paper after sensitizing may very easily be ascertained. It is only necessary, after sensitizing a sheet, to wash the free silver nitrate out of it with distilled water, and to estimate the quantity of it in the usual volumetric manner. From estimations made by ourselves on the lines indicated, we may say that the amount of silver nitrate remaining in the paper in excess after sensitizing is fairly represented by the actual diminution in bulk of the printing bath. We mean that, for example, if three sheets of paper take up one ounce of a sixty-grain bath, there will remain in each sheet of paper twenty grains of free silver nitrate, the further nitrate required to produce the chloride of silver and organic compound serving only to weaken the remaining solution.

Taking Hardwich once more as an authority, we find that an average quantity of bath to be used up by a quire of paper is eight ounces; that is to say, each sheet of paper removes one-third of an ounce of fluid from the bath.

Our own experience would incline us to put this figure a little higher in ordinary circumstances; the quantity absorbed varies greatly with the paper. Thick paper naturally absorbs much more of the bath than thin paper does. Making an average, we should say that a quire of paper reduces the bath by about nine or ten ounces. Taking this quantity as correct, and supposing the bath to be a sixty-grain one, we find that almost precisely the same quantity of silver nitrate is taken up merely to form a chlorine absorber as is used to form the important sensitive salt. This appears to be somewhat extravagant, and has been felt to be so for a long time. More than twenty years have elapsed since it was pointed out that the silver bath might be greatly reduced in strength if part of the silver nitrate were replaced by sodium nitrate, which would serve as well as the silver nitrate to coagulate the albumen of the film. Doubtless economy resulted; but somehow, so far as we know, the method was never very popular.

There are other methods of economizing, however, which ought to be taken notice of. It is well known to practical printers that it is a great advantage to have the albumenized paper damp before it is floated. The edges do not curl away from the bath in the aggravating manner that they do when the paper is dry, and air-bubbles are less likely to be formed. These advantages are fairly well known, but we do not think that it is known how great an absolute economy there is in using the paper as damp as is practical, this economy arising from the mere fact that much less of the nitrate of silver bath is absorbed by paper when it is damp than when it is dry. We were astonished to find how great an economy really results from the use of damp paper.

Some time ago we were working with a very highly albumenized and very thick paper, which reduced the bulk of the bath very greatly. We noticed that the amount of bath absorbed varied with the dampness of the paper, and determined to find out the extent of the variation.

We first used the paper very dry—as dry as it was practicable to handle it. We discovered that each sheet reduced the bath by more than half a fluid ounce.

We next made the paper as damp as was possible without danger of softening the albumen. We now found that each sheet absorbed barely one-third of an ounce of bath. The prints given by the paper sensitized when damp were of quite as good quality as those got on that sensitized dry. The bath which we were using was a sixty-grain one, and we found the damping of the paper to result in the saving of quite 12 grains of silver nitrate per sheet, or not far short of 380 grains per quire.

Concerning the manner of damping the paper, a few words may be said.

It is a common plan to keep albumenized paper in a damp cellar. In fact, this course is often recommended by dealers in albumenized paper. Many have not a cellar damp enough at their command. Moreover, it is objectionable to store albumenized paper in a damp place. It should merely be placed in such, if such be available, a few days before it is to be used, which often involves some trouble.

Abney recommends that the steam from a boiling kettle be allowed to play on the paper a moment or two before it is sensitized.

The following is the plan we have ourselves adopted: On the shelf of a cupboard which has but one, the albumenized paper is laid flat, the albumen sides of the sheets upward. Half an hour before commencing to sensitize, a vessel of boiling water is placed on the bottom of the cupboard. There is room for the steam to pass up between the front edge of the shelf and the door of the cupboard. The water is replenished from time to time during working. The paper is thus kept very damp, and apart from the saving in silver effected, the comfort in working is greatly increased.—*Photographic News*.

FORMULA FOR MAKING AND DEVELOPING GELATINO-CHLORIDE PLATES.

By T. BAYNTON.*

I MUST commence by stating that I am indebted to Mr. A. Cowan for the emulsion formula, and to Mr. B. J. Edwards for the developing formula, although I have made some slight alteration in them. The members will find that they can, with this kind of plate [sample transparencies from negatives taken during the summer were here passed round], make very beautiful lantern slides, and so amuse their friends and themselves at the same time on these dull winter evenings.

For the convenience of those members who wish to make their own emulsion plates, I will now give the formula. Those who do not care to be at this trouble can obtain them from me if they like.

Silver 1 ounce.
Water 10 ounces.
Gelatin (hard) 1 ounce.
Sodium chloride (pure) ½ "
Water 10 ounces.

Let the gelatin soak for a short time, and then dissolve by placing the vessel in water at about 110° F., and warm the silver to the same temperature. Now take into the dark-room, and mix by any of the well-known methods, so as to form a very fine emulsion. It may now be cooled by placing the containing vessel in

running water, and when cold, wash, remelt, filter, and coat in the usual way. Expose for five seconds (more or less, according to the density of the negative) to diffused daylight, and develop with—

No. 1.

Neutral oxalate of potash 2 ounces.
Chloride of ammonium 40 grains.
Citric acid 2 drachms.
Distilled water 20 ounces.

No. 2.

Sulphate of iron 4 drachms.
Alum 90 grains.
Distilled water 20 ounces.

Add one part of No. 2 to an equal part of No. 1, but do not reverse this by adding No. 1 to No. 2, or the result will not be so good. If the plate is properly exposed, the result will be a fine purple-black tone in the transparency. If you like a warm brown tone, expose double the time, and add an equal bulk of water to the developer. The development in this case will be much slower. Many different tones may be obtained by using the various developers given by Mr. Cowan. To fix the picture, use one part of hypo to eight parts of water. After fixing and washing, put the plates for half a minute in the following:

Alum 1 ounce.
Sulphuric acid 1 "
Water 20 ounces.

This will dissolve the opalescence caused by the oxalate. The plate must now be well washed, dried, and varnished in the usual way.

THE PHOTOGRAPHIC ICONOMETER.

The small apparatus represented herewith is of Mr. A. Rissnol's invention, and is designed to allow traveling photographers to dispense with uselessly placing their apparatus for some time before a subject which is captivating at first sight, but which is so lighted that it cannot give a satisfactory image.

The apparatus consists of a small opera-glass whose lenses are mounted at a fixed distance and have an arrangement contrary to that which is usual.

The objective, N, is plano-concave, and the convex

PHOTOGRAPHIC ICONOMETER.

ocular, O, is of blue glass. The subject (landscape or anything else) is thus seen of reduced size through the effect of the lenses, and without any other color than blue—the only one useful to know. The tube that carries the lenses slides within a second one that is provided at its front end with a rectangular aperture, D, having the proportions of the photographic negative. The object of this arrangement is to restrict the parts of the subject to the space that the objective will represent upon the ground glass of the camera. In order to regulate the instrument and put it in relation with any objective whatever, it is necessary, after placing the camera in position, to sight with the iconometer by drawing the lens tube out until the subject seen through the instrument appears limited by the same objects as upon the ground glass of the camera. A datum point then marked upon the sliding tube will permit of again finding at will the extent to which it is to be drawn out for each objective, and consequently of allowing the subject to be seen in the state that the objective employed will give it, or, conversely, of selecting the objective that is best adapted for obtaining a reproduction of an object within definite limits.—*La Nature*.

MAKING VITRIFIED PHOTOGRAPHS.

A VISIT TO AN ENGLISH ESTABLISHMENT.

SAYS the editor of the *Photographic News*: We recently visited the works of the Ceramic Stained Glass and Vitrified Stained Glass Company at Chingford, and were shown by Mr. H. N. White, the superintendent, the process of making vitrified photographs. The establishment hardly corresponds to the general notion of a "works" or factory, as the cottages are comfortably fitted up in the ordinary house fashion, and are principally occupied by young ladies who are engaged in retouching, painting diapers or borders, and coloring the ceramic pictures. At the back of the cottage is a field, of which a part is laid out as a garden, and beyond the garden beds are three studio-like buildings of wood and glass, while on one side, and as much out of the way as possible, is the stove or furnace where the firing is done.

It is the dusting-on process which Mr. White adopts, and he first took us into the studio-like building where the sensitive plates are prepared, upon which the enamel color is dusted; and it does not follow by any means that the glass or porcelain first coated with the sensitive mixture is that upon which the enamel is finally vitrified, as it is quite easy to transfer the dust

image to a new glass or tile. If, however, the image is to be transferred, the glass should be collodionized and allowed to dry before the application of the sensitive mixture. The exact composition of the sensitive preparation used by Mr. White is one of those two things which he keeps to himself, but we know that the mixture recommended for this purpose in Dr. Liesegang's "Handbook of Photographic Enameling" answers very well, so we will give it here:

Water 100 parts.
Moist sugar 10 "
Gum arabic 10 "
Bichromate of ammonium 4 "

The glass, very carefully cleaned (and collodionized if the image is to be transferred), is now placed on a leveling stand, flooded with the sensitive mixture, and after the composition has been allowed to remain on for a few seconds, the excess is drained off, the plate being now dried in an inclined position. The drying cupboard is contained in the "dark"—or rather, yellow-lighted—portion of the building; but no doors separate the dark-room from the rest, the entry of whitelight being prevented by hangings of baize arranged on the baffle-plate principle, so that one can walk in or out of the yellow room without touching or disturbing the hangings. The warm cupboard stands on a tin water vessel, scarcely two inches deep, and about two feet wide by five feet long, the whole being closed, excepting that a pipe is provided, by which any vapor may escape. The wooden bottom of the drying box stands directly upon the top of the hot-plate or water-bath, and the front of the box is merely closed by means of a curtain. As the plates are coated, they are reared up on edge in the cupboard, and allowed to remain until quite dry, when they are ready for exposure in the printing-frame. Mr. White tells us that much depends upon care in drying, and that many fail in the working of the dusting-on process through drying the plates at too high a temperature; indeed, he tells us that in warm weather he very often uses no artificial heat at all. "What is the temperature in the cupboard now?" we asked; but Mr. White confesses that he had no idea of the temperature in degrees. To the hand the interior of the drying box seems only a trifle warmer than the external air, and one may perhaps estimate it at about 85° Fahrenheit. The large flat water-bath or hot-plate upon which the cupboard stands is kept sufficiently warm by one paraffin heater with a four-inch wick, and turned down very low. "The special advantage of the hot-water plate is that it ensures a uniform heat all through the bath," says Mr. White; and once more he takes the opportunity of impressing upon us the fact that very little overheating is fatal, as it bakes the mixture, and renders it incapable of again absorbing moisture.

The exposure is made under a transparent positive, and the greatest care is exercised to see that printing frames and transparencies are perfectly dry; indeed, it is generally considered advisable even to slightly warm them before use. More than this, Mr. White called our attention to an apparatus somewhat resembling a gardener's forcing frame, and provided with a heating arrangement consisting of a battery of paraffin lamps. "This is where the printing frames are placed during damp weather," Mr. White said; "and without some such arrangement for keeping them perfectly dry our work would be perfectly uncertain." The exposure required is not a very prolonged one, a single minute in bright sunshine being often sufficient, while in dull daylight half an hour or more may be required. No actinometer is used, it being easy for one who is constantly at the work to judge the exposures with sufficient accuracy. The effect of exposure to light is to destroy the power of absorbing moisture which the sugar and gum ordinarily possess, consequently when the plate is withdrawn from the printing frame and exposed to damp air for a few minutes, those portions which have been protected from the action of the light will hold the vitrifiable pigment which is now dusted over the plate, while the most exposed parts refuse to take up any pigment, because they do not become adhesive by the absorption of water. For dusting with the vitrifiable pigment—which is just such a powder color as potters use in decorating their goods—the plate is laid in a tin dish, and the powder is dusted over with a broad camel's hair brush. If the image is very slow to appear, one may venture to breathe very cautiously on the plate, after which the enamel color is again applied. A little consideration will show that in this process over-exposure results in a hard image, while fog or general tinting is a consequence of under-exposure. When a perfect picture, having all the gradations of the original, is obtained, the excess of pigment is brushed off, and the powder color is fixed by flowing colloction over the plate. If the plate were now fired, the chromium compounds in the film would become vitrified, and would give a disagreeable green tint to the picture, so some means of insuring their removal must be adopted.

One of Mr. White's secrets is the composition of the fluid in which he soaks the plates at this stage to remove the chromium; but Dr. Liesegang recommends soaking for half an hour or so in a two per cent. solution of caustic potash. The preparation used by Mr. White for the removal of the chromium is contained in the largest collection of glass dipping baths which we ever before saw in one place; we counted eighty all placed in a compact row one behind the other, and then gave up the task, as we observed other such rows on another part of the table. The chromium having been removed, and the plate dried, all is ready for the final operation in the furnace, if the vitrification is to take place on the original support; but if the film is to be transferred, the plate must be allowed to remain in very dilute acid (say one part of nitric acid in sixty or eighty of water) until the film can be floated off, and placed in position on the glass or tile which is to be decorated.

As we leave the place where the dusting work is done, we meet an inventive friend of Mr. White, who has just come to tell him that he has discovered a new use for vitrified photographs. "See here," he says, as he fastens to the door of the room a tile bearing a group photograph; "let these portraits be those of the persons employed in the establishment; you mount this upon the door, and when any one goes out you cover him up with a kind of shield hinged on a wire, thus."

* Read before the Coventry and Midland Photographic Society.

* *Photographische Schmelzfarbenbilder*. Ed. Liesegang, Dusseldorf.