost. In the master-piece grace and elegance must be combined.

The sitter should be so seated as to range a few inches back of the window, and when by a window about two and a half by five or six feet, he should be about three feet from it. If too near, the lights will be too sharp and the shadows too intense. When a larger window, (which is in all cases preferable,) is used, the sitter should be still farther from it. We are using one four by six and a half feet, and place the person nearly in range with the back edge, at the distance of five feet from it. Should you want more shadow, place the subject forward; and if less, place him back. By this last, you can obtain a clear, white, but flat impression—which, unfortunately, is too

often called for. The amount of shadow desired, can be obtained by turning the screen out, so that should you wish more, the rays of light may diverge off from the subject. But should less be wanted, turn the screen in, to produce the opposite effect. There are many ways for regulating the lights and shadows; the above will answer for all practical use. A stand, or some ornamental furniture should be used, to give variety.

The eyes are a very important part of the impression; the object is to save, as far as possible, all wild, staring looks. This can only be done by trying positions. If you have a person with very light eyes never try to get a likeness front view, for then you would have a staring, death-like expression.

As a general rule, turn the face quartering from the window, and let the eyes be cast down, say to the floor, at the distance of about twenty feet; should your room not admit of this, let them be directed in the same line, which in ten feet would be about one and a half from the floor. It is sometimes best that the sitter should move his head, while you at the same time look on the ground-glass, and when the eyes are most free from reflected light, take the impression.

A window in front of the subject should be avoided, as it causes two spots in the eyes. Care

should be observed not to leave the hands out of focus, as it causes them to appear magnified. This may be obviated in a measure by elevating the camera as high as the eyes of the sitter, and placing them back in line with the person.

To obviate a freckly face, let the person rub it until it is quite red, and the effect will be to lessen the contrast; the photogenic intensity of the red and yellow being nearly the same, an impression can be produced nearly free and clear.

When a child is to be taken, and there are doubts of its keeping still, the operation may be accelerated by placing it nearer the window, bringing the screen nearer, and placing a white muslin cloth over head; this will enable you to work in one-third of the usual time. Should the person move, or the plate become exposed to the light, it may be restored to its original sensitiveness by placing it over the quick, one or two seconds. Always adjust the head-rest the last thing before putting the tablet containing the plate in the camera.

The time of exposure being so variable, it is left with the artist to exercise his judgment.

All colors are not equally photogenic; thus the chrome yellow, the P. Veronese green, and vermilion, three of the most brilliant colors of the painter's pallet, have hardly any action upon the sensitive plate; the blues, violets and lakes have,

on the contrary, a very energetic one. We have made on this subject a great number of experiments, which we shall probably publish later.

EXPOSURE TO MERCURY.

The lamp is to be lighted and placed under the bath before commencing to operate, and kept constantly burning. When the thermometer reaches the right point, the blaze must be so regulated as to maintain it at that point during the day. The exact temperature proper to maintain with any given time of exposure can only be found by trial, as the scale varies considerably in different baths. In general, with short exposure, it will be found between seventy and eighty degrees. The manner of fixing it may be this: Assume some point, say seventy-five degrees, and while standing at that, expose the impression two minutes. If the time in the camera was right, and the impression shows an excess of mercury, lower the temperature; if a deficiency, raise it. We invariably expose two minutes, adapting the heat to produce the proper effect within that time, and having found the point, note it on the scale once for all.

For various reasons, we prefer a high temperature and short exposure. It accelerates the process. It renders the lights of the picture more

strong and clear, while the deep shades are more intense. It gives a finer lustre to the drapery. The solarized portions also are very seldom blue, especially after gilding. If heated too high, however, the light parts become of a dead, chalky white, and the shadows are injured by numerous little globules of mercury, deposited over them. Just the right quantity of mercury leaves the impression of a transparent purplish white tone, which improves in the highest degree in gilding. To mercurialize with exactness is a nice point. If you have reason to suspect having timed rather short in the camera, reduce the time over mercucury in a corresponding proportion. A dark impression will be ruined by the quantity of mercury which would only improve a light one.

If practicable, it is most expedient that the plate be submitted to the action of mercury immediately on coming from the camera. We frequently, however, carry plates for miles in the plate-holders, and after exposing in the camera, bring them back to expose to mercury, and obtain fine proofs. Never replace a picture over mercury, as it is almost sure to produce a dense blue film over the dark shades. This we are confident is occasioned by the action of light on the yet sensitive portions of the plate, and made to appear only by subsequent exposure to mercury, being equivalent to solarization.

We now add one of the most frequent causes of failure that all artists are subject to; this, as given by Mr. Daguerre, "consists in the changes of temperature in the atmosperic air, with which the plate is in contact from the first operation, to that of the mercury. It is well known that as often as bodies, when cold, are exposed to a warmer air, the humidity contained in it is condensed. It is to this effect that we must attribute the difficulty experienced in operating in a moist air, such as the atmosphere is, especially when you come to the operation of the mercury, which requires, to give out a proper vapor, a heat of at least fifty degrees centigrade.

"This vapor, which begins by heating the air contained in the apparatus, produces on the metal a mist which weakens the impression. It is very evident that this moist coating is very injurious; if, for example, you breathe several times on the plate, when it is taken out of the camera, the mercurial vapor will not bring out the image.

"The vapor, which becomes condensed *even at the slightest difference of temperature* between the surface of a body and the surrounding air, contains in suspension a non-volatile substance, which might be called the atmospheric deposit; and, as soon as an equal temperature is established between the air and the surface of that body, the humid vapor which had condensed upon it be-

comes volatile, and, depositing upon it the sediment which it contained, mixes with the air and becomes again saturated with a new quantity of that impure substance, the deposit above named.

"In order to paralyze as much as possible this effect, the temperature of the plate may be kept higher than that of the air which surrounds it, during each of the operations. But it is not possible to carry this heat to fifty degrees, so that it may be at the same degree as the vapor of the mercury, because, if the plate is exposed to that degree of heat, after it has been subjected to the operation of the light in the camera, the image would be obliterated or spoilt.

"At first, I had attempted to absorb the humidity of the air in the mercury box, by the means usually resorted to for that purpose, such as lime, &c.; but these means proved insufficient, and only complicated the process, without giving any saitsfactory results. Another means which has been proposed consists in vaporizing the mercury in the pneumatic machine; by this process, it is true, the mist on the plate is avoided; but the plate is thereby deprived of the pressure of the air which is indispensable to the formation of the image. Results thus obtained are never free from imperfections."

Your mercury bath should always be kept covered, for two reasons: First, to prevent the dust from falling into it; second, that the former may not saturate the atmosphere. This latter result is the only danger of injuring the health of those engaged in the profession. The cover should frequently be brushed.

REMOVING THE COATING.

This is dissolving the iodide of silver off the surface of the plate, by means of a solution of hyposulphite of soda.* It is best that it should be done immediately after the plate is taken from the mercury. If left to stand long with the coating on, it assumes a very dark tint—as the operation of the light continues, though less active, than while exposed in the camera, and destroys that brightness which would otherwise have been obtained. It is best to wash and gild a picture, without its first being dried; yet when there are doubts of its giving satisfaction, there would sometimes be a saving by drying and getting the decision of the subject before gilding—as this last injures the plate for another impression. First,

* The HYPOSULPHITE OF SODA is a beautiful salt, as clear as crystal, which has the property of dissolving the iodide of silver produced by the action of the iodide on the daguerrian plate. It is prepared by the manufacturers of chemicals.

light your spirit lamp, then with your pliers take the plate by the lower right hand corner, holding it in such a manner that the pliers will form in a line with the upper left hand corner; pour on, slowly, the hyposulphite solution, slightly agitating the plate, until all the coating is dissolved off, then rinse off with clean water, and if it is not to be gilded, dry by holding the plate perpendicular with the bottom left hand corner lowest, and applying the blaze of the spirit lamp to the back, at the same time blowing gently downward on the face of the plate.

If the solution be too strong, it corrodes the impression, and injures the tone. It must not be used after becoming colored, as it will cause pictures to cloud and spoil in gilding. Filter every time used.

GILDING.

When an impression is to be fixed by the ordinary gilding process, though the coating may have been previously removed, it is best to wash with the hyposulphite solution, to insure the removal of any accidental coating that may have been deposited from other coated plates in the same box, then drench with water, and not allow to dry before the gilding is applied. The same is to

be observed in respect to the bleaching solution.* With the pliers, bend up the corners, if a quarter or half plate, and holding the plate in the same manner as for removing the coating, pour on the gilding, newly filtered, until the surface is wholly covered, and with the blaze of your lamp at least three inches high, apply it to the back of the plate, moving it about, that the surface may be heated with as much uniformity as possible. Continuing this operation, the surface will generally become covered with small yellow bubbles, which soon disappear, leaving the image clear and distinct.

It is advisable to make use of a lamp of a sufficiently strong flame to produce the effect in a few minutes. If, after a first heating, you find that the impression can admit of a greater degree of intensity, it might be heated anew; but that is seldom necessary, and often by trying to do too well, the operator, if he persists in heating certain parts of the plate, may find the liquid dry up just above the flame, and inevitably cause a stain;† or else the blacks are covered with a film, or even the coating of silver may suddenly

* The manner of applying this solution is given in connection with the receipt.

† This can be remedied, if it is immediately washed over with the same solution that is on the plate, so that the surface shall not become cool; continue for a short time to apply the lamp under, and agitate the plate slightly, and it will soon be free from all imperfections, and give a fine clear tone.

exfoliate, when small particles are detached from it; the impression is then entirely spoiled; but the plate may be re-polished.

It is not unfrequent that the surface assumes a dark, cloudy appearance. This is generally the best sign that the gilding will bring out the impression with the greatest degree of distinctness. Soon, the clouds gradually begin to disappear, and "like a thing of life" stands forth the image, clothed with all the brilliancy and clearness that the combined efforts of nature and art can produce. When in your judgment the operation has arrived at the highest state of perfection, rinse suddenly, with an abundanee of clean water, and dry as before described.

The sudden cooling of the plate in this manner, with a large quantity of water, without waiting to pour off the gilding, tends to harden the coating of gold, and improve the brilliancy of the picture.

When an impression is dark, the gilding process may be longer continued; but when light, it should be gilded quickly, as lengthening the time tends to bleach the impression and make it too white. The cause of this appears to be, that with a moderate heat, the chlorine is merely set free from the gold, and remaining in the solution, instead of being driven off, with its powerful bleaching properties, it immediately acts upon the shades

of the picture. A dark impression can thus, by a low heat, long-continued, be made quite light. To procure the best effect, then, heat suddenly with a large blaze, and, judging it to be at the maximum, cool as suddenly as possible.

COLORING.

This branch of the art needs great care. Many dabble with it who would not make good sign painters. Such should let the productions of nature remain untarnished. There are but few impressions that need no coloring, and those are the gems of the art, and such as it would be mockery to think of improving. A dark impression, with a fine, clear tone, and all the lights and shadows truly blended and faithfully brought out, needs but little if any coloring. This, however, must be regulated according to the judgment and taste of the artist. When coloring is used, the object should be to so blend it in with the shade of the impression as not to make a strong contrast at the outline. If you wish to color the cheeks, and they are light, do not apply a bright red, it forming too great a contrast of itself, but reduce it either with white or yellow, the last being preferable—a tint affording less contrast, and producing a color that will harmonize with that of the impression. The above principle is to be observed in all coloring.

When flowers are to be represented, use the colors a little wet with water or alcohol; a very little is sufficient. Touch slightly the object, making merely a dot, as it would be difficult in the extreme were you to undertake to color each particular leaf and flower.

When applying the color, breathe slightly on the plate, as it will dissolve the gum, and cause it to adhere more closely.

RECEIPTS FOR CHEMICALS.

ROTTEN STONE.—Purchase the best ground rotten stone of the druggist, put a few ounces at a time in a Wedgewood or Porcelain mortar, with plenty of clean rain water. This should have about forty drops of nitric acid to the quart. Grind well, and after letting the mortar stand *two minutes*, pour off into another vessel. Let this stand *four minutes* and pour into a third. After remaining undisturbed *eight minutes*, finally pour off into a fourth to settle. Rinse back the sediment in the second and third, and grind over with a new batch. Repeat the operation till you have all in the fourth vessel. Let this stand several hours, and pour off the water very carefully. Set the deposit in the sun, or by a stove to dry. When perfectly dry, pulverize, and it is ready for use. With a little trouble you will obtain in this way a much better article than can generally be bought of dealers. For the last washing, alcohol, or a mixture of alcohol and water, is preferable.

ROUGE.—This is a peroxide of iron. Take sulphate of iron, (*copperas,*) place in a crucible and heat to a full red heat. The sulphuric acid

is thus driven off, a portion of which decomposes, affording oxygen, by which the iron becomes peroxidized. It may also be obtained by precipitation. For this purpose make a strong solution of sulphate of iron, and also a solution of carbonate of soda. Filter both and add them together. The precipitate is the peroxide. Filter out the water, calcine and pulverize in a mortar.

BLACK POLISH.—Take the best lampblack, put it in a crucible, seal over the top with clay, and heat in a forge to a white heat. Cool gradually, and when cold levigate in a clean dry mortar.

IMPROVED POLISH.—Mix equal parts by weight of the finest rouge and black polish, and pulverize well together.

ACIDULATED WATER.—Take any quantity of water, and add pure nitric acid, until it is about as strong as sharp vinegar to the taste.

POTASSA SOLUTION.—Put about an ounce and a half of alcohol in a close bottle, and add half a stick of caustic potash. This will soon become of a deep red color. For use, fill your small bottle, having a quill in the cork, with alcohol, and add a few drops of the above, or enough to change it to a bright orange or saffron color.

HYPOSULPHITE SOLUTION.—Put in a wide-mouthed bottle about half a pint of pure rain water, and add a common teaspoon-full of hypo-

sulphite of soda. When dissolved, filter through a piece of sponge placed in the neck of a glass or earthen funnel, and it is ready for use.

About half a teaspoon-full of alcohol added to the above will be an improvement.

BLEACHING SOLUTION.—Make a saturated solution of muriate of ammonia, (*sal ammoniac,*) in pure water, and filter through paper. Reduce with an equal quantity of water when used. When the linen or any other portion of the impression is badly solarized, after removing the coating, rinse with water, then pour this upon the surface in the same manner as the gilding solution. If the solarization be very deep, apply the lamp beneath and warm the plate a trifle. Now pour off, and without rinsing, apply the gilding. The whole operation must be quickly performed, or the chlorine soon attacks the shades of the picture. When properly done, however, the solarized parts are restored to a clear, transparent white.

GILDING SOLUTION.—To one pint of pure rain or distilled water add fifteen grains of pure chloride of gold, and to another pint add sixty grains of hyposulphite of soda. When dissolved, pour the *gold solution* into the *hyposulphite* by small quantities, shaking well after each addition. You can also now add with advantage a teaspoon-full of

muriate of potash. Place a handful of chloride of sodium (*common salt*,) in your filtering paper, filter the whole through, and keep in a dark place.

N. B. The soda solution must not be poured into the gold, as the gold would be immediately decomposed, and the solution turns black, and is unfit for use.

QUICK STUFFS.

No. 1. Take pure rain or distilled water, one quart, filter through paper into a ground stopper bottle, and add, for warm weather, one and a half ounces chloride of iodine; or for cold, one ounce, then add one ounce bromine, and shake well. Now, with care not to allow the vapor to escape, add, drop by drop, thirty drops of aqua ammonia, shaking well at each drop. Care must be taken not to add more at a time, as it evolves too much heat. This, mixed in equal proportions with John Roach's quick, forms an excellent chemical combination. For this purpose, take one and a half ounces of each, to which add ten ounces water, for warm weather, or from six to seven for cold. Pour the whole into a large box, and it will work from two to four months. We are now using one charged as above, which has been in constant use for three months, and works uniformly well. The above is right for half or full

size boxes, but half of it would be sufficient for quarter size box.

Coat to the first shade of rose over iodine, change to a deep rosy-red over quick, and back about one-tenth the first.

No. 2. Lime water, one quart; chloride of iodine, one oz.; bromine, three-fourths oz.

In the box, one part quick to six of water. Coat to light yellow over iodine, to rose over quick, and recoat one-fourth as long as first coating.

No. 3. Take rain water one quart, add pulverized alum until it is a little sour to the taste, and a small piece, say one-half inch square, of magnesia. Filter through paper, and add chloride of iodine one-half oz., bromine sufficient to take it up, which is a little less than half an oz.

Charge with one of quick to six of water. Coat over iodine to a soft yellow, nearly, but not quite bordering on a rose; over quick to a dark purple, or steel, and back one-sixth to one-tenth.

This is used by a few of the best Artists in the United States. It works slow but well; and with a *good light* is capable of producing as good pictures as any combination known.

MAYALL'S QUICK—No. 1. Rain or distilled water one gallon; bromine one and a-half drachm; sulphuric acid, two and a-half drachms; hydro-

fluoric acid,* two drachms. Shake well as each is added in the above order.

To one ounce water, add fifteen to thirty drops Quick. Coat over iodine to an incipient rose, over the quick barely change to fair rose, and back one-fourth to one-third as long as first. The battery must be strong enough to change the color sufficiently in from *one* to *four seconds*. Works in two-thirds the time of other quicks. Requires to be replenished every morning, and mixed anew every week or two.

No. 2. Rain or distilled water two quarts, bromine one ounce, sulphuric acid one ounce, hydrofluoric acid half an ounce. Mixed and used like No. 1.

Dry Quick.—Take lime recently slacked, one pint; dry it on a plate of iron, or on a stove, and when cold put it in a ground stopper bottle, and add one ounce of bromine or sufficient to give it the color of bright orange-red, a few drops at a time, shaking it well after each addition.

Spread about a teaspoon full over the bottom of your box. Coat over iodine to light yellow, over

*This acid dissolves glass with great rapidity. It is purchased in leaden bottles. When necessary to measure it, fill your graduated glass partly with the mixture to which you intend adding it, then fill up to the point which will make the required quantity. It is necessary to be very cautious in handling it, as it is the most violent corrosive poison known. We always put on a pair of leather gloves, and tie a handkerchief about the face.

quick to a light red, and recoat from one-sixth to one-quarter. Your chemical box charged with this, needs replenishing every day.

Acidulated Quick.—Water one pint, bromine ten drops; chloride of iodine, forty drops; nitro-muriatic acid, one-fourth ounce; sulphuric acid, two drops. Mix one part quick with ten of water; renew daily. Coat over iodine to orange, over quick to rose red, back one-fourth.

Roach's Tripple Compound.—This is a very excellent sensitive, and is used by many of the first artists. Mr. Roach, of New-York, is the only one that makes this combination. It may be had of almost any dealer in stock. To use it, take one part of the compound, and dilute it with from eight to twelve parts water, coat over dry iodine to a bright orange yellow, then over the compound to a rosy red. The effect in the camera is quick, and produces a picture of a fine, white tone.

Chloride of Iodine.—Mix together three parts of common salt and one of black oxide of manganese, put this in a retort or flask, and add two parts sulphuric acid, diluted with an equal quantity of water. The retort or flask must communicate with a small bottle or receiver in which is placed the iodine. Chlorine gas escapes over freely, and combining with the iodine, forms the chloride. Moderate heat applied to the retort

will facilitate the disengagement of chlorine. When the liquid becomes of a bright red, the operation is complete. Wax the stopper to prevent cementing in, and seal close; diluted with 300 parts water it forms Rieser's or the German mixture. There is a crystalized chloride, which does not precipitate when added to water. It is used like the liquid, and is considered better.

It would be better to purchase of dealers than to make it, and would also be cheaper.

Bromide of Iodine.—Place any quantity of bromine in a small bottle, add (a little at a time) more iodine than will dissolve. If used as an accelerator, to one part of bromide of iodine add two hundred parts water.

Bromine* Water.—This is simply a saturated solution of bromine in water. For use as an accelerator this is generally reduced by adding forty parts water. Much has been said by theorisers on the superiority of bromine water as an accelerator. It is our opinion, however, that those who have not had long experience had better *let*

* This element was discovered in 1826, by M. Balard, in the mother liquor, or residue of the evaporation of sea-water. It is named from its offensive odor, (bromos, dead odor.) In nature it is found in sea-water, combined with alkaline bases, and in the waters of many saline springs and inland seas. The only use which has been made of bromine in the arts is in the practice of photography. At common temperatures it is a very volatile liquid, of deep red color, and with a specific gravity of three, being one of the heaviest fluids known. B. Silliman, Jr.

it alone, at least until they have obtained a good knowledge of some quick which operates with more certainty, or until some apparatus is invented which will enable them to use it with a better prospect of success.

Chloride of Calcium.—Pour into a clean, shallow earthen vessel, a pound of muriatic acid, add pulverized white marble until effervescence ceases, strain and evaporate to dryness. In this form it may be used, but more conveniently when calcined. For this purpose place it in a clean crucible, heat in a forge to red heat, when it melts. Pour out on a stone slab, or other smooth surface, and break in fragments. Keep in a well stopped bottle.

Chloride of Gold.—Mix one part nitric and two parts muriatic acid. This forms the nitro-muriatic acid. Place your gold foil in a small porcelain or glass dish; acid may be added until the gold is dissolved. Set the dish in your sand-bath and apply the lamp. This must not be much above 120 degrees Fahrenheit, or the chloride will be decomposed. When nearly dry, set by to crystalize. Fifteen grains of this is a bottle. As generally sold, it is much adulterated with chloride of sodium, (*common salt*). Probably two-thirds of the article sold for chloride, is nothing more than two parts salt to one of gold.

The evaporation must not be carried on in your rooms, as the fumes of chlorine will prevent all success in operating. The same may be said of the calcium, also. Care should be observed not to inhale the escaping vapor, as it is very injurious to the lungs.

HYPOSULPHITE OF GOLD.—Dissolve one part chloride of gold, and four parts hyposulphite of soda in equal quantities of distilled water: pour the gold into the hyposulphite solution, in the same manner as in mixing the gilding solution; let it stand until it become limpid; filter and evaporate to dryness. Re-dissolve; add a few grains of burnt alum.

After standing a few hours, filter and evaporate again. If not sufficiently pure, repeat the crystalization until it is so. For gilding, dissolve in water, and use in the same manner as the common gilding solution. It is considered to be no better than the chloride, and not being so easily prepared, it is less used.

HYPOSULPHITE OF SODA.—Boil three parts of carbonate of soda with one of sulphur, in five parts of water, until the sulphur is dissolved; pass a stream of sulphurous acid gas through the liquor until it smells strongly of it. This is done by pouring sulphuric acid upon pulverized charcoal in a retort, immersing the tube in the liquor and applying a lamp to the retort. Now strain

the liquor, evaporate to a syrup, and set by to crystalize.

It is however a saving of time and money to purchase the article ready prepared.

PROT-OXIDE OF SILVER.—Dissolve *crystalized nitrate of silver* in pure water, and add strong lime water. A brown powder precipitates, which is the prot-oxide. Filter out the water, dry and bottle for use.

SOLUTION FOR REMOVING SPECKS.—In an ounce of water, dissolve a bit of cyanide of potassium the size of a pea, filter and apply in the manner of the bleaching solution, heating until the specks disappear.

If you have not the cyanide at hand, a solution of hyposulphite of soda made and used in the same manner, will answer the purpose, although not as well.

CYANIDE OF POTASSIUM.—Take yellow prussiate of potash, enclose it in an iron crucible, and heat it in a forge to a full red heat. Powder the mass, and boil it in diluted alcohol; the cyanide crystalizes in cubes.

PREPARING COLORS.—For flesh color, take a small quantity of yellow ochre, pulverize on an old plate, and burn over the spirit lamp, stirring constantly until it turns to a brown, and lastly to a red. Stop at the color you wish, and pulverize

adding a little gum arabic. Mix with carmine or chrome yellow to vary the tint. Prussian blue and carmine form a good purple for drapery. Green may be prepared by mixing blue and yellow. White is the oxide of bismuth.

"COMPOUNDING COLORS.—*Indian red, King's yellow* and *carmine*, used in different proportions, will give any desirable tint of *flesh color*. Spread a quantity of the very best and brightest copal varnish on a piece of glass or earthen, and let it dry. Scrape it off, and pulverize it very fine in a porcelain mortar. Grind this and the above colors together, until they attain the utmost degree of fineness, and you will have a flesh-color as lustrous as the cheek of beauty itself. The very *best kind of ladies' rouge* is super-excellent.

"*Prussian blue, Chinese blue* and *ultra-marine*, may be used on the drapery to advantage. The latter will adhere better for being ground with a little starch."*—*Hill.*

CLEANING MERCURY.—Make a small bag of chamois skin, pour in the mercury, and squeeze it through the leather. Repeat this several times, and filter by means of a funnel made of paper, with a very small aperture through which it will escape and leave the particles of dustu,or other

* We would recommend a little finely-pulverized gum Arabic as superior.

substances in the paper. A paper with a pin-hole through it, will answer as well, and it is less difficult to make.

STICKING PAPER.—Take gum arabic, four ounces, put it in a wide-mouthed bottle, and pour on water about one-third above the gum. Add an ounce of isinglass, or fish glue, and a small piece of loaf sugar. Let all dissolve, and spread over French letter paper or bank note paper, with a brush or piece of sponge. If once spreading is not enough, perform the same operathe second time.

BLACK STAIN FOR APPARATUS.—Dissolve gum shellack in alcohol, or procure some shellack varnish at the druggists', stir in lampblack, and apply with a sponge or bit of rag. This will adhere to metal, as well as wood, and is used for the inside of camera tubes, &c.

WAX FOR SEALING BOTTLES.—Melt together six parts rosin and one beeswax, and add a small quantity of lampblack; or, if red is preferable, add red lead. Common white wax is best, as most chemicals act less upon it.

DRESS.

This, as far as convenient, should be of dark material. Black silk for ladies is preferable to any other kind of goods, on account of its fine lustre. Satin gives a very rich drapery, but, with strong light, the lustre is apt to be rather too sharp. There is a class of worsted goods, almost destitute of gloss, which it is very difficult to bring out in drapery, especially with a light complexion. These answer very well, however, for a person of dark or very florid complexion, as the additional time required for the face, in such case, will help to bring out the shadows of the dress. A very light complexion should be accompanied by a lightish dress, in order not to afford too strong contrast. Very young children may be dressed light, which also helps to reduce the time of sitting. Lace and muslin collars, borders, &c., should be narrow and open as possible, or they reflect light on the features, and destroy the outline. Linen, muslin, &c., take better if done up without starch, or ironed on the under side, as it obviates reflection. Red and yellow take black. Light blue and purple, white.

COPYING.

In copying paintings, engravings, &c., arrange them in a position where the light will fall evenly over the surface, and see that the picture is as nearly as possible at right angles with the camera; otherwise the different parts will be out of proportion. Daguerreotypes are more difficult, on account of the reflection of the plate. This must be avoided, by turning the picture, until it can be distinctly seen on the ground-glass. It is well to cover the front of the camera, by pinning a piece of black cloth around the tube, to prevent reflection. In order to copy a picture the size of the original, slide the ground-glass to the back end of the camera, and make the distance between the lenses and glass equal to that between the lenses and the object to be copied. The copy can be magnified so as to produce a quarter size from a medium picture; but this requires a double, or copying camera-box, which admits of drawing out so as to increase the distance from the ground-glass to the lenses, to any requisite

degree. This can be obtained of any dealer, and should be in the possession of every artist; and it will undoubtedly supersede all others.

When called upon to take a miniature for a pin, or ring, it is frequently least trouble to take an impression of the ordinary size, and copy from it.

VIEWS.

On this subject, Mr. Lerebours makes the following observations, which we think hold good at the present time:

"For a view with an extended horizon, or for the reproduction of a landscape, you must take great care not to adjust the point of view by the distant parts; but, on the contrary, reserve all the clearness in focussing for the first and second range of foreground. The choice of the position given to the apparatus is of very great importance to the result. In taking an edifice, withdraw where the nature of the ground will allow it, to a distance of double its greatest dimensions; you will thereby avoid making it appear on the plate as if cramped for want of room. It is also requisite to choose a position at an elevation of about one-third of the total height of the edifice, otherwise, in order to take the whole of it, it would be necessary to incline the camera, and then the vertical lines, which ought to be perpendicular and parallel to each other, would meet at an ac-

cidental point of incidence of the sky, and cause the edifice to appear as if falling."

Views are always most desirable when taken in right position; that is, without being reversed in the camera. This may be very neatly done by means of a small reflector, connected with the instrument. One is easily made by a tinman, at a trifling expense. Procure a piece of best plate looking-glass, two and a half by five inches for a quarter, or four by eight for a half sized camera, put a piece of pasteboard the same size on the back, to protect the silvering, and stick around the edge in the same manner as in putting up a picture. Take a sheet of tin for the large size, or a half sheet for the other, place the glass cross-wise in the centre, bend the ends of the tin over the edge of the glass, and turn them back so as to form a groove to hold the glass, and still allow it to slide out and in. These ends of the tin must be turned out flaring, that they may not reflect in the glass.

Have a tin band about an inch wide, made to fit close on the end of the camera tube; place it on, and taking the tin containing the glass, bring it to an angle of forty-five degrees with the tube, extending nearly the whole length of the glass in front of the lenses, lap the loose ends of the tin on each side of the tin rim, and having your camera turned on the side to throw the view

lengthwise, arrange the exact angle, by examining the image on the ground-glass. When you have it exactly right, hold it while it is soldered fast to the band. Take out your glass, and stain the tin black, to prevent reflection.

For taking views, we have several extra tablets; and putting a plate in each, it is only necessary to carry out the camera and stand. By varying the time a little on the exposure of each plate, we seldom fail to obtain one or more fine impressions. The proper time for taking views is either in a cloudy day, or just after sunset. Where there is foliage the latter time is best, as there is apt to be less air stirring to move the leaves.

It should be observed in all cases, when carrying the tablet containing the coated plate, to have the face down. Never huddle your plates together, when going to take a view; but carry them face downwards, as above directed.

MANAGEMENT OF CHEMICALS.

It is necessary, first of all, to know that you have a chemical which is capable of producing good results when in skilful hands. For this reason, it is best to prepare your own quick, after some formula which is known to be good. Those quick-stuffs which contain chloride of iodine, are noted for their depth of tone, while they probably operate with less uniformity than those which are destitute of it. For operating under ordinary circumstances, especially with an inferior light, probably no accelerator is more quick * and sure than May-

* There is a class of accelerators called sensitives, claiming to work in from three to ten seconds, which, however, will be found very little if any more sensitive than this. We frequently work it with the ordinary coating, in twelve and fifteen seconds. The manner in which the sensitives are worked, is by coating very light. In this way, a flat, shallow picture is obtained, in a few seconds; and the same can be done with any of the more volatile quicks.

It is a fact not generally known, that a plate coated in a light chemical room is more sensitive than when coated in darkness. By admitting a free, uniform light, and exposing the plate to it a few seconds after coating, then timing short in the camera, a very light, clear impression is obtained. The time in the camera is reduced in proportion to the previous action of light. The shades of course are destroyed,

all's. It also produces a very fine, white, pleasing picture, though lacking that depth of impression so much to be desired. The dry quick operates with surety, and its use is simple and easy, producing an impression much like Mayall's. For those having a good and permanent light, however, we would recommend a chemical giving more body to the impression,—as No. 1, 2, or 3.

Having adopted the use of a chemical, make it your study until you are thoroughly acquainted with its nature, and never change for slight causes. The superiority, after all, is not so much in any one chemical, as in knowing how to use it with precision.

The selection of iodine is not unimportant. Reject, at once, that which has any thing like a dull, black, greasy appearance; and select that which is in beautiful large crystalline scales, of a purple color, and brilliant steel lustre.

Solarization, and general blueness of all the light parts of the picture, were formerly great obstacles to success, though now scarcely thought of by first-class artists. Beginners in the art, however, are still apt to meet with this difficulty. It

and the tone injured; still, for taking children, we have succeeded better by this method than by the use of "sensitives." The discovery of this principle was accidental, while operating where the direct rays of the sun, entering a window just before sunset, fell on the curtain of our dark room, rendering it very light within.

is occasioned by dampness in the iodine box, which causes the plate to become coated with a hydro-iodide of silver, instead of the iodide. The remedy is in drying your iodine. If in summer, you can open your box and set it in sunshine a few minutes; or if in winter, set it under a stove a short time. The true method, however, is to dry it by means of the chloride of calcium. The use of this constitutes the celebrated "*London process.*" It has such a remarkable affinity for water, that a small fragment placed in the open air, even in the dryest weather, soon becomes dissolved.

Take one or two ounces of this chemical, heat it in the drying bath, or in a hot stove, to perfect dryness; place it in a small glass toy dish, or large watch crystal, and set it in the centre of your iodine-box: take this out and heat to dryness every morning. Adopt this process, and with your mercury at a high temperature, you will never be troubled with blue pictures.

Our own practice is, to place the dried calcium in the box at night, and when we commence operating next day, take it out and put in a close wide-mouthed bottle, until night, when it is again dried and put back.

Young operators are apt to impute all want of success in operating to their chemicals, even though the cause is quite as likely to be elsewhere.

Failure is quite likely to occur from dampness in the buffs, or in the polish; it is therefore necessary to be constantly on the guard in this quarter. With a view to this, always scrape your buffs with a dull knife, or with one blade of your shears, the first thing in the morning, and after brushing them thoroughly, dry them, either in the sun, by a stove, or in the buff-dryer. It is equally important that the polish and the brush should be kept dry.

Want of success may arise from vapors of iodine or bromine in the camera-box, mercury-bath, or even in the buffs. It is incredible how small a quantity of these vapors will destroy the effect of light when coming in contact with the plate, after or during the exposure in the camera. It is therefore necessary to be cautious not to mix chemicals, nor open your boxes or bottles in your room, but take them out to do it. Never hurry the operation through, from lack of confidence in the result. The fact of anything being out of order, forms no excuse for slighting the process. If unsuccessful, do not pursue the same course every trial, but vary with a view to detect the cause of difficulty.

In case of a long series of failures, institute a regular course of investigation, after this manner, commencing where the trouble is most likely to occur:—

1. Are the plates well cleaned?

2. Is the iodine dry? If the impressions come out blue, you may rest assured it is not. Take out the iodine, wipe and dry the box, and dry the calcium.

3. Is the quick battery of the right strength? If Mayall's, it must change the plate in from one to four seconds. If dry, from six to fifteen. If any of the chloride of iodine class, it may vary from five seconds to a minute. Begin by coating light, and increase on each trial, observing the effect. If the light side of the picture seems loth to come out, and shows no contrast with the dark side, it is to be inferred that your battery is too strong, and must be reduced with water, or set out in the open air for a few minutes, with the lid off. If working an old battery, never renew very strong, or it will work dark and heavy. A battery, to work well, should be gradually *losing strength*, but never gaining. An old battery, however, may be quickened up, and made to work well for some time by adding five or six drops of sulphuric acid, repeating the quantity as often as necessary, providing always that acid be not used in manufacturing the quick.

4. Have the plates lost their sensitiveness by being many times exposed to mercury? Clean

and burn them; but if French or White's plates, burn light, or you spoil them.

5. Are the buffs dry and clean? Examine the plate critically after buffing, to detect any appearance of scum or film on the surface. If so, the longer you buff the more it shows. Scrape and dry the buffs thoroughly.

6. Is the mercury free from scum and dirt? If not, filter. Is it also far enough from the coating-boxes? Should be at least three feet, and kept covered.

7. Is the mercury sufficiently heated? This is important. Long exposure, however, will answer the same purpose.

8. Are your lenses clean, and in proper place?

9. Are the tablets in focus with the ground-glass? If you can attribute the failure to none of these, mix a new box of some other kind of quick, say the dry for instance. If you fail in the same manner here, take time, wash your buffs, overhaul all the chemicals, and start anew. Do not be discouraged. There is no day so dark but the sun will shine again. We will close with this brief summary of advice:

Clean your plates.
Keep every thing dry.
Keep the mercury hot.

Follow these instructions carefully and you *must* succeed.

METHOD OF FIXATION.

The following new mode of fixing and strengthening pictures by oxidation, has been proposed by Mr. Charles G. Page, M. D., Professor of Chemistry, Columbia College, Washington:

The impressions being obtained upon a highly polished plate, and made to receive by galvanic agency, a very slight deposit of copper from the cuperous cyanide of potassa, (the deposit of copper being just enough to change the color of the plate in the slightest degree,) is washed very carefully with distilled water, and then heated over a spirit lamp, until the light parts assume a pearly, transparent appearance. The whitening and cleaning up of the picture by this process, is far more beautiful than by the ordinary method of fixation by a deposit of gold. A small portrait fixed in this way more than a year since remains unchanged, and continues to be the admiration of persons interested in this art. One remarkable effect produced by this mode of fixing, is the great hardening of the surface, so that the impression is effaced with great difficulty. I have

kept a small portrait, thus treated, unsealed and uncovered for over a year, and have frequently exposed it in various ways, and have rubbed it smartly with a tuft of cotton, without apparently injuring it; in fact the oxidized surface is as little liable to change as the surface of gold, and is much harder.

To succeed well in this process, the impression should be carried as far as possible without solarization, the solution of the hyposulphite of soda should be pure and free from all traces of sulphur, the plate should be carefully washed with distilled water, both before and after it receives the deposit of copper,—in fact the whole experiment should be neatly performed, to prevent what the French significantly call *taches* upon the plate, when the copper becomes oxidized.

COLD GILDING.

BY T. GAUDIN.

"Dissolve one gramme* of chloride of gold in half a litre† of ordinary water, and thirty grammes of hyposulphite of soda in another half litre of similar water; then pour the solution of chloride of gold into that of soda, by little and little, agitating it exactly as in Mr. Fizeau's preparation, of which this is but a variation.

"When you wish to use it, pour some into a plate, or any other vessel of the same kind, sufficient to cover the proof; then, after having added to it a drop of ammonia, immerse the plate in it as soon as you take it out of the mercury-box, after having wiped its back and edges, and agitate the mixture quickly from right to left, so as to dissolve rapidly the coatiing of iodide of silver as usual. As soon as the plate appears white, cease all rapid motion, but continue to give it a slight undulating one; for if it were allowed to remain still, for only a few minutes, the proof would be

* One gramme is 15.4 grs. † One litre is 1.76 pt.

clouded. By little and little, the surface of the plate takes a yellow tint, which darkens more and more, approaching to bistre. You stop, therefore, at the color you wish; and when the proof has been washed and dried, in the manner previously explained, it will be found to be fixed, without any stain, with a limpid surface, and an extraordinary warm tone. If you were to augment the proportions of the ammonia or chloride of gold, the operation would progress much quicker; but then the middle of the proof would be always much clearer than towards the border. The mixture may be used several times without being renewed. It does not, however, give such a beautiful color to the impression, as when it is newly prepared. By communicating to the vessel containing the solution a continual motion, the impression, when once immersed, will be fixed. During that time, and whilst attending to anything else, watch its color; and at the end of ten minutes, or a quarter of an hour, take it out of the bath and dry it."

COLORED IMPRESSIONS.

BY M. E. BECQUEREL.

"The tablets upon which the colored images are obtained, are prepared in the following manner: A silver plate, such as is employed in the Daguerreotype process, is connected by a copper wire with one pole of a small galvanic battery; a piece of platina foil being connected, by a copper wire likewise, with the other pole. A solution of muriatic acid in water being prepared—about one part acid to two of water—the plate and platina are plunged into it, and brought near to each other but not in contact. Of course the circuit being made up through the acid solution, a chemical action is established over the surface of silver plate, the chlorine of the decomposed muriatic acid attacking the silver, and forming a chloride of silver over the surface. As the film of chloride of silver is produced and gradually thickens, it passes through the colors of Newton's thin plates, and at length assumes a lilac, which is the sensitive coating. These plates have not yet been rendered sufficiently sensitive to ensure

any action except from the direct rays of the sun. But if a prismatic spectrum of well defined character is allowed to fall upon the prepared plate, it will be found, after an exposure of a few minutes, that a distinct impression of the seven colored rays are obtained in *color*, every ray being represented by its own color on the plate, the red being the most intense, and the yellow the least so."

OBTAINING DAGUERREOTYPES WITHOUT MERCURY.

The plate is iodized and exposed in the camera about fifteen times longer than when operating with bromine-water. On taking it thence, carefully preserving it from the least ray of light, it is put into a kind of sheath covered with yellow glass, and exposed to the direct solar radiation. The time for that exposition cannot be precisely determined; but the operation presents no difficulty, for the operator can see through the yellow glass the progress of the action. The proof is, therefore, only withdrawn when it will be found to have attained the proper point, which it is as easy to appreciate as when using the mercury-box.

By this process, views may be obtained of exquisite delicacy of detail, and of a very peculiar tone.

With the accelerating substances the red glass must be used, but we have never obtained by that process results as satisfactory.

GALVANIZING.

THE BATTERY.—1. A copper cup about three inches in diameter, and six in height. To the top of this is attached a copper or iron wire, eighteen or twenty inches long, and to the other end of the wire a piece of silver.

2. A porous cup used for Daniels' Battery, an inch in diameter, and four or five inches deep, placed in the centre of the copper cup. In this is a piece of zinc, from which runs a wire, similar in length to the first, and to the other end of this wire is attached the plate to be galvanized. To hold the plate, bend a small piece of old plate over the end of the wire, hammer the ends together, and crowd the edge of the plate between them.

3. A plate-cup for holding the silvering solution. This must be sufficiently large to admit the sized plate to be galvanized. It may be earthen or glass. The jar of a coating-box answers well.

TO CHARGE THE BATTERY.—1. In the copper cup put one-fourth pound of sulphate of copper, and pour in water.

2. In the porcelain cup pour rain water, and add sulphuric acid to make it about as sour as vinegar.

3. In the plate cup, three pints of water, to which is added one drachm of protoxide of silver, and three drachms cyanide of potassium,; the whole filtered. Place the annode attached to the copper cup in the solution, at one edge of the cup. Clean your plate as for taking an impression, attach it to the zinc wire, place it in the solution, and drop the zinc in the porcelain cup. The zinc wire must not come in contact with the other wire, nor the copper cup. The plate, after remaining a few minutes, should come out with a clear light-blue surface. If it does not, it must be again cleaned, and the process repeated. Wash and dry with the lamp. The contents of the plate cup must be filtered every night. The plate commonly requires the second silvering, and it may be repeated any number of times. Clean lightly with very fine dry rotten-stone or rouge, dusted on a piece of cotton flannel, and buff as usual. If the plate is coated with an uneven, flour-like deposit, it is oxide of silver and cyanide of potassium must be added to the solution. If it comes out a dirty-looking whitish color, the plate was not clean.

Galvanizing undoubtedly improves the sensitiveness of the plate, and for large sizes, perhaps it compensates for the extra labor and expense.

HINTS AND CAUTIONS.

First of all, cleanliness should be observed. When there is dust or dirt about your room, particularly about the work-bench, failures will be frequent, for the smallest particles of *rotten-stone*, when allowed to come in contact with the buffs, will produce scratches on the surface of the plate, which very much injures the opertion, and often cause failures.

Dust flying about the room is injurious, if allowed to fall on the plate, either before or after it has been coated, as it causes black spots which cannot be removed.

The polished plate should not be allowed to come in contact with a strong current of air, for it tends to oxidize the surface. Breathing on the surface should also be avoided, for the same reason.

The plate should, in all cases, be buffed immediately before using, and not allowed to stand any length of time, and held with the face-polished surface down.

It is always best that the plate should be of the same temperature of the atmosphere in the room.

Keep the *camera* and *mercury-bath* perfectly free from the vapors of *iodine* and *bromine*; for the presence of the slightest degree of either of the above, will injure the impression in no small degree. As a preventive, let the camera be exposed to the sun or fire for a few minutes in the morning.

Filter your mercury often, to keep the surface free from film and dust.

The hyposulphite solution should be filtered through sponge every time it is used.

The direct rays of light must not enter the camera in conjunction with those reflected from the object; the picture will be veiled, and the color of the plate changed to a thick green.

If the plate be iodized only to a light-yellow, the result might be of a bluish or grey tinge; and this is generally the case, when the quick is new and strong, and there is an excess of it on the plate, and yet not enough to form the bromide iodide of silver; in which case it would wholly spoil the impression.

A buff of white cotton velvet for the finishing touch is preferable to any other, and should always be used when it can be obtained.

Your iodine will be found to operate more successfully, when the time required for coating the plate does not fall short of fifteen seconds, or exceeed one minute.

Too quick coating can be avoided by using less iodine in your box. In the summer months, when the weather is 80 degrees and over, one-quarter of an ounce, or even less, will work to advantage.

LUNAR DAGUERREOTYPES.

Since the first edition of this work, our attention has been called to *luner daguerreotypes.* Our first, and only experiment, was performed in taking the moon, which was done on the night of the first of September, 1849, at half-past ten. Two plates were prepared, as nearly alike as possible, and in the same manner as for taking a portrait; one of these was put in the camera and exposed to the moon for two minutes and five seconds, (this being the time occupied in moving the distance of its diameter,) then turning the regulating screw of the camera once around so as to allow space for another impression, and exposing the

plate one minute and two scconds; then regulating the camera as before. We obtained nine distinct impressions on the same plate, two as above, and seven as follows: the third exposure, fifteen seconds; the fourth, five; the fifth, four; the sixth, three; the seventh, two; the eighth, one second; and the last or ninth, instantaneous. Both plates were subject to the same operation, and like results produced; the three second exposure was the strongest impression on both.

The above was performed with a half-size camera, which remained permanent. It will readily be seen that the shorter time alowed the plate in the camera, the more distinct and strongly marked will be the impression. Should the plate be exposed one minute in the camera, the result would be a dim, indistinct impression, caused by the moon's motion, as it is seen, it changes nearly half its diameter in the time.

Mr. J. Roach, a celebrated optician of New-York, in several late communications, says:

"I succeeded in obtaining, with one of my instruments, a distinct and strongly marked impression of the moon. On that occasion, I used a half-sized and a medium plate, as prepared for taking a portrait. I found that one minute in the camera was sufficient time to obtain a strong picture; but that if suffered to remain longer, the

indistinctness, consequent upon the moon's motion, was as clearly exhibited as the movement of a sitter for a portrait." Now this gentleman must have performed his experiment long ago, and forgotten the real time, or the moon must have, on that occasion, stood still; the former is, however, more likely.

HYALOTYPES;

OR,

PICTURES ON PLATE-GLASS.

We have seen some very fine specimens of the *Hyalotypes*, produced by Messrs. Langenheims, of Philadelphia. These gentlemen claim to be the inventors of the process; be that as it may, by reference, we see that the process was announced at a recent meeting of the Paris Academy of Science. The following was the report, as given by the "Scientific American:"

"At a recent meeting of the Paris Academy of Sciences, this process was described by M. Reghault in behalf of M. Evrard, of Lille, who is said to have discovered it in 1847.

The principle of the discovery is matrix of albumen, rendered sensible to the action

of light, by aceto-nitrate of silver, and spread in a thin layer on a plate of glass. The process is to take a certain number of the white of eggs, and remove all the non-transparent part, and then add a few drops of a saturated solution of iodate of potassium, then beat the eggs into froth and allow it to settle. The plate of glass is well cleaned with alcohol, and the albumen is then spread over the glass in a thin layer with another piece of glass. The glass must have a perfect thin coat adhering to it, when it is hung up by one of the corners to drain off the excess. The glass is then placed flat upon a level board, screened from dust and allowed to dry. When dry it is submitted to a good heat, but not so much that the albumen will peel off. After this the glass is dipped into a solution of aceto-nitrate of silver, face downwards, after which it is removed and immersed in a basin of clean water, being stirred in it for a few seconds, then taken out, held up by a corner, and is completely sensitive, moist or dry, to receive photographic impressions. It is then placed in the camera obscura, after which it is dipped in a bath of galic acid, to which is added a little of aceto-nitrate of silver. Care is taken not to let the glass remain too long in this. After being dipped in the galic acid it is washed in water and then immersed in a solution of the bromide of

potassium, (twenty parts to one hundred of water,) after which it is carefully and well washed in water, and left to dry in a horizontal position in a dark room.

This is a description of the process of producing photographic pictures on glass, as communicated to the Paris Academy of Sciences. There are some other little nic-nacs, which are essential to a successful and good picture—but this is a very minute description—one sufficient for an artist to do all the rest himself."

TITHONOTYPE;

OR,

RE-PRODUCTION OF DAGUERREOTYPES.

This consists in depositing on the surface of the original Daguerreotype plate, by means of the electrotype process, a second plate of copper; which, on separating from the plate, presents a perfect counter proof of the original picture. The following process is condensed from Lerebour's Treatise on Photography, translated by J. Edgarton:—

The apparatus necessary to obtain a reproduction is, first, one of Bunsen's cells; second, a glass precipitating trough, to contain a saturated solution of sulphate of copper, (*blue vitriol.*) The plate, being well gilded, and the surface perfectly clean, attach it to the connecting wire of the trough, to which the positive pole (*zinc*) of the battery is joined, and make fast with a binding screw. The back of the plate is then covered with a coating of varnish, composed of one part spirits of turpentine and two parts beeswax, or simply with beeswax, to prevent a useless deposit

of copper. Care must be taken that this varnish, which should be applied hot, should be of uniform thickness, and should not interpose between the plate and the connecting wire, to interrupt the metallic contact necessary to the success of the operation.

The sulphate of copper solution must be saturated in cold water, and carefully filtered. When all is prepared, put the positive electrode (*a plate of copper which dissolves in the trough*) in connection with the negative pole of the battery, (carbon,) and immerse it in the bath; establish also a connection between the proof to be reproduced and the other pole, (zinc,)—immerse it in the bath, when it immediately becomes covered with copper.

In general, operators are in a hurry to see the progress of the process; but they should always wait a few minutes before taking the plate out of the bath, and each time it is done, care must be taken not to leave it long in contact with the air, or the surface will become oxydized and the next deposit be prevented from adhering to the former. When the metallic coating is judged to be of sufficient thickness—(and that of a stout card suffices,—) the plate should be rinsed copiously in water, and dried either with saw-dust or blotting paper. If you wish to preserve on the plate the beautiful rosy hue of the mother-of-pearl opal,

which the deposit should leave, hasten the drying of it, after passing it once through water, by wetting it with spirits of wine, which you also dry up with blotting paper.

The most secure method of separating the two plates, consists, (when the deposit is not too thick,) in cutting with a pair of shears, a strip say one-tenth of an inch in width, all around the edges of the two plates, when with the blade of a knife, they are separated with the greatest facility. The affinity of oxygen for copper being much greater than for silver, the counter-proof must be withdrawn as soon as possible from the contact of the air, by placing it in a skeleton frame; and above all, the greatest care must be taken not to touch its surface with anything whatsoever.

A single battery of Bunsen, charged outside with pure nitric acid, and with a mixture composed of one part sulphuric acid and fifty parts of water, in the interior of the porous vessel, will suffice to reproduce in the space of a few hours, a whole sized plate.

CALOTYPE.

BY H. F TALBOT.

The following is the method of obtaining the Calotype pictures:—

Preparation of the Paper.—Take a sheet of the best writing paper, having a smooth surface, and a close and even texture.

The water-mark, if any, should be cut off, lest it should injure the appearance of the picture. Dissolve 100 grains of crystallized nitrate of silver in six ounces of distilled water. Wash the paper with this solution, with a soft brush, on one side, and put a mark on that side whereby to know it again. Dry the paper cautiously at a distant fire, or else let it dry spontaneously in a dark room. When dry, or nearly so, dip it into a solution of iodide of potassium, containing 500 grains of that salt dissolved in one pint of water, and let it stay two or three minutes in this solution; then dip it into a vessel of water, dry it lightly with blotting paper, and finish drying it at a fire, which will not injure it even if held

pretty near; or else it may be left to dry spontaneously.

All this is best done in the evening by candle-light. The paper so far prepared, the author calls *iodized paper*, because it has a uniform pale-yellow coating of iodide of silver. It is scarcely sensitive to light; but, nevertheless, it ought to be kept in a portfolio or a drawer, until wanted for use. It may be kept for any length of time without spoiling or undergoing any change, if protected from the light. This is the first part of the preparation of Calotype paper, and may be performed at any time. The remaining part is best deferred until shortly before the paper is wanted for use. When that time is arrived, take a sheet of the iodized paper, and wash it with a liquid prepared in the following manner:—

Dissolve 100 grains of crystallized nitrate of silver in two ounces of distilled water; add to this solution one-sixth of its volume of strong acetic acid. Let this mixture be called A.

Make a saturated solution of crystallized gallic acid in cold distilled water. The quantity dissolved is very small. Call this solution B.

When a sheet of paper is wanted for use, mix together the liquids A and B, in equal volumes, but only mix a small quantity of them at a time, because the mixture does not keep long without

spoiling. I shall call this mixture the gallo-nitrate of silver.

Then take a sheet of iodized paper and wash it over with this gallo-nitrate of silver, with a soft brush, taking care to wash it on the side which has been previously marked. This operation should be performed by candlelight. Let the paper rest half a minute, and then dip it into water. Then dry it lightly with blotting-paper, and finally, dry it cautiously at a fire, holding it at a considerable distance therefrom. When dry, the paper is fit for use.

The author has named this paper, thus prepared, Calotype paper, on account of its great utility in obtaining the pictures of objects with the camera obscura. If this paper be kept in a press, it will often retain its qualities, in perfection, for three months or more, being ready for use at any moment; but this is not uniformly the case, and the author therefore recommends that it should be used in a few hours after it has been prepared. If it is used immediately, the last drying may be dispensed with, and the paper may be used moist.

Instead of employing a solution of crystallized gallic acid for the liquor B, the tincture of galls diluted with water, may be used, but he does not think the results are altogether so satisfactory.

Use of the Paper.—The Calotype paper is sensitive to light in an extraordinary degree, which

transcends a hundred times or more that of any kind of photographic paper hitherto described. This may be made manifest by the following experiment:—

Take a piece of this paper, and having covered half of it, expose the other half to daylight for the space of one second, in dark cloudy weather in winter. This brief moment suffices to produce a strong impression upon the paper. But the impression is latent and invisible, and its existence would not be suspected by any one who was not forewarned of it by previous experiments.

The method of causing the impression to become visible is extremely simple. It consists in washing the paper once more with the gallo-nitrate of silver, prepared in the way before described, and then warming it gently before the fire. In a few seconds, the part of the paper upon which the light has acted, begins to darken, and finally grows entirely black, while the other part of the paper retains its whiteness. Even a weaker impression than this may be brought out by repeating the wash of gallo-nitrate of silver, and again warming the paper. On the other hand, a stronger impression does not require the warming of the paper, for a wash of the gallo-nitrate suffices to make it visible, without heat, in the course of a minute or two.

A very remarkable proof of the sensitiveness of the Calotype paper is afforded by the fact stated by the author, that it will take an impression from simple moonlight, not concentrated by a lense. If a leaf is laid upon a sheet of paper, an image of it may be obtained in this way in from a quarter to half an hour.

This paper being possessed of so high a degree of sensitiveness, is therefore well suited to receive images in the camera obscura. If the aperture of the object-lense is one inch, and the focal length fifteen inches, the author finds that one minute is amply sufficient in summer to impress a strong image upon the paper of any building upon which the sun is shining. When the aperture amounts to one-third of the focal length, and the object is very white, as a plaster bust, &c., it appears to him that one second is sufficient to obtain a pretty good image of it.

The images thus received upon the Calotype paper are of the most part invisible impressions. They may be made visible by the process already related, namely, by washing them with the gallo-nitrate of silver, and then warming the paper. When the paper is quite blank, as is generally the case, it is a highly curious and beautiful phenomenon to see the spontaneous commencement of the picture, first tracing out the stronger outlines, and then gradually filling up all the nu-

merous and complicated details. The artist should watch the picture as it develops itself, and when in his judgment it has attained the greatest degree of strength and clearness, he should stop further progress by washing it with the fixing liquid.

The Fixing Process.—To fix the picture, it should be first washed with water, then lightly dried with blotting-paper, and then washed with a solution of bromide of potassium, containing 100 grains of that salt dissolved in eight or ten ounces of water. After a minute or two it should be again dipped in water, and then finally dried. The picture is in this manner very strongly fixed, and with this great advantage, that it remains transparent; and that, therefore, there is no difficulty in obtaining a copy from it.

The Calotype picture is a negative one, in which the lights of nature are represented by shades; but the copies are positive, having the lights conformidable to nature. They also represent the objects in their natural position with respect to right and left. The copies may be made upon Calotype paper in a very short time, the invisible impression being brought out in the way already described. But the author prefers to make the copies upon photographic paper prepared in the way which he originally described in a memoir read to the Royal Society, in February 1839, and which is made by washing the best writing paper, first with a weak solution of common salt, and next with a solution of nitrate of silver. Although it takes a much longer time to obtain a copy upon this paper, yet when obtained, the tints appear more harmonious and pleasing to the eye; it requires in general from three minutes to thirty minutes of sunshine, according to circumstances, to obtain a good copy on this sort of photographic paper. The copy should be washed and dried, and the fixing process (which may be deferred to a subsequent day) is the same as that already mentioned. The copies are made by placing the picture upon the photographic paper, with a board below and a sheet of glass above, and pressing the papers into close contact by means of a screw or otherwise.

After a Calotype picture has furnished several copies, it sometimes grows faint, and no more good copies can then be made from it. But these pictures possess the beautiful and extraordinary property of being susceptible of revival. In order to revive them and restore their original appearance, it is only necessary to wash them again by candlelight with gallo-nitrate of silver. and warm them; this causes all the shades of the picture to darken greatly, while the white parts remain unaffected. The shaded parts of the pa-

per thus acquire an opacity which gives a renewed spirit and life to the copies, of which a second series may now be taken, extending often to a very considerable number. In reviving the picture, it sometimes happens that various details make their appearance which had not before been seen, having been latent all the time, yet nevertheless not destroyed by their long exposure to sunshine.

The author terminates these observations by stating a few experiments, calculated to render the mode of action of the sensitive paper more familiar.

1. Wash a piece of the iodized paper with the gallo-nitrate; expose it to daylight for a second or two, and then withdraw it. The paper will soon begin to darken spontaneously, and will grow quite black.

2. The same as before, but let the paper be warmed. The blackening will be more rapid in consequence of the warmth.

3. Put a large drop of the gallo-nitrate on one part of the paper and moisten another part of it more sparingly, then leave it exposed to a very faint daylight; it will be found that the lesser quantity produces the greater effect in darkening the paper; and in general, it will be seen that the most rapid darkening takes place at the

moment when the paper becomes nearly dry; also, if only a portion of the paper is moistened, it will be observed that the edges or boundaries of the moistened part are more acted on by light than any part of the surface.

4. If the paper, after being moistened with the gallo-nitrate, is washed with water and dried, a slight exposure to daylight no longer suffices to produce so much discoloration; indeed, it often produces none at all. But by subsequently washing it again with the gallo-nitrate and warming it, the same degree of discoloration is developed as in other cases (experiments one and two). The dry paper appears, therefore, to be equal, or superior in sensitiveness to the moist; only with this difference, that it receives a virtual instead of an actual impression from the light, which it requires a subsequent process to develope.

The above communication from Mr. Talbot, was made to the Academy by Mr. Biot, who, at the same time, announced, that he had placed the specimens of sensitive papers, sent by Mr. Talbot, in the hands of Mr. Regnault, member of the Academy, who has long devoted his attention to the production of Daguerreian images, in which he has been very successful. Mr. Biot adds the following remarks:

"As the impressionable papers are destined to become of great utility to travellers, it will not be

uninteresting to show that their use may be much improved, if the following precautions are taken:—

"1st. To prepare them always with paper of a very uniform texture.

"2nd. To adapt to the camera object-glasses, which are not achromatic for the light; but the curves of which are calculated so as to collect, in one focus, all the invisible radiations which are most efficaciously on the impressionable substance employed in their preparation.

"3rd. To keep them for a very few instants in presence of the objects to be represented, and to continue the developement of the image out of their presence, by the influence of the solar radiation, transmitted through a red-glass, in conformity with the singular property which the latter possesses, and which was so ingeniously discovered by Mr. Edmund Becquerel."—*Egerton's Treatise.*

DIFFERENT METHODS OF PREPARING PAPER.

Mr. Cundell's Paper.—To a solution of one drachm of nitrate silver, in twelve drachms water, add strong ammonia, till the precipitate which falls is just re-dissolved. Wash the marked side of the paper over with this solution, then dip it

in water containing forty grains common salt to the pint; apply the nitrate of silver solution as before, and dry carefully in the dark.

Mr. Cooper's Paper.—Soak the paper for a few minutes in a boiling solution of chlorate of potash, (the strength is immaterial;) dry it, and wash it on one side with a solution of nitrate of silver, sixty grains to the ounce of distilled water. This paper is not very sensitive, but the image can be fixed by washing only.

M. Daguerre's Paper.—Immerse the paper in hydrochloric (muriatic) ether, which has become acid from keeping; the paper is then carefully and completely dried. It is then dipped into a solution of nitrate of silver, and dried without artificial heat in a perfectly dark room. This paper is very sensitive when quite new, but gradually loses its impressionability.

Bromide Paper.—The preparation of this being less difficult; it is the one more generally used. Dissolve 100 grains bromide potassium in one ounce distilled water, and soak the paper in this solution. Take off the superfluous moisture, and when nearly dry, brush it over on one side only with a solution of 100 grains of nitrate of silver, to one ounce water. This paper is readily prepared, and tolerably sensitive. If required to be very sensitive, it should be brushed over a second time with the nitrate of silver.

CHROMOTYPE.

Mr. PONTON was the first to point out the photographic properties of bichromate of potash. His process for preparing paper is as follows:—Immerse a well-sized paper in a saturated solution of bichromate potash, and dry by the fire. It is of a fine yellow color, and keeps well in the dark. When exposed to the rays of the sun, it becomes of a light brown; and if an engraving has been placed upon it, the resulting picture is negative. It is fixed by soaking in water. Mr. E. Becquerel improved upon this process by applying evenly over the paper a sizing of starch, and then steeping it in the bichromate solution as before. The picture having been taken, and the paper washed and dried, it is immersed in a weak alcoholic solution of iodine, in which it remains some time, and is then rinsed and carefully dried between blotting-paper, without much heat. When wet, the shades of the picture are of a fine blue; but when dry, of a deep violet. If the picture, while wet, is covered with a coating of gum, the color is better preserved, and is more beautiful when dry.

Mr. HUNT announced the process, which is termed the Chromotype, at the meeting of the British Association in 1843. It is not sufficiently sensitive for the camera; but is valuable for copying engravings, etc. Good writing paper is washed over with sulphate of copper, in solution, about one drachm to an ounce of water; when dry, it is again washed with a strong, but not saturated solution of the bichromate of potash, and again dried. The paper may be preserved in this state for a considerable time. When exposed to sunshine, it changes to a dull brown, and if checked here, a negative picture is produced; but if the action of light is continued, the browning gives way, and the picture becomes positive,—yellow on a white ground. From five to twenty minutes is usually required to produce the effect. In either case, if the picture be washed over with a solution of nitrate of silver, a very beautiful positive picture results. To fix the picture, wash it immediately in pure water, and dry it. If the water contains any muriates, the picture suffers, and long soaking entirely destroys it. When a few grains of common salt are added to the water, a curious effect is produced. The picture is apparently rapidly destroyed, but may be restored by an exposure to the sun of from ten minutes to a quarter of an hour, and is now of a lilac color,—the

shades depending on the quantity of salt used. No fresh process is required to fix it.

A beautiful variety of Chromotype is thus described by Mr. HUNT: "A neutral solution of the chloride of gold is mixed with an equal quantity of the bichromate of potash. Paper is washed with this solution, and dried near the fire. On exposing this paper to light, it speedily changes, first to a deep brown, and ultimately to a blueish black. If an engraving is superposed, we have a negative copy, blue or brown, upon a yellow ground. If this photograph is placed in clean water, and allowed to remain in it for some hours, very singular changes take place. The yellow salt is all dissolved out, and those parts of the paper left beautifully white. All the dark portion of the paper become more decided in their character, and accordingly as the solarization has been prolonged or otherwise, or the light has been more or less intense, we have either *crimson, blue, brown, or deep black photographs of a most beautiful character.*"*

* Researches on Light, by Robert Hunt, 1844.

ENERGIATYPE.

The process which Mr. HUNT has designated the Energiatype, is one of the simplest and most convenient modes of obtaining photographic pictures; and the public are much indebted to this gentleman for the prompt and handsome manner in which he communicated his discovery, through the pages of the "Atheneum."

"While pursuing," he says, "some investigations, with a view to determine the influence of the solar rays upon precipitation, I have been led to the discovery of a new photographic agent, which can be employed in the preparation of paper, with a facility which no other sensitive process possesses. Being desirous of affording all the information I possibly can, to those who are anxious to avail themselves of the advantages offered by photography, I solicit a little space in your columns for the purpose of publishing the particulars of this new process. All the photographic processes with which we are at present acquainted, sufficiently sensitive for the fixation of the images of the camera obscura, require the

most careful and precise manipulation; consequently, those who are not accustomed to the niceties of experimental pursuits, are frequently annoyed by failures. The following statements will at once shew the exceeding simplicity of the new discovery."

Here follows, in the original letter, the description of the process as then employed. We shall, however, introduce it to the amateur with such modifications as the experience of Mr. HUNT himself, and other gentlemen who have adopted the method, have suggested to us.

PREPARATION OF THE PAPER.—Good letter paper, Whatman's, or Moinier's pure white is best, is first washed over with the following solution, viz.; five grains succinic acid, dissolved in one fluid ounce water, to which is added about five grains common salt, and half a drachm mucilage gum arabic. When dry, the paper is drawn over the surface of a solution of sixty grains of nitrate silver in one ounce distilled water. Allowed to dry in the dark, the paper is now fit for use, is of a pure white, retains its color, and may be preserved for a considerable time in a portfolio, until wanted for use.

The preparation of this paper is by no means difficult, but requires much care and attention. The solution must be applied very equally over

the paper, which should be immediately hung upon a frame or clothes' horse to dry. Extreme care must be taken that the paper be not exposed to light, after the nitrate of silver solution has been applied, until required for use. Many of the disappointments experienced by the experimenters on the Energiatype, are occasioned by a neglect of this precaution; as, although no apparent effect may have been produced by the exposure, the clearness of the subsequent picture will be seriously injured. The succinic acid must also be very pure. In the general way it will be found more convenient, and perhaps economical, to purchase the paper ready prepared. We shall now briefly describe the method of applying the Energiatype to the different purposes for which it is best adapted, premising that the varying circumstances of time, place, and light, will render necessary such modifications of the following directions as the experience of the operator may suggest. As a general rule, an open situation, sunshine, and, if possible, the morning sun should be preferred, as the image is sharper, and the color produced more intense, and less effected by the subsequent fixing process.

NEGATIVE PICTURES.

In the Camera.—For a building, an exposure of half a minute in strong sunshine is usually sufficient; for a portait, which can only be taken in the shade, two or three minutes is required.

Exact copies of prints, feathers, leaves, ect., may be taken by exposing them to the light in the copying-frame, until the margin of the prepared paper, which should be left uncovered, begins to turn very slightly. If the object to be copied be thick, the paper must be allowed to assume a darker tint, or the light will not have penetrated it.

Bringing out the Picture.—When the paper is taken from the camera or the frame, nothing is visible upon it; but by attending to the following directions, the latent picture will quickly develop itself. Having mixed together about one drachm of a saturated solution of *protosulphate of iron* and two or three drachms *mucilage of gum arabic*, pour a small quantity into a flat dish. Pass the prepared side of the paper taken from the camera rapidly over this mixture, taking care to ensure complete contact in every part. If the paper has been sufficiently impressed, the picture will almost immediately appear, and the further action

of the iron must be stopped by the application of a soft sponge and plenty of clean water. Should the image not appear immediately, or be imperfect in its details, the iron solution may be allowed to remain a short time, but it must be kept disturbed, by rapidly and lightly brushing it up, otherwise numerous black specks will form and destroy the photograph. Great care should be taken that the iron solution does not touch the back of the picture, which it will inevitably stain, and the picture being a negative one, render useless as a copy. A slight degree of heat will assist the development of the image, where the time of exposure has been too short.

The picture should be carefully washed to take off any superficial blackness, and may then be permanently fixed by being washed with water, to which a small quantity of ammonia, or, better still, hyposulphite of soda has been added. The paper must again be well soaked in clean water, to clear it from the soluble salts, and may then be dried and pressed.

POSITIVE PICTURES.

These are procured in the same manner as the copies of the prints, etc., just described; using the negatives before obtained in place of the objects themselves. Instead, however, of using the

iron solution, the paper must be exposed to the light, in the frame, a sufficient time to obtain perfect copies. The progress of the picture may be observed by turning up the corner of the paper, and if not sufficiently done, replacing it exactly in the same position. They should be fixed with hyposulphite as before directed. It is sometimes better to take negative pictures in the same way, without using the iron; in which case, the following observations may be useful:

Feathers, if white, or of a light shade, will bear very little exposure; dark feathers may be left until the paper assumes a tolerably deep color.

Lace.—White lace, net-work, etc., will not bear much exposure, and must be pressed very close to the paper; black lace, etc., may be exposed much longer.

Leaves, Flowers, etc.—These may be advantageously dried and pressed between blotting paper for a short time before using. They require considerable exposure to produce a perfect copy of the veins and marks: in sunshine, from fifteen to twenty minutes,—in ordinary day-light, for three or four hours. They are very beautiful when well executed, and may be colored to imitate nature very closely.

Wings of Insects, etc.—These being in general very transparent, must not be exposed too long. When the body of the insect has been preserved by drying or dissecting, so as to be tolerably transparent, the following method will secure an accurate copy. Take a light image of the whole insect, and then comparing the copy and the original, cut out those parts which are less transparent than the others, and having placed the object on a fresh piece of prepared paper, cover it with the cut paper, so that the dark parts may be first exposed to light. When these are well delineated, remove the upper paper, and leave the whole exposed till every part is sufficiently pourtrayed. The same plan may be adopted for leaves and flowers, where the parts are of different thicknesses. In copying wreaths of oak or vine leaves, the stem may be replaced by paper cut to imitate it.

Etchings on Glass.—By covering a piece of glass with lampblack and varnish, a subject may be traced on it with a point, which may be copied on the paper.

Pen and ink sketches on paper may be copied in the same manner.

"The advantage which this process possesses," says Mr. Hunt, "over every other, must be apparent. The papers are prepared in the most sim-

ple manner, and may be kept ready by the tourist until required for use. They require no preparation previously to their being placed in the camera, and they can be preserved until a convenient opportunity offers for bringing out the picture, which is done in the most simple manner, with a material which can be any where procured.

It has been found by experiment that the sulphate of iron has the property of developing the latent images on papers prepared with other salts of silver, and that by using the acetate bromide, benzoate, etc., the most varied and beautiful effects are elicited.

The calotype picture may, it is said, be developed in this way, after an exposure of one or two seconds only.—*Willats.*

CHRYSOTYPE.

Sir JOHN HERSCHEL, whose various experiments have done so much for the art of Photography, is the discoverer of this process, and that of the Cyanotype, of which we shall next speak. They are both founded upon the use of the salts of iron as photographic agents. The Chrysotype process was communicated to the Royal Society in June, 1843, and is as follows:—

"Paper is washed over with a moderately concentrated solution of ammonia-citrate of iron and dried,—the strength of the solution being such as to dry into a good yellow color, and not at all brown. In this state it is ready to receive a photographic image, which may be impressed on it either from nature in the camera obscura, or from an engraving in a frame in sunshine. The image so impressed, however, is faint, and sometimes hardly perceptible. The moment it is removed from the camera, it must be washed over with a neutral solution of gold, of such strength as to have the color of sherry wine. Instantly the picture appears; not indeed at once with its

full intensity, but darkening rapidly up to a certain point.

At this point nothing can surpass the sharpness and perfection of detail of the resulting photograph. The picture is now to be rinsed in spring water, which must be three times renewed. It is then blotted and dried, after which it is to be washed on both sides with a somewhat weak solution of hydriodate of potash. After being again rinsed and dried, it is now perfectly fixed. If the nitrate of silver be used instead of the solution of gold, the picture is brought out more slowly, and with much less beauty.

CYANOTPPE.

This name has been given, by Sir JOHN HERSCHEL, to several processes in which cyanogen is used in combination with iron. The term Ferrotype, which is sometimes applied to them, may with more propriety designate the whole of those photographic processes, a numerous class, in which iron may be employed as the developing agent.

FIRST PROCESS.—The paper is washed over, as in the Chrysotype, with a solution of ammonia citrate of iron. It is now exposed to light, and a latent picture impressed upon it. If the paper has sensibly darkened, the picture will appear negative. It is now brushed over very sparingly and equally with a solution of the ferro-cyanate potash, in which is dissolved a little gum arabic. The negative picture quickly vanishes, and is more slowly replaced by a positive one of a violet blue color, on a greenish yellow ground. If when dry the details are not sufficiently distinct, a second

wash will generally bring out the picture, which should be beautiful and sharp.

Second Process.—A paper is prepared with a mixture of equal proportions of ammonia-citrate iron, and ferro-sesquicyanate of potash. When a picture has been impressed, it is thrown into water, and dried, and a negative picture results. If this picture is washed with a solution of the proto-nitrate mercury, it is readily discharged, but is susceptible of restoration by thoroughly washing out the mercurial salt, and drying the paper. A smooth iron, rather hot, but not sufficiently so to scorch the paper, is now passed over it, and the obliterated picture immediately re-appears, but of a brown tint. These photographs gradually fade and disappear, but may be again restored by the application of heat.

Third Process.—One part by weight of ammonia-citrate of iron is dissolved in eleven parts of water, and this is mixed with an equal quantity of saturated cold solution of bichloride mercury. Before a precipitate has had time to form, the solution is brushed over paper, which should have a yellowish rather than a blueish cast, and dried. This paper keeps well, and when used is exposed to light, until a faint but perfectly visible picture is impressed. It is then brushed over as rapidly as possible with a saturated solution of

prussiate of potash, diluted with three times its bulk of gum water, so strong as just to flow freely without adhesion to the lip of the vessel. The wash must be spread with one application, evenly and very quickly, over every part of the paper. It is fixed by drying. Beautiful positive pictures are thus produced which will bear immediate exposure tolerably well, but which after a few days will bear strong sunshine uninjured. If the impression be overdone, the darker shades will disappear; if too little, the whole runs into blot. The exact time of exposure can only be learnt by practice.

There are several other varieties of these processes, which are not sufficiently important to be included here: the formula may be seen by reference to Sir John Herschel's Papers in the "Philosophical Transactions." The following process, communicated by him to the British Association in 1843, is, however, so curious, that we are induced to insert it here. If nitrate of silver, specific gravity 1.200, be added to ferro-tartaric acid, specific gravity 1.023, a precipitate falls, which is in a great measure re-dissolved by a gentle heat, leaving a black sediment, which, being cleared by subsidence, a liquid of a pale yellow color is obtained, in which a further addition of the nitrate causes no turbidness. When he total quantity of the nitrated solution added

amounts to about half the bulk of the ferro-tartaric acid, it is enough.

The liquid so prepared does not alter by keeping in the dark. Spread on paper and exposed wet, to sunshine (partly shaded) for a few seconds, no impression seems to have been made; but by degrees, although withdrawn from the light, it developes itself spontaneously, and at length becomes very intense. But if the paper be thoroughly dried in the dark (in which state it is of a very pale greenish yellow color,) it possesses the singular property of receiving a dormant or invisible picture; to produce which, (if it be, for instance, an engraving that is to be copied,) from thirty seconds to a minute's exposure in the sunshine is requisite. It should not be continued too long, as not only is the ultimate effect less striking, but a picture begins to be *visibly* produced, which darkens spontaneously after it is withdrawn. But if the exposure be discontinued before this effect comes on, an invisible impression is the result, to develop which, all that is necessary, is to breathe upon it, when it immediately appears, and very speedily acquires an extraordinary intensity and sharpness, as if by magic. Instead of the breath, it may be subjected to the regulated action of aqueous vapor, by laying it in a blotting paper book, of which some of the other leaves on both sides have been damped, or by holding it over warm water.—*Willats.*

AMPHITYPE.

This is another of the interesting and valuable discoveries of Sir John Herschel. It was given to the public at the last meeting of the British Association, and is described by him as follows:—

Paper proper for producing an amphitype picture, may be prepared, either with the ferro-tartrate or the ferro-citrate of the protoxide, or the protoxide of mercury, or of the protoxide of lead; by using creams of these salts, or by successive applications of the nitrates of the respective oxides, singly or in mixture, to the paper, alternating with solutions of the ammonio-tartrate or ammonio-citrate of iron,* the latter solution being last applied, and in more or less excess. I purposely avoid stating proportions, as I have not yet been able to fix upon any which certainly succeed. Paper so prepared and dried, takes a negative picture, in a time varying from half an hour to five or six hours, according to the intensity of the light; and the impression produced

* So commonly called, and sold as such; but as I am disposed to regard their composition, their chemical names would be ferro-tartrate and ferro-citrate of ammonia.

varies in apparent force, from a faint and hardly perceptible picture, to one of the highest conceivable fullness and richness, both of tint and detail—the color in this case being of a superb velvety brown. This extreme richness of effect is not produced except lead be present, either in the ingredients used, *or the paper itself.* It is not, as I originally supposed, due to the presence of free tartaric acid. The pictures in this state are not permanent. They fade in the dark, though with very different degrees of rapidity; some (especially if free tartaric or citric acid be present) in a few days, while others remain some weeks unimpaired, and require whole years for their total obliteration. But though entirely faded out in appearance, the picture is only rendered dormant, and may be restored, changing its character from negative to positive, and its color from brown to black (in the shadows) by the following process:—

A bath being prepared by pouring a small quantity of solution of pernitrate of mercury into a large quantity of water, and letting the subnitrated precipitate subside, the picture must be immersed in it, (carefully and repeatedly clearing off all air-bubbles,) and allowed to remain till the picture (if anywhere visible) is entirely destroyed; or if faded, till it is judged sufficient from from previous experience,—a test which is often

marked by the appearance of a feeble positive picture, of a bright-yellow hue, on the pale-yellow ground of the paper. A long time (several weeks) is often required for this, but heat accelerates the action, and it is often complete in a few hours. In this state, the picture is to be very thoroughly rinsed and soaked in pure warm water, and then dried. It is then to be well ironed with a smooth iron, heated so as barely not to injure the paper; placing it, for better security against scorching, between smooth clean papers. If then the process has been successful, a perfectly black positive picture is at once developed. At first, it most commonly happens that the whole picture is sooty or dingy to such a degree that it is condemned as spoiled; but on keeping it between the leaves of a book, especially in a moist atmosphere, by extremely slow degrees, this dinginess disappears, and the picture disengages itself with continually increasing sharpness and clearness, and acquires the exact effect of a copper-plate engraving on a paper more or less tinted with pale-yellow.

I ought to observe, that the best and most uniform specimens which I have procured, have been on paper previously washed with certain preparations of uric acid, which is a very remarkable and powerful photographic element. The intensity of the original negative picture is no criterion

of what may be expected in the positive. It is from the production, by one and the same action of the light, of either a positive or a negative picture, according to the subsequent manipulations, that I have designed the process thus generally sketched out, by the term *amphitype*,—a name suggested by Mr. TALBOT, to whom I communicated this singular result; and to this process, or class of processes, (which I cannot doubt when pursued, will lead to some very beautiful results,) I propose to restrict the name in question, though it applies even more appropriately to the following exceedingly curious and remarkable one, in which silver is concerned.

At the last meeting, I announced a mode of producing, by means of a solution of silver, in conjunction with ferro-tartaric acid, a dormant picture brought out into a forcible negative impression by the breath or moist air. The solution then described, and which had, at that time, been prepared some weeks, I may here incidentally remark, has retained its limpidity and photographic properties quite unimpaired during the whole year since elapsed, and is now as sensitive as ever,—a property of no small value. Now, when a picture (for example an impression from an engraving) is taken on paper, washed with this solution, it shows no sign of a picture on its

back, whether that on its face be developed or not; but if, while the actinic influence is still fresh upon the face, (*i. e.*, as soon as it is removed from the light,) *the back* be exposed for a very few seconds to the sunshine, and then removed to a gloomy place, a *positive picture*, *the exact complement of the negative one on the other side*, though wanting of course in sharpness, if the paper be thick, *slowly and gradually makes its appearance* there, and in half an hour or an hour acquires a considerable intensity.

I ought to mention, that the "ferro-tartaric acid" in question, is prepared by precipitating the ferro-tartrate of ammonia (ammonio-tartrate of iron) by acetate of lead, and decomposing the precipitate by dilute sulphuric acid.

P. S. When lead is used in the preparation of Amphitype paper, the parts on which the light has acted are found to be in a very high degree rendered water-proof.—*Herschel.*

ANTHOTYPE.

"The influence of light upon the growth and germination of plants is very curious and interesting. The facts connected with this subject have been investigated by Mr. CHEVRIEUL, Mr. HUNT, and Sir JOHN HERSCHEL. To the latter gentlemen we are indebted for the enquiries which have led to the publication of the Anthotype process. He found that the express juices, and alcoholic or watery infusions of certain flowers, more particularly the papaver rhœas, the coschoous taponica, the violet rose, ten weeks' stock, ect. ect., when spread on paper, were very sensitive to light. To procure this colouring matter, the petals of fresh and well-selected flowers are bruised to a pulp in a marble mortar, either alone or with the addition of a small quantity of alcohol,—the juice is expressed by squeezing the pulp through a piece of fine linen. The paper is prepared in the following manner:—"The paper should be mositened on the back by sponging and blotting off. It should then be pinned on a board, the moist side downwards, so that two of its edges (suppose

the right hand and lower one) shall project a little beyond those of the board. The board being then inclined twenty or thirty degrees to the horizon, the alcoholic tincture, (mixed with a very little water, if the petals themselves be not very juicy) is to be applied with a brush, in strokes from left to right, taking care *not to go* over the edges which rest on the board, but to pass clearly over those that project; and observing also to carry the tint from below upwards by quick sweeping strokes, leaving no dry spaces between them, but keeping up a continuity of wet spaces. When all is wet, cross them by another set of strokes from above downwards, so managing the brush as to leave no floating liquid on the paper. It must then be dried as quickly as possible over a stove, or in a current of warm air, avoiding, however, such heat as may injure the tint." If alcohol has not been added, the extract must be applied to the paper immediately.

Most of the papers so prepared require an exposure of many days (from twenty to thirty) to produce a decided effect, and the pictures obtained are not always permanent. This will of course preclude their being of practical utility; but the changes produced are so remarkable, that we could not, with propriety, omit mentioning them. A full account of Sir John Herschel's experiments will be found in his Memoir, or "The Action of

the Rays of the Solar Spectum on Vegetable Colors," etc., published in the second part of the Philosophical Transactions for 1842.

Similar effects are produced by light in the gums, resins and residua of essential oils, when thin films are spread upon paper or on metal plates. A paper prepared with an alcoholic solution of guaiacum, and placed in an aqueous solution of chlorine, acquires a beautiful blue color; it is very sensitive, and may be used for copying engravings, the resulting picture penetrating the paper, and appearing on the back with almost the same intensity as on the face. The images, however, speedily fade."—*Willats.*

ON ENGRAVING.

The idea of transforming the Daguerrean images obtained on the silvered plates into engraved plates, so as to multiply them by impression, must have struck a great number of persons; we can affirm that it is Mr. Donne who was the first to obtain a somewhat satisfactory result. The following is the manner in which he operated:

After having gone through the washing process in the ordinary way, taking care to use a rather weak solution, the plate, which should be faultless, and containing at least one-twentieth of silver, should be dried, and its edges beyond the image covered with a coating of engraver's varnish.

Place the plate horizontally over a pan, on which its four angles rest, and pour upon it, in such manner as to cover all the unvarnished parts, a rather thin liquid coating, being a solution containing three parts of *pure* nitric acid and four parts of water.

At the end of three or four minutes, small globules will begin to appear at different points, and will at last spread over all the parts of the

plate. It is here that the greatest difficulty presents itself, for, nothing but experience can point out the moment at which the plate is sufficiently acted upon by the acid. If you cease the operation too soon, the blacks will be without vigour and of a gray tone; if prolonged beyond the necessary time, even the whites will be affected; thus the operator has two difficulties to contend with. Mr. Donne has pointed out an ingenious method of solving these difficulties, which he has found frequently to succeed; it consists in blowing off the acid with the breath from all the white parts, in order to preserve them. This methodis doubtless very good, but can only be used when the lights are accumulated on one point, which is very seldom the case.

Dr. J. Berres has given a process for etching, which has much analogy to that of Mr. Donne, from which it only differs in this, that Mr. Donne operates with a mixture of nitric acid, whilst Dr. Berres begins by exposing the plate to the vapours of nitric acid, slightly heated, and after having covered over with a varnish those parts which are to be protected, he covers the plate with a coating of gum arabic, which he afterwards melts in nitric acid at a strength of twelve or thirteen degrees, and which he augments progressively to sixteen or eighteen degrees. When the vapours are manifested, the plate is engraved.

This process, which we have never practised, appears to us to require a certain skilfulness in protecting the white parts and covering them with varnish, and in seizing the moment at which the plate is sufficiently eaten into by the acid; but we think that none but an engraver can expect to succeed in it.—*Lerebours.*

TITHONOTYPE.

NOTE: BY DR. DRAPER.

In the number of this journal for May last, I described a process for obtaining tithonotypes, or copies of the surface of Daguerreotypes, by means of gelatin.

A very important improvement on that process, an improvement which, indeed, has brought it almost at once to perfection, has been effected;—this is, to copy the surface in copper by the Electrotype, after it has been previously fixed by the agency of a film of gold.

Those who are conversant with these matters, will see at once that this is a very different thing

from the abortive attempts which were made early in the history of the Daguerreotype. Many artists endeavored to transfer its surface by precipitating copper upon it; among others, I made trials of the kind. The results of those abortive attempts were mere shadowy representations which could be seen in certain lights, and which were very unsatisfactory in their effect.

The beautiful tithonotypes that are now so common in this city, are made in the following way:—The Daguerreotype plate is carefully gilt by M. Fizeau's process, taking care that the film of gold is neither too thick nor too thin. The proper thickness is readily attained after a little practice The plate is then kept a day or two, so that it may become enfilmed with air. The back and edges being varnished, copper is to be deposited upon it in the usual way, the process occupying from twelve to twenty hours. If the plate has been properly gilt, and the process conducted successfully, the tithonotype readily splits off from the Daguerreotype.

The reader will understand, that, when the process succeeds, the Daguerreotype plate will be uninjured, and the tithonotype a perfect copy of it. If any portions are blue, or white, or flesh-colored, they will be seen in the same colors in the tithonotype; the intensity of light and shadow is also given with accuracy, and indeed, the copy is a

perfect copy in all respects of the original. A great advantage is also obtained in the reversal that takes place; the right side of the tithonotype corresponds to the right side of the original object, and the left to the left. In the Daguerreotype it is not so.

Copper tithonotypes were first made in this city, (New York,) by Mr. Endicott, a lithographic artist of distinction.

There is no great difficulty in obtaining from these tithonotypes, duplicate copies. An expert artist can multiply them one from another.

The problem of multiplying the beautiful productions of M. Daguerre, is therefore solved.

I will take this opportunity of making a remark which I intended to have inserted in my paper, "On the rapid Detithonizing Power of certain Gases and Vapours." Amateurs, in the Daguerreotype process, are often anoyed by the want of success which frequently attends them. They ascribe to the atmosphere, or to the light, or to other causes, their inability to obtain impressions. Most of these mischances are due to the accidental presence of the vapour of iodine, or other electro-negative bodies, in the chamber or about the apparatus. It is indiscribable what a brief exposure to these vapours will entirely destroy a picture before it is mercurialized. If the iodine box or the bromine bottle is kept in the same

room with the mercury apparatus, that circumstance in itself is often sufficent to insure an uniform want of success. If the little frame which fits into the back of the camera, and which holds the silver plate, be used in the iodizing process, as is often the case, the small quantity of vapour it absorbs will destroy every picture, or, at all events, increase the time required in the camera enormously. The reason of this is easily understood. Supose a plate, in such a frame, be placed in the camera, or what comes to the same thing, suppose a particle of iodine has fallen into the camera, or that the wood has in any way absorbed an electro-negative vapour; as fast as the light makes its impression on the sensitive surface, the vapour detithonizes it, and unless the light is quite intense, or the exposure much prolonged, a very feeble proof, or no proof at all, will be obtained. In the same way the difficulties are greatly increased in the process of mercurialization, for, the temperature resorted to being high, if there is the least particle of iodine about the box, the picture will be inevitably and instantly detithonized and ruined.

We ought, therefore, never to allow iodine, or bromine, or chlorine, to have access to the appartment or the apparatus in which Daguerreotype operations are being conducted."—*Lerebours.*

MISCELLANEOUS.

A pleasing experiment can be performed, when occasion offers, by covering successively different portions of the plate, and obtaining a *group* from persons at *separate sittings.* The manner is this: Take a piece of black paper, or black over a piece of writing paper with ink, cut it half the size of the plate, place it in the tablet or plate-holder first, then put the plate in as usual. In this way half the plate will be excluded entirely from the action of the light. Expose the uncovered part to the image in the camera, go to your dark room and change the plate round, or move the paper over the other side of the plate, and take an impression on the other part; then expose to mercury. In this manner any number of impressions of the same person, or of different persons, can be obtained on one plate.

Having two locket pictures to take at once, clean your plate lengthwise, turn down your camera, and sit both at the same time. Gild them together, then separate and cut them in.

To secure pictures in lockets, pins, rings, &c., from dust and dampness, after putting them in,

cement the edge around on the back with bees-wax, using the point of a knife in the manner of puttying in a pane of glass.

A piece of lead attached to the end of a string thirty-nine inches in length, and suspended in your chemical room, forms a correct pendulum for measuring seconds, and is very convenient in coating.

Spots which water will not remove, sometimes get on the plate by blowing, or from brushes in coloring. Flow the surface with alcohol, touch the specks lightly with a clean pointed brush, which seldom fails to remove them.

Turn down the edges of the plate with a small wooden mallet, this being much better for the purpose than a hammer.

We have recently obtained pictures of a peculiar tone, which we call Mezzotint Daguerreotypes, from their resemblance to that species of engraving. The coating employed is, iodine to to a fair rose, quickstuff to the first tint of violet, and back *one second.* Mercury very hot.

INDEX.

Agents for the Sale of this Work.

J. M. L. & W. H. SCOVILL, Dealers in Daguerreotype Stock, 101 William street, N. Y.

E. WHITE, Dealer in Daguerreotye Stock, 247 Broadway, New-York.

MEADE & BROTHER, Dealers in Daguerreotype Stock, Exchange, Albany.

N. E. SISSON, Dealer in Daguerreotype Stock, 496 Broadway, Albany.