then melted in a pot. A lump of glass sufficient to make a "table" of nine pounds weight is extracted at the end of a blowing tube, and is distended into pear shape by blowing through the tube and rolling on the marver, which is a cast-iron slab on a stand. Being softened by heat at the mouth of a small blowing furnace, it is rolled on the marver and blown till it assumes a more spherical shape, but has a conical end, which is removed as the glass approximates a spherical form, being blown as it is rolled on the bullion bar. Being again heated at the blowing furnace, it becomes spherical. It is then presented at a larger furnace hole called the bottoming hole, and being rapidly rotated becomes oblate. A pontil tipped with molten glass is then applied to the center of the flat portion, and the blowing tube is detached by touching the neck of the globe with a cold, wet iron. This leaves a hole in the end from which the blowing tube was detached. Heat and rotation being still applied, first at a furnace opening of moderate size called the nose-hole, and then at a much larger one called a flashing-furnace, the hole becomes more and more enlarged as the article becomes more and more oblate. Finally it flies open with a sharp rustling noise, and appears as a flat plate, called a "table," adhering at its central thicker portion, the bull's eye, to the pontil, by which, during the latter portions of the process, it was rested on the hook in the half-wall before the furnace, which formed a partial screen for the workman.

When it has cooled sufficiently to be rigid and not liable to bend or collapse, it is placed on a fork, the pontil detached by the application of a cold iron, and the "table" placed in the annealing arch, or kiln, where it rests on its edge for perhaps twenty-four hours, gradually cooling. The annealing arch is termed a lehr, and this is often made continuous; the trays holding the ware traveling from the hot to the cool end, being carried along as the trays of recently made glass are received at one end, while the contents of the trays at the discharge end, having cooled sufficiently to bear handling, are removed.

The size of a "table" or disk of crown glass is about fifty-two inches, and a pot holding one-half ton will make about 100 "tables."—*Glassware Reporter*.

SUBSTITUTES FOR GROUND GLASS.

MANY occasions for the use of obscured glass might arise when the expense of a special piece would not be justified; for example, if it were only required for a temporary purpose, or on a large scale, when fineness of surface was not essential. In such cases the knowledge of a means of quickly rendering an ordinary sheet of glass suitable for the purpose will be very useful.

The simplest and most efficient plan is to varnish it with a special varnish which will dry with a matte surface. There are several such to be found in commerce; but, as they are not very difficult to make, we give two formulae, both of which are recommended as giving a solution that will dry quite matte without the application of heat.

No. 1 is made by preparing the two following solutions separately and then mixing them together, the mixture being ready for use after a day's rest:

SOLUTION A.	
Absolute alcohol.....	2½ ounces.
Gum sandarac.....	½ ounce.
Turpentine.....	1½ drachms.
Oil of lavender.....	1 "

SOLUTION B.	
Alcohol.....	5½ drachms.
Ether.....	¾ drachm.
Camphor.....	1½ "
Distilled water.....	2½ drachms.

No. 2 is a simpler form, and we believe answers as well as, if not better than, the more complex one just given:

Mastic.....	50 grains.
Gum sandarac.....	½ ounce.
Ether.....	5½ ounces.

Powder the gums and add to the ether, and shake till dissolved; then filter or pour off from the sediment after standing a while, and add of benzole from two to two and three-quarter ounces, beginning with the smaller quantity and testing till a surface of the right degree of fineness is produced upon evaporation. The bottle containing this solution requires to be exceedingly well corked, or the contents evaporate in unequal proportions and cause the varnish to dry with a coarse grain, the exact proportion of the solvents for dilution not being readily hit upon.

For purposes where a surface of the most extreme delicacy is required, we have it on the authority of a very eminent optician that a solution of gutta-percha in chloroform surpasses everything else. It would be rather an expensive varnish, and one to be carefully used; but if the eulogiums bestowed upon it be justified, there can be no doubt of its extreme usefulness in some cases.

Another easily applied coating is a thin starch—arrowroot, corn flour, etc.—solution, which when dry leaves a very fair kind of surface to receive the image. Some photographers employ a coating of new milk, and where none of the above-mentioned ingredients are at hand it affords a substitute by no means to be despised, as does also a coating of ordinary varnish thinned with spirit and applied cold.

Mr. W. B. Woodbury some little time ago published a simple but most effective method of producing a dead white, opal-like coating upon glass. It consisted of mixing together ordinary negative varnish and uniodized collodion, and pouring the mixture cold upon the glass. When dry, the result is a beautifully-matte white surface, very solid and opaque-looking. Upon trying it for the first time, it struck us as being the very thing for a simply made substitute for ground glass; but, to our disappointment, it did not approach the benzole and ether formula (No. 2) as above. It required a considerable amount of dilution to make it in any way transparent enough, and when so altered it was too irregular and coarse-grained to be of use for any but rough work.

Not to make our remarks extend to too great a length, we will conclude our review of methods by alluding to those extemporized plans needed to remedy some disaster or accident, as, for instance, when a foot is put through a focusing-screen; or when, at the end of a long journey and far away from all glaziers, it is found that some extra severe concussion has broken the glass to pieces. To indicate any of the virtues of one varnish over another at such times, or of the need for a specially prepared obscured glass, would only be to increase the weight of the tourist's sorrow. We imagine that in the majority of cases the supplying of a piece of glass to size would be the most serious difficulty; but, that being overcome, it is a slight matter so to prepare the glass as to make it answer all practical purposes as a stop-gap. Putty, used as a dabber over the whole surface of the

glass, is often recommended; but we rather suspect that where putty could be found there also might a glazier be discovered; but there are few places where a piece of soap could not be obtained; and a piece moistened and rubbed over the surface will often serve to focus upon. A sensitive plate, wet or dry, has been used, as our columns will testify, many a time for the purposes we are discussing; but, though better than nothing at all, it forms but a poor substitute, owing to its opacity, compared with the other methods we have detailed.

Finally, we describe one method which would be available almost everywhere, and that is a piece of white paper—tissue paper, if possible, or writing paper, if none other be available. It should be wet and placed over the inner surface of the screen frame, and, when dry, oiled or varnished to render it translucent. With some shapes of screens, where the glass is not flush with their faces, it may be requisite to make an allowance in the focusing; but there would be no difficulty in the matter. With this recommendation we close the subject, feeling assured that one or other of the methods we have described would enable the photographer to meet almost any emergency.—*Br. Journ. of Photo.*

SILVER IODIDE IN PHOTOGRAPHIC GELATINE EMULSION.

THE iodide question is by no means properly understood at the present time in all its bearings; but the recent experiments of Schumann not only serve to throw some new light on the matter, but will doubtless lead to a further and closer experimental study of the subject. Fresh exposures made on some of Herr Schumann's plates, about nine months old, proved that with bromo-iodide films the action extends notably beyond that visible in the case of bromide plates, and that this difference becomes increasingly great as the light is richer in the rays corresponding to low rates of vibration. A difference was clearly noticeable in the case of pictures taken at various hours of the day, in some of these instances the bromo-iodide and pure bromide plates being simultaneously exposed with twin lenses; a rough estimate being that the iodide plates are double as sensitive as corresponding pure bromide films. This relative sensitiveness, however, appears to be very widely departed from in the case of exposures made by petroleum light; as, when twenty to thirty minutes were required to impress a mere trace of an image on a bromide film, a similar exposure of a bromo-iodide plate gave a negative which, if not fully exposed, was at least capable of serving as a makeshift. A study of these results leads to the conclusion that when the light is especially rich in yellow and red rays, the bromo-iodide plate is not merely twice as sensitive as the bromide plate, but rather six or eight times as sensitive.

Schumann's spectrographic experiments are equally surprising; as not only did an attempt with the light reflected from a grayish evening sky serve to impress a tolerably extended spectrum on a bromo-iodide plate, while a similar exposure would scarcely affect the bromide film, but with the highly actinic light of burning magnesium a striking difference was noticeable. About two grains and a half of magnesium wire, burned an inch from the slit of the spectro-scope, served to impress a vigorous spectrum on the iodide plate, the characteristic band in the green being notably well defined; while a similar experiment made with a bromide plate resulted in the production of a weak image in which above mentioned band was altogether absent.

It is curious to note that the remarkable difference between bromo-iodide emulsion and pure bromide emulsion appears to be greater in proportion to the extent to which the former has been treated with ammonia; at least, one would gather from Herr Schumann's experiments that this holds good up to a certain point, and the circumstance is of special interest when it is remembered that silver iodide is practically insoluble in ammonia.

Unless there is some notable and unobserved source of error in connection with Schumann's experiments, we may expect them to lead to an important advance in the struggle for extreme sensitiveness, a quality of special importance when feebly actinic light is alone available.—*Photo. News*.

IMPROVED METHOD OF PHOTO ENGRAVING.

In a recent lecture by J. Comyns Carr, the following process invented by Henry Dawson is described:

"Mr. Dawson makes no great secret of the principle on which his process is founded, and I may therefore briefly explain to you the ingenious mode in which admirable results are obtained. You will observe, in the first place, that these are impressions from metal plates, printed in the same manner, and by the same press, as a copper or steel engraving; but instead of the picture being engraved upon the plate, as one might expect, the plates are themselves, so to speak, produced upon the picture. It is the picture in Mr. Dawson's process which really creates the plate; and the way in which this is accomplished is so remarkable that perhaps you will allow me to give a few words of explanation. The first thing that Mr. Dawson does, after having photographed his subject, is to take from his negative a carbon print; this print is taken, not on paper, but on glass; and as the principle of a carbon print consists in the deposit of solid pigment, the picture so taken upon the glass represents a very delicate work in relief; that is to say, the surface of the picture is very slightly raised upon the smooth surface of the glass. This impression is then covered with a thin coating of gold, which acts as a powerful conductor of copper, and the glass is now placed in a galvanic bath, where the copper is gradually deposited over the whole of the plate. When the deposited copper has attained a sufficient thickness, it is taken from the bath, and the glass is removed. We then have a copper plate with the picture cut upon its surface, exactly corresponding to the carbon print; that is to say, those portions which in the print were in relief are now in intaglio, and every delicate gradation is exactly reproduced as in the original negative. The copper plate now resembles, in every respect, the work produced by the engraver. According to the character of the original, it partakes of the nature either of an engraving in line, or of a mezzotint engraving, and it is this quality of mezzotint surface which Mr. Dawson rightly regards as constituting the special claim of his invention. The difficulty here with which he had to contend was to give such a surface as would hold the ink, and this he has now accomplished in a very remarkable degree. A certain amount of hand work must occasionally be added, in order to correct the defects of the photograph, which sometimes gives undue force to the delicate portions of the original drawing; but, broadly speaking, the process is purely and wholly mechanical, and the copper-plate, as we have seen, is absolutely grown upon the raised print.

"There is scarcely any kind of original work to which this process may not be applied with success. In the reproduction of a drawing in pen and ink, the result resembles a strongly bitten etching. It is equally successful in imitating the effect of a drawing washed with a brush, or of a drawing in chalk; but as deposited copper is always more or less soft in substance, the plate, before it is used by the printer, is covered with a thin film of steel, and we have then a surface which is practically indestructible, and from which any number of impressions can be taken; for so soon as this thin film of steel shows signs of wear, the printer stops his labor, and the steeling is renewed. This process of steeling a plate is now very generally applied to engraved work on copper, and its effect is practically to abolish the distinction which once existed between proofs and prints. The value of a proof in former times consisted in the fact that it gave an impression of the plate in its full strength, before it had become worn by successive printings; but now there is in reality no limit to the number of impressions which can be taken from the steel plate, nor is there, as is sometimes supposed, any loss of the most delicate workmanship by the process of steeling."—*Photo. News*.

SIMPLE METHOD OF MIXING SOLUTIONS FOR ALKALINE PYROGALLIC DEVELOPMENT OF GELATINE PLATES.

By J. KAY.

I TAKE a bottle of pyrogallol containing one ounce of the acid, and add 14 drams of methylated spirit, which gives a concentrated solution, and may be labeled "Stock Solution," and one, I find, that keeps much better than a solution I used for many months, which was made the proper strength in the first instance. For ordinary use I take 2 drams of stock solution and dilute with 6 drams of methylated spirit, and keep in a wide mouth 3-ounce stoppered bottle. I find 1 ounce of this quite sufficient to have mixed at a time. I now have a solution which contains:

Pyrogallol acid.....	1 ounce.
Methylated spirit.....	7 ounces.

or rather, it would read thus if the whole bulk were so mixed.

If about to develop a half plate, I take ¼ dram of this dilute solution and put into an ounce measure; or, rather, I have a ¼ dram marked on my ounce measure, and pour the pyrogallol direct in, as pouring a ¼ dram from one measure to another would not be a very profitable proceeding; I then add common water to make up 6 drams. The reason I use so small a quantity as ¼ dram of pyrogallol solution is, that it is advisable, in saving time and water, to employ as small a quantity of spirit as possible. The strength of this pyrogallol solution when diluted with water as above mentioned is 2½ grammes to the ounce, which I find to be very suitable for studio work. For the ammonia solution I take:

Common water.....	80 ounces.
Liquid ammonia, 0.880 s. g.....	1 ounce.
Bromide ammonium.....	6 drams.

6 drams of this solution added to 6 drams of the pyrogallol solution is ample for developing a half plate. I would strongly insist upon using a good proportion of bromide in the developer. It is a good preventive of green fog, besides giving clearness to the shadows of the picture and brilliancy to the negative. In cases where plates have a decided tendency to fog, I use double the amount already stated. I am aware that rapidity is to some extent sacrificed by a free use of bromide, but with me rapidity is only a means to an end. The great end in view is a good negative; everything else must be subordinate to that.—*Photo. News*.

PHOTOGRAPHIC PAINT FOR MACHINERY.

It is a difficult matter to photograph a machine smoothly and effectively, and little success is likely to ensue unless the whole is first covered with a gray paint or wash. The *Photo. News* says that one of the best in use by photographers is the following:

Dry white lead.....	5 pounds.
Lamp black.....	2 to 5 ounces.
Gold size.....	1 pint.
Turpentine.....	1½ "

The amount of lamp black is varied according as a light gray or dark gray is best suited to the machine or the lighting. The paint is quite harmless, and is easily removed with turpentine rubbed on with a handful of cotton waste.

THE APPLICATION OF ELECTRICITY TO SHIPS' LOGS.

THESE are days of rapid scientific progress, and the great interest so recently excited by the application of electricity, in a new and startling way, to transmit information, has been almost eclipsed by the attention which its use for lighting and the transmission of power has attracted. Though no longer confined to signaling, yet this is still its most important use, and one for which its employment is being extended in many directions, always with the most satisfactory results. It is with the application of electricity, this fleet messenger, for giving a constant record of the rate of a ship that this article is concerned. Before, however, dealing with this matter, it will be well to say a few words about logs generally.

Ordinary ships' logs are of two kinds, called respectively harpoon and taffrail logs. Harpoon logs, which are the most extensively used, consist of a cylinder, on one end of which works a fan or screw, registering the number of revolutions by means of clockwork within the cylinder, the dial being visible through a glass face. To the other end, which is conical, a rope is fastened, so as to enable the log to be towed by the ship. A modification of this is called the "detached" log, the revolving fan and case for the clockwork being two separate pieces. To both these logs there are several objections, such as the almost unavoidable entrance of salt water to the wheelwork, the drag on the ship, which is often as much as 40 lb. or more, the inconvenience of hauling in the log each time it has to be read, and lastly, the loss of the whole instrument, should the towing line break.

To obviate these objections, the taffrail log was invented, and which goes a step further than the detached log, by taking away the recording portion to the taffrail of the ship, and causing the towing rope to transmit the revolutions of the fan to it. These logs are, in many respects, a great improvement on the first; the registering dial is less liable to damage, and is always visible; the tension of the towing