PHOTOGRAPHIC NOTES.

Directions and Formulas for the Development of Dry Plates.—Mr. G. Cramer, of St. Louis, Mo., one of the pioneers in the manufacture of gelatino-bromide plates, has recently issued the following practical formulas and directions, which we quote in full:

Bear in mind that very rapid plates are sensitive to light of any color. The safest light is a combination of ruby and yellow, just strong enough to enable you to judge of intensity of negative and progress of development, and the plate should not be held close to the light for examination for more than a few seconds.

The following combinations make a safe light:

Orange colored paper with ruby glass.

Orange glass with cherry fabric.

Ruby glass with canary fabric.

Orange and ruby glass combined with ground glass.

Green is not as non-actinic as ruby and yellow combined, and it has furthermore the disadvantage that with it the intensity of negative cannot be judged as well as with the ruby light.

To make sure your light is safe, make the following test:

Cover one-half of a "lightning" plate with opaque paper and expose it to the light for about two minutes, at the distance generally observed while developing. Develop, and if the unprotected part of the plate shows fog, screen the light with additional paper or fabric until it is found perfectly safe.

For a developer of good keeping qualities, and which can be used repeatedly, prepare the following solutions:

No. 1. Alkaline Solution.

Water	60 ounces.
Sulphite of soda crystals	4 "

Four ounces sulphite of soda crystal are equal to about two ounces of sulphite granular. The crystals can be more easily obtained in sufficient purity than the granular, and are therefore preferred.

Yellow prussiate of potass	2 ounces.
Carbonate of soda crystals (sal soda)	1 ounce.

Put the ingredients into a wide mouth bottle, cork well, and let them dissolve. Keep also the sulphite of soda in well stoppered bottles, as contact with air will decompose the sulphite and render it worthless.

No. 2. Pyro Solution.

Distilled or ice water	6 ounces.
Sulphuric acid	10 minims.
Pyrogallic acid	1 ounce.

Do not prepare too large a quantity of the pyro solution, as it will in time become discolored and unfit for use.

No. 3. Bromide Solution.

Water	10 ounces.
Bromide of potassium	1 ounce.

DEVELOPER.

Sufficient quantity for half a day's work may be mixed at one time, in the following proportions:

To 8 ounces alkaline solution add from 2 to 4 drachms pyro solution.

Pour enough of this solution into a pouring bottle to well cover the plate, and add to this a few drops of bromide solution (say about 15 minims to 8 ounces developer), to prevent any slight haziness which is apt to be produced by fresh developer.

Several plates can be developed in succession in the same solution with good results. When it becomes exhausted and works too slow, pour it away, excepting about an ounce, which is to be added to eight ounces of new developer for the same purpose for which the bromide solution was used in the beginning. During cool weather an addition of bromide or old developer is not necessary, and the developer should be kept at about 70 degrees Fahrenheit.

Some emulsions require more pyro than others to obtain the proper amount of intensity. Three drachms will be found an average.

Do not use a stronger alkaline solution than given above, as a very sensitive plate will be injured by too powerful a developer.

If carbonate of potassium or dried carbonate of soda is used, note that one-half ounce of either is equal in strength to one ounce carbonate of soda crystals.

The yellow prussiate of potassium is added to give body and brilliancy to the negative, the sulphite of soda to prevent yellow color of negative and to preserve the developer.

If the shadows do not remain clear, add to 8 ounces of developer from 20 to 40 minims of bromide solution (No. 3).

Plates condemned as foggy or too rapid and lacking intensity will generally work perfect and clear with a small dose of bromide solution.

If more intensity is desired, add a little more pyro than usual, and be sure to carry the development far enough.

To correct overexposure, add bromide solution and a little more pyro to the developer.

An underexposed plate can be improved by diluting developer with water, or after developing by transferring the plate, *without draining*, from the developer to a dish containing water enough to well cover the plate and leaving it there for some time, well protected against *all* light, before rinsing and fixing.

For drop shutter or instantaneous work, the last mentioned treatment is recommended.

Before fixing it is well to flow the plate with saturated solution of alum. Do not return solution to bottle, but throw off, then rinse and fix.

After fixing, place the negative in dish containing alum solution, to harden the film, then wash thoroughly.

THE PRINCIPAL CAUSES OF FAILURE.

1. Overexposure.
2. Use of too much sal soda or carbonate of potassium in the developer.
3. Use of impure sulphite of soda, or such as is too old and decomposed by contact with air.
4. Introduction of impurities into developer.
5. Traces of white light entering camera, tablet, or dark room through holes in wall, underneath or on side of door, etc.
6. Exposing plates to white light while fixing, or before they are thoroughly fixed—this will never do with my "lightning" plates.
7. Use of too strong light for developing, whether the light is green, yellow, or red.

We commend the above directions for their brevity, and also for their usefulness to a beginner. It frequently happens that some unobserved minute leak of light in the camera front or camera bellows will be sufficient to ruin a sensitive plate which is perfectly good and clear.

In the taking of instantaneous views, where the camera and lens is exposed to strong sunlight, it is advisable to cover the camera bellows with the focusing cloth, and also to protect the plate holder in the same way. The diaphragm slit in the lens tube should be covered by a broad rubber band, or it may be protected by tying the pocket handkerchief around the tube.

An excellent plan of testing the light-tight qualities of a plate holder is to remove the lens board and look through the aperture, having the head protected by the focusing cloth. With the slide end of the holder facing a strong light, upon drawing out the slide, any leakage will be easily observed. If the valve in the holder does not close tightly, by reason of defective springs, or the warping of its different portions, a constant pencil or pencils of white light will be seen to stream in sideways across the face of a plate.

Plate holders should be carefully tested for these defects, at frequent intervals, if good, clear work is desired. In two or three instances we have found camera bellows which were supposed to be absolutely light-tight, when held in clear sunlight, to admit white light as if it was coming through an extremely fine sieve. The use of yellow prussiate of potash in the developer, as advised above, is really not necessary, it having been discontinued by the originator, Mr. H. J. Newton. Better effect is obtained by using equal quantities of carbonate of potassium and carbonate of soda.

Photographs of Lightning.—As the season of thunder storms is now at hand, an effort is being made by the Royal Meteorological Society of London to secure as many photographs of lightning as possible, in order that the peculiarities shown in the various phases of a lightning flash may be scientifically studied.

We would suggest a similar course be pursued by the U. S. signal service, and recommend that all its observers, scattered over the country, be supplied with suitable photographic apparatus, not only for photographing lightning, but also other meteorological phenomena, such as approaching cyclones, and the numerous peculiar cloud effects often observed.

The following are the instructions issued by the Royal Society: "It is desired to obtain photographs of flashes of lightning, and the council will esteem it a favor, first, if any one will send to the secretary copies of photographs of flashes of lightning that may have been already taken, and second if the reader will endeavor to procure such photographs himself, or interest others in the work.

"No particular difficulties are presented, and all that is required is to employ a rapid plate and a rectilinear lens with full aperture, leaving it uncovered at night during a thunderstorm, for a short time, in the direction of its probable approach. The ground glass of the camera should be set at the equivalent focus of the lens, or for objects at least 200 feet away. After the development of the plate, flashes of lightning will be found in some cases to have been impressed upon the plate, the only uncertainty being whether any particular flash will happen to fall within the field of view

"It is hoped many amateurs and professional photographers will take up this interesting branch of the art. We shall be happy to receive copies of such photographs, with particulars as to the time of night, also lens, stop, plate, and developer used.

"The address of the assistant secretary of the Royal Society is William Marriott, 30 Great George Street, Westminster, London, S. W., England."

WHEN the next decennial census is taken, three years hence, it is computed that New York City will have a population of two millions and Brooklyn of one million. That fact alone assures a pretty steady boom to every legitimate business hereabouts.

Many Items of Interest.

Edwin Clark says, in the *Architect* (London), that whenever space is crossed by any kind of structure inducing no lateral thrust on the abutments—that is, in all beams or tubes, whether round, oval, rectangular, or of whatever form, as also in all trussed roofs, trellis bridges, bowstring arches, etc.—the transverse strength of structures of similar section, but otherwise of any magnitude, is directly as their sectional area and depth, and inversely as their length. We have been careful to observe that this is founded on the assumption of all these structures being of such dimensions as to preserve their form, and to fail by actual crushing or extension, and not by distortion. Even in the case of structures in which the horizontal thrust is resisted by the abutments, as in suspension bridges and arches, this principle is practically available with a little modification. In fact, there can be no change in the direction of the vertical force at the supports without the intervention of a lever; and in the case of all these structures, this force at each end of the beam is transferred into horizontal strain at the center by an act of leverage, one arm being always the semi-length of the beam, and the other some fraction of the depth, which must in similar sections vary directly with the depth.

Cut flowers may be preserved fresh, it is said, for a long time in the following manner: Get a glass shade and place it on a non-porous vessel to form a stand; put water round the bottom to keep the shade air-tight, then procure fresh cut blossoms, put them in water immediately, drop into the water in which the flowers are placed a small quantity of spirit of chloroform, and place the shade over them at once. The flowers thus treated, some writer says, will keep fresh for months, but one should hardly expect they would be in a very fresh condition after their four weeks' confinement, but the new preserving process is worth trying. Care should be taken to have all in readiness. As soon as the chloroform is put in, place the shade over them, and water always kept round the bottom. A large soup plate would do for this.

The *Millers' Review* says: The tempering of mill picks is more a matter of care and observation than any special material used in the process. More picks are spoiled by burning or overheating the corners than by any other part of their manufacture. A slow fire and heating back from the point is an essential feature. Do not draw the edge thin. Leave it a little blunt and grind for the proper edge. Heat to a cherry red, no more at the corners than in the middle. Dip in clear water, and draw the temper to a full straw color. Brighten the edge surface on a grindstone or with emery paper before tempering.

Cheap postage with Mexico (as cheap as with Canada) comes into force on and after July 1, and a practical reciprocity treaty, applying to imports and exports through the mails in packages not weighing more than four and a half pounds.

Mr. J. S. Jeans, in his history of steel, says from first to last Mr. Bessemer's patents have brought him royalties to the value of £1,057,000, more than $5,000,000, this country paying him a large portion of it. Nor is this all. Mr. Jeans, speaking of the immense profits of the firm of which Mr. Bessemer was a member, says that on the expiration of the fourteen years' term of partnership of this firm, the works, which had been greatly increased from time to time, entirely out of the revenues, were sold by private contract for exactly twenty-four times the amount of the whole subscribed capital, notwithstanding that the firm had divided in profits during the partnership a sum equal to fifty-seven times the gross capital, so that by the mere commercial working of the process, apart from the patent, each of the five partners retired, after fourteen years, from the Sheffield works with eighty-one times the amount of his subscribed capital, or an average of nearly cent per cent for every two months—a result probably unprecedented in the annals of commerce.

It is a settled fact that a patentee is invariably entitled to "fair equivalents." The use of the words "or equivalent" in a claim does, therefore, not enlarge its scope, and its use is not allowable unless the equivalent or equivalents are specified. This was Commissioner of Patents Montgomery's decision in a case which came before him last April.

A New Unit of Time.

M. Lippmann, the well known *savant*, has recently proposed to the French Academy of Sciences the substitution of a new unit of time for the ordinary second, which he regards as an arbitrary and variable unit. The unit proposed would be an electrical resistance which can be shown to represent an interval of time—the resistance, say, of a cube of mercury. M. Lippmann gives a method of practically determining the unit by means of an artificial resistance and condenser—apparatus which he considers likely to be more constant than the standard clock.