cement, made of dolomite that has been calcined in such manner as to leave the carbonate of lime unchanged, owes its setting properties to this very crystallization, inasmuch as its mass would not become compact without it. It is therefore not likely that magnesia is an obnoxious constituent as far as the behavior of the applied cement is concerned, though there may be reasons from a manufacturer's point of view to avoid a too large percentage of it. Possibly magnesium carbonate and gypsum may, under certain conditions, have a bad effect on each other, inasmuch as it is known that finely pulverized dolomite, stirred or shaken in hot water that is saturated with calcium sulphate, yields magnesium sulphate, which is a very soluble salt. But whether a similar reaction can take place in cement, is a matter for analytical chemists to determine. As to the boiling test of cement that has just set, it seems plain that even the best is apt to break up on account of the accelerated dissolution of silicates of the alkalies.

It has been claimed by some prominent investigators that ferric oxide combines with silica during the burning by parting with one molecule of its oxygen. This may be so or not. But what we know for certain is, that the magnetic oxide, which is derived from the ferrous carbonate of the raw materials, does change more readily to ferrous oxide in combining with silica, and that ferrous silicates become decomposed—or superficially corroded—by the alternate action of the atmosphere, and of hard water. It seems, therefore, likely that the bond between the original silicates and the subsequently formed hydrosilicates of the set cement may gradually become loosened in the measure in which ferrous silicate is contained in either mass. In judging of the quality of a cement from its analysis it might, therefore, be of advantage to have an exact determination of the contents of ferrous oxide. As to ferric-oxide, that is regarded by many authorities not only as an unavoidable but also as an essential constituent, inasmuch as it is well known that a mixture of ferric oxide, alumina and alkalies frits at a lower temperature with silica than alumina and alkalies in corresponding molecular properties without the ferric oxide, but as the latter becomes in the end nothing better than ballast if not doing mischief by changing to ferrous oxide during the burning—the smaller its relative proportion as compared with that of alumina the safer it may be.

The writer does not claim that these statements give the complete solution of the question of the ulterior deterioration of Portland cement work, but only hopes that his suggestions in regard thereto may help to bring that about.

TEXAS OIL FOR LOCOMOTIVE FUEL.

AN Austin dispatch to the St. Louis Globe-Democrat gives the following interesting figures concerning the use of Texas oil for locomotive fuel:

The fact that the tests of the Beaumont oil as fuel for locomotives proved highly successful is of the greatest importance to several companies operating extensive railway systems in Texas. This is particularly true as applying to the Southern Pacific, the Atchison, Topeka & Santa Fé and the Gould lines. It is to be expected that the railroads, by buying in large quantities, as they now do coal, will be able to get fuel oil in the Beaumont field at a very low price, probably not exceeding 20 cents per barrel at Beaumont. The numerous tests which have been made show that this oil is a better steam producer for locomotives than much of the coal that is now being used. These tests have demonstrated that about 3½ barrels of oil are equal to one ton of coal for steam-producing purposes. It is asserted by some that 2½ barrels of the oil is equal to one ton of Indian Territory coal, which is used on most of the Texas roads. The reports made by the several railroads of Texas to the State Railroad Commission show that the total amount of coal used for locomotives on the Texas lines for the twelve months ending on June 30, 1900, was 1,716,471 tons. The price paid per ton for the coal ranged from \$1.35, for which the Paris & Great Northern obtained it, to \$5, which was the price paid by the Velasco terminal. The former road used 5,919 tons of coal during the year, and the latter road only 525 tons.

The total number of tons of coal used for locomotives by all the roads belonging to the Southern Pacific system in Texas during last year was 539,808, and the aggregate sum paid for this fuel was \$1,764,970.04. Taking the liberal estimate that it requires 3½ barrels of the Beaumont fuel oil to equal one ton of coal, it is shown that the 539,808 tons of coal are equivalent to 1,889,328 barrels of fuel oil. Inasmuch as this oil is now being sold in large lots at 20 cents per barrel, it is reasonable to suppose that the Southern Pacific will be able to contract for it at that rate or even lower. At 20 cents per barrel, the 1,889,328 barrels would cost \$377,865.60, as against \$1,764,970.04, which was the sum paid for fuel for locomotives of the Texas lines belonging to the Southern Pacific system during the twelve months ending on June 30, 1900. This would mean a saving of \$1,384,304.44 per annum in the company's fuel bill for its Texas lines alone. The cost of installing oil burners on locomotives is said to be about \$200 for each locomotive.

The railway group in Texas next in importance to the Southern Pacific is made up of the Gould lines, as follows: The Texas & Pacific, which used 260,268 tons of coal, at an average cost of \$2.15 per ton, for the twelve months ending on June 30, 1900; the International & Great Northern, which used 136,344 tons, at an average cost of \$2.44 per ton; the St. Louis Southwestern of Texas, which used 86,781 tons, at an average cost of \$2.45 per ton. The total number of tons of coal used by the lines belonging to this system in Texas for the year named was 483,393, and its cost was \$1,104,869. Figured on the basis of 3½ barrels of oil for one ton of coal, the Gould Texas lines would use annually approximately 1,691,875 barrels of oil for locomotives, at a cost of \$338,375. This would mean a saving of \$766,494 per annum in this item of expense. The St. Louis Southwestern has announced its intention of building an extension of its line south from Lufkin, Texas, to the Beaumont oil field, and when this is done it will be on the same

footing as the Southern Pacific so far as saving freight on the oil for use on its own lines is concerned.

LUMIERE PROCESS OF COLOR PHOTOGRAPHY.

For the light filters optically worked glass is evenly coated with a 10 per cent solution of gelatin, 5 c.c. to each 10 cm. of glass surface, and thoroughly dried; the plates obtained are immersed for five minutes in the following solutions at 70 deg. F.: For the green screen, ½ per cent solution of methylene blue N, 5 c.c.; ½ per cent solution of auramine G, 30 c.c. For the blue-violet screen, ½ per cent solution of methylene blue N, 20 c.c.; water, 20 c.c. For the red screen, ½ per cent solution of erythrosin, 18 c.c.; saturated solution at 60 deg. F. of metanil yellow, 20 c.c. Two plates of each are cemented together, film to film, with Canada balsam to form the screens. The plates to be used with the screens are: With green, Lumière orthochromatic, series A; with the blue, Lumière extra rapid, blue label; with the red, Lumière orthochromatic, series B. The printing of the color records from the negatives obtained is carried out as follows: A sheet of non-stretching baryta paper is mounted on a glass plate, which has been previously edged with a band of benzol, 1,000 parts; masticated rubber, 15 parts; and when dry coated with a collodion, prepared as follows: Alcohol, 500 parts; ether, 625 parts; pyroxylin, 12.5 parts; castor oil, 3 parts. The prepared support is sensitized with the following solution (5 c.c. to 13 by 18 cm. plate): Water, 1,000 parts; gelatin emulsion, 120 parts; Coignet's hard glue, 120 parts; ammonium bichromate, 60 parts; 25 per cent solution of potassium citrate, 40 parts; cochineal red, 1 part; alcohol, 200 parts. After drying, the sensitive papers are stripped from their supports, printed again, mounted on glass, and soaked first in cold water for two hours, and finally in water at 100 deg. F. for half an hour, when the paper support will leave the print, the development being continued until all the soluble gelatin is dissolved; the plate is then washed, placed for five minutes in alcohol, and allowed to dry. The colorless positives obtained are dyed in the following baths: For the green record positive, water, 1,000 parts; 3 per cent solution of erythrosin J, 25 parts. For the red record positive, water, 1,000 parts; 3 per cent solution of diamine F, 50 parts; 15 per cent solution of hard glue, 70 parts. For the violet record positive, water, 1,000 parts; chrysophene G, 4 parts; dissolve at 160 deg. F. and add alcohol, 50 parts; immersion for 12 hours is sufficient at ordinary temperatures. The positives are placed together and viewed to determine where correction is necessary; a further immersion in the dry-baths being adopted for intensification, and in water for reduction, with the exception of the blue positive, which may be reduced by a 20 per cent solution of glue. To finally place the films in superposition, a temporary support coated with hard glue, 50 parts; water, 1,000 parts, is applied to the yellow positive; when dry, the paper is stripped and the yellow film applied to the blue positive by using the following mountant: Water, 1,000 parts; hard gelatin, 120 parts; glycerin, 50 parts. When quite dry, the paper is stripped from the glass, bringing off both the blue and yellow films; the operation is repeated for the red film, and the picture finally transferred to glass in a similar manner.

MORE LIGHT IN THE DARK ROOM.*

By B. H. WORDSLAY.

UNTIL recently I have found the one drawback to proper development in the insufficient light given out from even the best of ruby lanterns and ruby windows. Ruby, that is, deep ruby, is about the worst light one could have when one wishes to really develop to that exact point where the best printing results are to be had, and what we seem to have as we examine the plate by it only too often shows that had we only a better light it would have been what we expected. Carrying development to just the proper turn seems to me to be more guess work than a science. Moreover, the light undoubtedly harms the eyes, and in time affects one's vision. When we take a negative from the dark room out into the light, our first real chance to examine its density, the various renderings of light and shadow and their proper or improper relations one to another, is afforded. Then we see perhaps what we could have easily improved if only the light in the dark room was better. It does not seem to make any difference in my practice how abundant the ruby light is, I cannot get delicacy by ruby light at all unless it is by accident. I have used enough ruby light in my dark room to read the print of newspapers by, but to no purpose. The finer, more delicate points cannot be well enough examined to permit of the best work. If I notice, in a landscape, that the foreground values do not compare favorably with those of the mid distance, I can apply the proper treatment if it is apparent, and similarly if the mid distance is not in harmony with the foreground and distance, that matter is readily changed during development if one can only see well what is going on. I do not like to be compelled to reduce here and there or intensify or doctor the negative with tissue on account of poor perspective, when, if the dark room light were adequate, I could have taken a perfect negative out of the hypo and later printed it without resorting to intensification or reduction. Such a negative is worth having, one that, bar a few touches of spotting here and there, affords a faultless print.

Well, to the point. I read in this journal that certain dyes, light in color, were, nevertheless, perfectly non-actinic, and that a solution of them used in a tank before the light would afford no end of light, and that of no such deep red as the ordinary ruby glass. All the aid I could find upon the subject was a short report in one of the English periodicals, by Dr. Cooper, and following his advice I secured some eosine and metanil yellow. Eosine is far the best red, as it is paler than aurine or erythrosin, yet is safer than either of the other darker reds, and a quite light (weak) solution of eosine, with a fair amount of metanil yellow,

will make a light filter that fully answers the most exacting dark room requirements, save when color-sensitive plates are used.

First, a tank for the front of the lamp must be had. I made one readily by separating two glasses with half-inch strips and making tight with a glue called seccotine, which any druggist will be able to supply. To make sure of my work, I heated the edges of the tank and melted yellow beeswax into the joints. The tank has never leaked, and being filled with solution and a little melted paraffin poured on top, it does not evaporate much or fade appreciably. The solution may be renewed about six times a year for safety, and the tank should always remain in the dark room, as otherwise the color will fade. The tank fits close to the front of the darkroom lamp, or on the front of a light-tight box having a good lamp within and proper ventilation. No ruby glass is used, of course; the tank, or filter, takes its place. The solutions used are as follows:

For very brilliant light, safe ordinarily at two feet from the tray.

Eosine	¼ grain.
Metanil yellow	6 grains.
Water	40 ounces.

A less brilliant one:

Eosine	¼ grain.
Metanil yellow	3 grains.
Water	24 ounces.

If one feels the need of something not so pale though a trial will prove that the above are safe as much as ½ grain of eosine, 6 grains of metanil and 24 ounces of water may be used, but the pleasure of working in a light where one can readily see what the true strength of the various parts of the negative is, is too great to spoil by returning to the deep reds, and those who will lay aside all misgivings and distrust of the light solution will find comfort and great improvement in their work by taking it on trial.

Paper stained with the same solutions would appear to work quite as well, but a friend who preferred to try it that way soon adopted the glass filter as far the best.

Have the body of the solution a half-inch thick, and it will be about right and wholly safe. I hardly need add that the thicker the filter, the farther apart the glasses holding the solution, the less will be the resulting light.

MOUNTING PHOTOGRAPHS ON GLASS.*

EVER since the glass-mounted photographs threatened to become a boom, and then suddenly collapsed, there has been a steady general demand for this class of mounting. It should certainly be one of the lines of a versatile photographer who is given to varieties and to novelties.

A curious fact about mounting photographs in optical contact with glass is that there seems to be quite a little knack attached to it. Some photographers try and fail, and give up in disgust. Others have success from the very commencement, and so cannot understand where any difficulty comes in. In Europe, where some of the smaller photographers make a regular line of "opalines," they seem to be more popular than in this country. They are almost entirely confined to a medium or fairly cheap trade, being, of course, eminently suited to sharply focused considerably retouched portraiture.

For the guidance of those who would like to add the opaline to their styles, we give first the commonly commended "approved" method of mounting, and afterward our own method. Either one, given the knack, is very easy, if reasonable care be used.

The glass should be as flawless and colorless as can be obtained. Special glass, with the edges beveled and polished, can be obtained, though for a cheap trade spoilt negative glasses may be used, as described later. Clean as many glasses as there are prints to mount, carefully on both sides, and pile them safely out of the reach of dust. The prints are attached to the glass with a thin solution of gelatin. For this solution soak two ounces of a good, soft gelatin in a pint of water; let it well soften, and then apply heat by placing the jar in a pan of water over a gas or oil stove. Thin the solution down, just before using, until it is scarcely thicker than water, and keep it fairly warm. The prints should be trimmed to the size of the glasses—or a trifle smaller, as they will stretch in mounting—and everything, including the room, should be warm. Take two porcelain dishes, filled with warm water. In one of these dishes lay a glass until warmed through; in the other soak a print until it lies limp and flat. Remove the plate from the water, let it drain a few moments, and then while still wet coat it with the gelatin solution, exactly as though varnishing a negative, using not more than just enough to coat it. Lift the paper from its bath, let it drain a few moments, lay the glass plate level on a piece of oilcloth, and carefully lay down the print on it. It is here that much of the knack comes in in the getting a good contact and the avoidance of air bubbles. Lay a piece of thin rubber or oilcloth over the back of the print, and then with a good, hard squeegee—not a roller one—press it firmly down. Commence with the squeegee about the center and stroke firmly toward one edge. Then slightly overlap the center and make the second stroke toward the other edge, then two more strokes crosswise. If the squeegee is firmly used a very heavy pressure may be put on without tearing or hurting the print. The heavier the pressure the better, for the print must be in perfect optical contact, and all air bubbles must be squeezed out. The glass should then be sponged around its edge and on its face with a warm, damp sponge or cloth, to remove any gelatin which may have overflowed. Lay the glass in a warm, dry place, print uppermost, until it is quite dry; trim away any edge of the print that may project, and the opaline is ready for further mounting.

Instead of soaking the print in water it may be laid face downward in a dish containing the gelatin solution. When it is limp slide the glass under it, and gripping the corners in register raise glass and pho-

* From the Photo-American.

* From Wilson's Photographic Magazine.